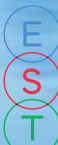


# EMERGING STRONGER TASKFORCE REPORT

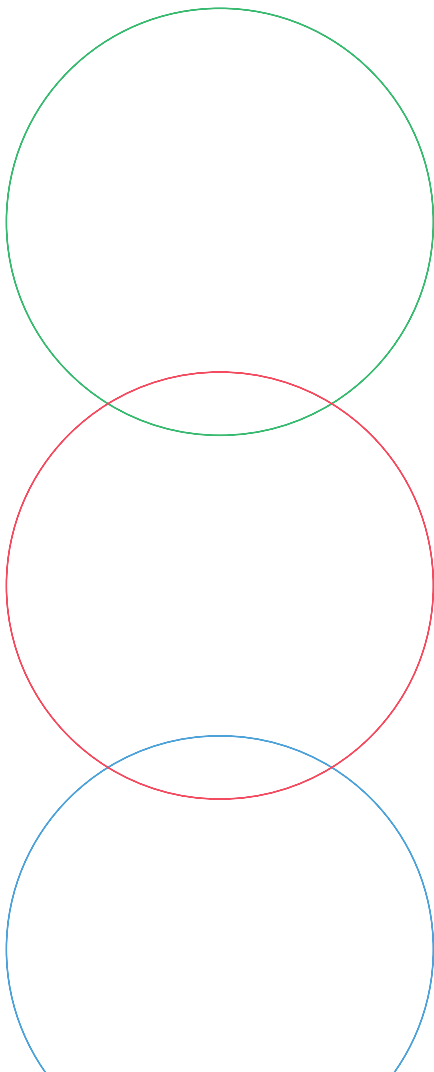


 Emerging  
Stronger  
Together

# Letter from the EST

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1. The global economy is undergoing a profound transition, as a result of the COVID-19 pandemic. Mass adoption of digital technologies has occurred on a scale and at a speed that we could not have imagined before. The geopolitical environment, which has allowed Singapore to thrive over the past 50 years, has changed, leaving us to confront the prospect of a much more fragmented world. These forces have also accelerated pre-COVID-19 trends to which we must now respond decisively. **What must we do to ensure that Singapore emerges from this crisis stronger?**
2. The Emerging Stronger Taskforce (EST) has been confronting this question since it was set up in May 2020, under the Future Economy Council (FEC). Bringing together the private and public sectors, with knowledge and skills from varied disciplines and broad perspectives on the global economy, the EST was tasked to:
  - a. Identify systemic shifts arising from COVID-19;
  - b. Assess the impact of these shifts on the Singapore economy, and how these translate into challenges and opportunities; and
  - c. Provide recommendations to the FEC on how Singapore should refresh, reimagine, or reset its economic strategies, to stay economically resilient and build new sources of dynamism in the post-COVID-19 world.
3. The EST worked closely with the FEC and its industry clusters, and consulted widely with businesses, unions, and Singaporeans, to bring together collective experience, insights, and aspirations to confront this crisis and jointly develop ideas and solutions so that Singapore can continue to be a vibrant economy, with opportunities for all. Around 2,000 individuals from more than 900 organisations have been part of the EST journey.
4. The EST has identified **six key shifts**, brought about or accelerated by the pandemic, that Singapore needs to prepare for:
  - i. A more fragmented global order, with growing tensions among the major powers in areas such as technology, finance, and trade.
  - ii. The consolidation of industries in response to the economic and financial implications of COVID-19, creating winners and losers amongst countries, companies, and individuals.
  - iii. The reconfiguration of global supply chains and production, as countries and companies re-evaluate their resilience and diversify operations.
  - iv. The acceleration of digital transformation and innovation, with the gains likely to persist well beyond COVID-19.
  - v. Changing consumer preferences, with new demand for hygiene and health, virtual and contactless services, and alternatives to physical travel.
  - vi. An increased focus on sustainability, due to growing climate ambitions globally and the need for sustainable development.



5. Adopting a bias to action to move quickly amidst the pandemic, the EST formed **nine Alliances for Action (AfAs)**, in partnership with key stakeholders across the private and public sectors, to quickly pilot and test its initial ideas. These AfAs serve as pathfinders within different sectors:
  - i. Secure our Economic Future through **Supply Chain Digitalisation**.
  - ii. Build Singapore as a “Bright Green Spark” through **Sustainability**.
  - iii. **Digitalise Built Environment** to Build Tomorrow’s Cities.
  - iv. Bring Singapore to the World through **Smart Commerce**.
  - v. Break the Productivity Frontier through **Robotics** Solutions.
  - vi. Reconnect with the World through **Safe and Innovative Visitor Experiences**.
  - vii. Reach the World’s Learners through **EduTech**.
  - viii. Strengthen Singapore’s Position as an End-to-End Hub for **MedTech** Product Development.
  - ix. Build a World-Class **AgriTech** Ecosystem while Supporting Singapore’s Food Resilience Goals.
6. Building on but going beyond the AfAs, the EST’s vision is for a **Virtually Unlimited Singapore** – one that offers limitless possibilities and opportunities for our nation, our businesses, and our people. To achieve this vision, the EST proposes five key recommendations and next steps, for Singapore to build a **Virtually Unlimited and Sustainable Nation** that is **Stronger Together**:
  - i. *Virtually Unlimited* – Creating New Virtual Frontiers.
  - ii. *Sustainable Nation* – Seizing Growth Opportunities from Sustainability.
  - iii. *Sustainable Nation* – Enabling Global Champions and Growing an Agile and Strong Singapore Core.
  - iv. *Stronger Together* – Institutionalising the Singapore Together AfA Model, a Novel Form of Private-Public Partnership.
  - v. *Stronger Together* – Strengthening International Partnerships, especially with Southeast Asia.
7. Throughout our history, Singapore has overcome challenges, thanks to the grit, ingenuity, cohesion, and resilience of our people. The EST firmly believes that the challenges arising from COVID-19, while profound, are not insurmountable – but only if we act quickly and decisively, together. Singapore will need to address immediate challenges and dislocations arising from the structural shifts, and also nimbly re-position ourselves to seize medium to long-term economic opportunities.
8. Even as the EST concludes its work, the task of unlocking new doors of opportunity, and achieving prosperity and progress for Singapore and Singaporeans, remains an ongoing endeavour that warrants the concerted effort of all stakeholders. It is the hope and belief of the EST that all stakeholders can come together and take up the mantle to build the Singapore of tomorrow.
9. The EST submits this report which documents the journey of the EST, and sets out the EST’s vision and proposed recommendations to the FEC for its consideration. With the completion of its work, the EST wishes to thank the FEC for the privilege of serving on the taskforce.



**Desmond Lee**  
(Co-Chair)

Minister for National Development, and  
Minister-in-Charge of Social Services Integration



**Tan Chong Meng**  
(Co-Chair)

Group CEO, PSA International



**Amos Leong**  
President and CEO,  
Univac Group



**Andrew Kwan**  
Founder and Group Managing Director,  
Commonwealth Capital



**Azlinda Anwar**  
Director, Grants & IP Administration,  
and Coordinating Director,  
Temasek Life Sciences Laboratory



**Caesar Sengupta**  
General Manager and Vice President,  
Payments and Next Billion Users, Google



**Dilys Boey**  
Assistant CEO,  
Enterprise Singapore



**Edmund Koh**  
President, UBS Asia Pacific of UBS Group  
and UBS AG, and Member of the UBS Group  
Executive Board



**Fidah Alsagoff**  
Joint Head, Enterprise Development  
Group, and Head, Life Sciences,  
Temasek International



**Gan Seow Kee**  
Vice Chairman and Honorary Treasurer,  
Singapore Business Federation



**Jessie Yeo**  
Executive Secretary,  
Singapore Port Workers Union, and  
Human Resource Director, NTUC



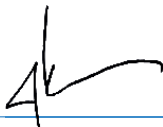
**Koh Lian Pin**  
Professor of Conservation Science,  
Technology and Policy, and Director,  
Centre for Nature-based Climate Solutions, NUS



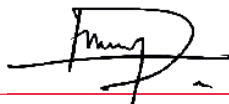
**Kwee Wei-Lin**  
President, Singapore Hotel Association,  
and Head of Hotels, Pontiac Land Group



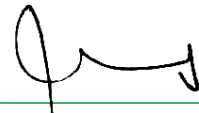
**Lee Chee Koon**  
Group CEO,  
CapitaLand Ltd



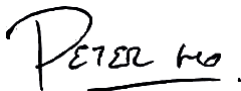
**Lee Seow Hiang**  
CEO, Changi Airport Group



**Lim Ming Yan**  
Chairman,  
Singapore Business Federation



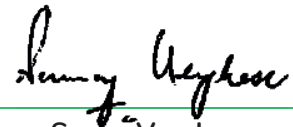
**Loo Choon Yong**  
Executive Chairman and Co-Founder,  
Raffles Medical Group



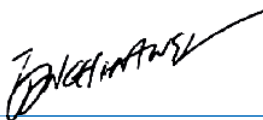
**Peter Ho**  
CEO, HOPE Technik



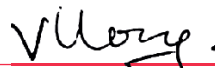
**Piyush Gupta**  
CEO, DBS Group



**Sunny Verghese**  
Co-Founder and Group CEO,  
Olam International Ltd



**Tan Chin Hwee**  
CEO-Asia Pacific, Trafigura



**Vincent Chong**  
President and CEO, ST Engineering



**Ye Gang**  
Co-Founder and Group COO, Sea Ltd

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A large circular graphic with a red border is centered on the page. Inside the circle is a photograph of a cityscape at dusk or dawn. On the left, a tall skyscraper with a bridge-like structure on top is visible. In the center, there's a large, modern building with a glass facade. On the right, a prominent, white, lotus-shaped building is illuminated. The foreground shows a body of water reflecting the city lights. The text "EXECUTIVE SUMMARY" is overlaid in the center of the circle in a white, sans-serif font. The background of the entire page is light pink, with two large, thin, curved lines (one green, one blue) arching over and under the central circle.

# EXECUTIVE SUMMARY



## Introduction

1. The scale and nature of the COVID-19 pandemic has brought about unprecedented global disruptions, and accelerated long-term structural shifts in the global economy. The Emerging Stronger Taskforce (EST) was formed in May 2020 during the Circuit Breaker, amidst great uncertainty and crisis. It was this sense of urgency, and a belief that there will be no return to the old normal, that drove the work of the EST.
2. To steer Singapore on a new path forward, **the EST identified six key shifts that Singapore will need to prepare for, and broad ideas on how to do so.**

## Discovery: Six Key Shifts and Implications for Singapore

3. **Changing global order.** At the heart of these shifts lies the uncertainties surrounding the future of globalisation, which poses a challenge for Singapore as globalisation has enabled Singapore and Singaporeans to prosper. As the tide of nationalism turns countries inwards, the world is becoming increasingly fragmented. We see signs of this in the growing geopolitical and economic tensions on multiple fronts, such as technology, finance, and trade.
4. **Accelerating industry consolidation and churn.** Businesses are likely to consolidate in response to COVID-19's economic and financial implications. COVID-19 could reinforce the market dominance of large private companies in certain sectors, especially those that have done well to capture opportunities during the pandemic, and those with available capital to acquire distressed assets. While new players could face difficulty growing in the current climate, this will test the transformative and innovative capabilities of our companies who aspire to become global champions.
5. **Rebalance between “efficiency” and “resilience” in supply chains and production.** The pre-COVID-19 focus on efficiency left many companies with little buffer to absorb disruptions, and businesses had to re-evaluate their supply chains and diversify operations, to reduce over-reliance on any single country. Overall, we will likely see simpler and shorter regional supply chains, production moving closer to end consumer markets, and more stockpiling of essential supplies.
6. **Accelerating digital transformation and innovation.** The challenges posed by COVID-19, such as the urgent need for safe distancing, have compelled businesses and consumers to adopt technology-enabled alternatives, including digital communications, remote working tools,

and contactless e-commerce and e-services. This has accelerated the trend towards a more digitally-connected global economy, creating new opportunities for businesses to access markets and talent across geographical boundaries. On the innovation front, research and development (R&D) has intensified, and product development cycles have become shorter, particularly in sectors like biomedical sciences and healthcare, where novel regulatory approaches and advanced technologies were used to rapidly develop innovative solutions in areas directly impacted by the pandemic.

7. **Changes in consumer preferences.** While some economies have reopened partially, consumer behaviours, such as brick-and-mortar shopping, have not returned to pre-pandemic norms. As more consumers stay at home, they have become accustomed to contactless alternatives to retail, as well as virtual services, entertainment, and even communities. In the near term, dampened demand for travel will spur alternatives, such as hybrid business conferencing formats (part physical, part virtual) or staycations for leisure. Consumers will demand higher standards of safety, health and hygiene. They may also be more conscious about environmentally-friendly products and business practices.
8. **Increased focus on sustainability.** Calls for a greater focus on environmental, economic, and social sustainability have been gaining greater momentum globally and locally, with greater awareness of climate change risks. There will also be new opportunities in the green economy, due to growing climate ambitions and the need for sustainable development.

## Discovery: The EST's Approach

9. Against this backdrop, **the EST recognised that there was a need to do things differently from previous review committees, with swift strategic convergence and a pivot towards action.** To do so, the EST identified areas of opportunity for Singapore to invest in, amidst the key shifts in our operating environment, and set off pathfinders to explore new, creative ideas that could pave the way for our broader ambitions. **The EST therefore adopted a bias to action that allowed the EST and its partners to quickly pilot and test-bed some of its initial ideas,** through a collaborative approach that we term “Alliances for Action (AfAs)”.





## Exploration: The EST's Journey

10. Adopting an agile “startup” approach, the AfAs promoted partnerships among private and public sector stakeholders as well as the Labour Movement, and sought to deliver minimum viable products (MVPs) within compressed timelines. To date, the EST has launched nine AfAs that have the potential to create trailblazing opportunities or address the challenges arising from the six key shifts:
  - i. Secure our Economic Future through **Supply Chain Digitalisation**.
  - ii. Build Singapore as a “Bright Green Spark” through **Sustainability**.
  - iii. **Digitalise Built Environment** to Build Tomorrow’s Cities.
  - iv. Bring Singapore to the World through **Smart Commerce**.
  - v. Break the Productivity Frontier through **Robotics** Solutions.
  - vi. Reconnect with the World through **Safe and Innovative Visitor Experiences**.
  - vii. Reach the World’s Learners through **EduTech**.
  - viii. Strengthen Singapore’s Position as an End-to-End Hub for **MedTech** Product Development.
  - ix. Build a World-Class **AgriTech** Ecosystem while Supporting Singapore’s Food Resilience Goals.
11. Through this new, dynamic form of partnership, the AfAs were able to achieve success in a short period of time, from developing prototypes that have shown promise of commercial scalability, to forging a new and innovative model of private-public collaboration. This partnership also demonstrated that we are more than the sum of our parts, and that the Government, our businesses, the Labour Movement, and our people can adapt and move together with speed to emerge stronger together.

## Aspiration: Virtually Unlimited Singapore

12. Building on the work of the AfAs, **the EST’s economic vision is for a Virtually Unlimited Singapore (VUS)**, to offer limitless possibilities and opportunities for our nation, our businesses, and our people. This vision will spur our transformation as a Global-Asia node of technology, innovation, and enterprise, even amidst the COVID-19 pandemic.





13. A **Virtually Unlimited Singapore** will only be possible if we find ways to be of value to others – in enabling virtually unlimited possibilities for enterprise, talent, and cities around the world. We cannot compete on technology alone, but by creating and providing services in areas which play to our strengths of trust, speed, consistency, and systems-level coordination. This will be a new way for Singapore to strengthen our economic linkages with the world, and serve as a vital node at the intersection of high-value global trade, finance, digital, data, technology, and talent flows. To achieve this vision, we must resist the forces of anti-globalisation and protectionism by remaining open, particularly to global talent and skills, so that businesses can access best-in-class ideas and understand consumers and businesses beyond our shores, and Singaporeans can continue to learn from the best in the world.

## Aspiration: The EST's Recommendations and Next Steps

14. To achieve this vision, the EST has put forward **five key recommendations** for Singapore to build a **Virtually Unlimited and Sustainable Nation** that is **Stronger Together**.

### RECOMMENDATION 1:

#### **VIRTUALLY UNLIMITED – CREATING NEW VIRTUAL FRONTIERS**

15. Building on the strong foundations of Singapore's digitalisation journey so far, **the EST recommends taking our Smart Nation aspirations global – to create new virtual frontiers for Singapore, and enable us to access virtually unlimited opportunities for enterprise, talent, and cities.** For enterprises, we can (i) build a vibrant **Virtual Marketplace of Goods and Services**, by supporting them to create new products and digital experiences, and participate in the trusted trade of goods and services. This will (ii) strengthen our position as a **Hub for The World's Trade**, extending to the virtual realm, by building on Singapore's trust premium and neutrality. On the talent front, we can use **Virtual Training and Workforce Solutions** to help our companies tap on global resources, including in-situ talent, to better serve global demand from Singapore. This could also open up new opportunities for Singaporeans to work beyond our shores. Finally, we can redefine our relevance as a **Safe and Smart City** for trade, business, work, and leisure, as we resume travel safely through the use of technology, and secure our place to thrive in new virtual frontiers.



## **RECOMMENDATION 2: SUSTAINABLE NATION – SEIZING GROWTH OPPORTUNITIES FROM SUSTAINABILITY**

16. In response to the growing green economy, the EST recommends **establishing Singapore as a sustainability hub** to serve global demand, while fulfilling our own carbon commitments and contributing to the global agenda to tackle climate change. To support this, the EST proposes making a concerted push to **establish Singapore as a carbon trading and services hub**. This entails developing a carbon marketplace built on quality and trust, that addresses gaps in the voluntary carbon market, establishing a one-stop solution for companies to measure, mitigate, and offset their carbon footprint, and convening partnerships to capture opportunities through research and innovation. In addition, we should **strengthen food resilience through AgriTech**, by improving the economic viability and sustainability of indoor vertical farming within Singapore, and identifying broader AgriTech opportunities that Singapore should invest in and aim to attain leadership in, in the years ahead. Finally, the EST sees value in **strengthening the traceability and accountability of industry value chains through end-to-end digitalisation**, by establishing common standards to facilitate data flow, and supporting the integration of complex work processes across the value chain, to enable partners across the ecosystem to make informed decisions to optimise asset deployment and environmental impact.

## **RECOMMENDATION 3: SUSTAINABLE NATION – ENABLING GLOBAL CHAMPIONS AND GROWING AN AGILE AND STRONG SINGAPORE CORE**

17. The EST recommends that the Government make a concerted push to support the **growth of a pool of innovative and international Large Local Enterprises (LLEs)** through innovation, internationalisation, mergers and acquisitions, and talent development. We must also enable a broad base of companies to succeed, especially our small and medium-sized enterprises (SMEs) and microenterprises. This will create good jobs for Singaporeans and fulfil our people's aspirations. But we can achieve even more with support from industry, for industry. The EST therefore recommends **(a) leveraging “queen bee” companies**, including in the area of training and upskilling, and **(b) using commercial frameworks to bring along smaller companies or suppliers in their respective ecosystems or value chains**. This should be **augmented by the Government providing digital infrastructure such as common data or digital platforms** to enable all companies to access best-in-class practices, technology, and resources.

18. The key shifts that shape our future economy, and our long-standing workforce challenges, will require us to double down on our upskilling and reskilling efforts so that businesses and workers keep pace with Singapore's economic restructuring. The EST believes that **businesses, training providers, Institutes of Higher Learning (IHLs), and unions must play a bigger and more sustained role in upskilling and creating career progression pathways for our workers.** Many businesses are already doing this, through corporate academies and provision of training opportunities for their own workers. Amidst a fast-changing environment, the EST sees value in **having businesses work with unions in adopting a preventive or predictive upskilling approach to identify job disruption and training needs early on, and develop workforce training plans,** so that businesses and workers can be more resilient and ready for the future. To further support workers in building their skills, we should **promulgate training recommender systems that can complement training programmes and enable self-directed learning.** We can do more to help our workers take ownership of their own skills journeys, to identify and bridge gaps in their current skills, in order to move into redesigned or higher value work. As we develop our local workers, we must **remain open to skills from abroad to complement our workforce,** forming one Team Singapore.

#### **RECOMMENDATION 4:**

#### **STRONGER TOGETHER – INSTITUTIONALISING THE SINGAPORE TOGETHER AfA MODEL, A NOVEL FORM OF PRIVATE-PUBLIC PARTNERSHIP**

19. Given the initial success of the EST's AfAs, the EST recommends **institutionalising the AfA approach, which taps on the complementary strengths and offerings of the private and public sector stakeholders.** Being a relatively new modus operandi spurred by the COVID-19 crisis, the AfA approach should be further nurtured for some time to ensure its adoption and effectiveness in the economic realm. **The EST recommends that future AfAs in the economic domain be primarily (though not exclusively) established under the FEC, and serve as an additional platform for private-public collaboration and a key enabler for transformative economic growth.** Early learning points from the EST's AfAs should be taken into account to strengthen the execution of future AfAs, and key criteria should be set for commissioning and closing AfAs. In the spirit of entrepreneurship, and in line with the AfAs' "startup" approach, we should be prepared that not every AfA will succeed in the traditional sense of delivering the outcomes it had set out to achieve at the start. We should therefore expect and be open to AfAs "graduating" in different ways. The FEC, as the proposed custodian of the AfAs in the economic domain, should continue to refine the AfA model, by learning the ingredients for success, and the insights from challenges and failures.



## RECOMMENDATION 5:

### **STRONGER TOGETHER – STRENGTHENING INTERNATIONAL PARTNERSHIPS, ESPECIALLY WITH SOUTHEAST ASIA (SEA)**

20. Singapore should position ourselves as a partner for recovery and growth, and foster win-win partnerships with our neighbours. As a country, we will need to think about new models of integration and modes of connectivity. To do so, the EST recommends that **Singapore partners countries in the region, including at the business-to-business (B2B) level, and deepen our engagement with and knowledge of the region.** This will be enabled by the **establishment of more platforms that bring interested companies together to engage the region at the B2B level** for continued and effective collaboration, and enable SEA to serve the world, in ways that would not have been possible individually.
21. In addition, as a digital SEA can present virtually unlimited opportunities for the region, the EST recommends **strengthening digital connectivity across SEA towards a Single Digital Area**, by riding on existing government efforts and engagements with ASEAN that set out stronger digital integration in the area of data flows, promote regional recovery through inclusive digital transformation, and enhance cybersecurity cooperation.

## CONCLUSION

22. Everyone has a stake in creating a Virtually Unlimited Singapore. The EST's contributions mark the beginning of this journey, and it is the EST's hope that more will take up this mantle to build the Singapore we envision. Our uniquely Singapore blend of scarcity and curiosity, fragility and diversity, and a "no one owes us a living" type of grit, has enabled us to overcome adversity and thrive despite the challenges. As we venture into the future, we must unlock new doors of opportunity, achieve prosperity and progress for Singapore, and emerge stronger together.





CHAPTER 1

# DISCOVERY

# Six Key Shifts and Implications for Singapore

23. While COVID-19 is first and foremost a public health crisis, the scale and nature of the pandemic has brought about unprecedented global disruptions and accelerated the pace of long-term structural shifts. As the global fight against COVID-19 continues, the impact of a “long COVID” on the global economy is expected to be greater and more enduring than the Global Financial Crisis. Given the deep and uneven nature of the pandemic shock, the recovery in global economic activity is likely to be long-drawn, highly uncertain, and uneven across sectors and geographies.
24. To steer Singapore on a new path forward, **the EST identified six key shifts that Singapore will need to prepare for, and broad ideas on how to do so.**
25. **Changing global order.** At the heart of these shifts lies the uncertainties surrounding the future of globalisation, which pose a challenge for Singapore as globalisation has enabled Singapore and Singaporeans to prosper. As the tide of nationalism turns some countries inward, the world is seeing increasing bifurcation and even fragmentation of the global order. We are seeing signs of this in the growing geopolitical and economic tensions on multiple fronts, such as technology, finance, and trade.
26. As a small and open economy, Singapore has always thrived on trade, but it also means that we are subjected to the changes in the global order. We cannot assume that we will continue to be connected to a changing world. **Singapore must act quickly to find new ways of remaining relevant in a more fragmented world order**, just as other countries and businesses are similarly finding new ways to adapt to the new uncertainties. For instance, amidst the geopolitical volatility, there will be increasing premium placed on doing business in neutral and trusted hubs with strong political, financial, and legal institutions. **Singapore must harness this premium in partnership with our neighbours in Asia and SEA** – the fastest growing production base and consumer market in the world.
27. **Accelerating industry consolidation and churn.** Industries are likely to consolidate in response to COVID-19’s economic and financial implications, creating winners and losers amongst countries, companies, and individuals. In particular, COVID-19 could reinforce the market dominance of large private companies in certain sectors, especially those that have done well to capture opportunities from the pandemic, and those with available capital to acquire distressed assets. New players could face difficulty growing in the current climate, which may limit the potential for our companies to grow into global champions. There may also be more caution in investments due to higher debts and greater uncertainty, which could in turn result in reduced economic vibrancy. Hence, **Singapore will need to double down on our industry transformation efforts** so that we can build new comparative advantages, particularly in growth areas, and offer a vibrant local ecosystem for global champions to thrive in. By working closely with companies throughout their transformation journeys, we will **enable them to become more productive, develop new capabilities, and find new ways to collaborate effectively, within and across industries, as well as within Singapore and beyond our shores.**





28. At the same time, governments too are seeing their roles being reshaped. Proactive management of the public health crisis has given credence to the important role of good governance in recovering and restarting economic activity. Likewise, government support in the form of expansionary fiscal measures and intervention in critical industries such as aviation continues to provide an important response to mitigate the impact of COVID-19 on the economy and livelihoods. These measures will, however, increase fiscal pressures on governments, and can lead to greater competition for corporate tax revenue. Even as “big government” has seen some return, there is also an increasing realisation that the **more complex challenges that countries will face, such as climate change, will require both private and public sectors to work more closely together.** Wicked problems and black swans will require the collective effort of industry and government to address, as has been done for COVID-19.

29. **Rebalance between “efficiency” and “resilience” in supply chains and production.** The pre-COVID-19 focus on efficiency has left companies with little buffer and flexibility to absorb disruptions. This has compelled businesses to re-evaluate their supply chains and diversify operations, so as to reduce over-reliance on a single country. At a more fundamental level, governments and companies have also begun re-evaluating business risks in terms of local resilience, especially in areas such as healthcare, food, and deep tech.<sup>1</sup> Overall, we will likely see simpler and shorter regional supply chains, production moving closer to end consumer markets, and more stockpiling or source diversification of essential supplies. Corporate activity is likely to consolidate into fewer “superhubs” with stronger coordination and control capabilities, for example in “smart sourcing”.<sup>2</sup> To ensure that Singapore is able to maintain our hub status and remain a critical node in global value chains, **Singapore could play a significant role in meeting the international demand for resilience and robust supply chain management.** To this end, we must maintain our connectivity with the world, enhance our industrial production capabilities, and strengthen our business ecosystem.

30. **Accelerating digital transformation and innovation.** The challenges posed by COVID-19 have driven new innovations and accelerated digital adoption. The urgent need for safe distancing has compelled businesses and consumers to adopt technology-enabled alternatives, such as digital communications, remote working tools, and contactless e-commerce and e-services. What began as an emergency response or survival tactic may become more permanent. Hence, this has accelerated the trend towards a more digitally-connected global economy, creating new opportunities for businesses to access markets and talent across geographical boundaries. As companies rethink the need for business travel and for a physical presence in overseas markets, Singapore may face stronger competition as a node for talent and enterprise. Conversely, **Singapore companies can capitalise on this trend to seize new opportunities by accelerating efforts to digitalise their business models, access new markets and customers digitally, develop and upskill the local workforce to support business transformation and growth, and rethink their talent sourcing approach,** such as tapping on global talent in-situ, which will widen the scope and diversity of global talent that companies can benefit from, to complement the Singapore core. At the same time, we must ensure that our efforts to incentivise technology adoption will support labour rather than supplant it, and empower our people to participate fully and confidently in the digital future.

<sup>1</sup> Technologies such as artificial intelligence (AI), robotics, blockchain, advanced material science, photonics and electronics, biotech, and quantum computing.

<sup>2</sup> A “smart sourcing” strategy is a move away from traditional outsourcing or single sourcing, which considers other moves such as build, buy, or partner as well as onshoring, offshoring, and outsourcing, to enable companies to shift from rigid supply chains to more integrated supply networks where there is greater visibility at every level of the value chain.



31. On the innovation front, R&D has intensified, and product development cycles have become shorter, particularly in sectors like biomedical sciences and healthcare, where novel regulatory approaches and advanced technologies were used to rapidly develop innovative solutions in areas directly impacted by the pandemic. While the adoption of Industry 4.0 tools may be initially slow and uneven, the pandemic has triggered a dramatic uptick of the use of digital technologies and innovative activities. It has demonstrated the potential of digital technologies to enable businesses to reorganise themselves for resilience in an agile manner, grow their businesses despite a challenging economic environment, and tap into the world as hinterland and markets. For Singapore to remain relevant, **we must raise the innovation capabilities across all companies**, ranging from efficiency innovations driven by digitalisation, to sustaining innovations which improve existing products and services, and market-creating innovations to keep pace with the increasingly rapid product development cycles. **Fostering a culture of pervasive innovation will enable Singapore to respond nimbly to future shifts, and participate at the technological frontier of the global stage.**
32. To stay ahead of disruption, businesses are relooking their business models and traditional ways of operating, to identify new growth opportunities and generate new revenue streams beyond their core businesses. Some are doing so by building and launching their own corporate ventures, which are new businesses that combine the agility of a startup with the backing of the large corporate. This provides the new ventures with a competitive edge that increases their chances of achieving scale and commercial success. These include customer relationships, deep domain expertise, technical capabilities, strong brand recognition, as well as experience with growing and scaling businesses. Before deciding on what new ventures to build, businesses will need to examine market opportunities and test venture concepts, to validate business potential with rigorous but agile approaches.
33. **Changes in consumer preferences.** Besides a greater willingness to adopt digital technology for both work and leisure, other consumer preferences have also been altered by COVID-19. While some economies have reopened partially, consumer behaviours, such as brick-and-mortar shopping, have not returned to pre-pandemic norms. Consumers are likely to demand higher standards of safety, health and hygiene, and be more conscious about environmentally-friendly products and business practices. Additionally, as more consumers stay at home, they have become accustomed to contactless alternatives to retail, as well as virtual services, entertainment, and even communities. In the near term, dampened demand for travel will spur alternatives like hybrid business conferencing formats (part physical, part virtual) or staycations for leisure. Moreover, if business deals can be closed over video conferencing platforms, the demand for business travel and meetings, incentives, conferences, and exhibitions (MICE) activities will shrink. These developments will require **businesses to transform their operating models to respond to the longer-run impact of the pandemic on consumer behaviour.** In order to seize recovery opportunities, businesses should adapt to changing tastes by improving customer-centricity, and keeping an ear to the ground to **anticipate new needs and sources of demand to pivot towards.**
34. **Increased focus on sustainability.** Calls for a greater focus on sustainability – in terms of the environment, economic, and social





aspects – have been gaining momentum in recent years, with greater awareness of climate change risks and social disparities. Touted as a “dry run for climate catastrophes”,<sup>3</sup> COVID-19 has accelerated recognition of sustainability as a key priority for countries and businesses to avoid or alleviate similar future disruptions. Businesses operating in the future economy will need to pay increasing attention to the environmental, social, and governance (ESG) agenda as sustainability becomes an expectation in the “new normal”, and the case for better returns and resilience to economic shocks becomes clearer. There will also be new opportunities in the green economy, due to growing climate ambitions and the need for sustainable development. Equipping businesses for the future economy will therefore entail **developing sustainability as an essential enterprise capability**, and **developing new strengths to capture opportunities from green growth**. Just as importantly, economic growth must be sustainable and inclusive, with growth that uplifts all Singaporeans.

### COVID-19: THE BURNING PLATFORM FOR CHANGE

35. The COVID-19 pandemic has thus created a burning platform for accelerated economic transformation all over the world. Countries and businesses worldwide recognise this, as these structural shifts will bring about opportunities, but also new challenges and risks. They are already responding to these shifts by re-calibrating their economic strategies, even as they prepare for economic recovery to be punctuated by further disruptions, such as new waves of infections, viral mutations, and repeated lockdowns. For example, European Union (EU) leaders established NextGenerationEU, a €750 billion temporary recovery instrument to help the EU address the immediate impact of COVID-19, while positioning Post-COVID-19 Europe to be greener, more digital, more resilient, and better fit for challenges. Closer to home, at the recent 27th ASEAN Economic Ministers’ Retreat,<sup>4</sup> the need for greater regional cooperation and collective action to begin the process of economic recovery in ASEAN was highlighted. Discussions included strengthening the resilience of regional value chains and supply chain linkages; harnessing technology to facilitate essential business travels and regional tourism in a safe manner; and committing to unimpeded flow of essential goods across the region.
36. Singapore will similarly need to act fast if we do not want to be left behind in this reshuffling of the global economy. This will require us to shift our mental models, and search for new and creative ways to overcome our constraints and break old deadlocks. How can we overcome the challenge of a shrinking local workforce amidst a COVID-19 pandemic that is driving more businesses to digitalise, automate or tilt towards global remote work, and still ensure productivity and wage growth for Singaporeans? As a small city-state without a natural hinterland, how will we defy the odds of history to avoid being disintermediated from supply chains or as a business hub? The convergence of these challenges means that we will need to double down on restructuring our manpower- and carbon-intensive industries, developing our Singapore workforce to their full potential, while welcoming complementary talent from all over the world as our partners and co-workers to bring in fresh ideas and sharpen our creative edge. We will need to build on the efforts of the FEC and the Industry Transformation Maps (ITMs) – a journey that was started more than five years ago. Even as we deal with the immediate impact of COVID-19, our eye must be on the horizon to start setting these plans in motion, because the faster we adapt, the faster we recover, and the better we can respond to new challenges that will most certainly arise in an increasingly volatile and competitive world.

<sup>3</sup> Bailey, R. (2020, March 30). *Planning for the Unexpected: COVID-19 Is a Dry Run for Climate Catastrophes*. Brink News.

<sup>4</sup> The 27th ASEAN Economic Ministers’ Retreat took place on 2-3 March 2021 via video-conference.



# The EST's Approach: Fast Strategic Convergence and a Pivot Towards Action

37. This is why the EST decided that it was necessary to converge fast on strategy and pivot towards action. For Singapore to stay relevant and resilient in the changing global economy, **the EST identified two overarching themes that must underpin Singapore's future economy:**
- i. **A Singapore that is Connected.** Singapore is a small economy and our success has been premised on our strong connection to the rest of the world. In a world that will be characterised by distributed networks of trade, capital, and ideas, we must aspire to be a Smart Nation that is connected to the world, **both physically and digitally** – creating and accessing new markets, to create more opportunities for Singaporeans and our businesses.
  - ii. **A Singapore that is Sustainable.** Our growth must be achieved in a manner that is sustainable for the environment, the economy, and our people. We must be inclusive, by empowering and enriching all stakeholders in Singapore, from small businesses to employees at risk of unemployment, to civil society. We must continue to develop local talent and capabilities, while remaining open to global talent and partners who can add value to Singapore.
38. To make this a reality, **the EST recognised that there was a need to do things differently from previous review committees**, given the radically different operating contexts. There was an urgency to act fast, to shape and harness the disruptions, rather than to be disrupted by them. To do so, we could identify areas of opportunity that Singapore can invest in amidst the key shifts in our operating environment, by setting off bold pathfinders to explore new, creative ideas and pave the way for our broader ambitions. **The EST therefore adopted a bias to action that allowed the EST and its partners to quickly pilot and test-bed some of its initial ideas**, with the goal of enabling Singapore, our businesses and people, to move quickly to seize opportunities and come out of this COVID-19 crisis stronger.

An aerial photograph of a lush garden, likely the Singapore Botanic Gardens. The central feature is a large, sculptural tree with a circular canopy. A roller coaster track is visible on the right side of the image. The garden is filled with various trees and plants, and a winding path is visible on the left. The image is framed by a large red circle, with green and blue curved lines extending from the top and bottom edges of the page.

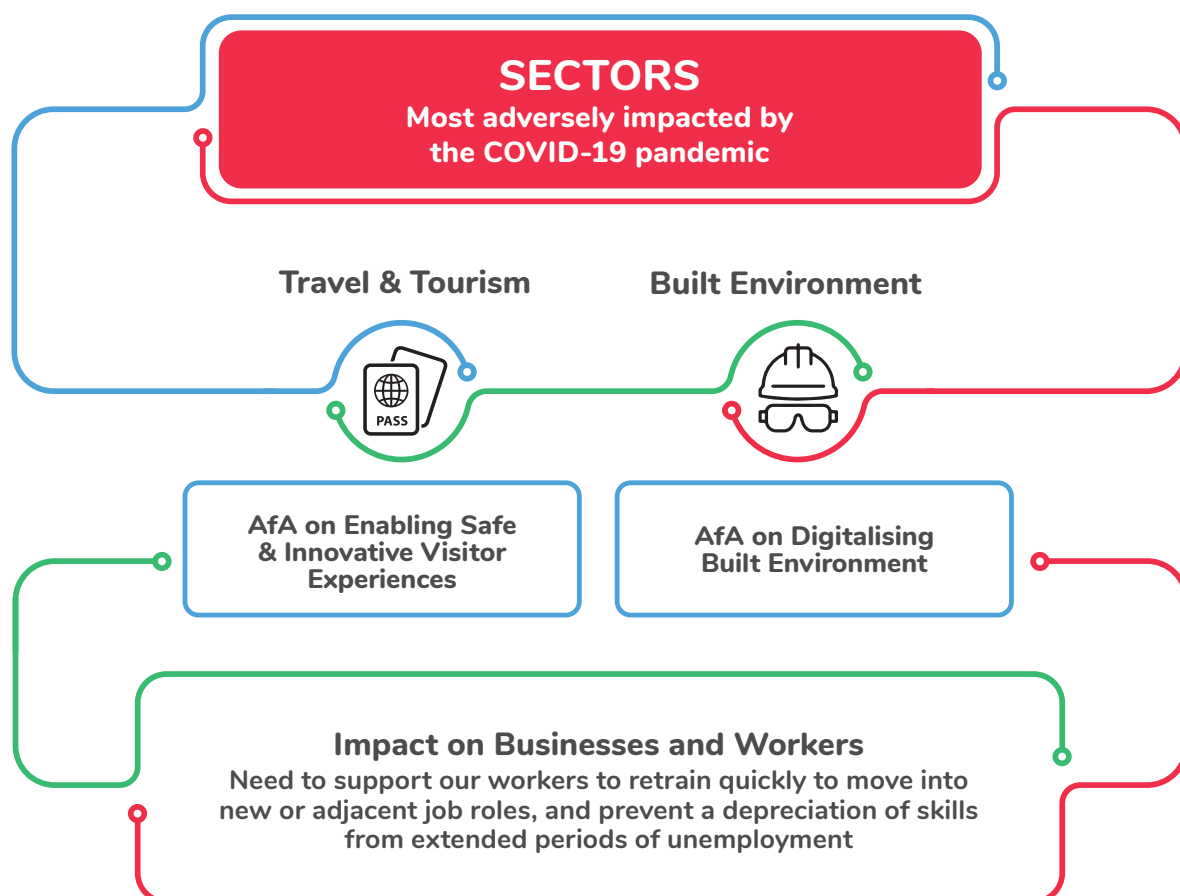
CHAPTER 2

# EXPLORATION

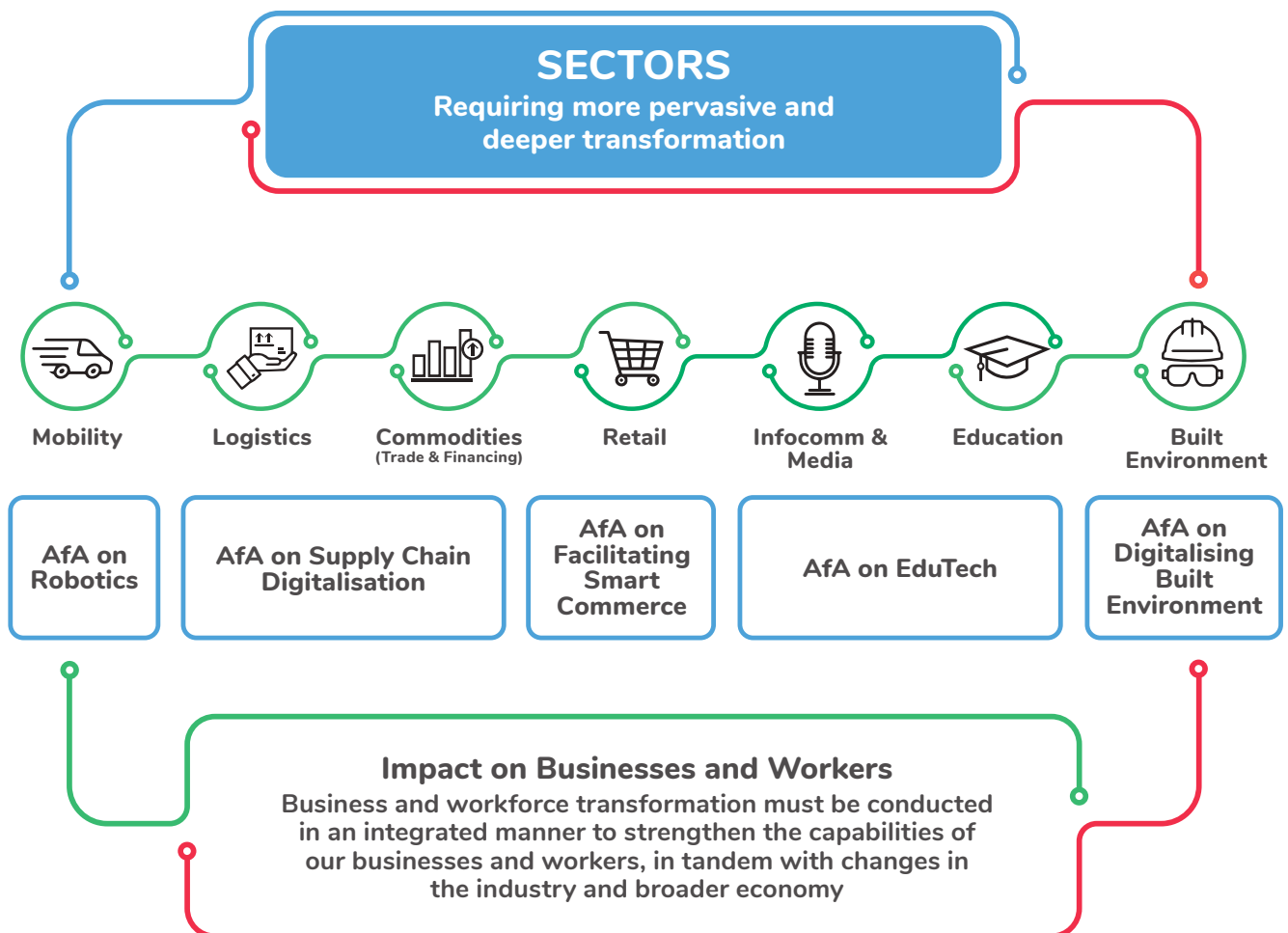
# The EST's Journey

## ADOPTING A BIAS TO ACTION THROUGH SINGAPORE TOGETHER AfAs

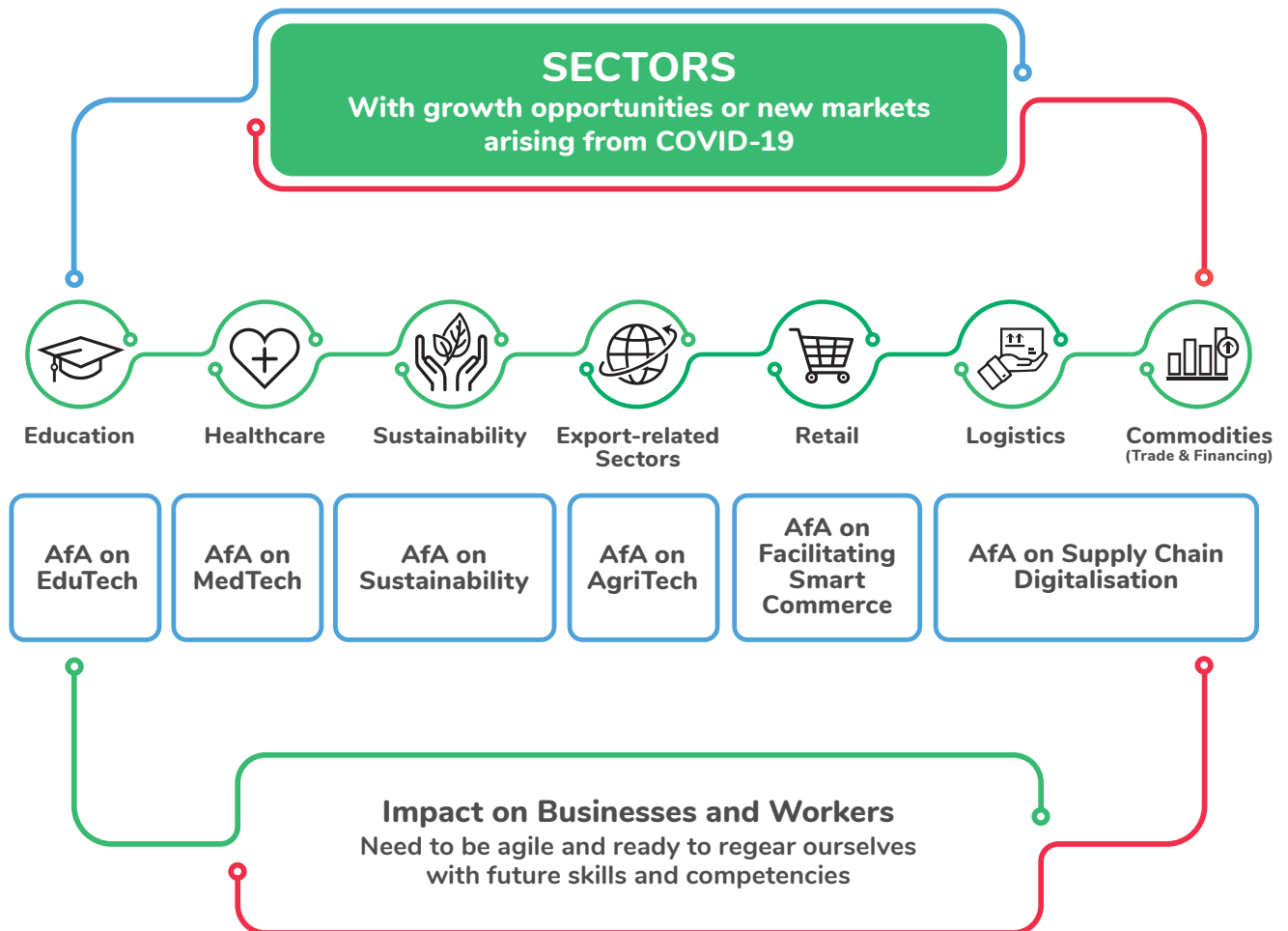
39. This bias to action translated into the AfAs, which are pathfinders that bring multiple stakeholders together with the common goal of identifying quick wins or proving out long-term investment possibilities for Singapore to emerge stronger from this crisis. These industry-led coalitions adopted an agile **“startup” approach – to dream big, but pave the way by starting small**. The AfAs quickly developed, prototyped, and executed minimum viable products (MVPs) or pilots which can be subsequently scaled up if successful; while concurrently working with government agencies and stakeholders to stretch the medium- to long-term ambition for Singapore in each opportunity area identified.
40. In considering the scope of the AfAs, the EST considered the impact of the six key shifts on different sectors in our economy. Broadly, this fell into three categories:
- Sectors which are most adversely impacted by the pandemic and for which there is urgency to adapt to the immediate “new abnormal”.** This may require sectors to find new ways to continue business even amidst COVID-19, or pivot to completely new business models. This is particularly the case for the Travel and Tourism, and Built Environment sectors, which may face a slow recovery due to delays in the reopening of international travel, and disruptions in the supply of raw material and manpower.



- b. **Sectors which will need more pervasive and deeper business transformation to meet the changes driven by the shifts from COVID-19.** This may require sectors to improve or reconfigure previously tried-and-tested models so that they can remain relevant in the longer run. This can be seen in the accelerated offline-to-online shift for the retail sector, and the shift from the use of e-learning tools in the physical classroom to the migration of teaching and learning to virtual classrooms.

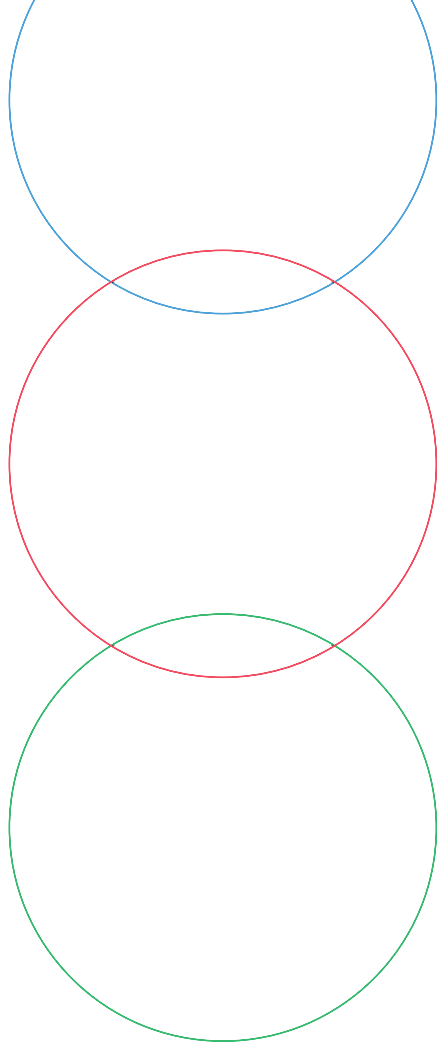


- c. **Sectors which have growth opportunities or new markets arising from COVID-19**, such as in the Healthcare, Education, and Sustainability-related sectors, which are seeing an increased demand for goods or services for reasons such as a greater emphasis on safety, quality, and environmental sustainability.



41. A month into the formation of the EST, seven AfAs were formed in June 2020, with another two launched in November 2020. These AfAs were chosen for their potential to create trailblazing opportunities or address, in new ways, the challenges arising from the six shifts identified by the EST.





42. The nine AfAs seek to map out a broader agenda for action for Singapore's economy in the following areas:
- Secure our Economic Future through **Supply Chain Digitalisation**.
  - Build Singapore as a "Bright Green Spark" through **Sustainability**.
  - Digitalise Built Environment** to Build Tomorrow's Cities.
  - Bring Singapore to the World through **Smart Commerce**.
  - Break the Productivity Frontier through **Robotics** Solutions.
  - Reconnect with the World through **Safe and Innovative Visitor Experiences**.
  - Reach the World's Learners through **EduTech**.
  - Strengthen Singapore's Position as an End-to-End Hub for **MedTech** Product Development.
  - Build a World-Class **AgriTech** Ecosystem while Supporting Singapore's Food Resilience Goals.
43. Through this process, the AfAs brought together EST members, business leaders, industry stakeholders, IHLs, the Labour Movement, non-government organisations (NGOs), and government agencies, to work in partnership towards a common goal. **The EST demonstrated that this is a differentiating factor for Singapore** – that we are more than the sum of our parts, and that the Government, our businesses, the Labour Movement, and our people can move together with speed to emerge stronger together. In a more difficult world, this new, nimble, and dynamic form of private, public, and people partnership becomes even more important for us to tackle challenges and seize growth opportunities together.

## ENGAGING WIDELY

44. The EST consulted widely to gain insights from a wide spectrum of society, and incorporated their views, aspirations, and concerns into its work. The EST would like to thank all participants of these conversations for their views, insights, and generous contributions, which have helped to shape the thinking and progress of the AfAs and the EST.

### AfA Partners

Throughout their journey, the AfAs worked closely with partners and key stakeholders who contributed ideas, expertise, and resources. These involved close to 1,800 private and public sector participants, from local SMEs to MNCs, who were engaged by the AfAs. This also included international partners, inter-governmental organisations, NGOs, and standard-setting bodies.

### Business Associations and Knowledge Partners

To reach out to businesses and workers beyond those involved in or engaged by the AfAs, the EST also organised dialogues with and briefings to our trade associations and chambers (TACs), our knowledge partners, and unions, involving more than 200 participants.

### Unions

Cognisant that workers are at the heart of what we do, the EST engaged the NTUC Central Committee and unions, especially on how the AfAs will affect jobs and skills. During the engagement with the unions, the Labour Movement expressed its support for the work of the EST, which also led to further discussions between each of the AfAs and the respective unions to ensure that the concerns of workers were adequately addressed.

### Emerging Stronger Conversations on the Economy

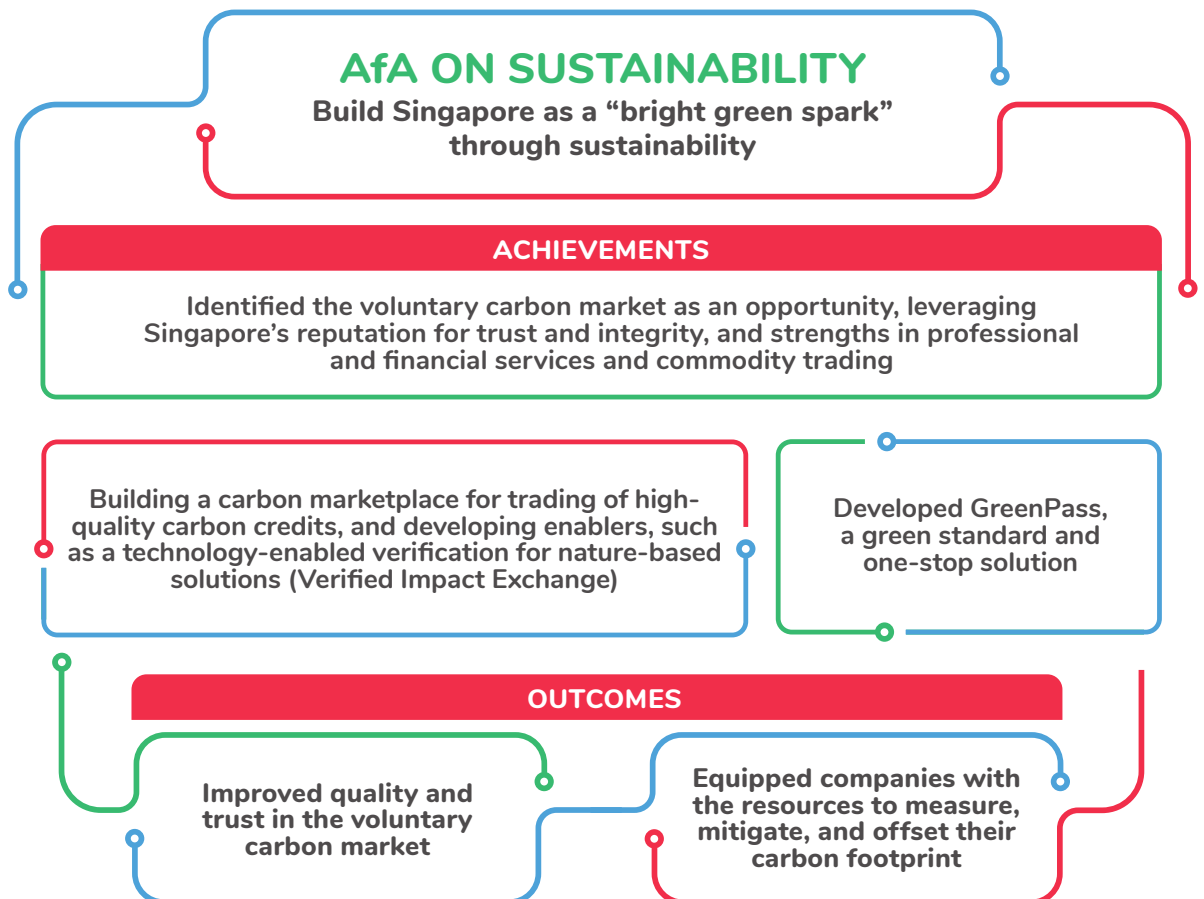
In line with the broader Singapore Together movement to engage and partner citizens on their aspirations for the post-COVID-19 new normal, the EST co-hosted three Emerging Stronger Conversations on the Economy, involving around 150 participants, including members of the public, and representatives from unions, businesses, civil society, and community organisations.

45. The work of the EST was also supported by knowledge partners who proactively came forward to help amplify the thinking and engagement beyond EST. The EST would like to acknowledge the contributions of the following knowledge partners:
- Accenture Singapore**, which helped to document the AfA journey and provided an independent perspective on what worked well and what could be improved.
  - Bain & Company**, which supported the AfA on AgriTech to improve the economic sustainability and viability of indoor vertical farming in Singapore.
  - BCG Digital Ventures**, which supported the AfAs on EduTech and Sustainability in moving towards investible business plans, in consultation with industry stakeholders.
  - McKinsey & Company**, which examined the overall impact of COVID-19 on the Singapore economy, identified six priority growth sectors, and ways that Singapore could pursue these opportunities.
  - Singapore Institute of International Affairs**, which organised the “New Horizons” series, a series of closed-door dialogues with Singapore corporates, focusing on key SEA economies and issues related to Sustainability.
  - ThinkPlace and Platformation Labs**, which developed a blueprint for Singapore to seize new export opportunities through a range of virtual services that could be run, verified, or hosted by Singapore – Virtually Unlimited Singapore – and convened meetings with businesses, technologists, government, and civil society, to discuss how to bring these ideas to life while ensuring that the gains from growth are inclusive.

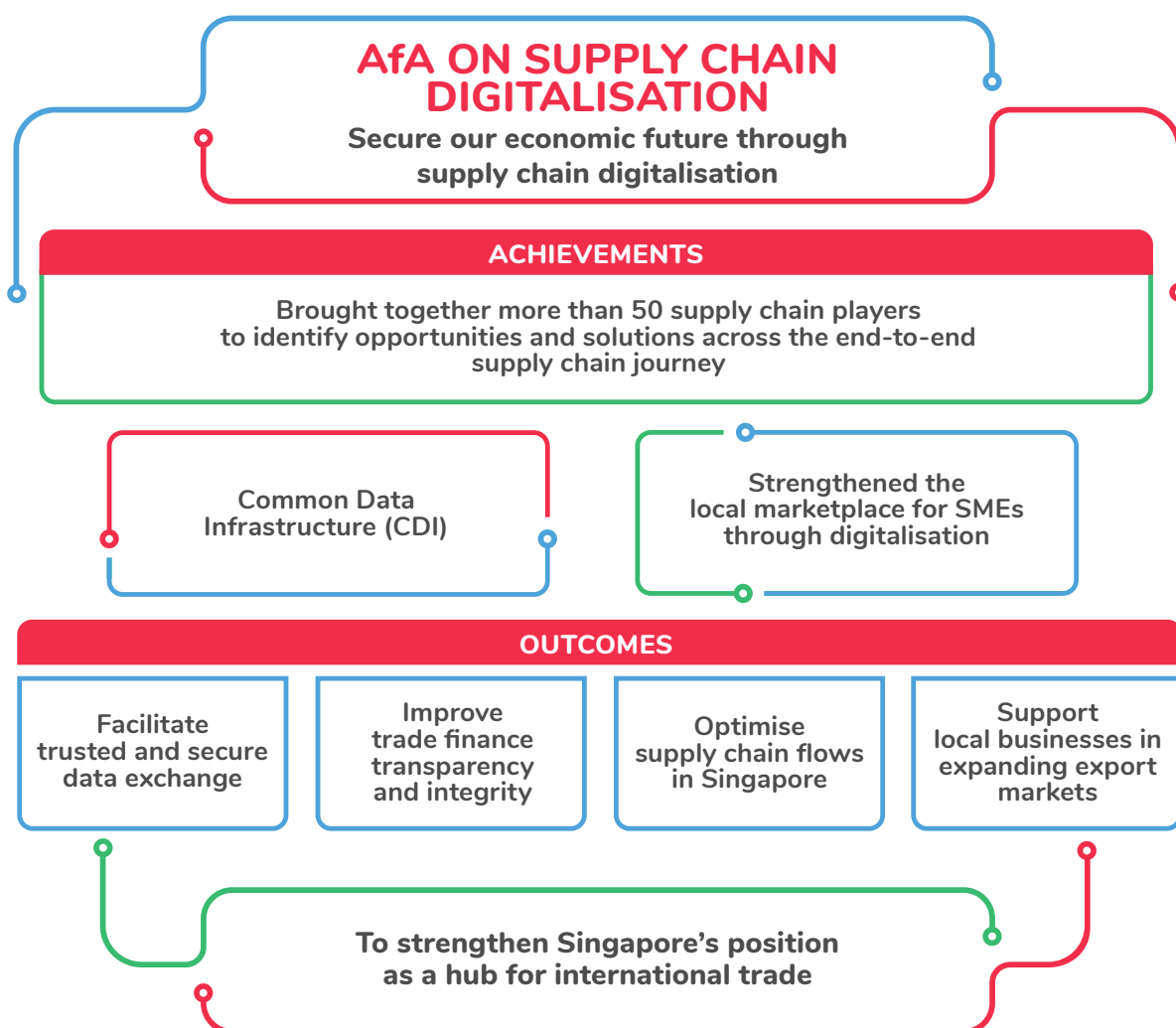
### THE EST’S RESULTS: ACHIEVEMENTS AND OUTCOMES

46. Through this new, dynamic form of partnership, the AfAs were able to achieve success in a short period of time, from developing prototypes that have shown promise of commercial scalability, to forging a new and innovative model of private-public collaboration.

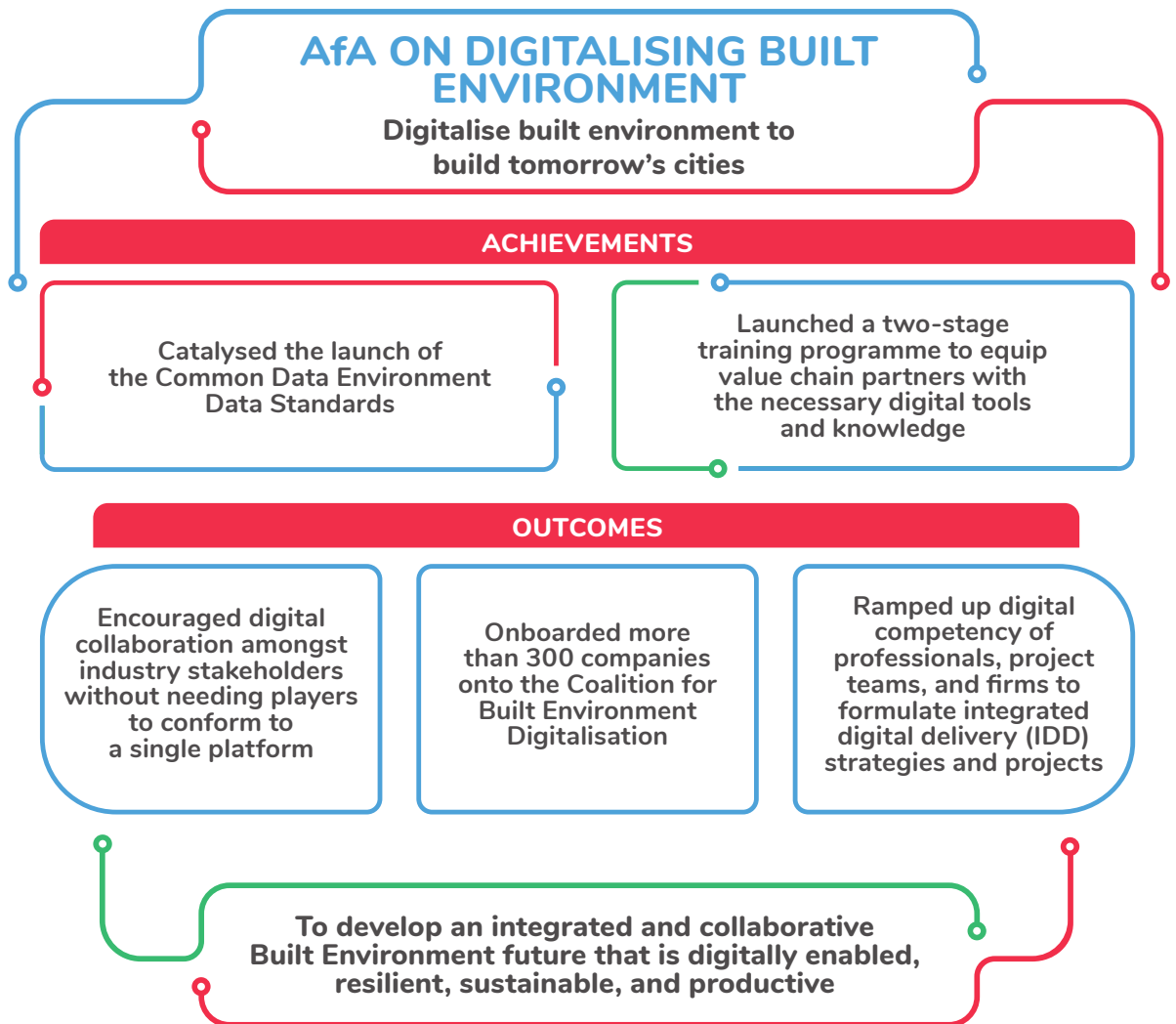
47. Each of these MVPs and pilots demonstrates how the quick action taken by the AfAs has borne early fruit. Scaling up the specific MVPs and developing new ones to address the broader opportunity areas identified by the AfAs will require continued collaboration and sustained effort on the part of industry stakeholders and the Government. The EST hopes that the momentum achieved by the AfAs will inspire others to action and join in this journey to expand the frontiers of Singapore's economy.



- The AfA identified the voluntary carbon market as an opportunity that Singapore is well-placed to pursue. This is due to Singapore’s position in Asia which is a key source of nature-based solutions offsets, Singapore’s reputation for trust and integrity, and strengths in professional and financial services, and commodity trading.
- The AfA will build a carbon marketplace for trading of high-quality carbon credits, and develop enablers such as technology-enabled verification for 17 nature-based solutions (Verified Impact Exchange). The MVP aspires to address gaps, and introduce quality and trust in the voluntary carbon market.
- The AfA also developed a second MVP, a green standard and one-stop solution to help companies measure, mitigate, and offset their carbon footprint (GreenPass).

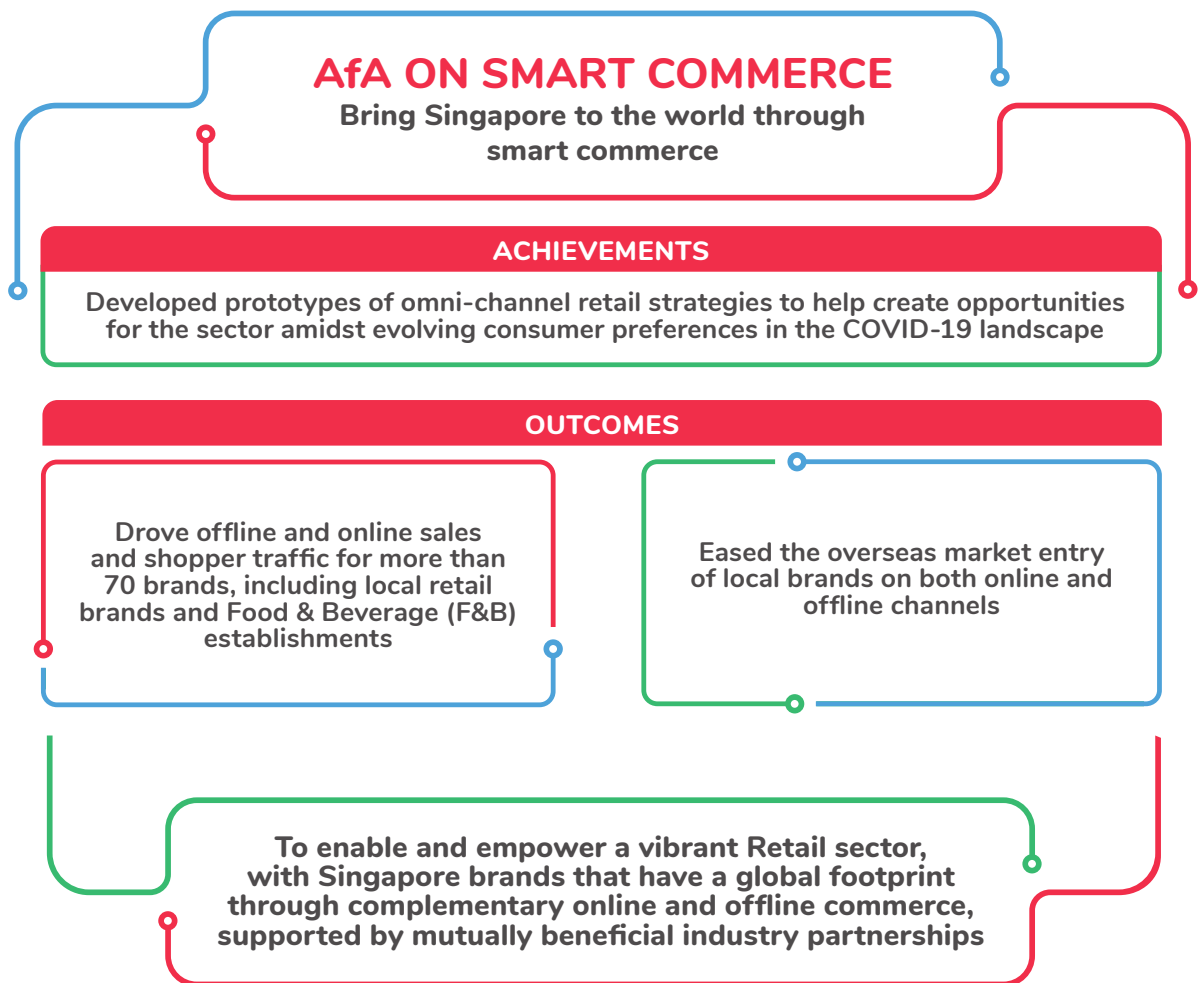


- The AfA brought together more than 50 supply chain players to identify opportunities and solutions across the end-to-end supply chain journey. Such multi-stakeholder partnerships sought to co-create and bring a common vision of supply chain end-to-end visibility to fruition, and position Singapore as a trusted global trade and logistics hub.
- This resulted in the establishment of a common data infrastructure (CDI) to facilitate trusted and secure data exchange and platform interoperability, and enable businesses of all sizes to “plug and play” into the infrastructure to improve trade finance transparency and integrity, to optimise their supply chain flows through Singapore, promote long-term sustainability as a key node in the global supply chain, and support Singapore businesses in expanding their export markets.
- The AfA identified three use cases to be piloted with industry players in: (i) strengthening trade finance and converging efficiencies, (ii) container flow node decongestion, and (iii) digitalisation of the bunkering industry.
- The AfA also strengthened the local marketplace for SMEs through digitalisation, focusing on key enablers such as digital payments and financing, and creating an integrated e-marketplace.
- Over the long term, the AfA aims to strengthen Singapore's position as a hub for international trade, by extending our strengths into the virtual realm.

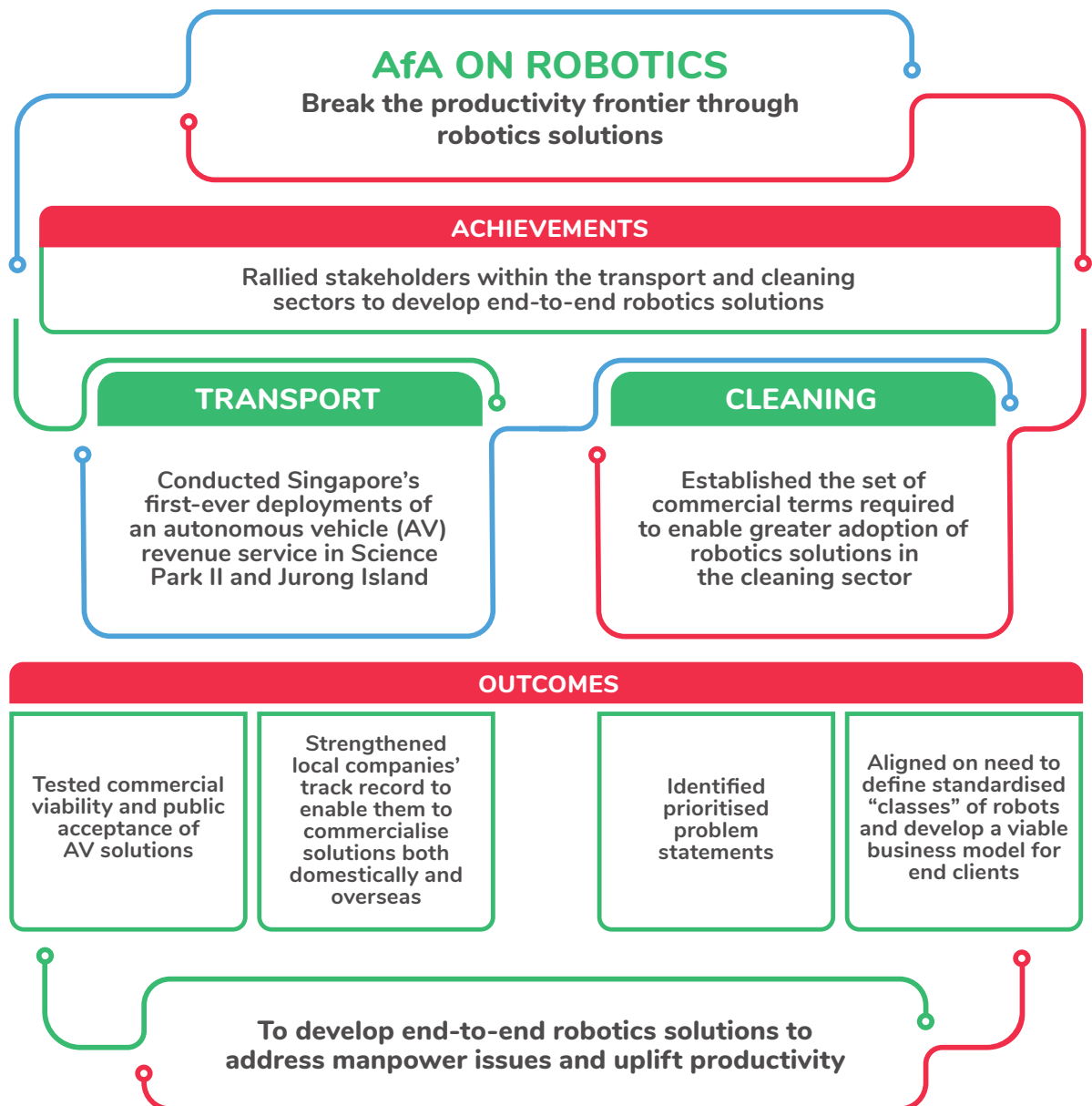


- The AfA catalysed private-public collaboration to accelerate the digital transformation of the Built Environment Cluster, through the launch of a Common Data Environment Data Standard, to better integrate work processes and connect different industry stakeholders working on the same project.
- “Power users” such as CapitaLand, City Developments Limited, and GuocoLand Limited have committed to pilot, and subsequently adopt suitable digital platforms in their upcoming projects. This generated a “pull effect” to bring along other stakeholders in the value chain.
- To sustain this momentum, the AfA established the Coalition for Built Environment Digitalisation, an industry digital partnership which onboarded 300 companies and 25 projects within six months, and aims to bring on board 1,000 companies by 2025.
- To equip value chain partners such as developers, contractors, and designers with the necessary digital tools and knowledge, a two-stage training programme was launched to ramp up the digital competency of professionals, project teams, and firms, to formulate integrated digital delivery (IDD) strategies, and execute trial IDD projects.

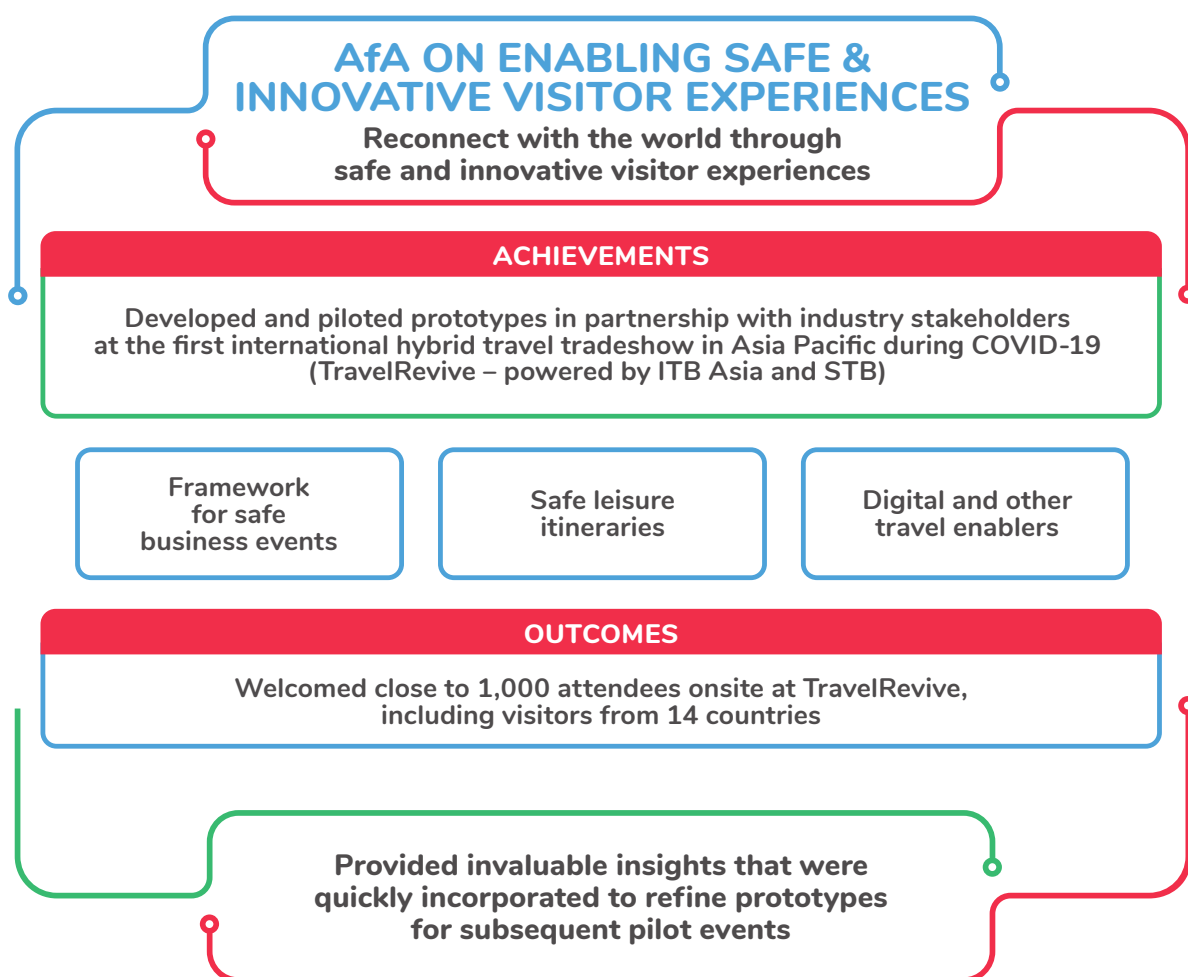




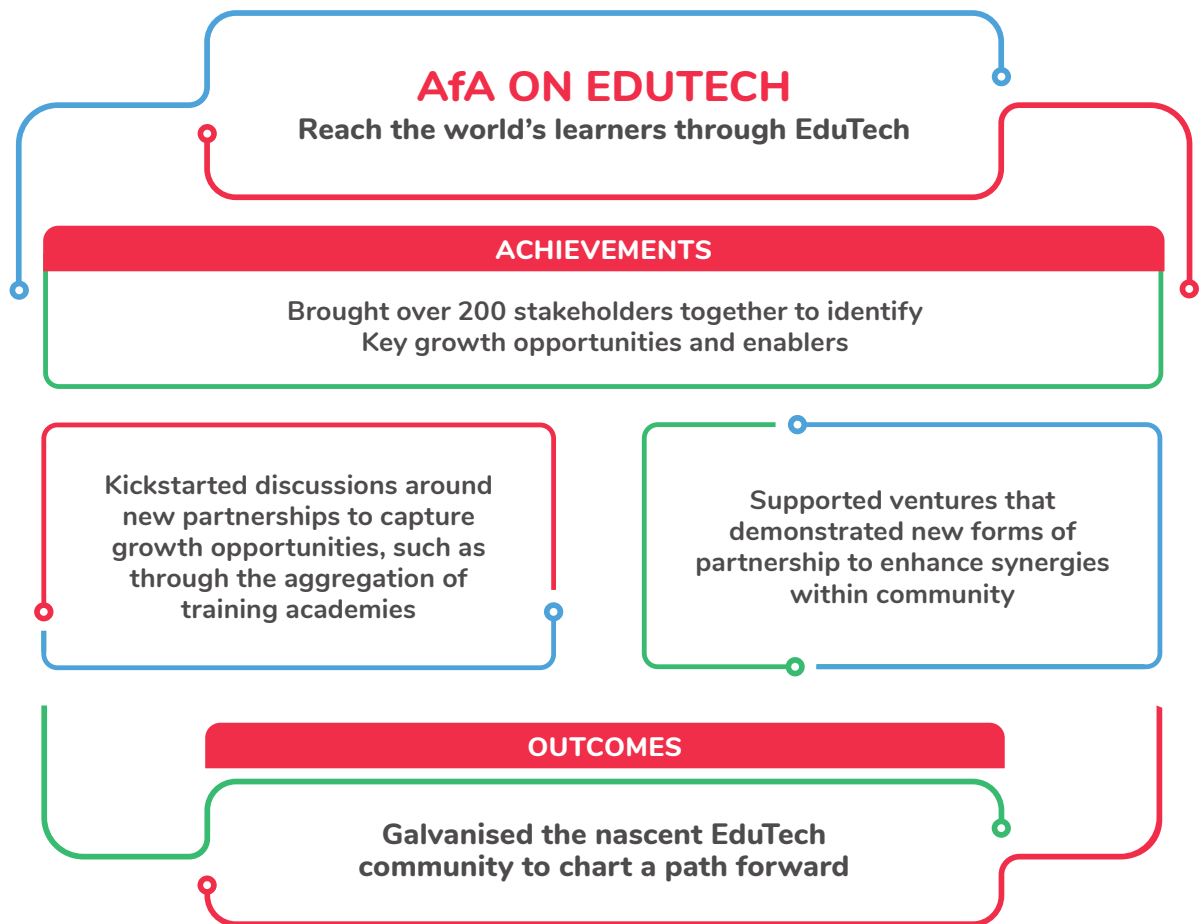
- The AfA pioneered new operating models to help Singapore retailers digitalise, diversify their revenue streams, and export their brands overseas, to address evolving consumer preferences in the COVID-19 landscape.
- It piloted omnichannel sales through the CapitaLand x Shopee 11.11 Campaign. The Campaign integrated online and offline shopper engagement, and drove sales, traffic, and engagement for six CapitaLand malls through gamification.
- Having attained success with the Campaign, the AfA also created an IMM Virtual Mall on Shopee, to create new opportunities for brick-and-mortar retailers, and food and beverage (F&B) establishments to increase their global footprint, through an enhanced online presence. More than 70 brands, including local retail brands and F&B establishments, such as SK Jewellery, Skin Inc, and Ajisen Ramen, have benefitted from these campaigns.
- The AfA also shaped an incubator programme that aims to help local brands export to the region in an expedited manner, leveraging the complementary expertise of both online and offline retail partners.



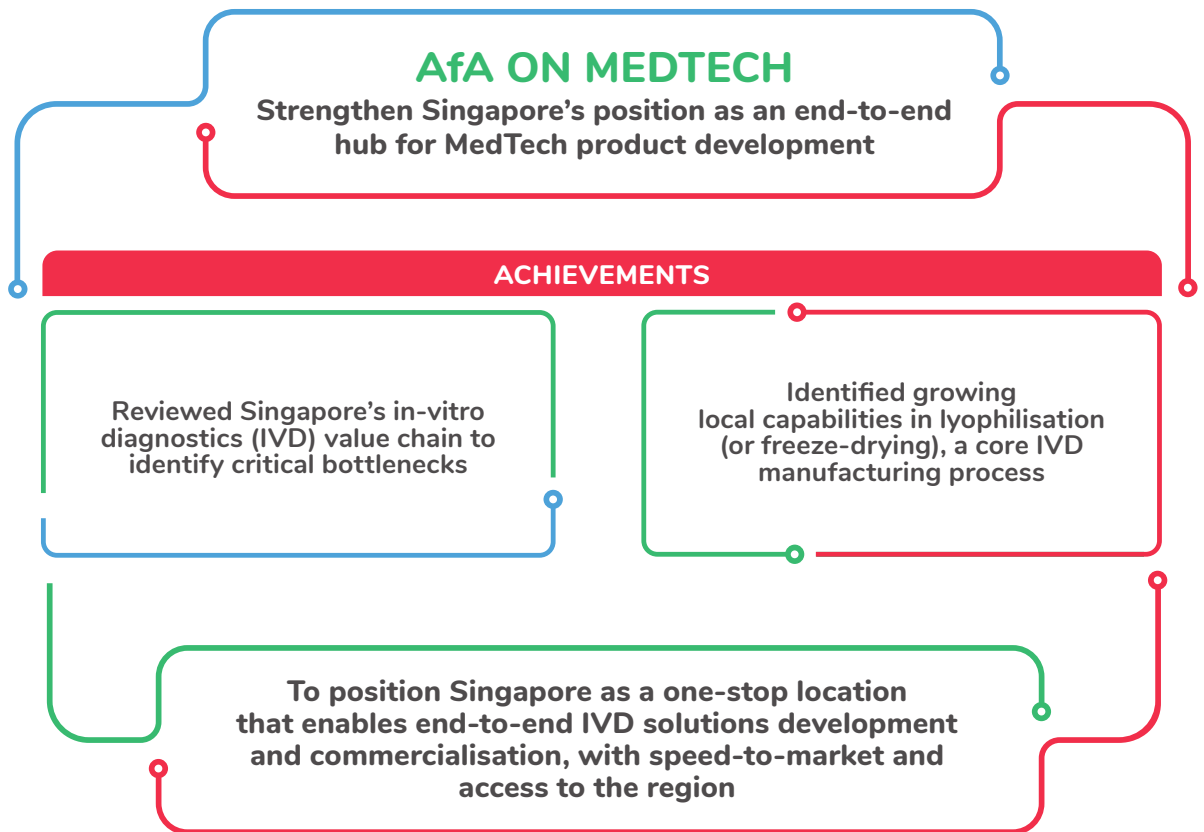
- The AfA rallied stakeholders across the value chains within the transport and cleaning sectors to develop end-to-end robotics solutions to address manpower issues and uplift productivity.
- For transport, the AfA conducted commercial trials of on-demand private bus services at Singapore Science Park 2 and Jurong Island to test the commercial viability and public acceptance of autonomous vehicle (AV) solutions. These trials were the first-ever deployments of a revenue service AV solution in Singapore, and will serve to boost our local companies' track record as they look to commercialise their solutions domestically and overseas.
- For cleaning, the AfA enabled the adoption of robotics solutions in the sector by engaging cleaning services providers, cleaning robot manufacturers, and key buyers of cleaning services to identify prioritised problem statements, define standardised "classes" of robots, and develop a viable business model that end clients could adopt.



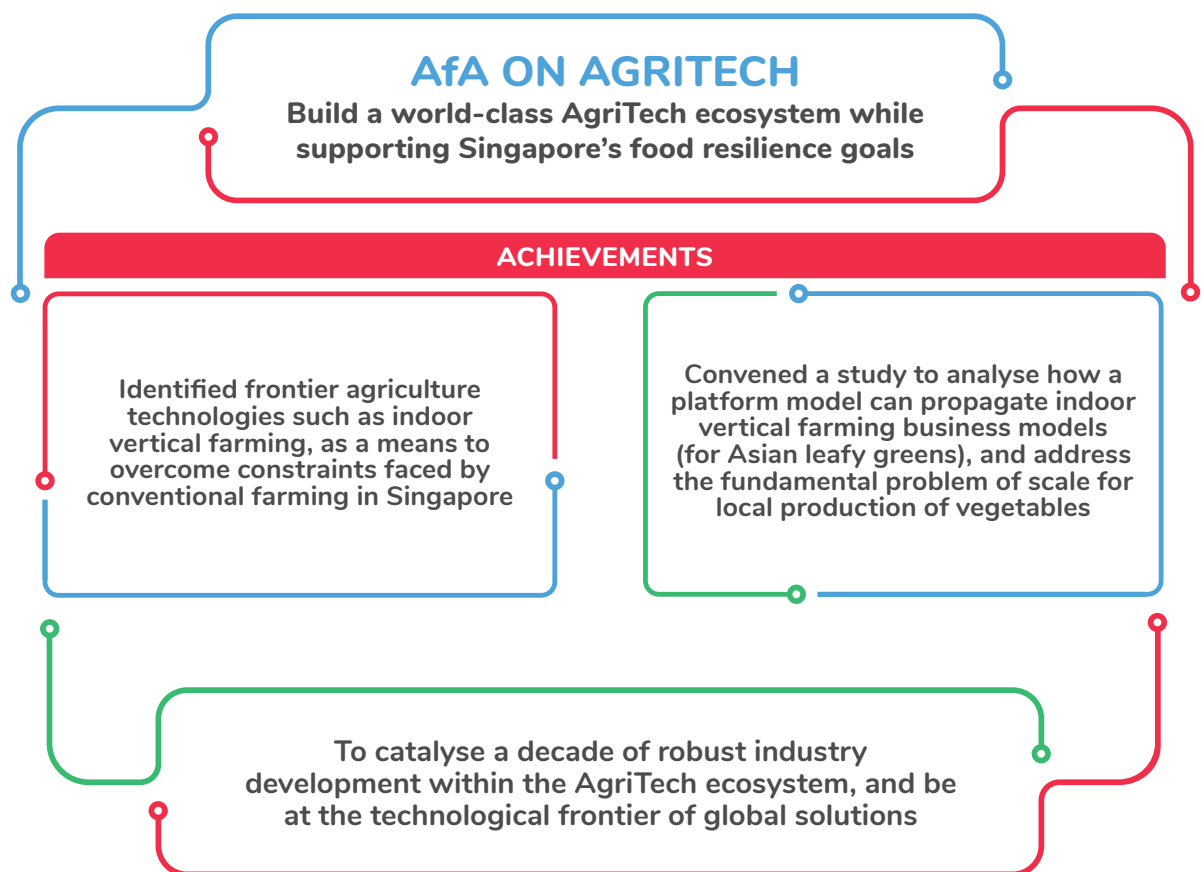
- The AfA developed prototypes for safe business events, safe leisure itineraries, and travel enablers, in partnership with industry stakeholders such as Changi Airport Group (CAG), Singapore Hotel Association (SHA), Singapore Association of Convention and Exhibition Organisers and Suppliers (SACEOS), and the National Association of Travel Agents Singapore (NATAS), and government agencies such as the Singapore Tourism Board (STB) and Ministry of Health (MOH).
- This came together in the form of a pilot hybrid tradeshow, TravelRevive – powered by ITB Asia and STB – which was the first international travel tradeshow to take place physically in Asia Pacific during COVID-19.
- Other unique features of the event included a Safe Itinerary Guide to help travellers navigate new COVID-19 requirements, and digital enablers, such as a Safe Travel Concierge application, to assist travellers in managing pre- and post-arrival procedures. Singapore welcomed close to 1,000 attendees onsite, with foreign visitors from 14 different countries for this event.
- The learnings from this first pilot were quickly incorporated into an updated hybrid event prototype for Geo Connect Asia 2021, with more than 1,000 attendees from 55 countries.



- The AfA brought over 200 stakeholders in the EduTech community together to agree on the key growth opportunities and enablers required in this space. The AfA galvanised the nascent EduTech community to chart a path forward, and kickstarted discussions around new partnerships between companies to capture these opportunities. Several corporates are exploring the possibility of aggregating their training academies, and hence their resources and industry expertise, to meet the increasing upskilling and reskilling needs of the local and regional workforce, and enable these corporates to make further inroads to internationalise or attract regional and global talent.
- The AfA also supported ventures that demonstrated new forms of partnership to unlock synergies within the community. For example, Kydon worked with SkillsFuture Singapore (SSG) to pilot a delivery platform (ZilLearn Skills) that leverages analytics to create skills-job matches and pilot the use of SkillsFuture Credit on a subscription basis.



- The AfA identified in-vitro diagnostics (IVD) as a key MedTech sub-sector to focus on, given the rising importance of IVD for diagnosing diseases or monitoring a person's health amidst the growing prevalence of both infectious and chronic diseases, and the drive towards value-for-money and personalised medicine. It aims to position Singapore as a one-stop location that enables end-to-end IVD solutions development and commercialisation, with speed-to-market and access to the region as our key differentiating advantages.
- The AfA reviewed bottlenecks in Singapore's IVD value chain and identified developing local capabilities in lyophilisation, a core IVD manufacturing process which we currently lack, as a low-hanging fruit that can be quickly harvested.



- The AfA is launching a new platform that could address the fundamental problem of scale for local production of vegetables. A platform built for the Singapore context could ultimately propagate indoor vertical farming business models (for Asian leafy greens) which are highly productive but may not be sustainable under the current operating environment.
- The AfA envisions the platform to be a launchpad to steer the broader industry into action. By charting a possible pathway towards economic viability of indoor vertical farming for Asian leafy greens, the AfA aspires to catalyse a decade of robust industry development within the AgriTech ecosystem – one which comprises a healthy mix of local champions and established global players who contribute to sustainably supporting Singapore's food resilience goals, and are at the technological frontier exporting AgriTech solutions to the world.

48. Having successfully concluded their MVPs and obtained key insights from their sprints, the AfAs have secured the agreement of key stakeholders to take on implementation and scale-up. Some of these will be through private sector consortiums, co-operatives, or joint ventures; others will be through the FEC and its sub-committees. For example, learnings from the AfA on Facilitating Smart Commerce's Online-to-Offline prototypes will be incorporated into the work of the FEC Lifestyle Cluster to help Singapore retailers digitalise and internationalise. Where there is value to retain the AfA in its current form or composition so as to continue tapping on the existing partnerships established, as in the case of the AfA on Enabling Safe and Innovative Visitor Experiences, the AfA will continue its work until a later stage.





CHAPTER 3

# ASPIRATION



## Virtually Unlimited Singapore

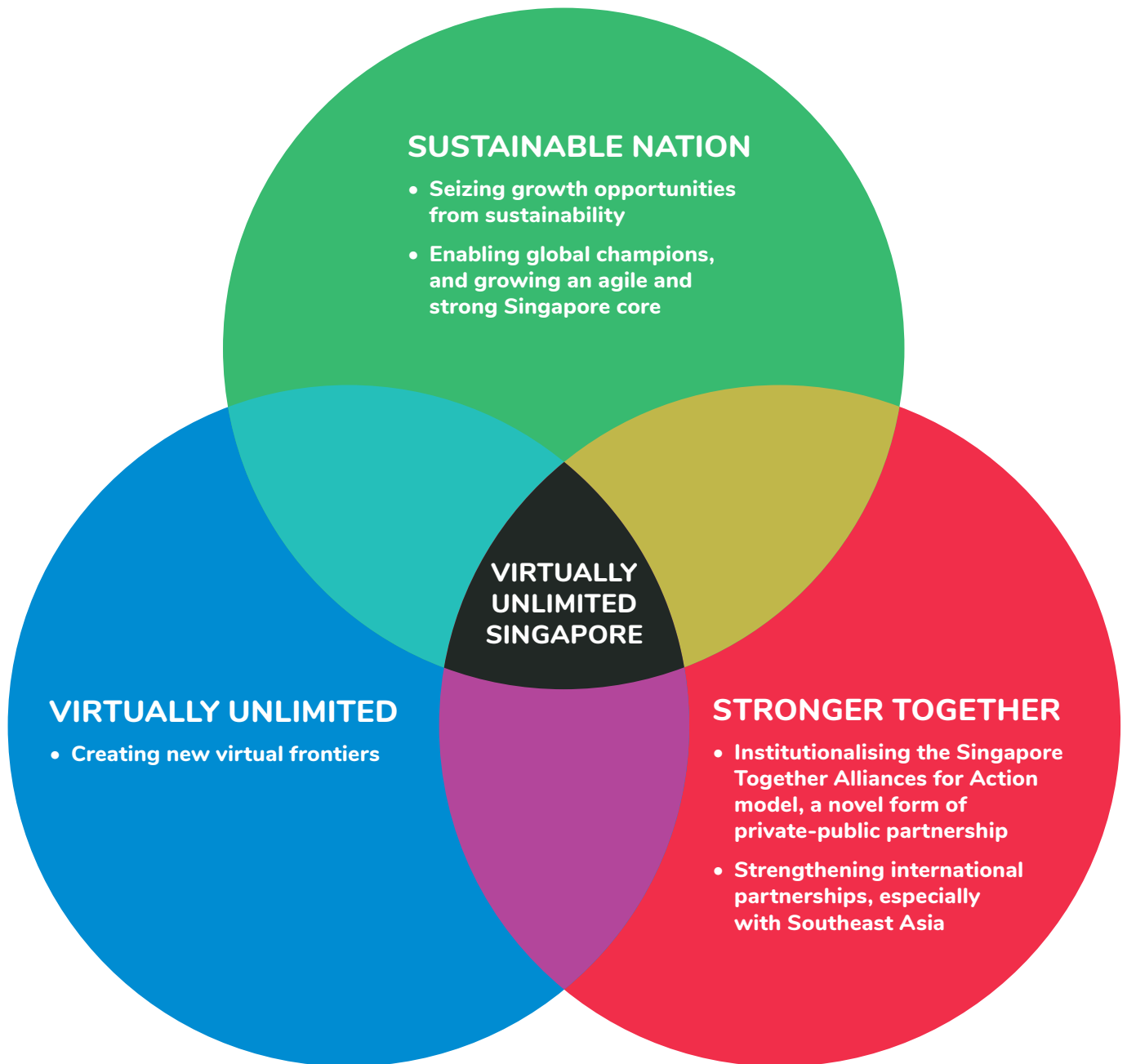
49. The positive outcomes from the AfAs show that Singapore can indeed remain relevant and resilient, even in a more uncertain and fragmented world. Building on the work of the AfAs, **the EST's economic vision for Singapore is for a Virtually Unlimited Singapore (VUS)**, which offers limitless possibilities and opportunities for our nation, our businesses, and our people, and will spur our transformation into a Global-Asia node of technology, innovation, and enterprise, even amidst the COVID-19 pandemic.
50. A **Virtually Unlimited Singapore** will only be possible if we find ways to be of value to others – in enabling virtually unlimited possibilities for enterprise, talent, and cities around the world. We cannot compete on technology alone, but by creating and providing services in areas which play to our strengths of trust, speed, consistency, and systems-level coordination. This will be a new way for Singapore to strengthen our economic linkages with the world, and serve as a vital node at the intersection of high-value global trade, finance, digital, data, technology, and talent flows. To achieve this vision, we must resist the forces of anti-globalisation and protectionism by remaining open, particularly to global talent and skills, so that businesses can access best-in-class ideas and understand consumers and businesses beyond our shores, and Singaporeans can learn from the best in the world. In doing so, Singapore can be a vibrant centre of technology and innovation, where new ideas germinate, cross-pollinate, and are nurtured into globally-competitive enterprises, forming complementary and exceptional ecosystems of business activity that generate a virtuous cycle and strong competitive advantage for Singapore.
51. In developing this blue-sky vision for Singapore to be a critical node of trust in technology, innovation, and enterprise for governments, businesses, and people, the EST has identified three focus areas.

### **VIRTUALLY UNLIMITED, SUSTAINABLE NATION, STRONGER TOGETHER**

52. We must create a Singapore that is **Virtually Unlimited**. To succeed in the future economy, we must transcend our physical boundaries and seize opportunities in the digital economy. Singapore can build on our strengths in digital infrastructure and create new virtual services by and from Singapore, to position **Singapore as a virtual node**. By harnessing digital technology to replicate our strengths in physical connectivity in the virtual realm, we can establish ourselves as a preferred platform for cross-border service delivery, thereby enabling businesses to gain an exponential reach to new segments of consumers and businesses. Through this virtual realm, Singapore as a trusted and high-value digital node can enable companies to access new markets, tap on top global talent, and be an important part of other countries' growth stories.

53. We must be a **Sustainable Nation**. While being Virtually Unlimited can enable our future to be boundless and herald the next bound of economic growth for Singapore, this should be augmented by an ability to seize new growth opportunities from Sustainability, in view of the growing global climate ambitions and the need for sustainable development. In so doing, we must also ensure that our growth is sustainable, both in terms of environmental sustainability and inclusivity. The Singapore Green Plan 2030 will address these existential challenges and we need private enterprise to translate them into concrete growth opportunities for Singapore. Domestically, our economic growth must be **inclusive** for all segments of society, powered by a **competitive and future-ready local workforce that is complemented by a skilled global workforce, and a strong core of global champions**. Only in this way will we be able to pass on a vibrant and sustainable Singapore to future generations.
54. A Virtually Unlimited and Sustainable Nation can be achieved if we transform the way that we work and embrace the belief that we are **Stronger Together**. The EST has demonstrated the potential of agile private-public partnership through the **AfAs**, which, if institutionalised, can be one of Singapore's competitive advantages. Through this new AfA approach, with industry taking the lead and closely supported by the Government, we can better collaborate to harness our entrepreneurial spirit, grow our capabilities, jointly create solutions, and in doing so have the potential to unlock virtually unlimited possibilities.
55. But being Stronger Together **goes beyond Singapore alone**. We are also a part of the global economy, and closer to home, a part of SEA. COVID-19 has clearly shown the potential and importance of close collaboration, in dealing with the pandemic as well as its consequential impact on economies, such as supply chains. As SEA recovers from COVID-19, we must partner our neighbours to unlock new growth and prosperity together, by serving the world in ways that individual countries cannot do alone.
56. In summary, the EST believes that we can be a Virtually Unlimited Singapore if we can implement the following five recommendations:
- i. *Virtually Unlimited* – Creating New Virtual Frontiers.
  - ii. *Sustainable Nation* – Seizing Growth Opportunities from Sustainability.
  - iii. *Sustainable Nation* – Enabling Global Champions and Growing an Agile and Strong Singapore Core.
  - iv. *Stronger Together* – Institutionalising the Singapore Together AfA Model, a Novel Form of Private-Public Partnership.
  - v. *Stronger Together* – Strengthening International Partnerships, especially with Southeast Asia.





# THE EST'S RECOMMENDATIONS AND NEXT STEPS

## RECOMMENDATION 1:

### **VIRTUALLY UNLIMITED – CREATING NEW VIRTUAL FRONTIERS**

57. Singapore's small size is a reality that we have to live with, but we have always found ways for our economy to transcend our physical boundaries – as a major air hub, an international maritime centre, a hub for financial and professional services, and a trusted gateway to Asia. We must now do the same in the virtual realm, as digitalisation has become more pervasive across all economies and societies.
58. The COVID-19 pandemic has accelerated the adoption of digital services as more people are using online technologies to stay connected, bringing about seismic shifts that are advancing the digital economy in previously unimaginable ways. One study suggests that the world leapt five years forward in terms of consumer and business digital adoption in a matter of weeks.<sup>5</sup> Some 40 million people in SEA adopted digital technologies for the first time in 2020, bringing the total number of internet users in the region to 400 million.<sup>6</sup>
59. For Singapore, COVID-19 has also created an unprecedented impetus for digital adoption amongst businesses and individuals. Based on a survey released in September 2020 by Microsoft and market research firm IDC Asia Pacific, nearly three-quarters of Singapore's organisations are accelerating their pace of digitalisation due to the pandemic. The need to innovate during the pandemic has also forced many businesses to go digital in order to survive. Our businesses have shown adaptability and resilience that allowed them to continue to operate during the Circuit Breaker period, and reach new markets through digital platforms.
60. We are not starting from scratch in digitalisation. We uplifted a generation through computerisation and automation in the 1980s, established broadband links nationwide in the 1990s, and then wired up the island to be fibre-ready in the 2000s. As early as 2014, we started our Smart Nation journey, where we envisaged a leading economy powered by digital innovation, and a world-class city that is responsive and adaptable to changing needs. Organised into three key pillars: Digital Economy, Digital Government, and Digital Society, our efforts to transform Singapore into a Smart Nation have laid strong foundations for Singapore to step up and seize opportunities in this digital age.

<sup>5</sup> Based on surveys conducted by McKinsey across 45 countries on a weekly, bi-weekly or monthly basis since mid-March 2020.

<sup>6</sup> Google, Temasek, & Bain. (2020). e-Conomy SEA 2020.





### Building the Foundations of Our Digital Economy

To support digital connectivity and innovation, we have established physical, digital, and legal infrastructure. We have anchored investments in data centres and 5G standalone networks; built digital utilities such as corporate digital identity, e-invoicing, and document exchanges to enable businesses to seamlessly engage in digital transactions; pursued digital economy collaborations with like-minded partners to foster interoperability of digital standards and systems; and reviewed legislative frameworks such as the Personal Data Protection Act and Electronic Transactions Act. To raise the digital maturity of enterprises, we have embarked on programmes like SMEs Go Digital to level up the baseline and will focus more on grooming digital leaders across different sectors. At the same time, to expand our innovative capacity, we will develop new strategic capabilities in frontier technology areas like AI, 5G, cybersecurity, trust technologies, and quantum technologies, through our Research, Innovation & Enterprise (RIE) investments. Finally, we will continue to train and upskill individuals to equip them with relevant skills to seize exciting new opportunities in the digital space, such as through our TechSkills Accelerator programme.

61. Building on these foundations, **the EST recommends taking our Smart Nation aspirations global – to create new virtual frontiers for Singapore, and enable us to access virtually unlimited opportunities for enterprise, talent, and cities.** To unlock the full potential of Virtually Unlimited, the EST believes that there are three principles that differentiate the approach we will need going forward.
62. **First, our starting point must be to create value for customers.** The digital space is even more competitive than the physical one, as it is not constrained by geography, traffic jams, or weather. Unlike goods, data can flow freely and quickly across vast spaces, and services can be provided by talent working from anywhere. **We will need to go beyond supply-side interventions, such as infrastructure development, to differentiating ourselves through an unparalleled understanding of those to whom we can add value,** and provide radically differentiated customer experiences enabled by technology. Technology alone is unlikely to suffice as a solution without business process engineering, and the latter would require private-public collaboration where our strengths of trust, speed, consistency, and systems-level coordination are differentiators for Singapore.



63. **Second, we should “think global” from the get-go, leveraging our trust premium and neutrality.** The central value proposition that Singapore can offer is the enabling of trust, in a world where trust deficits, both existing and emerging, are being driven by three key trends. First, technological change that is outpacing the ability to mitigate risks through effective regulation; second, a secular decline of trust in new technologies as well as global governance; and third, the fracturing of multilateralism and possible emergence of a “splinternet”, or an internet fractured along geopolitical lines. Without a stronger global orientation, Singapore is too small a market to sustain the significant long-term investments required to keep at the cutting edge of technology.
64. **Third, ecosystem orchestration is pivotal.** The efforts of different stakeholders across our economy have helped to spur the growth of our digital economy, with the Government taking the lead to build the necessary infrastructure and private enterprise leading the way to seek new opportunities. While the role of the orchestrator cannot lie with the Government alone, it will need to provide enough direction to the private sector, help enable our homegrown innovations to have a higher chance of succeeding, and partner the private sector in an agile and iterative manner to ensure that we strike the right balance between conflicting needs – such as the provision of a seamless digital experience without compromising accountability, security, and trust.
65. Singapore has a chance to do this well, by integrating efforts at three tiers – upskilling individuals, unleashing private enterprise and collaboration, and ecosystem coordination with infrastructure and private-public partnership. The AfAs, born in the midst of COVID-19, are a testament to how this can be done. The key challenge will be to do this in an inclusive way, so that we are intentional about bringing along smaller companies and Singaporeans, often those who operate in the more domestic-facing sectors of our economy, to also access the opportunities in serving and working with the world’s best. At the same time, we will also need to think about the new norms and strategic capabilities we need to build to secure our place and thrive in our new virtual frontiers.
66. Marrying these three principles and building on the work of the AfAs, **the EST has identified the following areas of opportunity that Singapore could invest in for the longer-term, and where the Virtually Unlimited Singapore vision can be materialised.**

## **ENTERPRISE: VIRTUAL MARKETPLACE OF GOODS AND SERVICES**

67. The growing popularity of e-commerce has extended the digital catchment of retailers by allowing them to access customers and markets beyond Singapore. SEA’s digital economy is expected to grow almost three times, to US\$300B, between 2020 and 2025.<sup>7</sup> Of the 540 million people in SEA, 70% is already online and half are digital natives under the age of 30 who have grown up in a world of digital applications and virtual experiences. Digital native companies will spring up to serve their needs, and on the back of that, require also digitally native B2B services. Digital services is a fast-growing area, offering a multitude of offerings from security, diagnostics, to professional services that deliver equal effectiveness, and often more efficiently. Singapore can bring value to this growth story by conferring trust and reliability associated with the Singapore brand.

<sup>7</sup> Google, Temasek, & Bain. (2020). e-Conomy SEA 2020.

68. Coupled with Singapore's digital connectivity, **there is immense potential for our businesses to create new products and digital experiences, and participate in the trusted trade of goods and services through a vibrant virtual marketplace, so as to grow and create new markets for their goods and services.** Our businesses must move quickly to seize these opportunities, and in so doing, will also create good jobs for Singaporeans. To help SMEs, Infocomm Media Development Authority (IMDA) and Enterprise Singapore introduced the Grow Digital initiative to support SMEs in selling their products overseas through B2C and B2B e-commerce platforms.

#### AfA on Facilitating Smart Commerce

Leveraging digital technologies and tools, the **AfA on Facilitating Smart Commerce** led an effort to create **Online-to-Offline (O2O) partnerships** to enable local retailers to seize e-commerce opportunities. In November 2020, the AfA launched the CapitaLand x Shopee 11.11 campaign, an innovative integration of online and offline shopper engagement to drive sales, increase traffic, and enhance engagement for six CapitaLand malls through gamification. More recently, the AfA expanded its O2O partnership efforts with the launch of IMM Virtual Mall, to re-create IMM's iconic shopping experiences online, and enable local retailers to enhance their online presence. This will allow the retailers in IMM to sell their products to Malaysia, for a start. The use of digital technology also enables retailers to better collect data to understand their customers, and refine their product offerings and go-to-market strategies. These efforts serve as a pathfinder for the wider retail industry to innovate and adopt a new operating model, and as a springboard for retailers to expand their market from Singapore's domestic population of around five million, to one billion consumers around the world.

The AfA has also developed the **Exporting Singapore Brands incubator programme** which seeks to ease the overseas market entry of local brands, both online and offline, through a collective approach. Local brand establishments will come together to validate strategic markets, plan for in-market operations, and leverage CapitaLand's and Shopee's domain expertise and resources regionally, to internationalise as a group.





## ENTERPRISE: HUB FOR THE WORLD'S TRADE

69. In a future where immense value resides in data flows and data security becomes a top priority for businesses, **Singapore is well-positioned to build on its trust premium and neutrality to play a pivotal role in serving as a hub for the world's trade. We have done this in physical trade, and we now need to extend this to the virtual realm** – one that enables full traceability of supply chains, fully-digitalised trading documentation based on global standards, interoperability of trading systems, autonomous port operations, and the regional management of supply chain operations through an interconnected data exchange.
70. To complement existing efforts, the **AfA on Supply Chain Digitalisation** undertook a user-centric approach to cohere various efforts and unlock real value for end-customers in a variety of industries, by solving their most common and pertinent pain points. It identified the need for a **common data infrastructure (CDI)** as being critical in enabling supply chain agility, transparency, intelligence, and platform interoperability.

### AfA on Supply Chain Digitalisation

The common data infrastructure (CDI) aims to facilitate trusted, secure, and inclusive data sharing across the supply chain ecosystem. The CDI will be built with the vision to enable (i) open and secure data sharing; (ii) scalability and interoperability with local and global data platforms; and (iii) accessibility to all players, large or small, across the value chain.

The AfA has developed three initial use cases in (A) strengthening trade finance and converging efficiencies; (B) container flow node decongestion; and (C) digitalisation of the bunkering industry. Recognising the limited visibility financial institutions (FIs) have over the physical movement of goods, Use Case A aims to strengthen process efficiency and trade finance integrity, through reconciling trade details with physical flows. Use Case B looks at the domestic challenges of logistics players and seeks to enable greater visibility of logistics flows and schedules in key nodes, such as depots and warehouses, to address existing inefficiencies in our logistics networks. Use Case C aims to digitalise the documentation and processes associated with the delivery of bunker, and improve information flow across businesses, to enhance operations efficiency and transparency for bunker financing.

Singapore can offer transparency in documentation, interoperability of trading systems, and full traceability along supply chains; become a pioneer of global trade data standards; and create better job opportunities for a digital future. Ultimately, a future supply chain powered by secure and transparent data exchange will advance Singapore's position as a digital trade and fulfilment hub, strengthening the connectivity and resilience of our national supply chains, while providing more opportunities for our local players to be connected to global markets, and vice versa.

## TALENT: VIRTUAL TRAINING AND WORKFORCE SOLUTIONS

71. Talent has and will continue to be a critical determinant of our competitiveness. COVID-19 has given us an insight into the future of work and new ways of leveraging talent, with the rise of remote work and distributed workforce management, and the power of online and just-in-time learning to help individuals keep pace with employment trends, and to help companies and industries to respond to disruptions and structural shifts. As the prospect of a global remote workforce emerges, this brings to the fore questions about how our companies can better tap on global resources, including in-situ talent, to serve global demand from Singapore. For Singaporeans, this could open up new opportunities for work beyond our shores. This also represents an opportunity for our Training and Adult Education (TAE) sector to grow globally, as Singapore's unique advantages include: our concentration of corporates and corporate academies, IHLs and Continuing Education & Training (CET) providers, technology players and startups, and our position in a region rich in human potential and markets.

### AfA on EduTech

The AfA on EduTech identified the Training and Adult Education (TAE) sector as presenting the greatest opportunity for Singapore. The AfA brought the EduTech community together through multiple industry events, and catalysed new ventures and partnerships in the process, such as:

- **ZilLearn Skills** is a fully integrated career advancement platform that provides personalised career and learning recommendations for individuals through skillsets evaluation, leveraging data-driven job market insights, and identifying upskilling and reskilling needs to future proof careers and transform lifelong learning.
- **eduCLaaS Academy** seeks to bridge digital skills mismatches across Asia with innovative applied learning delivery and advanced education technology. The eduCLaaS platform connects higher education students, working adults, hiring employers, and higher education institutions for scalable digital talents incubation and deployment in Singapore and across Asia.
- **The AfA also identified corporate academies as playing a unique role in the ecosystem.** Many large corporates in Singapore have established corporate academies. These corporate academies deliver industry-relevant training from knowledge that have been created from Singapore's industrial hubs. Now, because of virtual learning, this can be scaled and offered to local SMEs and overseas learners where suitable. This would enable Singapore corporates to identify and attract regional and global talent, and equip Singapore SMEs to internationalise. The AfA has kickstarted discussions between several corporates on the possibility of aggregating their training academies to train the local as well as the regional workforce.





## CITIES: OUR ENDURING RELEVANCE AS A SAFE AND SMART CITY

72. COVID-19 has compelled governments and businesses around the world to rethink how we live, work, interact, and play, both in the physical and digital domains.
73. Health and safety have emerged as immediate priorities in a COVID-19 environment. With greater digital adoption, cities like Singapore have found ways to deploy technology to facilitate efficient and effective contact tracing, thereby laying the foundation for the safe resumption of travel by giving increased confidence to governments, industries, and consumers. Singapore will need to continue to resume travel in a safe way. This will help us **redefine our relevance as a safe and smart city for trade, business, work, and leisure.**

### AfA on Enabling Safe and Innovative Visitor Experiences

Recognising the need to develop market-creating innovative solutions that will facilitate the progressive resumption of activities in the Tourism sector which has been hit by travel restrictions, the **AfA on Enabling Safe and Innovative Visitor Experiences** worked with industry stakeholders to pilot innovative solutions in the Meetings, Incentives, Conventions, and Exhibitions (MICE) sector. This was done through redesigning safe business events, designing safe leisure itineraries, and developing digital tools to enable a safe and seamless journey for visitors. The AfA's prototype for large-scale safe tradeshows and exhibitions involving local and foreign participants, as well as innovative methods of COVID-19 testing and tracing, enabled the Singapore International Energy Week (SIEW) to be held in October 2020, as well as TravelRevive – Powered by ITB Asia & STB, the first international travel tradeshow to take place physically in Asia Pacific amidst the COVID-19 pandemic, in November 2020. The AfA has also leveraged technology to develop a Safe Travel Concierge web application as a one-stop resource to assist both travellers and industry in managing pre-arrival procedures and post-arrival itineraries.

## RECOMMENDATION 2: SUSTAINABLE NATION – SEIZING GROWTH OPPORTUNITIES FROM SUSTAINABILITY

74. The EST recommends that Singapore should seize new growth opportunities in sustainability. COVID-19 has accelerated the focus on sustainability, and the ESG agenda is gaining prominence in the future economy. Commitments and policies to tackle climate issues have been increasing, as can be seen from the European Green Deal, climate change being a key pillar of the Biden Administration, China's 2060 carbon neutrality pledge, and the increasing number of net zero commitments from corporates. Due to growing climate ambitions and the need for sustainable development, there will be new business opportunities in the green economy. In response to the growing green economy, it is therefore imperative to **establish Singapore as a sustainability hub** to serve global demand, while fulfilling our own carbon commitments and contributing to the global agenda to tackle climate change. The EST has identified the following opportunity areas, which can be significant initial steps that contribute to our broader whole-of-nation push towards sustainability under the Singapore Green Plan 2030.

### SERVING OPPORTUNITIES AS A CARBON TRADING AND SERVICES HUB

75. In view of the emerging economic opportunity that carbon trading and services present for Singapore, **the EST recommends a concerted push to establish Singapore as a carbon trading and services hub.**
76. The growth of carbon markets presents economic opportunities for Singapore. Demand for carbon services and trading is expected to increase, as voluntary carbon markets are expected to scale up significantly to meet Paris Agreement goals. Demand for carbon offsets could grow by approximately 15-fold to 1.5 to 2 GtCO<sub>2</sub> per year by 2030, and at maximum by 100-fold to 7 to 13 GtCO<sub>2</sub> per year by 2050.<sup>8,9</sup> Singapore is well-positioned to be a carbon services and trading hub for the region. First, Singapore has a reputation as a neutral location and trusted broker; we are part of Asia and SEA, which has a potential supply of nature-based solutions (NBS) credits<sup>10</sup> that can provide up to one-third of the mitigation needed to meet Paris Agreement goals by 2030.<sup>11</sup> Second, Singapore is already a professional services and financial hub for the region. Third, Singapore is home to many trading companies (e.g. energy and commodities traders), and some have existing interests and expertise in carbon markets activities globally.
77. The work of the **AfA on Sustainability** will help to position Singapore as an early mover to capture growth opportunities in carbon markets.

<sup>8</sup> Taskforce on Scaling Voluntary Carbon Markets. (2021). TSVCN Final Report.

<sup>9</sup> And could possibly be worth USD200 billion by 2050. Watson, F. (2020, May 13). Global carbon offsets market could be worth \$200 billion by 2050: Berenberg. S&P Global Platts.

<sup>10</sup> From 2008-2018, projects in Asia generated the largest share of offsets issued (39%). Hamrick, K., & Gallant, M. (2018). *Voluntary Carbon Markets Insights: 2018 Outlook and First-Quarter Trends*. Ecosystem Marketplace.

<sup>11</sup> Temasek, DBS, National University of Singapore, & Conservation International. (2020). *The Business Case for Natural Climate Solutions - Insights and Opportunities for Southeast Asia*.



### AfA on Sustainability

The AfA on Sustainability seeks to establish a **carbon credits marketplace (the Verified Impact Exchange (VIE))** that is built on quality and trust. Such a marketplace could facilitate price discovery, improve liquidity, and verify the integrity of carbon credits, including NBS projects. It also explored the feasibility of technology solutions-enabled verification. Some examples include:

- Testing the use of artificial intelligence to extract key data from lengthy project documents into more accessible and comparable formats. Market participants can then use this standardised information to assess the value of projects and price them better.
- Testing the use of remote sensing technology combined with satellites to more accurately verify carbon sequestration. This is important to ensure that credits issued from a project represent real and measurable reductions in emissions.

In addition, the AfA led a sprint to develop **GreenPass**, a one-stop solution for companies to measure, mitigate, and offset their carbon footprint. This platform seeks to enable a simple, automated, and accurate measurement of carbon footprint by integrating suppliers and buyers, allow companies to track their progress, and access reduction recommendations through advanced analytics.

Both the VIE and GreenPass venture concepts leverage assets, resources, and networks from corporates in the AfA, such as DBS, SGX, and Olam International, which accelerated the concept validation process and places the venture concepts in good stead to be launched.

78. Beyond the AfA, there are other ongoing efforts in Singapore to capture opportunities in carbon services and trading. To support these efforts, research and innovation are paramount in devising new solutions. In March 2020, the National University of Singapore (NUS) launched the **Centre for Nature-based Climate Solutions (CNCS)**. The CNCS focuses on research, thought leadership, and education pertaining to NBS for the Asia-Pacific region. In December 2020, DBS, Google Cloud, NUS, Temasek, Verra, and World Bank launched the **Sustainable Xcelerator**. The Sustainable Xcelerator is aimed at increasing confidence in nature-based carbon credits, through the use of technology solutions that reduce the cost and improve the accuracy of environmental verification of carbon sequestration.



## STRENGTHENING FOOD RESILIENCE THROUGH AGRITECH

79. Besides carbon trading, the EST believes that there is an opportunity to strengthen Singapore's food resilience, both for our own consumption and export purposes, through AgriTech.
80. As a country that imports as much as 90% of its food today, Singapore is susceptible to the volatility of the global food market. This vulnerability has been accentuated by COVID-19 and climate change, which could undermine our food supply, and put heightened pressure and urgency on Singapore to step up on our existing multi-pronged approach to build up our long-term food supply. This entails going beyond diversifying our import sources to mitigate the risks of supply disruptions, through the adoption of cutting-edge technology to overcome resource constraints and improve yield.
81. In line with the "30 by 30" aspiration – to produce 30% of Singapore's nutritional needs locally by 2030, **the EST recommends deepening existing efforts to grow Singapore's emerging AgriTech ecosystem into a highly land- and labour-productive industry, that can produce more, and higher quality food, in a manner that is sustainable and efficient, and commercially viable.** If we can do so, we would have translated our efforts to address this existential challenge into an opportunity. To this end, the **AfA on AgriTech** was set up to explore and seize opportunities for Singapore in this space. Specifically, the AfA has identified a new platform model that could address the fundamental problem of scale for local production of vegetables, and in so doing, enable a substantial proportion of leafy greens consumed in Singapore to be produced locally by 2030.

## STRENGTHENING TRACEABILITY AND ACCOUNTABILITY OF INDUSTRY VALUE CHAINS THROUGH END-TO-END DIGITALISATION

82. In light of the increasingly complex, multi-layered, and multi-origin value chain networks of today, transparency and traceability have become ever more crucial in allowing companies, consumers, and regulators to understand the safety, provenance, and sustainability of their value chains. The demand for more stringent ESG standards has to be complemented by end-to-end digitalisation and data sharing, enabled by industry-specific standards, to enable transparency, verification, and compliance.
83. In addressing this imperative, the CDI piloted by the **AfA on Supply Chain Digitalisation** marks a key step in forming the baseline infrastructure upon which Singapore can establish common standards in supply chains, and facilitate data flow across the value chain. Recognising the impact of environmental sustainability on our built environment, the **AfA on Digitalising Built Environment** has also implemented the Common Data Environment (CDE) Data Standard, to support the integration of complex work processes across the built environment value chain, and enable value chain partners to stay updated and connected in their projects to make informed decisions.
84. Such enhanced visibility across the value chain empowers businesses to optimise their asset deployment and environmental impact. For instance, sharing of event and operational data across key container flow nodes, such as depots and warehouses, will allow logistics players to reduce waiting times and wasted trips, thereby cutting down their carbon footprint. In the case of built environment, data integration allows companies to extract insights such as energy efficiency, and embodied carbon of material choices, to make informed decisions throughout the value chain to optimise sustainability performance, and reduce the embodied carbon in the Built Environment Cluster.

85. The AfAs have taken initial steps as part of the nation's wider sustainability agenda, through initial efforts in carbon trading, and leveraging digitalisation to strengthen traceability and accountability, whether for Supply Chain Digitalisation more broadly or AgriTech more specifically. We must continue to pursue our sustainability ambitions by amplifying and augmenting Singapore's broader efforts to grow our green economy, secure early-mover advantages where possible, and work towards establishing a hub status. Sustainability is a potential growth engine of our future economy, and we can create new and different opportunities across a wide range of sectors, such as manufacturing, built environment, logistics, and training and consultancy. The EST welcomes other parties to develop innovative ideas and ventures to contribute to Singapore's ecosystem.

### RECOMMENDATION 3:

#### **SUSTAINABLE NATION – ENABLING GLOBAL CHAMPIONS AND GROWING AN AGILE AND STRONG SINGAPORE CORE**

##### **OUR BUSINESSES**

86. COVID-19 has been trying, but Singapore's ambition for exceptionalism has not been quelled. Although we are physically small, we must continue to transcend our limits and contribute outsized value to the world. We can offer our strengths to enhance the flows of capital, goods and services, data, innovation, and talent that come through Singapore, thereby reinforcing these flows and strengthening our role as a critical node in the global ecosystem. To achieve this, we must enable Singapore enterprises to grow their capability and then take flight as regional or global players.
87. **The EST recommends that the Government make a concerted push to support the growth of a pool of innovative and international Large Local Enterprises (LLEs) that cannot be easily displaced in global value chains,** through innovation, internationalisation, mergers and acquisitions (M&As), and talent development. We have to be more daring and innovative in enabling Singapore-based companies to grow and scale up. But this growth must also be inclusive. Singapore's corporate ecosystem must uplift the broad base of our businesses, including SMEs, and give companies the confidence that they can excel on the global stage. This will in turn create good jobs and careers for Singaporeans of diverse aptitudes, strengthen our Singapore core, and catalyse the next generation of successful enterprises.
88. There is no magic formula that will work for every business. A variety of tools to enable companies to develop a competitive advantage will be required for different segments of companies. **The EST recommends the use of different tools to help our companies with high growth potential succeed, in order to compete globally.** Singapore could review how the private and public sectors can better support companies on their growth and transformation journeys and encourage innovation, so that these promising high-growth enterprises can create new products and services, and access new markets. Some examples include looking into complementary tools such as equity financing, leveraging government procurement as lead demand, and encouraging technology and capability transfer. The EST welcomes the Government's decision to co-invest with Temasek in a \$1 billion Local Enterprises Funding Platform, in equity and mezzanine debt of selected LLEs so that they have sufficient capital to pursue their next phase of growth.

89. At the company-level, **business leadership is key to driving deep business transformation**. Leadership is key to ensuring that transformation efforts are authentic, meaningful, and sustainable, and not shallow or focused only on short-term wins. This often requires a strong steer, especially to change mindsets throughout the organisation, as companies reinvent their business models, and translate goals into implementation. Recognising that this is no easy task that can be executed overnight, there are existing government programmes, such as Scale-up SG, which aim to accelerate the growth of high-growth potential local companies, by supporting the development of their leadership teams and better equipping business leaders to lead their transformation efforts, so that their companies can scale effectively and become leaders in their fields, while contributing significantly to Singapore's economy and creating good jobs for Singaporeans. We have many good business leaders in Singapore, but the culture of strong leadership and mentorship must be more pervasive.
90. In addition, to further enable companies to compete globally, Singapore should provide opportunities for companies and their supplier ecosystem to test and validate their products here. This will help companies build up and demonstrate a track record of successful projects when seeking to expand to overseas markets. Singapore's regulations and conformance initiatives can also facilitate this by certifying internal processes for companies, or in acting as a trust-mark for innovations originated or tested in Singapore. The **AfA on Robotics (Transport)** has begun to demonstrate the potential benefits of supporting companies locally, to validate the operational and commercial viability of their business concepts.

#### AfA on Robotics (Transport)

Autonomous transport technologies are already here and deployed in AV bus revenue services via the Robotics (Transport) AfA's operational sprint. Comprising ST Engineering, HOPE Technik, SMRT, SBS Transit, GPS Lands, and SWAT Mobility, as well as government agencies (EDB and LTA), the AfA's focus has been to differentiate by operationalising efficient end-to-end solutions at city level, leveraging Singapore's strengths, instead of competing at the level of technology components or sub-systems which is becoming crowded.

In January 2021, the AfA launched two MVP deployments of autonomous buses at Science Park II and Jurong Island, in partnership with CapitaLand and JTC respectively. These deployments allowed the AfA to validate the operational and commercial viability of its AV business concept, develop new capabilities in ops-tech integration, and forge new ways of working amongst AfA members to deliver a stronger end-product or service offering to the customer and end users.

The unparalleled degree of collaboration between various industry players across the value chain will help pave the way for the companies to work together to pursue opportunities. This is critical as the AfA believes that Singapore's competitive advantage is not selling individual components in the AV value chain, but delivering a superior end-to-end solution premised on Singapore's ability to orchestrate and deliver complex systems. The AfA believes that the collaborative spirit of private-public partnership, "sprinting together" to achieve common goals, is a key differentiator for Singapore companies to be able to build up a strong track record locally, be recognised as a leading global operator and provider, and ultimately to become global champions in robotics solutions for the future.





91. **We must also enable a broad base of companies to succeed, especially our SMEs and microenterprises.** This will create good jobs for Singaporeans and fulfil our people's aspirations. The EST notes that we are not starting from ground zero in this regard. Our ITMs set out growth and competitiveness strategies for different enterprise segments across 23 sectors, covering the areas of innovation, productivity, internationalisation, and jobs and skills. To ride the wave of digitalisation arising from COVID-19, the Committee for Digital Transformation is focusing on levelling up digital proficiency by encouraging small companies to go digital and our people to learn new digital skills.
92. We can achieve even more for this broad base of companies with support from industry, for industry. **The EST recommends (a) leveraging “queen bee” companies to uplift the skills of the wider industry sectors, and (b) using commercial frameworks to pull along smaller companies or suppliers in their respective ecosystems or value chains. This should be augmented by the Government providing digital infrastructure such as common data or digital platforms to enable all companies to access best-in-class practices, technology, and resources.** Such an approach was adopted in some of the AfAs, such as the AfA on Digitalising Built Environment and the AfA on Robotics (Cleaning).

#### AfA on Digitalising Built Environment

Building on the early efforts of the ITMs, the **AfA on Digitalising Built Environment** led an effort to accelerate the digital transformation in the Built Environment Cluster. It leveraged “queen bee” companies in a complex and diverse industry, and has demonstrated the potential gains of this approach. The AfA has formed a Coalition for Built Environment Digitalisation, and brought onboard 300 companies within a year to co-create a sustainable and productive built environment future for Singapore and Singaporeans. Collaboration amongst industry stakeholders is also facilitated via interoperable digital platforms, such as the Common Data Environment (CDE) Data Standard. Another important aspect of this effort is in strengthening industry digital literacy. Building on the AfA's efforts, BCA Academy has launched a two-stage training programme to support the members of the Coalition to ramp up the competency of professionals, project teams, and enterprises to develop and implement IDD strategies.





#### AfA on Robotics (Cleaning)

The AfA on Robotics (Cleaning) has developed a new commercial framework that enables the participation of all players across the value chain. Not only will this benefit end users, solution providers, and workers in the industry, it is an important step in facilitating the adoption of cleaning robotics in a viable and sustainable manner where all stakeholders receive some value from the new framework.

By developing a “commercial marriage” between technology providers, service providers, and end clients, standardised “classes” of robots will be defined within the framework. This can assist in accelerating adoption and industry transformation, as well as enable our local software ecosystem to access overseas markets and be a key player in the digital networks of the future. Robotics solutions will increasingly become a critical bridge between virtual and physical worlds, sensing and performing activities in the physical world while being plugged into a much larger virtual and connected system. Software in these solutions can be developed in Singapore and uploaded virtually to robots and autonomous systems deployed globally. This will create opportunities for our local software ecosystem to reach overseas markets that were previously not possible. Such a framework can facilitate the adoption and scaling up of cleaning robotics in a viable and sustainable fashion.

93. To support and promote knowledge transfer from industry “queen bees” to other industry players, **the EST recommends that more “queen bees” pursue collaborations with other companies to support and provide advisory for projects related to digital transformation.** For instance, PSA is exploring with Enterprise Singapore on a pilot programme to leverage PSA’s in-house experts in the areas of Cybersecurity, Robotic Process Automation (RPA), and Data Analytics, to support SMEs in the transport and logistics industry through knowledge transfer.

#### OUR PEOPLE

94. At the heart of Singapore’s economic growth is our people. **A highly skilled workforce with good quality jobs is both the enabler and the goal of our economic transformation.** Singapore will only be as competitive as the skills and talent we have. But as Singapore faces the twin trends of an ageing population and a low resident total fertility rate, workforce challenges will become more pronounced. The EST notes that the Government has taken steps to address this. Launched in 2014, SkillsFuture is a national movement to provide Singaporeans with the opportunities to develop their fullest potential throughout life, regardless of their starting points. Building on the good progress since the launch of the SkillsFuture movement, the Government announced plans for the Next Bound of SkillsFuture in 2020, to enhance the role of our enterprises in supporting workers’ reskilling needs and career progression; to enable individuals to continue their own learning; and to have a special focus on mid-career workers by scaling up career transition programmes and launching an additional SkillsFuture Credit (Mid-Career Support).

95. Nevertheless, the global economy is changing much more fundamentally than before. The six key shifts identified by the EST will raise the demands on our workforce, requiring new skills in areas such as digitalisation, cybersecurity, and sustainability. For instance, businesses across industries may see a stronger need for all employees, irrespective of their role, to have cybersecurity literacy to ensure the safety and security of the business' security systems, or to develop environment and sustainability management capabilities to support the business' plans to grow in a clean and sustainable manner. There is a pressing need for us to reskill and upskill our local workforce in a manner that is inclusive and digitally-oriented to help our people to adapt and avoid the erosion of the competitiveness of our businesses and people.
96. Just as COVID-19 has impacted our sectors differently, the pandemic also has had a different impact on our workforce. This will require differentiated interventions for the workforce in each sector.
- a. **In the sectors that have been most adversely impacted by the pandemic**, such as Travel and Tourism, interventions will need to help workers to retrain to move quickly into new or adjacent job roles where appropriate, so that we prevent a depreciation of skills from extended periods of unemployment.
  - b. **In the sectors where COVID-19 shifts have heightened the need to push ahead with more pervasive and deeper industry transformation efforts**, such as in Built Environment, Supply Chain, and Retail, business and workforce transformation must go hand-in-hand to ensure that transformation occurs in an integrated manner for both businesses and workers to strengthen their capabilities and skillsets, in tandem with changes in the industry and broader economy. Interventions should therefore focus on transforming skills, in tandem with business transformation.
  - c. **In the sectors where growth opportunities or new markets have emerged amidst the COVID-19 pandemic**, such as in Sustainability, we will need to have a sense of future skills in-demand, as there will be new demands on our workforce to regear with future skills and competencies.

### Tourist Guides Taking on New Roles

Given the immediate challenges posed to the Travel and Tourism sector, there was an urgency for Singapore to reimagine the visitor experience in a COVID-19-stricken world and adapt quickly to enable the safe resumption of business travel and MICE activities. One of the pilot projects that the **AfA on Enabling Safe and Innovative Visitor Experiences** launched was the development of a Safe Itinerary Guide. The guide is intended to help the travel trade navigate the new requirements for inbound visitors in a COVID-19 environment, and respond to new traveller priorities around safety, exclusivity, and smaller-group experiences. Executing this new initiative required new job roles, like safe itinerary designers and concierge staff. Thus, the AfA formed a workgroup with the National Association of Travel Agents Singapore (NATAS), SkillsFuture Singapore (SSG), and Singapore Hotel Association (SHA) to identify the related skillsets or new jobs that can complement and raise the quality of safe itinerary design and delivery. It also worked with NTUC Learning Hub to quickly develop a training course to upskill tourist guides, so as to enable them to “top up” their skills and competencies in order to transit into these new job roles to provide personal concierge-like services to visitors, and implement and monitor safe management measures.

Recognising that the current COVID-19 uncertainties will likely continue for some time, the AfA endorsed a partnership between STB and NTUC to design and develop a Tourism Sector Development Roadmap. This will bring together key associations like SHA, NATAS, Society of Tourist Guides Singapore (STGS) and Association of Singapore Attractions (ASA) to identify existing skills gaps, so that efforts can be channelled towards uplifting and strengthening critical competencies for businesses and workers across the tourism landscape to pivot towards the revised expectations for travel in a COVID-19 world.





### Training Workers to BE Digital-Ready

The AfA on Digitalising Built Environment worked with the Government to encourage industry stakeholders to adopt the Data Standards digitally and raise value chain partners' IDD capability. As the digital capabilities of the Built Environment industry are elevated, companies must level up the digital competencies of their workers in tandem. The AfA aims to accelerate the adoption of digital technology by workers. BCA Academy has launched a two-stage training programme to ramp up the competency of professionals, project teams, and businesses to formulate relevant IDD strategies and execute IDD projects. Through this training programme, participants will learn the key principles of IDD implementation, and the application of IDD principles across the Built Environment Cluster. This will uplift their skills and competencies, and allow them to take on other roles in the industry.

The private and public sector stakeholders must continue to work together, to drive business transformation and uplift digital competencies of supply chain partners as the rate of digitalisation at the enterprise and process levels are accelerated. Workers also have a part to play, in keeping pace with the digital needs of the industry. Together, this will help to create higher-skilled jobs in a more productive working environment, which can be taken up by more Singaporeans.

### Gearing Up Future Sustainability Professionals

In the area of Sustainability, IHLs such as the National University of Singapore (NUS) and Singapore Management University (SMU) are offering programmes on sustainable finance, sustainable operations, and social entrepreneurship. In addition, we will need to equip the workforce with other skillsets in areas such as project development, financing, and low-carbon advisory and trading, and be equipped with knowledge in topics such as in carbon accounting methodologies, carbon pricing schemes, and environmental science. These skills could be integrated into the curriculum offered at relevant university courses. Singapore could also consider attracting local offices of leading carbon services consultancies for knowledge and capability transfer. There is also scope to have more ESG modular programmes for different levels of decision makers including boards. The Human Capital Leadership Institute (HCLI) Sustainable Leadership initiative is one such example.

97. For many of the new growth areas, the EST notes that catalysing these opportunities may require new skills and capabilities that we may not currently have, or have in sufficient numbers in Singapore. If we want to be a Global-Asia node, **we must remain open to skills from abroad that complement our local workforce, forming one Team Singapore.** We will need to continue bringing in global talent to complement Singaporeans so that businesses have access to the skills they need to grow, with a view to ultimately helping Singaporeans build up and refresh their skills to move into better jobs. A multi-stakeholder effort – on the part of individuals, businesses, unions, and the Government – is needed if we want to achieve this.

98. **The EST believes that businesses, training providers, IHLs, and unions must play a bigger and more sustained role in upskilling and creating career progression pathways for their workers.** Many businesses are already doing this, through corporate academies and provision of training opportunities for their own workers. The “queen bee” approach mentioned earlier in this chapter can also apply to training and upskilling, with training by industry, for industry. For example, SkillsFuture “queen bee” companies such as Google, Bosch Rexroth, SMRT, and Kwong Wai Shiu Hospital, have reached out to other companies, particularly SMEs, to mobilise them for workforce development efforts. Larger “queen bees” can lend their deep sectoral knowledge and resources to support SMEs to conduct training and upskilling for their workers, and thereby facilitate valuable skills transfer to smaller companies and enable them to respond to the rapidly evolving business environment.
99. Our local training providers and IHLs will also need to establish a stronger nexus with our industries, to establish a strong CET ecosystem. Training providers and IHLs must ensure that graduates are well-equipped with the right aptitude and industry-ready skills. A stronger industry-training nexus allows faster reactions to evolve with changing industry needs. This could extend beyond traditional tie-ups with companies for student internships to the co-development and co-delivery of IHL or work-study programmes, which will help ensure that the curricula are relevant and up-to-date on industry developments.
100. Business and workforce transformation must go hand-in-hand and reinforce each other. A business seeking transformation will experience shifts in its nature of work, where jobs are redesigned or created in the process. Successful business transformation therefore depends on a workforce that is equipped with the right skills to take on these new job roles, whether by ensuring that its workers are agile to continually adapt and pick up new skills, or complementing its local workforce with talents from abroad. At the same time, the gains of workers’ training and development are most evident when they have a clear reason to apply these skills in new contexts or roles.
101. **The EST therefore recommends that businesses work with intermediaries and unions in adopting a preventive or predictive upskilling approach to identify job disruption and training needs early on, and develop workforce training plans, so that both businesses and workers can be more resilient and more ready for the future.** Some TACs and businesses are already taking the lead to upskill workers in their industries to ensure that workers stay ahead of the curve. For example, the early establishment of the Wealth Management Institute (WMI) in 2003, a centre of excellence for wealth management education, is an initiative involving over 60 industry players (including private banks, fund management companies, and business schools) that has supported more than 4,000 wealth management executives in upgrading their professional competence, so that they are well-positioned to seize job opportunities in the fast-growing space. More recently, the Singapore Motor Workshop Association (SMWA), with support from Enterprise Singapore and JTC Corporation, also set up the SWMA Training Academy to retrain and upskill technicians ahead of the expected growth in use of hybrid and electronic vehicles.







102. **But these efforts must be propagated**, so that more workers can benefit amidst the structural shifts. There are resources available for businesses to tap on for worker upskilling, such as programmes to train mid-career Singaporeans and redeploy their existing workers for new jobs, and the Productivity Solutions Grants to develop and implement job redesign solutions. The EST encourages employers to chart out and execute their companies' jobs and skills roadmaps, which may include collaborating with partners such as NTUC. For example, the NTUC Training and Transformation team supports businesses in developing a ready, relevant, and resilient workforce alongside business strategies that will address current and future needs. NTUC Learning Hub also works with businesses, unions, and workers to provide up-to-date training programmes, in line with the FEC's ITMs.

#### AfA on Robotics (Transport)

In public transport applications, autonomous buses will still need human safety operators on board, even if not doing most of the driving, for years to come. In developing its MVP deployments, the **AfA on Robotics** collaborated with the National Transport Workers' Union (NTWU) to develop relevant training and upskilling pathways for bus captains, which will enable them to take on better jobs, such as managing commuter experience and overseeing AV management systems. In the process, bus captains involved in the pilot trials also provided useful operational input that has helped to improve the driving behavior of the autonomous buses. This goes to show that as the work catalysed by the AfA continues to scale up and robotics and autonomous technologies advance, a strong and continued partnership between AV developers, the Labour Movement, and workers can simultaneously enable businesses to agilely pivot to new opportunities in this growing AV sector, and empower transport workers to keep adapting and building up their skills to benefit from the new and exciting jobs that are created in the process.

103. **To further support workers in building their skills, the EST recommends promulgating training recommender systems that can support the training efforts of businesses and unions, and enable more self-directed learning.** These systems can complement the training programmes of businesses and unions, allowing for further customisation to better meet our workforce's needs, and also help our workers to take ownership of their own skills journeys, to identify and bridge gaps in their current skills, in order to move into redesigned or higher value work. This will improve the overall competitiveness and confidence of our workforce, and enable them to embrace opportunities in local and overseas markets. Building on our existing skills upgrading efforts, the AfA on EduTech has supported venture concepts leveraging digital technology to develop platforms that support new joiners' transition into the workforce. Workers can develop personalised career and skills pathways. Insights into their learning behaviours can increase the effectiveness of upskilling programmes.



#### AfA on EduTech (WorkGuide.co and Agility Growth Index)

The AfA on EduTech is supporting WorkGuide.co to build a community for the emerging workforce and new joiners (aged 19 to 25) to smoothen their transition into the workforce by providing credible answers to real questions about work. This leverages technology to scale the benefits of traditional mentoring and makes it accessible to many.

The AfA also supported a venture that developed an Agility Growth Index (AGI), an analytics platform that helps companies understand the learning behaviours and motivators of their workforce, allowing them to effectively engage and retain high performers. The AGI will help organisations throughout the world to develop engaging and effective upskilling programmes.

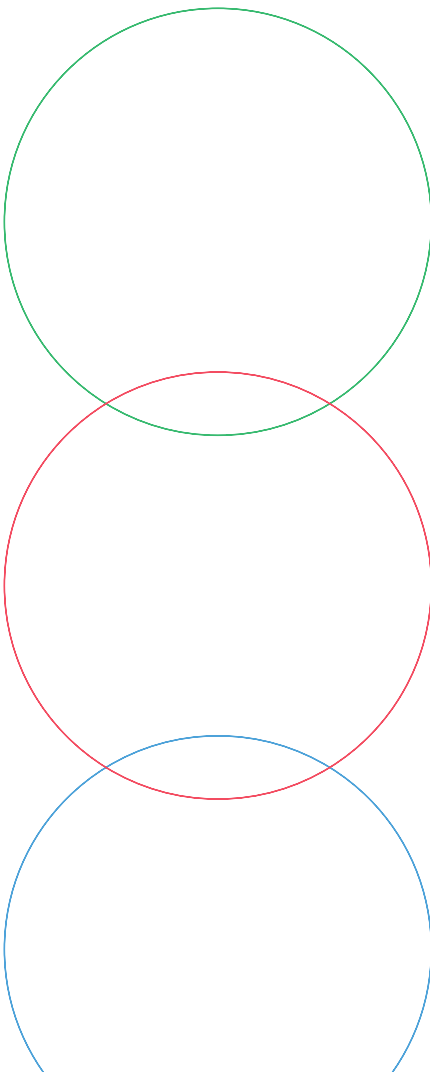
#### **RECOMMENDATION 4: STRONGER TOGETHER – INSTITUTIONALISING THE SINGAPORE TOGETHER AfA MODEL, A NOVEL FORM OF PRIVATE-PUBLIC PARTNERSHIP**

104. Collaborations between the public and private sectors are not new to Singapore. This model of partnership has, in general, traditionally depended on the Government's strength in strategic planning as a nation to first set the policy direction, and on the private sector's strengths in operational capacity and executional expertise to deliver outcomes. This model has served Singapore well over the years, delivering important infrastructure projects, such as our water desalination plants and education infrastructure.
105. But the case for a **new form of private-public partnership** has strengthened due to COVID-19. During the pandemic, we witnessed the way the private sector sprang into action, together with public sector agencies, to come up with innovations to support the fight against the pandemic. These have demonstrated the character of our nation, underpinned by innovation, grit, and resilience, and driven by an unrelenting #SGUnited and #SingaporeTogether spirit.
106. In a world that is more uncertain, complex, and volatile, **we must move towards private-public partnerships that are nimble, so that these partnerships can evolve with our circumstances; and that co-create, to ensure that the needs of Singaporeans continue to be served while creating shared value for both private and public sector players and our workers.** Such partnerships can be framed to deliver public value on a larger scale, by addressing complex economic or industry issues or fostering innovation and competitiveness to drive industry-wide transformation.

107. These partnerships reflect the reality that neither the Government nor industry has a monopoly of knowledge, expertise, resources or capabilities. Both play complementary roles in developing the market, growing enterprises, creating jobs, and driving economic growth for Singapore. To emerge stronger, we must therefore better combine the strengths of the Government – such as in economic planning and building an enabling and dynamic environment for enterprises, with the strengths of the private sector – entrepreneurial instincts and operational agility, and with our workers – a highly skilled and adaptable workforce. When the public, private, and people sectors work together, we can strive for ambitious goals.

### INSTITUTIONALISE THE SINGAPORE TOGETHER AfA MODEL

108. This has been demonstrated by the EST's AfAs. As industry-led coalitions, working in close partnership with the Government, the AfAs **translated our ambitions for Singapore into action-oriented experimentation and learning to help us advance key growth opportunities or push new frontiers.**
109. **The AfAs are a new way of partnership.** By adopting an agile “startup” approach, the AfAs were able to work quickly to prototype ideas within a short period of time, while concurrently engaging government agencies and other key stakeholders to stretch the medium- to long-term ambition in each of these opportunity areas. This approach was particularly effective in:
- a. Rallying industry around complex problems and aligning on the solutions, such as the AfAs on Supply Chain Digitalisation and Digitalising Built Environment.
  - b. Delivering concrete initiatives within short timelines, such as the AfAs on Facilitating Smart Commerce, Enabling Safe and Innovative Visitor Experiences, and EduTech.
  - c. Achieving private-public alignment on the roadmap for scaling up, which may involve changes to industry practices, business models, capability building for both businesses and workers, and regulatory support, such as the AfA on Robotics.
  - d. Collecting feedback and data from rapid concept testing, which enabled assessment of whether there was sufficient business case to create new businesses out of each concept, such as the AfA on Sustainability.



### AfA on Supply Chain Digitalisation

The **AfA on Supply Chain Digitalisation** organised more than 20 workshops that brought together industry stakeholders from over 50 organisations, including industry associations, MNCs, SMEs, startups, and government agencies, to identify pain points and opportunities across the supply chain customer journey. Through these workshops, the AfA arrived at a common solution of a common data infrastructure (CDI) to enhance interoperability between supply chain platforms.



### AfA on Robotics

The **AfA on Robotics** brought together key stakeholders across the cleaning value chain (from technology providers and service providers, to end clients) to identify key problem statements, particularly in light of the COVID-19 pandemic and the need to maintain high hygiene standards while minimising social contact. It was able to establish the set of commercial terms necessary for companies across the value chain to invest in and scale up the adoption of cleaning robotics beyond one-off pilots to strengthen the adoption of robotics solutions in the sector.

### AfA on Sustainability

The **AfA on Sustainability** embarked on two sprints to develop and validate their ideas. The first sprint was to develop a carbon market. The AfA brought key ecosystem stakeholders together, and arrived at a value proposition to facilitate price discovery, improve liquidity, and verify the integrity and source of carbon credits, including nature-based solution projects. It also explored the feasibility of tech-enabled verification. The second sprint was to develop a one-stop solution for companies to measure, mitigate, and offset their carbon footprint.



### AfA on Enabling Safe and Innovative Visitor Experiences

The **AfA on Enabling Safe and Innovative Visitor Experiences** demonstrated the huge potential of a strong working relationship between private and public sectors. Involving government regulators (such as MOH, MOT, and STB), private sector players (such as Changi Airport Group (CAG)), and industry associations (such as the General Insurance Association of Singapore (GIA)), the AfA was able to promptly introduce an inbound travel insurance covering COVID-19-related costs to build travellers' confidence, and facilitate the gradual reopening of Singapore's borders. By putting forth clear guidelines, the AfA rallied private insurers, namely American International Group (AIG), Chubb, and Hong Leong Assurance (HLA), to respond promptly and favourably to the call to develop a COVID-19 insurance product for visitors, despite the uncertainties of the situation.





110. These were made possible by industry leadership acting with the larger good in mind, applying their entrepreneurial instincts to identify new growth opportunities for Singapore, having the operational nous to identify key pain points for businesses so as to further unlock ecosystem synergies, and deploying operational assets, know-how, and networks to move quickly in executing prototypes to test out ideas. The Government played a fundamental part in going beyond regulating at arms-length, to lean forward and work hand-in-hand with the private sector to pursue a common mission in the respective AfAs. In this manner, not only do the AfAs exemplify the Singapore Together spirit, the intense experience of collaborating together, shoulder-to-shoulder, in an AfA sprint also forged new relationships of trust amongst those involved. Social capital built up in this way will stand us in good stead to advance Singapore's collective interests, unlock new opportunities, and enable us to act with versatility and speed on new opportunities or when challenges arise. As we chart a new path forward, this collaborative spirit of the Government, industry, TACs, the Labour Movement, and our people, and this new partnership model, will be Singapore's hallmark and competitive advantage.

111. Given the initial success of the EST's AfAs, **the EST recommends institutionalising the AfA approach, which taps on the complementary strengths and offerings of the private and public sector stakeholders.** Being a relatively new modus operandi spurred by the COVID-19 crisis, the AfA approach should be promoted and further nurtured for some time by the FEC, to ensure its adoption and effectiveness in the economic realm. **The EST recommends that future AfAs in the economic domain be primarily (but not exclusively) established under the FEC,** and serve as an additional platform for private-public collaboration<sup>12</sup> and a key enabler for economic growth. FEC Clusters, given their tripartite structure and oversight of the ITMs, will be well-placed to identify areas that could benefit from an AfA approach and enable possible topics to be surfaced and discussed by diverse industry stakeholders.

112. **The EST also recommends that the early learning points from the EST's AfAs be taken into account to strengthen the execution of future AfAs.** The EST has observed the following success factors across its AfAs:

- a. **Alignment of private-public interests on goals that are achievable in three to six months,** which facilitated the quick engagement of private and public sector members and injected a sense of urgency into the prototyping of ideas.
- b. **Commitment of private sector leaders to serve as hands-on "chief executives" to steer the AfA and commit resources to execute pilots.** This includes: (i) identifying business opportunities with national significance that can be acted on quickly, (ii) co-creating ideas, proposals, and implementation plans, (iii) deploying operating assets and resources to enable rapid prototyping, and (iv) activating their personal and professional networks to bring the right partners on board.
- c. **Involvement of senior representatives from the relevant government agencies** to lean in to sprint together, providing policy and regulatory support, towards the AfA's mission.

<sup>12</sup> Open innovation, economic challenges, and expert panels.

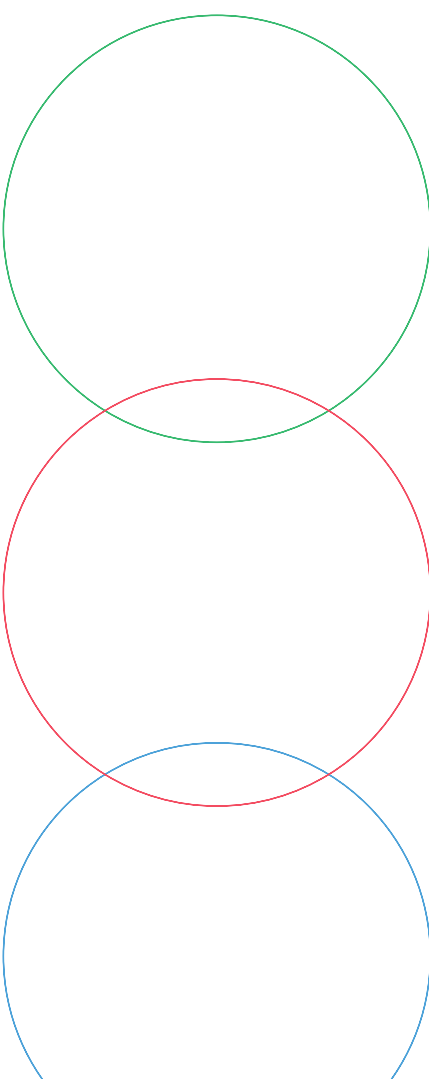
113. To facilitate the success of future AfAs, the EST recommends setting as key criteria for commissioning new AfAs: **(a) the readiness of a clearly defined joint goal(s) that is transformative for the economy and jobs, with a bite-sized proof point that is achievable within the AfA's compressed timeline;** and **(b) the active participation of senior private and public sector leaders who are willing to invest operational resources to sprint together to develop ideas, plans or prototypes and execute these.** Particularly, the willingness of AfA partners to commit operational resources will serve as a litmus test to whether there is agreement amongst the parties that an AfA should be commissioned (or conversely, exited at the next key milestone), as well as drive the AfA's work throughout its lifespan. These will ensure that we avoid engaging in a numbers game, proliferating AfAs in name only, but not in substance. Finally, **(c) an AfA should also determine upfront the decision metrics as to whether it should close or continue. This will enable the ecosystem to reduce the number of pathways that needs to be considered going forward, and can further galvanise support to focus on the most viable approaches.**
114. The risk of **“failing fast and failing forward” is an expected feature and not a bug of the AfA model.** Such an approach could galvanise a deeper transformation in our attitude towards failure. When entrepreneurs succeed in commercialising new innovations, they revolutionise markets or create entirely new value chains. But even when entrepreneurs fail, they still challenge the status quo and may provide the spark for industries to evolve. Can Singapore increasingly evolve its business culture into one that is less risk-averse, more resilient, and able to constantly bring failed entrepreneurs back into the fold, for them to bounce back and constructively apply their experience to try again?
115. **We therefore expect AfAs to “graduate” in different ways, and we must be open to this.** Some AfAs will not work and we will learn why, and we must be prepared to end the AfA. Some AfAs will conclude by providing lessons that can be applied to other initiatives – for example, the AfA on Robotics will provide insights on broader initiatives on AVs. Some AfAs will have secured the agreement of stakeholders to take over implementation and scale-up, such as the work on the CDI under the AfA on Supply Chain Digitalisation, or the formation of a platform under the AfA on AgriTech. **The FEC, as the proposed custodian of the AfAs in the economic domain, should continue to refine the AfA model, by distilling the ingredients for success, and the insights from challenges and failures.** This way, the AfAs can serve as a robust mechanism, alongside the ITMs, in supporting the FEC to drive the future economy agenda, and enable us to address emerging issues in a nimble manner in the fast-changing operating environment.



**RECOMMENDATION 5:**  
**STRONGER TOGETHER – STRENGTHENING INTERNATIONAL PARTNERSHIPS, ESPECIALLY WITH SEA**

116. As a small and open economy, international trade is indispensable to Singapore. In a more troubled world, we must resist the tide of turning inwards. We must continue to cultivate strong and meaningful international partnerships with the world. For instance, we have pushed forward with partnerships in the digital realm, through Digital Economy Agreements (DEAs) that seek to shape international rules and establish digital economy collaborations, starting with like-minded partners such as Australia, Chile, and New Zealand. We have also participated actively in bilateral cooperation projects such as the Singapore-China (Shenzhen) Smart City Initiative, where we signed nine Memoranda of Understanding (MOUs) committing to joint efforts, including the establishment of an Asia SME Hub, and promotion of innovation and entrepreneurship cooperation for businesses to access Shenzhen and SEA market opportunities.
117. In particular, we must contribute to the growth of SEA, together with SEA. In 2019, ASEAN was the third-largest market in Asia after China and Japan, and the fifth largest globally.<sup>13</sup> As COVID-19 accelerates the need for more resilient supply chains, SEA has emerged as a vital production location for the world. Our region's diversity can be a source of strength, as there are opportunities for all to win. However, achieving this will not be straightforward. We must think hard about what Singapore can offer, that positions us uniquely as a trusted partner to and within SEA. SEA is also a heterogeneous region. There will be no easy one-size-fits-all approach in business partnerships across the region. We will need to deepen our instincts and acumen to operate effectively and adapt to local conditions.
118. **As a country, we will need to think about new models of integration and new modes of connectivity, so that we can position ourselves as a partner for COVID-19 recovery and growth, and foster win-win partnerships with our neighbours.** We can contribute to strengthening SEA's position in global value chains, as more SEA economies move from primary industries into secondary industries and create more value by developing their rich resources. Singapore can work with SEA to develop an integrated regional market that exports not just goods and services, but even capital and our talent. This speaks to Singapore's role in the SEA network, and in enabling SEA to connect to global markets and major innovation nodes. For example, as Singapore looks to grow its expertise in carbon services and trading, we also want to support companies and countries in the region to lower their carbon footprint, and unlock the potential supply of good quality credits from nature-based solutions in SEA.
119. This will require Singapore to **take a long-term investment perspective as we develop partnerships in the region at all levels, and deepen our engagement with and knowledge of the region.** The Government will continue to strengthen traditional government-to-government engagements, particularly in improving trade connectivity and upholding multilateral frameworks, such as the Joint Ministerial Statement (JMS) on supply chain connectivity during the COVID-19 pandemic, the Regional Comprehensive Economic Partnership (RCEP), and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP).

<sup>13</sup> Association of Southeast Asian Nations. (2020). ASEAN Key Figures 2020.

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120. In addition, as more Singaporeans work and train in the region, they will be better attuned to ground realities, cultural sensitivities, and business opportunities. **Singaporeans need to develop a deeper and more instinctive feel of SEA.** This will enable Singaporeans to engage more effectively with our neighbours. For example, the Government has set a “70-70” target, for 70 per cent of local IHL students to have overseas exposure, and for 70 per cent of this exposure to be in SEA, China or India.
121. There is also potential for Singapore to meet the increasing need for upskilling and reskilling in the region, and contribute to the broader effort to grow the next generation of business leaders in SEA. For example, we have Technical and Vocational Educational and Training (TVET) collaborations with strategic partners in the region, ranging from train-the-trainer and consultancy programmes, to turnkey services for setting up TVET training centres. We could extend these collaborations to areas such as hospitality and retail, that could improve the employability of a wider segment of workers in the region and spur their domestic economies. Additionally, industry-relevant training delivered by corporate academies in Singapore can be scaled to overseas learners, allowing Singapore corporates to identify and attract regional and global talent. For example, the AfA on EduTech has kickstarted a partnership with the Singapore Business Federation (SBF) to explore aggregating Singapore corporate academies to train a regional workforce. This could be extended to more exchanges of talent through internships, and also at more senior management levels through attachments amongst participating regional countries. In this way, our regional partnerships at the individual and corporate levels can be strengthened as people in the region learn from each other, and relationships amongst the next generation of business leaders are fostered.
122. To complement these, **the EST recommends establishing more platforms that will bring interested companies together to engage the region at the business-to-business level for continued and effective collaboration. This will enable SEA to come together and serve the world, in ways that would not have been possible individually.** For example, Nongsa Digital Park’s pool of strong Indonesian tech talent creates useful tech solutions for Singapore-based companies. The SEA Manufacturing Alliance (SMA) allows companies to leverage the strengths of the leading industrial parks in the region, tap on Singapore SMEs to deliver customised solutions, and benefit from Singapore’s rich and innovative manufacturing hub. **The EST believes that partnerships and investments at the business-to-business level should not be solely driven by individual corporate interests.** Rather, Singapore businesses should be driven by a longer-term mindset of working with the region, and building regional partnerships from the ground up.
123. The EST has convened early efforts to advance this. For instance, SBF has, through its GlobalConnect@SBF platforms and initiatives, been actively exploring viable commercial projects which Singapore and Indonesian companies are interested in, in growth areas such as supply chain, healthcare, education, sustainability, and technology. SBF has also brought onboard large companies with strong international networks as strategic partners to expand the range and depth of expertise available to Singapore SMEs, and will continue to grow this network of support. The EST welcomes interest from more industry and partners to collaborate on such ideas, in line with the FEC and Enterprise Singapore’s internationalisation agenda.

### Stronger Together with SEA – By Business, For Business

The SBF, in partnership with Enterprise Singapore, launched the GlobalConnect@SBF (GC@SBF) to enable Singapore companies to expand overseas, and foster win-win partnerships with overseas corporations. GC@SBF supports companies across all stages of internationalisation with the end-goal of landing in overseas markets.

GC@SBF provides targeted market advice through a team of market specialists. More recently, to better support SMEs with limited resources on the ground, SBF established two overseas offices in Jakarta and Ho Chi Minh City. Several Singapore businesses have expanded into Indonesia, Thailand, Vietnam, Turkey and USA through SBF's facilitation since the GC@SBF initiative was launched.

SBF also signed Memoranda of Understanding (MOUs) with Keppel Land and UOB in February 2021 to sign them on as strategic partners in helping our SMEs internationalise. The partnership with UOB will allow Singapore businesses to access networks across Asia through UOB's Foreign Direct Investment (FDI) Advisory Unit's 10 FDI centres, while the partnership with Keppel Land will enable Singapore businesses instant landing points through KLOUD services overseas. Such partnerships augment SBF's existing relationships with counterpart organisations across the world, including SEA, Africa, and Europe.

Riding on this momentum of business-to-business partnerships, SBF is exploring establishing more platforms that will bring interested companies together to engage the region at the business-to-business level for continued and effective collaboration.

SBF is partnering both local and overseas TACs to build a network that can support companies to land in regional markets. One example is with the Singapore Food Manufacturing Association (SFMA) and other Singapore food groups to include Singaporean food products in limited edition "Vietnamese New Year Hampers" sold at the retail outlets of HAPRO, AEON Citimart, and Ryan's Grocery in Ho Chi Minh City and Hanoi. This was a first step in partnering with Vietnamese supermarkets from the ground-up, to generate brand awareness for Singaporean food.

SBF has also partnered industry players to create an online marketplace that connects Singapore and overseas businesses for cross-border trade. The platform, known as GCB2B, is slated to bring on board more than 2,000 companies from various countries such as Australia, Rwanda, Singapore, and Vietnam. Services to facilitate those trades are also expected to be integrated over time, starting first from end-to-end logistics fulfilment and a payment gateway.



124. The potential for a digital SEA will present the region with virtual and unlimited opportunities. As SEA countries are important digital partners to Singapore, **the EST recommends strengthening digital connectivity across SEA** towards a Single Digital Area, such as through digital economy collaborations (DEAs, Digital Cooperation Memoranda of Understanding and Working Groups, as well as targeted capacity-building), and building on the ASEAN Agreement on Electronic Commerce, which can facilitate the seamless flows of goods, services and data. The EST recognises the Government's current efforts to enhance digital trade standards interoperability, as electronic exchange of trade documentation is pursued via the ASEAN Single Window, and further initiatives on trade facilitation will enhance our digital integration. Digital "highways", in addition to our physical air and sea links, will enable the flow of data and growth of digital trade and commerce, and unlock virtually unlimited opportunities for the region. Businesses can benefit from these through increased efficiencies and lower costs, as well as greater regulatory transparency and cooperation.
125. The EST also notes the Government's efforts and engagements with ASEAN to **set out stronger digital integration in the area of data flows, promote regional recovery through inclusive digital transformation, and enhance cybersecurity cooperation**. The 1st ASEAN Digital Ministers Meeting (ADGMIN), held in January 2021, approved a number of initiatives supporting greater digital integration and transformation.<sup>14</sup> The EST agrees that these will help SEA businesses, particularly SMEs, in their data-related business operations and seize opportunities in the digital economy. The EST also supports the Government's initiatives to enhance ASEAN cybersecurity cooperation.<sup>15</sup> These efforts to support an inclusive, secure, and coordinated digital ASEAN will allow our region to emerge stronger and more resilient from the COVID-19 crisis.
126. Overall, for Singapore to play a role in our growing region and in the world, we will need to become adept at cultivating our global reach whatever the circumstances. This will require our businesses and Singaporeans to expand our cultural broadband and strengthen our links to the rest of the world. Whatever eventuates, by staying open to flows of trade, capital, people, and ideas, and working with our neighbours to better harness each other's strengths to seize opportunities in a growing SEA, we can also realise the full potential of SEA as a region, economy, and community as we enter a new phase of economic growth together.

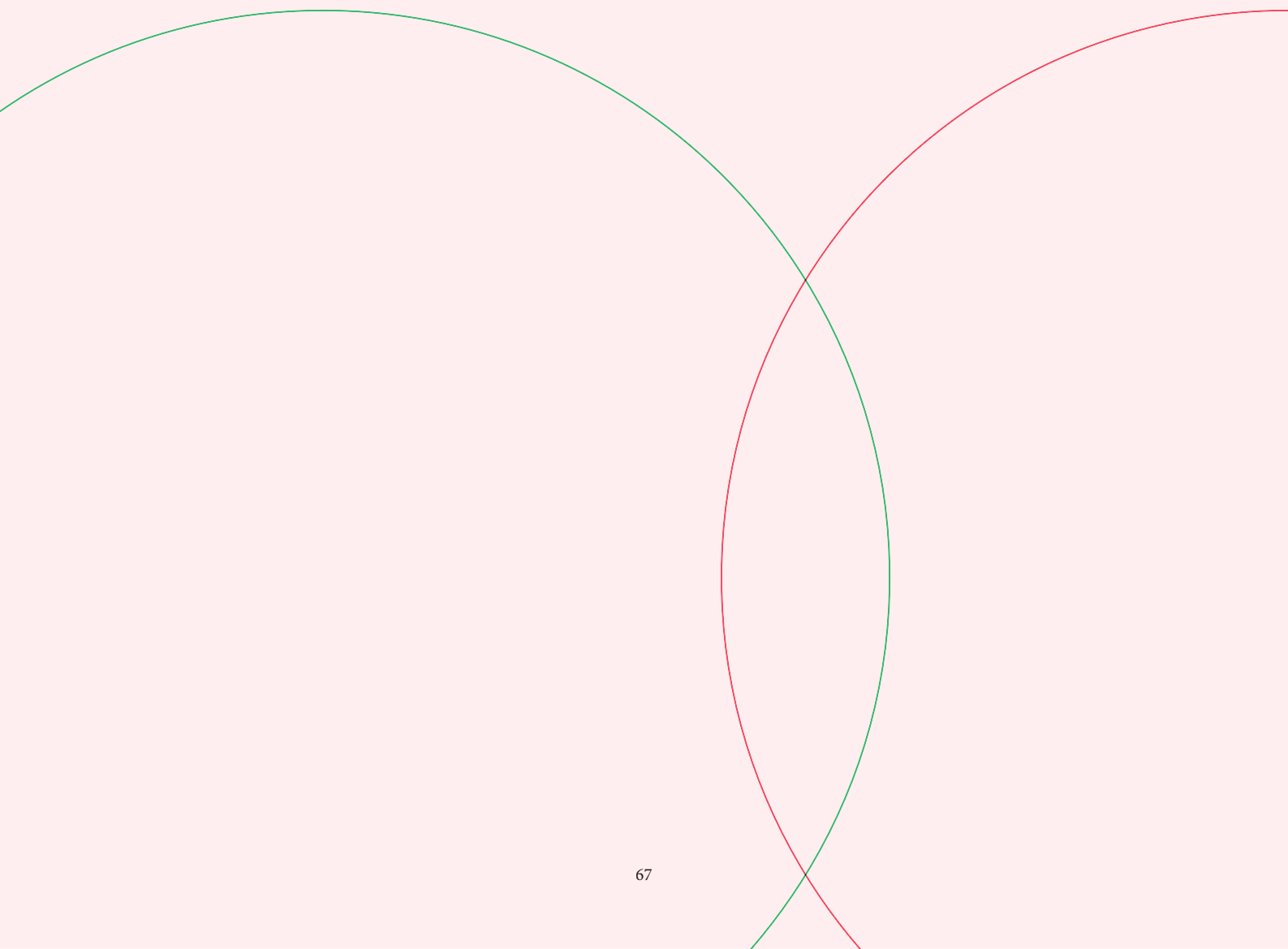
<sup>14</sup> The 1st ADGMIN approved the ASEAN Data Management Framework (DMF) and ASEAN Model Contractual Clauses (MCCs) for Cross Border Data Flows in January 2021. The 1st ADGMIN also approved the five-year ASEAN Digital Masterplan 2025, to accelerate inclusive digital transformation.

<sup>15</sup> The existing ASEAN Member States' National Computer Emergency Response Team (CERT)-level exchanges were formalised with the establishment of an ASEAN CERT information exchange mechanism as a core component of the future ASEAN CERT. The mechanism will support national CERTs through the exchange of information and best practices, and coordinate CERT capacity building programmes in the region.



ANNEX I:

# THE EST ALLIANCES FOR ACTION



# Alliance for Action (AfA) on Digitalising Built Environment

## VISION

The AfA envisions an integrated and collaborative Built Environment (BE) future that is digitally enabled, resilient, sustainable, and productive. With the impact of COVID-19 making clear the need for digitalisation, the AfA has worked with government agencies to establish ambitious targets on this front:

- a. Secure commitment from 1,000 value chain partners onboard a Coalition for Built Environment Digitalisation by 2025; and
- b. Attain at least 70% Integrated Digital Delivery (IDD) adoption, in terms of Gross Floor Area (GFA) of new building projects by 2025.

## RESULTS

The AfA has “turbo-charged” digital transformation in the BE Cluster by catalysing the launch of Common Data Environment (CDE) Data Standards to encourage digital collaboration amongst industry stakeholders without needing players to conform to a single platform. Recognising the importance of securing the commitment of “power users” to support this and generate a “pull effect”, the AfA established the Coalition for Built Environment Digitalisation, an industry digital partnership. To date, the AfA has onboarded more than 300 companies, such as CapitaLand, City Developments Limited, and GuocoLand Limited, to pilot the CDE Data Standards, and adopt suitable digital platforms in their upcoming projects.

## LEARNING POINTS

Building on the learnings gathered from the AfA, BCA launched the Growth and Transformation scheme, which will take a value chain rather than project-based approach to drive transformation in the BE Cluster. It will support the formation of strategic alliances among progressive developers, builders, and consultants across the entire value chain.

## CONTEXT

1. The BE Cluster comprises a long and complex value chain with many stakeholders. The tripartite approach adopted by the FEC’s BE Cluster and its Industry Transformation Maps (ITMs)<sup>1</sup> have helped to forge a more collaborative relationship between stakeholders in the Cluster. This has allowed the Cluster to make good progress in its transformation, such as the use of IDD to enable construction firms, architects, and engineers to visualise building designs prior to actual production and minimise costly reworks; and Design for Manufacturing Assembly (DfMA) to prefabricate building components for on-site assembly, which improves on-site productivity.
2. However, COVID-19 has dealt a huge blow to the Cluster, as BE firms face the challenges of production and operations being put on hold, and limited access to workers due to travel restrictions. While this has threatened businesses and livelihoods, it has also **pushed the Cluster**

<sup>1</sup> The ITMs under the Built Environment Cluster are Construction, Environmental Services, Real Estate, and Security.

to reimagine the way we build to overcome these challenges. For example, businesses are adopting digital technologies that can be used at worksites to support safe distancing and facilitate the commencement of on-site productions and operations. Although we are in a better position now compared to the earlier days of the pandemic, **we must not lose momentum in transformation.**

### AMBITION & FOCUS AREAS

3. The AfA aspires to an **integrated and collaborative BE future that is digitally enabled, resilient, sustainable, and productive.** This will uplift the BE Cluster, creating good jobs for Singaporeans, and enabling progressive local companies that can fly Singapore's flag in the region and beyond.
4. As a first step towards this aspiration, the AfA has identified digitalisation as a core element across the Cluster. While most BE firms are minimally digitalised, processes and digital systems are still disparate, which reduces the potential for gains through digital collaboration. **The AfA thus sought to develop an interoperable and connected IDD ecosystem, to improve productivity across work processes, create better jobs, nurture exportable digital capabilities, and strengthen the Cluster's resilience to external threats and shocks.** This focus on IDD was unanimous amongst the AfA, as pilot IDD projects demonstrated estimated project time savings of more than 25%. Projects that have adopted IDD are also found to have better delivered in terms of timeline, cost, quality, and safety from design to construction.
5. This required the AfA to focus on two areas. First, **establishing industry-wide CDE Data Standards**, to support the integration of complex work processes across the value chain, via integration of interoperable digital platforms. The CDE Data Standards will be updated periodically to meet the evolving needs of the industry. Second, **establishing a Coalition for Built Environment Digitalisation (CfBED)**, which is an industry digital partnership to encourage the adoption of interoperable digital platforms, and enhance digital literacy to manage increasingly complex projects.

#### Hubble

Hubble is developing Singapore's first Construction Digital Platform (CDP), which is a cloud-based platform driven by machine learning and artificial intelligence. The CDP offers a suite of digital services to allow contractors of all sizes to manage a project end-to-end and collaborate with various project stakeholders on a single unified platform.

Based on a set of agreed data standards, the CDP simulates a CDE that enables seamless data sharing across various essential digital use cases for IDD, which are usually performed on different digital platforms throughout the construction life cycle.

The CDE Data Standards will specify the type of information required for a building project, and how information can be structured, so as to facilitate sharing and collaboration amongst BE firms to manage and harness data on the CDP. It will help BE firms to stay updated and connected in their projects, and adopt a bird's-eye view across different functions to make informed decisions.

6. Through these initiatives, the AfA targets to:
  - a. **Secure commitment from (i) 300, and (ii) 1,000 value chain partners onboard the CfBED by 2021 and 2025, respectively; and**
  - b. **Attain at least 70% IDD adoption, in terms of GFA of new building projects, by 2025.**

## ACHIEVEMENTS OF THE AfA

7. While digitalisation has always been a key strategy in the FEC BE Cluster, the AfA has helped to **move the digitalisation agenda forward more quickly than in the past, and expedited the establishment of the CDE Data Standards**, by leveraging the complementary expertise and networks of private and public sector stakeholders involved in the AfA. To date, the AfA has secured the commitment of **more than 300 industry stakeholders and 25 projects onboard the CfBED**, to implement the CDE Data Standards and adopt a chosen interoperable digital platform for their in-house projects. This includes government agencies such as JTC, HDB, and LTA; and private sector participants such as Changi Airport Group, and members of the Real Estate Developers' Association of Singapore, including CapitaLand Limited, China Construction (South Pacific) Development, Fraser Property Limited, GuocoLand Limited, and City Developments Limited. To complement the launch of the CDE Data Standards, the AfA is also working with BCA and IMDA to promote the use of pre-qualified digital platforms that are in line with the Data Standards, via the Productivity Solutions Grant (PSG) and Productivity Innovation Project (PIP), to encourage industry stakeholders to adopt the Data Standards digitally and raise value chain partners' IDD capability.
8. In terms of workforce development, BCA Academy has also launched a **two-stage training programme to ramp up digital competency of professionals, project teams, and businesses to formulate relevant IDD strategies and execute IDD projects**. By encouraging upskilling of our workers, the AfA's initiatives aim to nurture home-grown digital talent and exportable digital capabilities in the long run. With industry-wide CDE Data Standards, companies across the BE value chain can now enhance the digital technical skills and competencies for various emerging roles in their workforce, including Asset Information Management, Project Process Planning, and Internet of Things Management. This will uplift workers' skills and competencies to handle smart operations, and allow them to take on other roles in the Cluster.

## KEY LEARNING POINTS

9. The accelerated milestones achieved by the AfA in a short period of time and despite the challenging operating environment is testament that the Cluster can come together to work nimbly and quickly towards a common goal and vision, that is inspiring and beneficial for all. By sharing one another's unique expertise, perspectives, and resources, **the AfA was able to create a "pull effect"**, in which companies brought onboard their partners on the digitalisation journey. For example, in the Rivière Project by Frasers Property, Woh Hup and its value chain partners have adopted a commercial common data environment solution for updates and review of a common Building



Information Modelling (BIM) model. This strengthened collaboration between stakeholders which benefited downstream production and installation planning. Main contractors such as Tiong Aik Construction, Woh Hup, and Kimly Construction have also adopted a complete suite of integrated digital solutions from IMDA's Construction Advanced Digital Solutions (ADS) to enforce the COVID-Safe Restart Criteria on site, and brought along their downstream supply chain partners to digitalise work processes related to safety and quality management on the Hubble Platform.

10. The AfA, having met its short-term goals, has worked with the BE Cluster to take steps towards building a more integrated and connected BE Cluster. In the spirit of Singapore Together, experience from the AfA's process has demonstrated the **importance of private-public collaboration in doubling down on our efforts to push new boundaries, and reimagine the way we work in the BE Cluster**. We have since seen the AfA approach being put into practice with the launch of the Growth and Transformation Scheme by BCA to support the formation of strategic alliances amongst key value chain partners, from developers, builders, consultants, to contractors. This will enable the Cluster to emerge stronger from the pandemic.

## RECOMMENDATIONS

11. Recognising that COVID-19 has amplified the vulnerabilities of the BE Cluster to external threats and shocks, it is important for the private and public sectors to continue to work together to accelerate the rate of digitalisation at both the enterprise and process level, and uplift digital competencies of supply chain partners to take on new value-added functions. This will also help to create higher-skilled jobs in a better working environment that will appeal to more Singaporeans. **The AfA recommends that the FEC and the IDD Steering Committee continue this push towards greater digitalisation, productivity, and data sharing across the Cluster to bring about efficiency gains and smarter buildings; adopting the AfA approach which sets out long-term ambitions while taking quick and practical steps towards the common goal.**

# Alliance for Action (AfA) on EduTech

## VISION

The AfA aspires for EduTech to open the window for Singapore to reach the world's learners. Growing the quality of our Education sector will strengthen the competitiveness of our workforce, and position Singapore as a global talent hub.

## RESULTS

The AfA brought over 200 stakeholders in the EduTech community together to agree on the key export opportunities and enablers required. It has also supported new partnerships and EduTech ventures as real-life pathfinders for what is needed to unlock synergies within our community. It has established that within EduTech, the Training and Adult Education (TAE) sector presents the strongest growth opportunity for Singapore, advantaged by our concentration of corporates and corporate academies, and position amidst a region rich in human potential and markets.

## LEARNING POINTS

The AfA brought together diverse stakeholders involved in EduTech, including universities, polytechnics, private education providers, startups, in-house corporate academies, and government agencies. The AfA supported ventures that received the most interest from ecosystem stakeholders to provide expertise or offer their resources, and in so doing demonstrated the power of collaboration to unlock new ecosystem value.

## CONTEXT

1. **COVID-19 has accelerated the global adoption of EduTech**, from home-based learning to online professional education and training. The Education sector is currently under-digitalised globally, with only 3.1% of the sector's expenditure going to EduTech. Estimates project the EduTech sector to grow to about US\$400B in 2025.<sup>2</sup>
2. **Singapore's education and continuous education systems have a strong reputation**, undergirded by the top international standing of our Autonomous Universities, and strong reputation of our polytechnics and Institute of Technical Education (ITE) in technical and vocational education and training (TVET). Singapore has also prioritised lifelong learning and skills acquisition, particularly with the accelerated adoption of Industry 4.0. We have established a good foundation for Continuing Education and Training (CET) for professionals, managers, and rank and file workers, enabled by our Singapore Skills Framework.

## AMBITION & FOCUS AREAS

3. Talent has and will continue to be a critical determinant of Singapore's competitiveness. Our COVID-19 experience has given us insights into the future of work and new ways of thinking about talent. This includes the rise of remote work, and the power of online and just-in-time learning to help individuals keep pace with employment trends.

<sup>2</sup> Cairneagle, EdTechX, & IBIS Capital. (2020). EdTechX Global Report – The 2020 Guide to Education & Training.

As the prospect of a global remote workforce emerges, this brings to the fore questions on how our companies can better tap on global resources, including in-situ talent, to better serve global demand from Singapore. For Singaporeans, this could open up new opportunities for work beyond our shores.

4. **This presents an opportunity for our TAE sector to grow globally**, addressing issues we see in Singapore and the region – in closing skills gaps and curating training programmes for learners to facilitate job matching; providing practical learning tied to business needs; and delivering such learning interventions affordably and at scale by tapping on education technologies. Singapore's advantages include: (i) our unique ecosystem and concentration of corporates and corporate academies, Institutes of Higher Learning (IHLs) and CET providers, technology players and startups, and (ii) our position in a region rich in human potential and markets.
5. In terms of workforce development, the **AfA believes that there is a need to transform the Education sector through technology to strengthen the competitiveness of our workforce**. Technology will enable education and training to be more pervasive and resilient. EduTech takes education outside the classroom through digital devices, and enables students to pursue learning at their own pace. It also allows our students and workforce to continue learning, even if COVID-19 or other factors prevent us from doing so in physical environments. This will bridge current skills gaps, and facilitate the transition of workers into redesigned or higher value work, to improve the overall competitiveness of our workforce, enabling them to embrace opportunities in both local and overseas markets.

## **ACHIEVEMENTS OF THE AfA**

### **a. Venture Building**

6. With support from BCG Digital Ventures, the AfA organised a Hack-A-Future workshop in June 2020, bringing together almost 30 organisations, from universities, polytechnics, and private education providers, to startups and government agencies, to ideate venture concepts to advance EduTech in Singapore. BCG Digital Ventures introduced key trends and conceptualisations of the future to trigger discussion and collaboration, which include (i) Learn with me: How might we enable the building of community through remote learning experiences, such that motivation can be sustained over time? (ii) Personalised Career Portfolio: How might we encourage people to take the first next step to explore new career options and learn new skills, instead of putting it on the backburner, until a crisis triggers change?, and (iii) Real World School: How might we encourage self-assessment of skills needs, learner readiness, and growth mindset?
7. Four venture concepts were selected to embark on three-month sprints to validate the opportunity areas and develop viable business models and prototypes. They target segments of our current and future workforce, aiming for an agile and strong Singapore core that takes ownership of its skills journey:
  - i. **ZilLearn Skills** is a fully integrated career advancement platform in Singapore that provides personalised career and learning recommendations for Singaporeans through skill sets evaluation, leveraging data-driven job market insights, and identifying upskilling and reskilling needs to future-proof careers and transform lifelong learning.

- ii. **Agility Growth Index (AGI)** is an analytics tool that helps companies to understand the learning behaviours and motivators of employees, for effective engagement and retention.
  - iii. **WorkGuide.co** aims to be the go-to local guide for the fresh entrant workforce with the largest resource of questions and insight on work-skills matters.
  - iv. **eduCLaaS Academy** seeks to bridge digital skills mismatches across Asia with innovative applied learning delivery and advanced education technology. The eduCLaaS platform connects higher education students, working adults, hiring employers, and higher education institutions for scalable digital talents incubation and deployment in Singapore and across Asia.
8. Supporting the ventures doubles as pathfinders to discover the necessary enablers to unlock ecosystem synergies, e.g. ZillLearn Skills demonstrated new ways of private-public partnership by partnering with SkillsFuture Singapore (SSG) to leverage analytics to create skills-job matches, and pilot the use of SkillsFuture Credit on a subscription basis.

#### b. Galvanising the Ecosystem

9. The AfA galvanised more than 200 EduTech stakeholders through four industry engagements, rallying support around a common goal of identifying EduTech solutions for export, and capturing new market opportunities.
10. Pebbleroad was engaged to lead a design sprint on how our EduTech ecosystem can be strengthened to capture the potential of EduTech. More than 30 stakeholders were interviewed, followed by an ideation workshop on opportunity areas with almost 20 organisations, and an industry engagement session to share its findings and gather feedback with more than 120 participants.
11. The AfA established that the **TAE sector presents the greatest opportunity for Singapore**. Globally, rapid technological advancement has created a great need for reskilling, creating a massive demand for CET, especially for modularised training programmes and micro-credentials. The global CET sub-sector is expected to grow by 5.5% annually from 2019 to 2025, higher than the K-12 and IHL sub-sectors.<sup>3</sup> The adoption of EduTech will enable Singapore CET providers to develop virtual training solutions, creating new virtual frontiers for the TAE sector.

- **Opportunity Area 1: Local CET providers should build on current TAE capabilities and move towards a “born digital” approach for training courses, to strengthen operational resilience amidst the pandemic and reach global learners through online and hybrid courses.** Singapore made an early start in establishing the CET sector, and there is an opportunity to position the sector for export through digital means. Online and hybrid CET courses developed for the local market can be scaled to global learning platforms through curation and adaptation. For example, local take-up for Temasek Polytechnic’s (TP) micro-learning courses is good, and overseas students have started signing up following TP’s regional marketing efforts. To differentiate from Massive Open Online Courses (MOOCs), the CET landscape can provide certifiable courses taught through interactive webinars, or via suitable local partners in target countries. Our polytechnics and ITE could explore setting up technical and vocational training institutes in the region, to provide training relevant to the skills base and market

<sup>3</sup> Cairneagle, EdTechX, & IBIS Capital. (2020). EdTechX Global Report – The 2020 Guide to Education & Training.

opportunities available, e.g. in tourism and hospitality. Digitalisation of the CET sector could build on efforts led by SSG as well as the Institute for Adult Learning.

- **Opportunity Area 2: Corporate academies play a unique role in the ecosystem with insight on jobs vacancies and skills in demand, and the ability to design and deliver practical training.** Based in Singapore, they sit within the Asia and Southeast Asia region – the world’s fastest growing production base and consumer market, rich in market opportunities and human potential. The diversity of markets and skills means corporates need to pull together the best team across the region to grow their business – people who understand the local market, and have deep functional competencies in technology, finance or manufacturing. Many large corporates in Singapore have established corporate academies under the programmes spearheaded by EDB and SSG. These corporate academies deliver industry relevant training based on Singapore’s experience of developing industrial hubs. With virtual learning, this can be scaled and offered to SMEs, suppliers, customers, and overseas learners. This helps Singapore corporates identify and attract regional and global talent, and enables them to grow their regional or global markets more effectively with stakeholders in their value chain. The AfA and several corporates are exploring the possibility of aggregating corporate training academies to train the local and regional workforce, including through internships, and senior management attachments amongst participating regional countries. This could encourage the region to cross-learn, build relationships amongst the next generation of business leaders, and strengthen meaningful international partnerships.

12. The growing middle class in the region is a **key driver for the K-12 sector** as parents continue to invest heavily in quality education services. Nonetheless, the study found this sector to be highly competitive as overseas markets have large well-funded players with access to local networks and resources (e.g. Ruangguru in Indonesia, Hocmai in Vietnam, and Byju’s in India). These incumbents could be potential partners for our Singapore K-12 premium enrichment players or EduTech providers.

- **Opportunity Area 3: Tuition and enrichment companies, and K-12 EduTech companies, can form alliances and consortiums to export education products overseas, and onboard learning platforms to offer their services globally as a more holistic Singapore education proposition.** The regional tuition and enrichment markets are significant and growing. Singapore tuition and enrichment companies, and K-12 EduTech companies, have developed curriculums and pedagogies resulting in more effective learning. School closures, caused by the COVID-19 crisis, have further accelerated adoption and acceptance of EduTech solutions at home and in schools. There is an opportunity for Singapore tuition and enrichment companies, and K-12 EduTech companies, to (i) onboard regional learning platforms to efficiently reach overseas markets, scale their business, and lower customer acquisition cost; and (ii) work together to pursue opportunities to sell content and solutions for different subjects as a package and strengthen their value proposition in overseas markets. This will enable a broad base of EduTech SMEs to succeed globally. Enterprise Singapore’s (ESG) efforts in this area could be scaled up in accordance with the growth of the market catalysed by COVID-19.



## KEY LEARNING POINTS

13. Through the Hack-A-Future workshop, the AfA was able to bring together almost 30 organisations across the education ecosystem, to ideate venture concepts to advance EduTech in Singapore. The exchanges from these discussions helped the participants to gain a better appreciation of the challenges, opportunities, and collaboration opportunities within the sector. Some of the stakeholders also provided expertise or resources to support the ventures that received the most interest, and in so doing, demonstrated the power of collaboration to create new value in the Education sector.

## RECOMMENDATIONS

14. Today, ESG supports EduTech companies with developmental resources, market facilitation and funding support. To fully realise the opportunity areas identified, Singapore will also need to unlock additional ecosystem enablers. These enablers are expressions of the new form of nimble, co-creating private-public partnerships exemplified by the AfAs.
  - a. **Enabler 1: Singapore Inc for EduTech. Encourage partnerships between EduTech companies, CET providers, IHLs, and corporate academies, and develop a consortium brand as Singapore Inc.** Innovation, knowledge creation, and learning are best unlocked through cross-sharing involving various players with different knowledge and competencies. Interactions can trigger collaborations amongst EduTech players. Eduspaze, Singapore's first EduTech accelerator, regularly organises events to connect startups to other education stakeholders to generate interest and catalyse collaborations. An EduTech committee has also been set up within SGTECH, a trade association for the technology industry in Singapore, to be a platform for EduTech players to exchange knowledge. Consolidating Singapore's brand value, bringing it to life, and creating a buzz around Singapore as an EduTech Centre of Excellence could take ESG's efforts in supporting the local EduTech industry to the next level.
  - b. **Enabler 2: Skills Certifications. Pilot the Workforce Skills Qualifications (International) (WSQi) to facilitate CET providers to export Singapore-branded training courses.** To support the export of Singapore-branded training courses, SSG is piloting a direct export model where interested registered training providers can reference the WSQ competency standards and/or the Singapore Skills Framework skills and competencies, to customise training courses for delivery overseas under the WSQi credentialing system. There is potential to couple these WSQi course offerings with consultancy services to leverage the training providers' experience in other CET-related work, e.g. experience in co-developing and validating the Skills Framework. WSQi and similar initiatives should be scaled up if there is sufficient industry interest and end-user demand from learners or employers beyond Singapore.
  - c. **Enabler 3: Test-bedding. Expand opportunities for test-bedding EduTech products in both K-12 and TAE sectors.** Test-bedding EduTech products with a selected sample of users is useful for co-creation, and gathering market needs and feedback for improvement. Expanding such opportunities will boost EduTech development and deployment in Singapore. Local EduTech companies can apply to test-bed complementary solutions on MOE's Student Learning Space. Eduspaze has also worked with partners to facilitate developmental opportunities

for EduTech startups, e.g. Eduspaze's MOU with international private higher education group, Kaplan, which will provide over 20 Singapore-based EduTech startups opportunities to develop their product and work towards a viable business model.

- d. **Enabler 4: EduTech Talent. Groom EduTech talent to accelerate pivot to online/hybrid teaching.** Talent is required to create, deliver, and measure the effectiveness of online learning. This includes online trainers, online curriculum developers, media developers, learning analysts, software programmers, and educational technologists, amongst others. More work is needed in this area to equip educators to design and deliver effective online lessons.
  - e. **Enabler 5: Funding and Commercial Networks. Strengthen fundamentals of EduTech startups to access early-stage private financing beyond government grants.** Most startups can secure funding below US\$1 million, but face challenges in breaching US\$5million. While there is growing interest from venture capitalists (VCs),<sup>4</sup> EduTech is less familiar amidst competing investment opportunities with shorter growth paths and proven investment returns. Investors have also noted that Singapore EduTech companies do not always demonstrate sufficient innovation, technology, or potential to address a sizeable market. Our startups will need to strengthen their differentiation and find test-bedding opportunities to gather sufficient data points on their solutions to gain investor confidence. While many enter the sector with a passion for education, they will also need business skills and commercial networks, which the community could work together on as part of Enabler 1.
15. Growing our EduTech ecosystem is a no-regrets move to make lifelong learning more pervasive, strengthen our education providers' business models, and pivot them to online strategies to reach new markets. The opportunity areas and enablers identified by the AfA are key first steps to position Singapore as an EduTech Centre of Excellence and a virtual talent hub. The recommendations can be reviewed and developed, where applicable, through the Education Industry Transformation Map (ITM).

<sup>4</sup> Pillai, S. (2020, October 13). US edtech fund Owl Ventures takes a shine to S-E Asia. *The Business Times*.

# Alliance for Action (AfA) on Enabling Safe and Innovative Visitor Experiences

## VISION

Singapore is one of the world's most visited cities by international travellers, and serves as cross-roads where people, capital and ideas meet. Spurred by COVID-19, the AfA sought to reimagine the end-to-end international visitor experience to deliver not only safe but innovative visitor experiences. Its aspiration was to restore 30% of Singapore's pre-COVID-19 travel flows by end-2021, and enable international businesses to connect in Singapore through MICE – Meetings, Incentives, Conferences, and Exhibitions, even amidst the COVID-19 global pandemic.

## RESULTS

The AfA developed prototypes for safe business events and safe leisure itineraries, including enablers such as an inbound travel insurance product and a digital concierge to assist both travellers and industry in managing pre-arrival procedures and post-arrival itineraries. The prototypes were piloted in November 2020 at TravelRevive – powered by ITB Asia & STB, the first hybrid international travel tradeshow to take place physically in Asia Pacific during COVID-19, with local and foreign attendees. This generated confidence to continue refining the prototypes to bring back large-scale events in a safe manner.

## LEARNING POINTS

The AfA demonstrated that new “sweet spots” can be found that balance health and safety concerns, if we come together in a common mission. The significant milestones achieved by the AfA within a short timeframe demonstrates that changes can be implemented promptly if private and public sector stakeholders work nimbly and flexibly in collaboration. Prototypes and initiatives implemented will set the foundation for the subsequent development of a commercially-viable framework that can be scaled to support more and larger-scale international business events going forward.

## CONTEXT

1. The **Tourism sector is a key pillar of the Singapore economy**, which strengthens Singapore's position as a Global-Asia node for business and leisure. However, COVID-19 has severely hurt tourism. From January to September 2020, visitor arrivals in Singapore fell by 81.2% compared to the same period last year.<sup>5</sup> The fall in international visitor arrivals has hurt many businesses and livelihoods, and undermined Singapore's position as a global business and air hub, unless bold steps are taken to re-establish cross-border links with the rest of the world. At the same time, there is an **urgency to restart safe business travel and Meetings, Incentives, Conferences, and Exhibitions (MICE) activities**, as the MICE sector's activities have also supported the growth of local companies in growth sectors, by facilitating the inbound flow of knowledge and expertise into Singapore, and providing business exposure and leads for them at MICE events.

<sup>5</sup> Singapore Tourism Board. (2020). *Tourism Sector Performance Q3 2020 Report*.

## AMBITION & FOCUS AREAS

2. Amidst a challenging operating environment, the AfA aspires to: (a) restore **30% of Singapore's pre-COVID-19 travel flows by end-2021**; and (b) maintain our status as the **Asia-Pacific's leading MICE destination**, and as one of the **world's most visited cities by international visitors**.<sup>6</sup>
3. For a start, the AfA has focused on the **MICE sector**, which supported over 34,000 jobs and contributed about \$3.8 billion of value-added, pre-COVID-19.<sup>7</sup> MICE events involve many stakeholders in the Tourism sector – from event organisers, ground handlers, attraction owners, to hoteliers – and hence are a useful segment to testbed new ideas for visitor experiences in a COVID-19 environment, through the following efforts:
  - a. **Design of Safe Business Events.** To conceptualise a model for safe, trusted, and innovative business events, by piloting strategic, large-scale international MICE event(s) in a COVID-19 environment, with rigorous Safe Management Measures (SMMs) in place without compromising the quality of the business experience;
  - b. **Design of Safe Itineraries.** To provide an industry guide for designing safe itineraries that are innovative, bespoke, and exclusive, to serve the needs of business and MICE travellers; and
  - c. **Deployment of Digital Tools to Enable a Safe and Seamless Journey.** To design and develop digital enablers to facilitate a convenient end-to-end safe travel experience, while providing functions that enable safe management and contact tracing in compliance with prevailing national requirements.
4. The successful pilot of these concepts will demonstrate Singapore's thought leadership, as an early mover to pioneer trusted, safe, and innovative visitor experiences in a COVID-19 environment. Through these efforts, we also hope to create a commercially-viable framework that can be scaled to support more and larger-scale business events in the future.

## ACHIEVEMENTS OF THE AfA

5. The AfA has reimaged the end-to-end visitor experience by designing a safe, enjoyable, and seamless journey for visitors to Singapore in a COVID-19 environment. This was demonstrated by the successful pilot of **TravelRevive – powered by ITB Asia & STB, the first hybrid international travel tradeshow to take place physically in Asia Pacific during COVID-19, with local and foreign attendees from 25-26 November 2020**. Featuring conference sessions, exhibitions, and opportunities for one-on-one buyer-seller appointments, the two-day event **attracted close to 1,000 attendees, including 65 foreign visitors from 14 different countries**. In preparing for the pilot event through the development of minimum viable products (MVPs), the AfA pushed various boundaries:

<sup>6</sup> For example, the Mastercard Global Destination Cities Index regularly ranks Singapore as one of the world's top five cities by international visitorship and spending.

<sup>7</sup> Based on STB MICE Economic Impact Assessment (2019), MICE activities have also supported the growth of local companies by facilitating the exchange of knowledge and expertise in Singapore, and providing international exposure and business leads.

## MVP

## KEY ACHIEVEMENTS

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### Design Safe Business Events

- **Piloted a large-scale MICE event for up to 2,500 persons** as a prototype for safe business events in a COVID-19 environment.
- Enabled **trials for testing at scale**, such as on-site Antigen Rapid Testing (ART). Around 500 participants were tested for TravelRevive, including PCR tests pre-arrival, on-arrival and pre-departure, and antigen tests on-site.
- The second large-scale MICE pilot under the AfA was Geo Connect Asia 2021 (24-25 March 2021), Southeast Asia's inaugural geospatial services and location intelligence hybrid event. The event will feature **40 international leading speakers**, with a virtual show floor that can host up to **50 companies**, of which more than half are international.
- Riding on the learnings and insights from TravelRevive, Geo Connect Asia 2021 debuted in Singapore in a reimagined format, with an aim to pilot creative solutions to enhance health and safety for delegates such as real time detection of intermingling patterns and crowding, touchless kiosks with integrated facial recognition, and temperature scanning to allow participants a seamless check-in experience.

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### Design of Safe Itineraries

- Tested various **"controlled itineraries"** to allow for greater flexibility in offering bespoke leisure itineraries for visitors, starting with TravelRevive delegates.
- Partnered with private sector stakeholders to expedite the **introduction of an inbound travel insurance product**, to provide assurance to travellers coming to Singapore.
- Developed a **Safe Itinerary Guide** to help the travel trade navigate new requirements for inbound visitors in a COVID-19 environment, as well as respond to new traveller priorities around safety, exclusivity, and smaller-group experiences.

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### Deployment of Digital Enablers

- Developed the **Safe Travel Concierge web application** as a one-stop resource to assist both travellers and industry in managing pre-arrival procedures and post-arrival itineraries.
- Collaborated with MOH and GovTech to **trial MICE Pods** at TravelRevive, which collected interaction data on adherence to SMMs in different venue settings. The trial results will help us to refine SMMs and facilitate the resumption of large-scale events on a sustainable basis.
- Worked with A\*STAR to **trial an integrated AI monitoring system with thermal temperature screening, crowd monitoring, and mask detection**, to ensure the health and safety of delegates. The trial results will help A\*STAR to develop robust technology solutions that could aid event venues and organisers in monitoring and ensuring adherence to SMMs.

6. In terms of workforce development, the AfA has worked closely with tripartite partners to help workers in the sector to pivot and take on new skills and roles, so that they can remain gainfully employed and engaged. For example, the AfA worked with NTUC Learning Hub to **develop a training course to upskill Tourist Guides (TGs)** to provide personal concierge-like services to visitors and implement and monitor SMMs. The AfA also formed a workgroup with National Association of Travel Agents Singapore (NATAS), SkillsFuture Singapore (SSG), and Singapore Hotel Association (SHA) to **identify related skillsets or new jobs** that can complement and raise the quality of safe itinerary design and delivery. These initiatives will help workers in the Tourism sector to be more resilient and adaptive to the changes arising from COVID-19.

## KEY LEARNING POINTS

7. The achievements of the AfA indicate that significant changes can be implemented promptly and effectively by **leveraging the complementary expertise and networks** of private and public sector stakeholders to work nimbly together. By sharing their unique expertise, perspectives, and resources, members of the AfA were able to act quickly and find “sweet spots” that balanced health and safety concerns with economic imperatives. For example, the AfA was able to promptly introduce an **inbound travel insurance covering COVID-19 related costs** to build travellers’ confidence, thanks to the concerted effort of multiple parties, including government regulators such as MOH, MOT, and STB; the private sector, such as Changi Airport Group (CAG); and industry associations, such as the General Insurance Association of Singapore (GIA). The successful development of the **Safe Travel Concierge application** as a one-stop resource for travellers also underscored the collaboration between CAG, STB, and SHA to tap on each other’s digital offerings and expertise to develop an important enabler to augment the provision of safe and innovative end-to-end visitor experiences.

## RECOMMENDATIONS

8. Drawing on its pilot experience, the AfA has put forth two key recommendations which entail the continued partnership of government and industry stakeholders as a legacy of the AfA. As travel demand is expected to remain muted, the AfA sees the importance of doubling down on our efforts to push new boundaries in a safe manner and build new capabilities, while ensuring commercial viability to achieve sustainable recovery, to better position ourselves for future growth opportunities.

### a. Ensure Commercial Viability of Event Format

9. While the AfA has trialled innovative formats for MICE events in a sandboxed environment as part of its sprint, more can be done to achieve the goals of restoring pre-COVID-19 travel flows sustainably and safely. Experience from TravelRevive has shown that it is important to **ensure the scalability and commercial viability of the model**, even as we seek to safeguard the health and safety of visitors and Singaporeans. For example, SMMs may be logistically challenging to implement given the differing requirements in different settings and could inevitably result in higher operating costs and reduced interest in delegate participation. This poses a significant challenge



to the commercial viability of these events in an environment where travel demand is already subdued. It is therefore important for **the Government and private sector to continue working together to address these challenges**, such as to (i) **review where SMMs can be more business-friendly or better adapted to suit different event formats**, and (ii) **harness private sector expertise and resources**, such as in **prototyping cheaper rapid testing solutions, digital event enablers, or testing alternative cost/revenue models**, to enable the scaling up of such critical capabilities to support the gradual reopening of the MICE and tourism industry.

#### **b. Upskilling Industry Stakeholders**

10. With the push for events to pivot to hybrid format, there is a need for industry stakeholders to be upskilled and well-equipped with the skillsets for virtual/hybrid event production. This presents new job opportunities for those who possess such knowledge. The AfA has endorsed a partnership between STB and NTUC to design and develop a Tourism Sector development roadmap. This is a pilot initiative to bring together key associations like SHA, NATAS, Society of Tourist Guides Singapore (STGS), and Association of Singapore Attractions (ASA), to identify current skill gaps and strengthen critical competencies to pivot towards revised expectations for travel in a COVID-19 world. Such skills include providing personal concierge services, familiarity with SMMs, and use of technology to create an enhanced seamless experience. The Roadmap will facilitate consistency in the delivery of end-to-end safe itineraries for visitors to Singapore, and provide a holistic perspective to uplift the capabilities across the tourism landscape. The sectoral roadmap could allow the respective associations to customise and deep-dive into industry-specific competencies for their members. In this regard, trade associations such as the Singapore Association of Convention & Exhibition Organisers & Suppliers (SACEOS), SHA, and NATAS, will play critical roles in helping the industry to navigate these new guidelines, and to direct them to relevant opportunities and resources. **The Government and trade associations must continue to work together to drive industry change towards adapting to the new normal**, and equip the frontline tourism industry stakeholders with the abilities and skillsets to meet changing visitor priorities, such as providing personal concierge services, familiarity with SMMs, and use of technology to create an enhanced seamless experience for travellers to Singapore.

# Alliance for Action (AfA) on Facilitating Smart Commerce

## VISION

The AfA sought to enable and empower a vibrant Retail sector, with Singapore brands that have a global footprint through complementary online and offline commerce, supported by mutually beneficial industry partnerships.

## RESULTS

The AfA demonstrated the benefits of online-to-offline approaches to local retailers, through the launch of the CapitaLand x Shopee 11.11 Campaign and IMM Virtual Mall. The 11.11 campaign, for example, drove sales and shopper traffic for tenants at six CapitaLand malls through inclusion of gamification elements, while also driving online footfall for local retailers through Shopee. More than 70 brands, including local retail brands and F&B establishments, such as SK Jewellery, Skin Inc, and Ajisen Ramen, have benefitted from these campaigns. The collaboration also demonstrated the potential of merging online and offline experience at a scale beyond the enterprise level. These learning points were translated to create an Exporting Singapore Brands incubator programme, that aims to reduce the lead time for retail partners to venture beyond the local market from one year to three months.

## LEARNING POINTS

The significant milestones achieved by the AfA in a short period of time shows the positive impact of a collaborative approach in the sector. By combining expertise and sharing resources amongst industry players, a mutually beneficial retail ecosystem can be co-created for a win-win situation for all players, even while curating a customer experience for shoppers that differentiates Singapore brands on the regional and global stage.

## CONTEXT

1. The Retail sector is an important part of our economy, contributing 1.4% to Gross Domestic Product, and 3% of Singapore's total workforce.<sup>8</sup> In Singapore, the Retail sector developed around the consumers' daily physical commute, with commercial spaces and malls sprouting around transport nodes. Even prior to COVID-19, the sector was seeing structural changes due to a growing e-commerce market, increasing digitalisation of retailers, and changing consumer tastes and expectations. This transformation continues to be supported by the Retail Industry Transformation Map (ITM). The outbreak of COVID-19 accelerated these changes and intensified the need for transformation in the sector. At the same time, these trends have also provided opportunities for retailers to seize opportunities that will allow them to increase their global footprint, as individual businesses and as a sector.

<sup>8</sup> Singapore Department of Statistics (2015).

## AMBITION & FOCUS AREAS

2. Riding on the key trends identified by the EST, the AfA believes that there is an opportunity to shape the future of Retail, by **nurturing a vibrant and productive Retail sector, with local brands that have a global footprint through complementary online and offline commerce, supported by mutually beneficial industry partnerships**. If we can work together towards this aspiration, the Retail sector will continue to play an important role in enhancing the quality of life for Singaporeans through work and play, and contributing to the attractiveness of Singapore as a tourism destination.
3. Taking the first step towards this, the AfA decided to focus on two areas. First, **pioneering online-to-offline (O2O) shopping experiences**, incorporating unique gamification experiences to merge online and offline experiences, and deliver unique and seamless O2O shopping experiences. Rising customer sophistication and the increasing trend of e-commerce have compelled retailers to rethink business models and improve supply chain management, last mile fulfilment processes, IT infrastructure, and marketing practices, so as to create seamless shopping experiences across online and offline channels. This focus area seeks to demonstrate the viability of integrating stable e-commerce infrastructure and digital marketing capabilities into retailers' business models, enabling retailers to better reach the local and international market via an omni-channel retail strategy. If implemented successfully, it allows Singapore to digitally multiply our presence and mindshare in the region and globally.
4. Second, **exporting Singapore brands through an incubation programme**, to ease the overseas market entry of local brands, leveraging industry players' regional presence. While digitalisation has enabled local retailers to internationalise at a faster rate, a series of focus group discussions conducted by the AfA unveiled operational challenges such as limited capabilities to gather market insights, lack of in-market network and connections, and the risks and costs of expanding overseas. Recognising these challenges, this focus area seeks to enable support and services for overseas expansion, such as through lowering retailers' operating costs via aggregated platforms and solutions, so as to support local retailers to capture new consumer markets.

## ACHIEVEMENTS OF THE AfA

5. Through the complementary expertise and networks of private and public sector stakeholders involved, the AfA has developed prototypes of omni-channel retail strategies that helped to create opportunities for the sector, even amidst the COVID-19 pandemic.
6. The AfA successfully piloted the O2O operating model, starting with the launch of the CapitaLand x Shopee 11.11 Campaign, which sought to drive sales and shopper traffic for tenants at six CapitaLand malls through gamification elements, while also driving online footfall for online retailers through Shopee. Held over a three-week period in 2020, the O2O marketing campaign recorded more than 37,000 unique players on the Shopee platform, driving shopper engagement across 45 participating retailers such as Skin Inc, Zaffron Kitchen, and Linen Gallery. The collaboration demonstrated **the potential of merging online and offline experience to drive additional revenue streams, and at a scale beyond the enterprise level**. Following the success of the 11.11 Campaign, the AfA expanded its O2O partnership efforts with the launch of the IMM Virtual Mall, to re-create IMM's iconic shopping experience online, and create new opportunities for brick-and-mortar retailers and food and beverage (F&B) establishments,

such as Kipling, SK Jewellery, Ajisen Ramen, and Old Chang Kee, to drive increased revenue through an enhanced online presence. This is part of the AfA's effort to empower and support retailers to establish and grow their online e-commerce presence.

7. In terms of workforce development, the O2O campaigns have also demonstrated the importance for retailers to be equipped with the capabilities to transact online, engage consumer digitally, and fulfil deliveries efficiently, in order to complement their physical shops with online channels, so as to stay competitive in the longer-term. Through the campaigns, retailers recognise the need to invest in building capabilities so as to be agile and responsive to consumer needs. Arising from discussions with the Labour Movement, it is clear that retailers will need to invest in reskilling and upskilling their workers with in-demand emerging skills and competencies, such as live streaming capabilities, Consumer Intelligence Analysis, and Delivery Optimisation, in order to meet the longer-term evolving demands of their jobs, and build job resilience.
8. The AfA is also in discussion with relevant industry players such as retail operators, retail technology providers, as well as space and content activation providers, to pilot the Exporting Singapore Brands incubator programme. The incubator programme seeks to ease the overseas market entry of local brands, both online and offline, through a collective approach. Through the programme, **local brand establishments will come together to validate strategic markets, plan for in-market operations, and leverage CapitaLand's and Shopee's domain expertise and resources regionally, to internationalise as a group.** Adapting to the current COVID-19 situation, the AfA will pilot the incubator programme in phases, starting with the online component. The AfA will also concurrently prepare for the physical launch in regional markets such as Malaysia.
9. In addition to the O2O partnership, the AfA is also working with other industry players to **pilot other ideas to address industry-wide challenges.** For example, the AfA is working with the Restaurant Association of Singapore (RAS) to support the expansion of F&B establishments' operations into China by leveraging CapitaLand's presence in China; and to optimise in-mall food deliveries in Singapore via in-mall consolidated collection points or delivery batching. The AfA is also in discussion with IMDA on the Nationwide Parcel Lockers Project to explore the innovative use of lockers, within CapitaLand malls, to enhance shoppers' experience in malls and increase the productivity of last mile logistics.

## KEY LEARNING POINTS

10. The AfA has demonstrated the potential of e-commerce as a key enabler to shape the future of the Retail sector, through the launch of the CapitaLand x Shopee 11.11 Campaign and IMM Virtual Mall. These initiatives have demonstrated the benefits of an O2O partnership model driven by the key partners, in which both partners and participating retailers were able to **deepen engagement with consumers via online and offline channels, establish an extended online brand presence, and drive footfall to their physical stores.**
11. Leveraging the complementary expertise and regional presence of both online and offline retail partners, the AfA **capitalised on a collective brand equity** to create an Exporting Singapore Brands incubator programme to shorten the lead time for retail partners, from as long as a year, to three months to venture beyond the local market. Insights gathered from the series of focus group discussions also highlighted the potential effectiveness of a collective approach to amplify the branding and marketing presence of the brands in the overseas market of choice.

12. The significant milestones achieved by the AfA in a short period of time is also testament that **the adoption of an open mindset to combine expertise and share resources amongst industry players is key to enable a mutually beneficial retail ecosystem that drives value creation for retailers, and delivers differentiated customer experiences for shoppers.** Through collaboration, the different players in Singapore's retail ecosystem were able to tap on one another's network, expertise, and offerings to deliver innovative products and services, and create a win-win situation that differentiates Singapore brands on the regional and global stage. This would have not been possible without the close partnership of the various players.

## RECOMMENDATIONS

13. As cross-border travel remains restricted and will conceivably continue to be so over the short term, the AfA sees the importance of **doubling down on our efforts to transform the Retail sector and push new boundaries, so as to meet changing lifestyle needs of consumers and allow retailers to reach out to customers digitally in the region and beyond.**
14. Having designed and successfully implemented the two O2O prototypes to enable Singapore retailers to grow their customer base and revenue, both locally and overseas, the AfA has presented demonstrative examples of successful omni-channel retail strategies that could be adopted for the wider Retail sector. **The AfA recommends that the FEC Lifestyle Cluster, through a refresh of the Retail ITM, continue to oversee and push this transformation of the sector,** particularly in:
- a. Developing omni-channel retail strategies to ride on the growing wave of e-commerce;
  - b. Supporting local brands and products to internationalise;
  - c. Working with industry to develop shared platforms and ideas that can unlock ecosystem-wide challenges, such as logistics fulfilment and parcel pickup services; and
  - d. Building a pipeline of skilled Singaporeans to meet new needs, and take on good jobs in the sector.

# Alliance for Action (AfA) on Robotics

## VISION

The AfA envisions Singapore as a global leader and provider of robotics and automation, not just an adopter. Singapore's competitive advantage is in delivering a superior end-to-end solution premised on Singapore's ability to orchestrate and deliver complex systems, not simply selling individual components or sub-systems in the robotics value chain.

## RESULTS

The AfA brought together local players across the Autonomous Vehicle (AV) and Cleaning value chains for the first time. For AVs, the AfA successfully deployed Singapore's first on-demand autonomous transport revenue service at Singapore Science Park 2 and Jurong Island in January 2021. By conducting commercial trials using even the current state of autonomous bus technology, the AfA provided a good opportunity to: (i) glean insights on paying commuters' expectations of AV services, user experience, and feedback, (ii) understand the optimal price point for running such a first- or last-mile service using an AV fleet for future commercial deployments, and (iii) establish local track record to scale internationally. Public acceptance has been good, with positive commuter feedback and no safety incidents.

For Cleaning, the AfA established the set of commercial terms necessary for companies across the value chain to invest in and scale up the adoption of cleaning robotics beyond one-off pilots to strengthen the adoption of robotics solutions in the sector, which include establishing standards for cleaning robots, and upskilling and certifying workers to take on supervisory roles over the cleaning robots.

## LEARNING POINTS

The industry-led approach in the AfA enabled a clear focus on the demand-side: how can we accelerate adoption of robotics by industry, companies or consumers; how can we integrate solutions to deliver value, using even existing technology? This complemented existing initiatives by the Government which focused on the supply-side, e.g. research and development (R&D) and building technology capabilities. Understanding what it took for customers to "buy" allowed the AfA to develop a clear idea of new value that could be created if ecosystem stakeholders could work together, yielding a more sustainable and focused basis for collaboration to effect ecosystem change.



## CONTEXT

1. COVID-19 has accelerated the use of robotics and autonomous technologies to take on more tasks to reduce in-person contact, and deal with disruptions in manpower supply. One example is in the increasing uptake of industrial robots and smart factory technologies in manufacturing plants worldwide, allowing these plants to continue operations amidst the pandemic using remote monitoring and maintenance. Robots have also joined the fight against COVID-19 by helping to disinfect high touch surfaces and public spaces, screen for high temperatures, and deliver food to people in quarantine. Digital interaction with customers has also accelerated the equivalent of many years in just months, according to a study by McKinsey,<sup>9</sup> and changes in digital and technology adoption are taking place about 25 times faster than before the pandemic.
2. While COVID-19 has devastated many businesses, COVID-19 as a catalyst has demonstrated how automation and digitalisation are critical enablers for Singapore and our businesses to overcome COVID-19-related challenges, including the economic turbulence caused by the pandemic. It has also created opportunities for Singapore businesses to leverage digital technologies to meet the rising demand for innovative, transformative, and operationally-ready robotics solutions in a post-COVID-19 world that reimagines the way we work, live, and travel.

## AMBITION & FOCUS AREAS

3. Apart from addressing Singapore's long-term manpower challenges, the AfA recognised the potential for the deployment of robotics and autonomous solutions in the immediate term to **address immediate COVID-19-related challenges**, such as the need to step up automation, digitalise operations, minimise social contact, and maintain high hygiene standards. While there are many possibilities spanning from cleaning and construction robots, to autonomous healthcare and public land transport system, the AfA identified **transport and cleaning** as two use cases to pilot its robotics deployment to achieve quick wins in a short timeframe of three months, noting that these sectors have been labour-intensive and were considered essential or frontline services even amidst the pandemic.
4. The successful deployment of the solutions will directly address COVID-19-related challenges and **strengthen Singapore's robotics core**, by generating industry awareness and instilling confidence in the market viability of robotics solutions, and driving industry-level transformation. Successful deployments of the solutions in Singapore with a proven revenue track record will also **lend greater credibility to subsequent provision of end-to-end solutions overseas**.
5. The AfA also believes that by **promoting and accelerating sustainable deployment of robotics and autonomous solutions in Singapore**, such technologies could be harnessed to benefit the local ecosystem, and further augment Singapore's Smart Nation and economic transformation efforts in three ways:
  - a. End users are provided world-class product offerings, greater user experience, and cost savings as operational and systems savings are reaped through robotics, and digital and autonomous technologies.
  - b. Singapore can offer end-to-end robotics and autonomous solutions at the city-level and build a vibrant local robotics and autonomous solutions ecosystem, alleviating local manpower

<sup>9</sup> LaBerge, L., O'Toole, C., Schneider, J., & Smaje, K. (2020, October 5). How COVID-19 has pushed companies over the technology tipping point – and transformed business forever. McKinsey & Company.

needs and enabling Singapore technology companies to excel in robotics development and deployment. This will facilitate the growth of global champions, which can win together locally and overseas.

- c. New and attractive job opportunities, such as AV safety operators, fleet managers, technologists, robotics development and maintenance engineers, as well as data analysts, will be created. Workers will be able to benefit from these higher-skill jobs by learning new skills.

## ACHIEVEMENTS OF THE AfA

- 6. Under both the transport and cleaning tracks, the AfA rallied stakeholders from across the respective value chains to develop a new business model to accelerate the development, deployment, and commercialisation of robotics solutions.
- 7. For transport, autonomous transport technologies are already here and deployed in AV bus revenue services via the AfA operational sprint. The AfA brought together bus transport operators and technology providers to **test the commercial viability of new business models and build public acceptance** for AV solutions domestically, with an eye for future opportunities abroad. This culminated in Singapore's first deployment of autonomous transport revenue services in January 2021. It also marked the first time in which local companies, including startups, SMEs, and large local enterprises from **different parts of the value chain came together** to demonstrate commercial AV deployments.
- 8. By conducting commercial trials using the current state of autonomous bus technology, the AfA provided a good opportunity to: (i) glean insights on paying commuters' expectations of AV services, user experience, and feedback, (ii) understand the optimal price point for running such a first- or last-mile service using an AV fleet for future commercial deployments, and (iii) establish track record for local companies to scale internationally. Public acceptance has been good, with positive commuter feedback and no safety incidents. It has also provided useful insights to the R&D direction under the AV pilot deployment, under the Call for Collaboration (CFC) programme helmed by LTA and EDB, which will facilitate subsequent development.
- 9. On-demand autonomous bus services were deployed for four months to augment current fixed-schedule services to better serve commuting needs during non-peak hours for workers at Singapore Science Park 2 and Jurong Island. In the process, the AfA made sure that the companies and end users were not the only beneficiaries from its efforts. In terms of workforce development, the AfA has been training additional bus captains to operate the AV buses, and also contributed to existing efforts by the National Transport Workers' Union to **identify potential future roles for transport workers**, as well as **relevant training and upskilling pathways for bus captains to take on potential AV job roles**, such as remote operation of autonomous buses, managing commuter experience on AV buses, and overseeing AV management systems. Roles for operations staff include fleet management and command and control functions, while technical staff can be upskilled to take on roles in testing and maintenance of AV buses. ST Engineering, SBS Transit, and SMRT are working with LTA to develop training courses, which will be ramped up to support the scale-up of AV operations. This demonstrates the strong and continued partnership between AV developers, transport operators, LTA, and the unions in preparing transport workers to benefit from the AV sector.

10. For cleaning, one of the key impediments to greater adoption of robotics cleaning solutions is the misalignment in expectations between end clients and service providers. Hence, the AfA engaged stakeholders across the value chain (technology providers, service providers, and end clients) to **identify and prioritise problem statements and challenges which each stakeholder faces, define standardised “classes” of robots and their capabilities, and work towards a viable procurement and contracting model** for end clients to adopt, so as to strengthen the adoption of robotics solutions in the sector. This will enable more cleaning companies to embrace robotics with a clear commercial return of investment (ROI) and contracting model. Relevant robotics solutions developed in Singapore and the tried-and-tested procurement and contracting model can be subsequently replicated or scaled up in overseas markets as well.

## KEY LEARNING POINTS

11. Within a short timeframe, the AfA was able to bring together key stakeholders across the value chain to make encouraging progress under both the transport and cleaning tracks. The AfA was able to leverage like-minded partners' collective expertise and experience to sprint together and **not only identify demand-side pain points keenly felt in both sectors, but develop possible solutions**. This is proof that instead of competing at the level of technology components or sub-systems but at end-to-end systems, we can collaborate effectively to solve seemingly insurmountable problems and create new value for all stakeholders.
12. For transport, through alliance- and company-level business sprints, the AfA gained important insights on the potential of autonomous transport solutions to provide significant systems savings and raise productivity, including when autonomous buses are employed as public transport – even where a human safety operator is expected on board (even if not doing most of the driving) for years to come. The deployments lend credence to these robotics and autonomous solutions, that continue to register keen interest from local and overseas transport providers and governments to similarly pilot deployments across urban and suburban environments.
13. The AfA's collaborative efforts have shown that capability development within the local AV ecosystem that includes all stakeholders (developers, operators, academia, and regulators) is key to a swift and successful AV deployment. LTA and EDB have been working with industry partners to deepen Singapore's expertise in AVs, and the AfA's deployment of autonomous bus services is another key milestone in the development of local capabilities in this emerging field. In terms of forging economic pathways for an **internationally competitive AV ecosystem** in Singapore, which includes the aspiration of developing global champions, the pilot deployments have:
  - a. Provided opportunities for industry players to shape ongoing work on building the regulatory framework for the trial and operations of AVs. This includes the policy framework for AV revenue services;

- b. Provided AfA companies useful data and insights on the operational and financial viability of their solutions, established a track record for local companies to venture overseas and commercialise their solutions, and in turn, demonstrated that Singapore companies have strong potential to come together to provide competitive end-to-end autonomous transport solutions globally. This will pave the way for AV ecosystem partners to continue to explore other revenue service deployments, including in international markets; and
  - c. Fostered new discussions between AfA members to explore new ventures in the AV space beyond the EST, targeting different parts of the value chain and overseas markets.
14. For cleaning, the AfA provided an opportunity for key stakeholders in the cleaning sector (from end users to service providers to technology providers) to come together to share their pain points, success metrics, and future goals. This has provided a good end-to-end insight into the industry, and will enable industry and government agencies to collaborate closely to drive needle-moving initiatives such as the standardisation of robotics capabilities, based on cleanliness standards and the expected performance levels of end users, or to tackle key industry problems with an innovative procurement model to strengthen the adoption of robotics solutions in the Cleaning sector. These learning points can be incorporated into the Environmental Services Industry Transformation Map (ITM) to further support the industry's transformation efforts.

## RECOMMENDATIONS

### a. Transport

15. The AfA has demonstrated the importance of commercial trials in helping AV developers bring AV solutions to the market. Commercial trials will become increasingly important as technical R&D in AVs begin to mature in the coming years. Given the opportunity to build a vibrant AV industry in Singapore, **the Government's regulatory support and developing the necessary infrastructure** are key enablers, and will be necessary to both facilitate future commercial trials and support Singapore companies to be one of the first movers in the global smart mobility market. Government agencies have demonstrated that they can build up the ecosystem's capability by moving more quickly from sandboxes into operations and service deployments serving passengers. They could also determine which parts of the value chain are strategic to Singapore's transport resilience, and which could only be served by trusted local companies.
16. At the same time, industry should **press on with R&D** to develop solutions to address technical challenges that are unique to our region, such as AVs' ability to operate in adverse weather, as well as strengthen capabilities to develop and administer safety assessments of AVs so that they can provide safe and reliable public transport services. In addition, **establishing greater public acceptance of AVs** will be critical for Singapore to advance AV deployments and eventually provide autonomous public transport services at-scale. Hence, government agencies should continue to engage the public

in parallel with agencies' AV deployment plans, and ensure that public acceptance grows in tandem with our developmental plans. The Government should take the above learnings from the sprints into consideration for future AV trials and deployments. In addition, the Government should build on the momentum gained by the AfA and strengthen collaborative efforts with industry to develop viable business and operational models or test-bed new and innovative AV solutions in Singapore so as to continue building local capabilities in robotics and autonomous technologies, and enable the growth of Singapore global champions.

17. The AV CFC is viewed by the AV industry as a good way to accelerate the two recommendations above, as it can lead to deployments at-scale and potential system savings in Singapore. Going forward, the AfA members will form an "AV Bus Alliance" to continue the work of the AfA. This will include **further validating of potential systems savings** from AV deployments, with the objective of rolling out **commercial public transport operations in Singapore and overseas**.

**b. Cleaning**

18. In addition to supporting industry transformation efforts of the Environmental Services ITM, the **AfA's agile problem-solving approach can be expanded to the waste and pest management sectors**, as these industry sectors complement one another. For example, introducing robotic solutions to assist cleaners in the collection of waste from litter bins to be subsequently transported to bin centres could change waste companies' waste collection operations significantly, resulting in better management of pests due to a more hygienic environment. Leveraging existing mechanisms within the Environmental Services ITM, identified problems and initiatives will be sharpened and executed collaboratively between the industry and the Government to spur activities in robotics innovations and implementation.
19. To identify and support the **building of R&D capabilities** in our ecosystem and the **development of innovative robotics cleaning solutions** to address our cleaning challenges and for commercial and/or export opportunities, the National Robotics Programme (NRP) will also continue to work with NEA and the private sector.

# Alliance for Action (AfA) on Supply Chain Digitalisation

## VISION

The AfA aims to strengthen Singapore's position as a hub for international trade, by extending our strengths into the virtual realm, and plugging our businesses and workers into future supply chain opportunities.

## RESULTS

The AfA brought a user-centric lens to the diverse and varied landscape of stakeholders involved in the supply chain value chain. It sought stakeholders' views to map out more than 60 pain points along the end-to-end customer journey. With these findings, the AfA established a common data infrastructure (CDI) to enable trusted and secure data sharing between industry players, driving efficiency, productivity, and resilience through physical, financial, and information flows. For a start, the AfA prioritised three use cases for the CDI, that would address about half of the pain points identified. The AfA also identified key pain points faced by local SMEs, and developed initiatives to address them, such as enabling access to new markets, supporting access to financing, and enhancing logistics fulfilment by onboarding SMEs onto supporting digital platforms.

## LEARNING POINTS

The AfA demonstrated the strength of an action-oriented approach, led by industry and supported by the Government. It took a user-centric view to identify where value could be unlocked, whether with new or existing building blocks; focused on specific use cases that had the greatest commercial viability; and most importantly, assessed how best to drive industry adoption to reap economies of scale. Several lead companies in the supply chain space were involved in the AfA from the start, to create a sufficient mass of early adoption for the CDI. They also played a key role in rallying other industry players within their ecosystem, kickstarting a multiplier effect.

## CONTEXT

1. Connectivity with the world has always been Singapore's *raison d'être*. However, COVID-19 has accelerated shifts in global supply chains which had already been underway. Growing fragmentation in the global order, uncertainty over the future of globalisation, technological advancement, and a rebalance between resilience and efficiency in production patterns affect our relevance as a trading and shipping hub. To remain a critical node in the global trade ecosystem, Singapore needs to enhance our position as a trusted and efficient trade and shipping hub, building on trust, quality, connectivity, and transparency as our trademarks.



2. Digitalisation has been a key pillar of the FEC Trade and Connectivity Cluster's work, and the AfA builds on the earlier efforts of the Cluster. The Industry Transformation Maps (ITMs) have been driving adoption of digitalisation in supply chain-related sectors, such as through the Industry Digital Plans (IDP) launched under the SMEs Go Digital Programme, which help SMEs in sectors including Logistics and Sea Transport transform through digitalisation. Initiatives such as the Networked Trade Platform (NTP),<sup>10</sup> digitalPORT@SG™,<sup>11</sup> and TradeTrust<sup>12</sup> also establish a strong foundation for Singapore's digital connectivity to the world.

## AMBITION & FOCUS AREAS

3. The AfA brought renewed focus to the digitalisation push by setting out a two-pronged vision to reinforce Singapore's position as:

- a. **A Hub for International Trade, Extending into the Virtual Realm**

4. Most of today's global supply chain operations are managed through manual processes, with stakeholders remaining reliant on physical documents. Existing platforms are usually not integrated, making data-sharing across the supply chain a challenge. This has led to significant inefficiencies in physical, information, and financial flows.
5. Through enabling seamless data exchange between supply chain stakeholders, the AfA aims to reinforce Singapore's competitive advantage as a hub for international trade and shipping, by extending our strengths into the virtual realm. This allows Singapore to (i) offer transparency in documentation, interoperability of trading and shipping systems, and full traceability along supply chains; (ii) become a pioneer of global trade and shipping data standards; and (iii) create better job opportunities for a digital future. Increased transparency and traceability of our supply chains will enable companies, consumers, and regulators to better understand the safety, provenance, and sustainability of their value chains, amidst the rising demand for more stringent environmental, sustainability, and governance standards.

- b. **A Hub Connecting SMEs to Future Supply Chain Opportunities**

6. The AfA is committed to inclusive growth. In addition to our local and global champions, Singapore's network of SMEs – each situated at a critical node along the supply chain – have played a valuable role in building a vibrant and competitive supply chain ecosystem. Through dedicated outreach to SME players, the AfA aims to improve the end-to-end business experience of SMEs through digitalisation, from strengthening logistics fulfilment, to increasing access to cross-border e-marketplaces and financing, and enhancing digital adoption amongst SME logistics service providers (LSPs) to support a digital network within the industry. Ultimately, the AfA envisions Singapore to be a hub of opportunity that allows businesses, including SMEs, to leverage our connectivity and digital infrastructure, and make a difference in the supply chain space.

<sup>10</sup> Launched in 2018, the Networked Trade Platform (NTP) is a one-stop trade and logistics ecosystem which connects players across the trade value chain, in Singapore and abroad. It was developed by Singapore Customs and GovTech, with the support of various other ministries, government agencies, and working groups.

<sup>11</sup> The digitalPORT@SG™ is a one-stop port clearance portal developed by the Maritime and Port Authority of Singapore (MPA) for ships calling at the Port of Singapore. It streamlines about 16 regulatory applications that were previously submitted to various agencies such as MPA, the Immigration and Checkpoints Authority (ICA), and the National Environment Agency (NEA), into a single window for port clearance services. Phase 2 of the initiative aims to provide a seamless experience by integrating just-in-time and other port services into the platform to improve vessel turnaround time.

<sup>12</sup> Launched in 2019, TradeTrust comprises a set of globally-accepted standards and frameworks supporting the exchange of electronic trade documents. This is achieved through a public blockchain offering interoperability to connect governments and businesses, and was developed by the Infocomm Media Development Authority (IMDA) in collaboration with various agencies and industry partners, both local and overseas.

## ACHIEVEMENTS OF THE AfA

7. Since its inception, the AfA has rallied industry stakeholders around a common vision, and developed the foundational infrastructure required to achieve its vision.
  - a. The AfA launched a **common data infrastructure (CDI)** that aims to **connect local and global supply chains**, via a **trusted, secure, and intuitive data sharing infrastructure**.

- i. More than 50 stakeholder organisations across the value chain – including LSPs, shipping lines and maritime service providers, platforms, banks, and regulators – were engaged through multiple workshops to map the end-to-end supply chain customer journey, and identify pain points and opportunities for transformation. Organisations engaged by the AfA ranged from multinational corporations (MNCs) and large local enterprises (LLEs) to SMEs, startups, and government agencies.
- ii. Through these workshops, participants identified more than 60 pain points such as inefficient data and document management, sub-optimal asset deployment, limited traceability, and costly or inaccessible trade financing processes. The AfA found that **most of these pain points could be resolved by more transparent and efficient data sharing at an ecosystem level**, which culminated in the decision to develop a CDI. The CDI will be a digital utility which facilitates data sharing, and enables businesses large and small to “plug and play” into the infrastructure easily. It will introduce common data standards and functionalities, to link various systems and players in the supply chain journey, and augment existing data sharing systems and platforms.
- iii. Based on the pain points, the AfA has identified and **prioritised the first three use cases for the CDI**:
  - **Strengthening trade finance and converging efficiencies.** Focusing on Singapore’s international supply chain linkages, this use case aims to address trade finance fraud risk through the use of the CDI. The CDI will offer visibility over the physical movement of goods, through sharing of data from government agencies as well as supply chain players, to improve data and process flow efficiency, and reduce reliance on physical documents. It will allow parties, such as banks, to reconcile trade details with the physical flow of goods and against other independent source systems, to mitigate the risk of trade finance fraud or duplicate financing. The AfA will prototype the CDI integration with various source systems, including a Trade Finance Registry (TFR) that is being developed by The Association of Banks in Singapore, to detect duplicate financing. The TFR will serve as a secure central database containing records of trade finance transactions financed by banks in Singapore. The AfA has also identified an oil holding certificates platform as a potential source system for further validation, and has developed a demo version of the platform, which will be made available to oil traders, financial institutions, and oil storage terminals.
  - **Container flow node decongestion.** Domestically, greater visibility of logistics flows and schedules in key nodes, such as depots and warehouses, will address existing inefficiencies in our logistics networks. Industry players will be able to leverage on event and location data, such as haulier locations, to improve productivity by optimising assets and trip utilisation.
  - **Digitalisation of the bunkering industry.** Singapore is one of the world’s busiest container transshipment hubs and bunkering ports, supplying approximately 50 million tonnes of bunker annually.<sup>13</sup> This use case aims to digitalise the documentation and processes associated with the delivery of bunker, including the bunker delivery note, and improve information flow across businesses to enhance operations efficiency and transparency for bunker financing.

<sup>13</sup> Maritime and Port Authority of Singapore. (2020). Port Statistics.

- b. The AfA also engaged more than 200 local SMEs to drive adoption of digital platforms, in order to streamline existing processes, improve productivity, and enable access to new markets.
- i. **Digitalisation across the local logistics system.** By connecting port and container depot systems to facilitate data exchange, stakeholders can gain greater visibility of the entire logistics flow, obtaining easy access to information such as vessel schedules, container movement events, and planned activities.

#### Onboarding SMEs onto Digital Depot Management Platforms

PSA International and the Container Depot and Logistics Association (Singapore) (CDAS) have launched SmartBooking, a booking platform linked to ports and depots with operations planning information. With advisory input from CDAS, PSA International is also introducing iBOX, a depot management solution. These systems aim to address current challenges – such as the need to manually extract data from siloed systems for ops planning – and will provide an integrated one-stop booking platform for container depots, terminals, hauliers, and logistics facilities across Singapore.

This initiative is supported by Enterprise Singapore (ESG), Infocomm Media Development Authority (IMDA), and Smart Nation and Digital Government Office (SNDGO), and is part of the National Artificial Intelligence (AI) Strategy to facilitate data exchange and enable the deployment of AI solutions.

- ii. **Strengthening access to new markets, fulfilment, and financing opportunities through e-marketplaces.** The AfA has onboarded SMEs onto e-marketplaces with enhanced logistics fulfilment capabilities.
  - Through the Singapore Business Federation (SBF)'s GlobalConnectB2B platform, for example, companies – including SMEs – can gain access to buying, selling, financing, and logistics bookings. This also facilitates SMEs' access to new sales channels and supply sources in Singapore and the region, complemented by cross-border trade fulfilment services.
  - The AfA also aims to help SMEs tap on financing support for business expansion and improve cashflow through financing programmes, such as through Shopee, and the Global eTrade Services (GeTs) Community Programme. From June 2020 to March 2021, around US\$1,900,000 of loans were financed for Singapore SMEs.
  - Finally, the AfA aims to enhance digitalisation through freight exchange platforms, to help SMEs gain access to sales opportunities, and augment their services. One such example is the CALISTA Freight Exchange (CFeX), a joint supply chain platform built by PSA International and GeTs. As of March 2021, more than 350 LSPs have signed up to CFeX under the AfA.
8. Ultimately, the AfA's initiatives aim to build stronger enterprises and a more resilient workforce. With improved visibility of physical, data, and financial flows, companies across the supply chain ecosystem, such as shippers, traders, and SME LSPs, can now enhance their planning, forecasting, and coordination capabilities. At the enterprise level, the AfA also encourages companies to come onboard digital initiatives.

9. In terms of workforce development, this will require reskilling and upskilling their workers with digital skills and competencies – such as digitalisation and platforming, data and statistical analytics, data visualisation, and supply chain modelling and planning – with a focus on resilience and sustainability, so that the workers can contribute actively to continuous process improvement. In particular, the AfA has identified the following areas that could be further explored or enhanced:
- a. **Requirements of growth sectors.** Identify the needs of sectors that will be growing strongly or transforming significantly, such as advanced manufacturing (electric vehicles), and work with tripartite partners to develop training programmes, curriculum and internships with IHLs, and international standards, so as to better equip their workforce for digital transformation.
  - b. **Requirements in specific roles and skills.** Address the needs of specific skills and/or vocations, which will be undergoing shifts due to digitalisation, by working with trade associations and chambers, such as the Singapore Logistics Association (SLA) and CDAS, to train the workforce with relevant accreditation in physical, data, and financial flows, offering them clear paths of career progression, providing them with adequate room for personal growth.
  - c. **Working with IHLs.** IHLs could offer selected bite-sized modules, tailored to the specific needs of these sectors, at all job levels, for both the new and current workforce. Module coverage could span from use of digital applications for trucking, warehouse, and depot operations for operators, to digital platforms for demand sensing and forecasting, data analytics for logistics managers, and to general cybersecurity risks.
  - d. **Enhance corporate leadership.** Seek corporate sponsorships to offer training programmes, and for corporates to be the “centres of excellence” or “queen bees” to host and train workers through internships and attachments. Similarly, large businesses could extend services to offer a leg-up to the SMEs. As an example, data scientists in established businesses could be deployed to the logistics sector amongst the SMEs to help them analyse truck turnaround. These opportunities for cross-pollination of talents across industry sectors will build a more diverse and multi-skilled workforce.
10. Through the above, which will dovetail with the work of the Industry Transformation Maps (ITMs), the AfA hopes that over the medium-term, its initiatives will enable the creation of higher value-added job roles, thus increasing productivity and reducing reliance on labour-intensive roles, while strengthening business resilience. Over time, the workforce will be more agile and skilled, and the ready pool of talent will in turn draw more foreign investments for international MNCs to establish their supply chain hubs in Singapore.

## KEY LEARNING POINTS

- a. **Not Reinventing the Wheel**
11. There are existing initiatives and platforms, both public and private, which aim to enhance supply chain connectivity. Hence from the outset, the AfA took **an action-oriented, user-centric approach** to identify where value could be unlocked, whether with new or existing building blocks. For future prototypes, project teams could also consider incentivising existing supply chain technology solution providers, including local SMEs that already have strong track records, to collaborate on integrating their solutions for user centricity. Furthermore, these technology solutions providers could subsequently act as multipliers to onboard other trade, shipping, transport, and logistics companies, after the pilots have been proven to be successful.

## b. Achieving Commercial Viability and Scalability from Prototypes

12. One challenge that the AfA encountered was in setting out a clear value proposition for commercial players, and ensuring sufficient participation from the start. The value of the CDI can only be derived from ecosystem-wide participation. Thus, scalability was an important consideration, especially in increasing SME participation. For instance, many SMEs might not have API connectivity or sufficiently digitised systems and processes, to enable seamless integration of data. Thus, participation in a common data exchange would not be cost-effective for them in the short run.
13. In managing these concerns, the AfA benefitted from its model of close public-private collaboration. First, the AfA focused on specific use cases which had the greatest commercial viability and industry traction; from rolling out these use cases, it then assessed how best to drive industry adoption to reap economies of scale, and to identify and leverage synergies across use cases. Second, lead companies in the supply chain space were involved in the AfA from the start, to create a sufficient mass of early adoption for the CDI. These lead companies also played a key role in rallying other industry players within their ecosystem, therefore kickstarting a multiplier effect. Finally, the close nexus between private and public players allowed government agencies to better understand where support could be targeted, in order to incentivise adoption.

## RECOMMENDATIONS

14. For Singapore to remain relevant as a global trading, shipping, and financing hub in the ever-changing and highly competitive global business environment, **the Government needs to press on with decisive interventions**, to enable businesses to build capabilities, and seize opportunities in a digital future. Government agencies should also consider leveraging on existing schemes to require companies, such as shippers, to come onto the CDI, where appropriate.
15. However, **transformation efforts are amplified and can only be successful when a critical mass of industry stakeholders are fully onboard, and continue to co-lead transformation efforts beyond the initial sprints**. Although the Government can encourage and incentivise digitalisation, the industry will need to align within itself and move together, to change and improve current practices. A Government-driven approach is not always feasible – if not managed well, it can increase compliance and other costs for businesses. Leveraging past experiences and know-how, the industry is in a good position to identify, co-create, test, and use solutions. This was evident through the coming together of industry stakeholders during the AfA workshops, to identify pain points which could be addressed by more seamless data exchange, and arrive at the common vision for a CDI.
16. For common utilities and data platforms to succeed, industry players need to be onboard in sharing data and participating in the exchange of data. Appropriate data governance structures, including data privacy and security measures, will have to be put in place to provide assurance to companies, so that they are confident in using these common utilities to share data. The AfA **urges industry players to come together, in driving end-to-end supply chain digitalisation**.

# Alliance for Action (AfA) on Sustainability

## VISION

Singapore sits amidst a region that can potentially supply Nature-Based Solutions (NBS) credits. NBS can provide up to one-third of the mitigation needed to meet Paris Agreement goals by 2030. The AfA's vision is for Singapore to help unlock this value by serving as a regional and global leading carbon services and trading hub. This will help Singapore to capture new opportunities in carbon-related services, and create a carbon-conscious society.

## RESULTS

The AfA interviewed more than 70 organisations to learn about gaps in the voluntary carbon market that Singapore could plug. Trust and quality were key issues – buyers want access to a supply of quality credits at transparent prices, while sellers want a minimum price. This enabled them to arrive at a value proposition to facilitate price discovery, improve liquidity, and verify the integrity and source of carbon credits (including NBS credits). The value proposition was sufficiently well-validated through the corporate venture sprint process to establish a joint venture investment to build out a carbon exchange. Concurrently, the AfA also developed a one-stop solution for companies to measure, mitigate, and offset their carbon footprint (GreenPass).

## LEARNING POINTS

The corporate venture sprint process was critical in bringing an unrelenting focus on whether there was an investible business case here that could catalyse the ecosystem for wider good. It enabled the various parties to learn together, and let go of earlier ideas in the face of stakeholder feedback that suggested poor product-market fit. The level of detail and insight uncovered in this manner was instrumental in convincing policy makers and regulators that this was not just another wishlist from industry, but a clear proposal for what could be done and why it was important.

## CONTEXT

1. COVID-19 has **accelerated the global focus on sustainability**, and the **Environmental, Social, and Governance (ESG) agenda will gain prominence in the future economy**, with greater awareness and priority given to tackling climate change and social disparities. Sustainable development has been a major priority for Singapore, and we have continued to devote resources towards our environment. For instance, Singapore recently launched the Singapore Green Plan 2030 to rally bold and collective action to tackle climate change. For circular economy, we rolled out the Zero Waste Masterplan to build a sustainable, resource-efficient, and climate-resilient nation.
2. Globally, corporates are increasingly committing to climate ambitions, and are trying to respond to calls to be more sustainable by various stakeholders, such as regulators, investors, and customers. Building on our strong foundations in technology, science, and professional and financial services, Singapore has an opportunity to move quickly and become a sustainability hub to serve regional and global demand, while fulfilling our own carbon commitments.



## AMBITION & FOCUS AREAS

3. The AfA's vision is to **establish Singapore as a regional and global leading carbon services and trading hub**. This could bring about economic opportunity for Singapore in the longer term, as demand for carbon services and trading is expected to increase.<sup>14</sup> Singapore is well-positioned to be a carbon services and trading hub, given Singapore's reputation as a neutral location, trusted broker, and a professional services and financial hub.
4. Given the EST's focus on prototyping new ideas in emerging areas, the AfA decided to **focus on developing a carbon marketplace, and a one-stop solution for companies to measure, mitigate, and offset their carbon footprint**. As the core building blocks and stakeholders – such as buyers, suppliers, and systems and infrastructure providers – are being put in place to foster a trusted and liquid market, developing Singapore as a regional carbon services and trading hub creates opportunities to attract and develop professionals across the value chain, such as in project development and financing, carbon advisory services, trading, science and technology, and measurement, reporting and verification (MRV).

## ACHIEVEMENTS OF THE AfA

5. From July to November 2020, the AfA embarked on two sprints to further develop and validate their ideas.
  - a. **Carbon Marketplace.** The AfA engaged more than 70 organisations<sup>15</sup> in the sprint process to address trust, liquidity, and transparency gaps in carbon markets, and arrive at a value proposition to establish a Carbon Marketplace in Singapore. Such a marketplace could facilitate price discovery, improve liquidity, and verify the integrity and source of carbon credits, including Nature-Based Solution (NBS) projects. The AfA also explored the feasibility of tech-enabled verification to enhance trust and credibility of carbon credits. In December 2020, with the concerted effort of multiple parties such as Google, National University of Singapore, Temasek, and World Bank, the AfA launched the Sustaintech Xcelerator, with a demo day planned in 3Q 2021. With this concept, Singapore has a strong opportunity to become one of the first markets to take action on the Taskforce on Scaling Voluntary Carbon Markets' recommendations.
  - b. **GreenPass.** As a one-stop solution for companies to measure, mitigate, and offset their carbon footprint, this platform seeks to enable a simple, automated, and accurate measurement of carbon footprint by integrating suppliers and buyers, allow companies to track their progress, and access reduction recommendations through advanced analytics tools.

<sup>14</sup> Watson, F. (2020, May 13). Global carbon offsets market could be worth \$200 billion by 2050: Berenberg. S&P Global Platts.

<sup>15</sup> Carbon credit buyers and sellers, academia, and government representatives.

## KEY LEARNING POINTS

6. The AfA's speed to execution has been **effective in changing mindsets, and progress has been fast and impactful**. For example, the AfA engaged more than 70 organisations in the sprint process, and learnt about gaps in the voluntary carbon market that Singapore could plug, especially the lack of trust and quality – buyers want access to a supply of quality credits at transparent prices, while sellers want a minimum price.
7. The AfA mode of collaboration between the private and public sectors has also been useful. Through regular bilateral discussions with government agencies, the **AfA gained insight on policy thinking, which helped them to further develop their concepts**. For example, the AfA engaged the National Climate Change Secretariat (NCCS) to determine the quality requirements for credits.

## RECOMMENDATIONS

8. In order for Singapore to develop as a carbon services and trading hub, we will need to have the right building blocks in place. This includes having a conducive environment and market infrastructures to facilitate trading of high-quality carbon credits, a supportive ecosystem of trusted services providers, and a strong base of R&D, science and technology partners to work with industry to test-bed, pilot, and develop new solutions for carbon markets. The Government will need to continue its efforts to build Singapore's foundation to ride on the wave of opportunities in carbon services and trading.
9. In terms of workforce development, **Singapore will also need to develop a pipeline of talent with the relevant skills to support this**, such as in project development, financing, low-carbon advisory, and trading. Today, there are existing programmes such as by the National University of Singapore (NUS), and Singapore Management University (SMU) on sustainable finance, sustainable operations, social entrepreneurship, and sustainable growth in the Southeast Asian region. More of such programmes could be considered to equip the local workforce with the requisite skills sets and competencies to seize new opportunities.
10. In line with the Government's whole-of-nation sustainability agenda, articulated in the Singapore Green Plan 2030, **the Government, businesses, and training providers must continue to work together to grow Singapore as a leader in sustainability**.

# Alliance for Action (AfA) on AgriTech<sup>16</sup>

## VISION

Indoor vertical farming for Asian leafy greens, which form the bulk of local demand of vegetables, is currently not economically viable in Singapore. The AfA has kickstarted a study on a new platform model, which would afford (operational) cost-savings, pooling of risks, value creation through stronger branding, and build stronger links between local vegetable farms and other stakeholders along the value chain.

If successful, indoor vertical farming will be able to sustainably amplify local production, leading to a virtuous cycle that will help achieve Singapore's "30 by 30" aspiration, and catalyse a decade of robust industry development within the AgriTech ecosystem – one which is not only sustainable for local needs, but at the technological frontier that exports AgriTech solutions to the world.

## CONTEXT

1. Singapore currently adopts three key strategies to safeguard our food supply – (i) diversification of food import sources; (ii) raising local food production; and (iii) stockpiling. Today, we import more than 90% of our food supply from more than 170 countries and regions. Even with diversification, Singapore remains vulnerable to emerging global trends such as the rising global demand for food, increasing uncertainty over global food production arising from climate change, and increasingly nationalistic and nativist sentiments amongst global economies. The COVID-19 pandemic has further accelerated some of these trends.
2. Against this backdrop, **Singapore needs to enhance its food resilience, reduce its dependence on food imports, and work towards its "30 by 30" aspiration.**<sup>17</sup> This will serve as an effective buffer against supply disruptions for Singapore, further enhancing Singapore's food security.
3. However, conventional farming in Singapore is constrained mainly by two input factors – land and labour. One way to overcome them is to leverage frontier agriculture technologies ("AgriTech") such as indoor vertical farming to amplify land and labour productivity to produce more, and higher quality food.

## AMBITION & FOCUS AREAS

4. The prevailing unit economics to produce Asian leafy greens, which form the bulk of local consumption of vegetables, through indoor vertical farming has proven to be challenging. Indoor vertical farming faces various factors and headwinds in order to reach economic viability, including:
  - a. High upfront capital costs, e.g. equipment purchase/lease, construction;
  - b. High operating costs, e.g. rental, manpower, utilities;
  - c. Intensely competitive prices from imported produce which enjoy lower costs of production; and
  - d. Lack of certainty over forward local demand – resulting in local farms bearing all production risk in terms of what to grow.<sup>18</sup>

<sup>16</sup> The AfA on AgriTech was formed in November 2020, following the first seven AfAs which were formed in June 2020.

<sup>17</sup> In 2019, Singapore set an ambitious goal to locally produce at least 30% of Singapore's nutritional needs by 2030.

<sup>18</sup> Without a sense of forward demand, there is potentially a mismatch of demand and supply of specific produce. In the current operating environment, the farms bear the full risk of potential mismatches, as opposed to shared risks with the retailers.

As a result, existing local indoor vertical farms tend to focus on high-value crops (e.g. kale, western spinach) to achieve economic viability. This leaves a supply gap in local production of Asian leafy greens which cannot be filled sustainably through conventional farming techniques in the long run.

5. It is therefore inherently difficult to strike the fine balance between addressing local nutritional needs via the high-volume production of Asian leafy greens through indoor vertical farming, while staying economically viable. The AfA has therefore chosen to study **how a new platform model could enable us to achieve the two objectives concurrently**. The study is an ambitious one – not only is the AfA looking to leverage the model to reduce production overheads, it also seeks to explore how an inclusive platform for all farmers can develop partnerships with multiple stakeholders (from power generation companies to retailers) to reduce cost inefficiencies along the value chain, and secure off-take agreements to provide greater visibility for production planning and investments.
6. The AfA also envisions the study to be a **launchpad to steer the broader industry into action**. By charting a possible pathway towards economic viability for indoor vertical farming in general, the AfA aspires to **catalyse a decade of robust industry development within the AgriTech ecosystem** – one which comprises a healthy mix of local champions and established global players who can cater to local needs, and are at the technological frontier exporting AgriTech solutions to the world. A vibrant AgriTech ecosystem will also **inspire and nurture a new generation of local urban farmers, and enable the creation of new and better jobs in this greenfield sector**.
7. **Over the longer term, our AgriTech ecosystem and solutions will form a greater nexus with adjacent industries, such as Food Manufacturing**. Dovetailing existing infrastructure and initiatives in these industries, Singapore can identify new critical problem statements and deliver better value propositions along the entire food production value chain to further enhance Singapore's food resilience, competitiveness, and economic sustainability.

## RECOMMENDATIONS

8. Based on insights from various key stakeholders and analysing the key constraints for operating in a local context, the AfA recommends exploring the formation of a platform that could:
  - a. **Leverage scale across participating farmers**<sup>19</sup> (regardless of production techniques) to perform negotiations and secure off-take agreements at competitive prices;
  - b. **Reduce operating costs for participating farmers** by aggregating output across players and perform value chain services in a cost-efficient manner via shared facilities;
  - c. **Reduce risks of participating farmers and retailers** by providing a more accurate forward view of local demand;
  - d. **Create value by coordinating branding and marketing** to build a favorable local produce brand association;
  - e. **Over time, enable the economic viability of high-volume production of Asian leafy greens** through indoor vertical farming to enhance Singapore's food resilience; and
  - f. **Extend the model** beyond production of Asian leafy greens to other types of vegetables and agricultural produce (e.g. aquaculture, eggs, poultry), and extend the role of the platform to also include talent attraction, e.g. **changing outdated public perception of the jobs within the AgriTech sector** as manual and laborious.

<sup>19</sup> The AfA envisions the platform to be inclusive – one that is open to all interested farmers to join and work together to achieve better outcomes for all.

9. The Government could also play a part in strengthening the commercial viability of local indoor vertical farming by:
  - a. **Facilitating demand for local produce through creating awareness and organising business matching sessions.** The involvement of the Government is crucial, as it delivers a strong signal of the Government's conviction on the quality of our local produce, and the drive to enhance food resiliency by supporting local farmers.
  - b. **Building greater public awareness on the benefits of local produce to spur wider public interest and acceptance.** This could be promotional efforts jointly led by the industry and government agencies to stimulate greater demand for local produce among local food services (e.g. HoReCa) and end-consumers.
  - c. **Tightening the nexus between upstream R&D and commercialisation.** The AfA has validated the view that competing on price alone is not a viable strategy for local production of Asian leafy greens. Hence, a stronger integration of a clear R&D roadmap and the industry will boost our capabilities to (i) develop exportable AgriTech solutions for the world; and (ii) produce premium Asian leafy greens that are more nutritious and have better taste to justify the higher price.
  - d. **Supporting the formation of the platform** as described in Paragraph 8 through active facilitation between stakeholders, commercial parties, or other means.
10. Post-EST, the development of a commercially viable local indoor farming sector should be overseen by the FEC, as the tripartite platform will allow collaborations between the private and public sectors to continue to flourish.

# Alliance for Action (AfA) on MedTech<sup>20</sup>

## VISION

The AfA aspires to develop Singapore into a leading global hub for MedTech, serving as a trusted location for end-to-end design, development, and manufacturing of a range of MedTech products, with speed-to-market, and access to the region as Singapore's key differentiating advantages.

## CONTEXT

1. **Medical Technology (MedTech)** is a promising sector that has benefitted from the investments and growth of Biomedical and Life Science multinational companies, and has the potential to feature even more prominently in Singapore's next lap of growth. Driven by ageing demographics, increasing prevalence of chronic diseases, and a rise in consumerism as consumers increasingly take a proactive approach to personal health and wellness, the Asia-Pacific MedTech industry is expected to climb at a CAGR of 8.8% to 157 billion USD by 2022.<sup>21</sup> This has created a multitude of opportunities for MedTech firms to leverage innovation and technology to meet the region's healthcare needs.
2. Singapore is well-positioned to seize these MedTech opportunities. Our investments in Biomedical research and development (R&D) over the years have generated a pipeline of technologies that could be translated into commercial opportunities, with one of the predominant focus areas being the in-vitro diagnostics (IVD) space. In addition, Singapore's fundamental strengths in advanced manufacturing and precision engineering will also enable us to capture downstream manufacturing activities and scale for global exports.
3. In 2019, Singapore's MedTech manufacturing sector contributed to 1.4% of Singapore's GDP, offering more than 16,000 jobs. Beyond manufacturing, Singapore also houses 75 leading MedTech companies with established regional headquarters and/or R&D presence in Singapore. Our pool of home-grown MedTech companies with proprietary technologies has also grown six-fold, from 60 in 2014 to more than 360 in 2020. Indeed, COVID-19 has thrust Singapore into the spotlight as one of the leading countries at the forefront of the fight against the pandemic, with local MedTech companies such as MiRXES, Veredus Labs, and Biolidics successfully developing diagnostic test kits and gaining global recognition.

## AMBITION & FOCUS AREAS

4. **Our vision of success is for Singapore to become a leading global hub for MedTech, serving as a trusted location for end-to-end design, development, and manufacturing of a range of MedTech products, with speed-to-market and access to the region as Singapore's key differentiating advantages.**
5. COVID-19 has clearly demonstrated Singapore's ability to rapidly design and develop COVID-19 diagnostic test kits, such as Fortitude and RESOLUTE 2.0, and quickly attain the necessary approvals for scale-up manufacturing and subsequent deployment for clinical use in Singapore and around the world, like in the United States,

<sup>20</sup> The AfA on MedTech was formed in November 2020, following the first seven AfAs which were formed in June 2020.

<sup>21</sup> APACMed. (2020). MedTech Industry in APAC.



New Zealand, and Hong Kong. We were able to do so with speed and through private-public collaboration, leveraging Singapore's MedTech manufacturing base, and growing Biomedical sector and R&D capabilities. **Singapore can build on the achievements and abilities proven during COVID-19, to propel our MedTech sector into the next phase of growth.**

6. Today, the **MedTech contract development and manufacturing (CDMO) market** is fast growing at 8% CAGR globally and 10% in APAC, following a **similar trajectory to that of consumer electronics** in the early 2000s. A study by McKinsey has shown that **Singapore has the potential to become the “Flex of MedTech” – a global MedTech CDMO powerhouse.** The largest and highest growth segments for MedTech manufacturing are in **cardiology, orthopaedics, and in-vitro diagnostics (IVD)**, with growth CAGR exceeding 7% and a total market size of around US\$30 billion.
7. Taking into account Singapore's proven strengths in rapid testing, contact tracing, and isolation in our fight against COVID-19, **the AfA decided to focus on the IVD<sup>22</sup> segment of the MedTech sector.** We are witnessing a growing prevalence of both infectious and chronic diseases, as well as a rising demand for companion diagnostics. These trends have led to an increased need for more cost-effective, non-invasive, and smaller diagnostic tools that can be used for point-of-care or self-testing, while delivering faster and more precise results that can guide patients' treatment plans, monitor their responses to treatment, and provide patients with a more comprehensive picture for personalised disease diagnosis. Through early detection and appropriate management, the onset of health complications for such diseases and the high medical costs resulting from hospitalisation can therefore be delayed or prevented. **The AfA believes that establishing strong end-to-end IVD design, development, and manufacturing capabilities will help to (i) address immediate COVID-19 challenges, and (ii) address other large/emerging areas, e.g. oncology and biotechnology.**
8. The AfA therefore came together to **review the IVD value chain** in Singapore. **Several critical bottlenecks were identified**, such as the (i) access to sufficient clinical samples for validation and regulatory clearance, (ii) expertise in product design and manufacturing process development, (iii) regulations to secure consensus on standards for new IVD tests in Singapore and overseas markets, and (iv) translation of prototypes to large scale manufacturing for subsequent commercialisation. **Putting in place specific initiatives to address the various critical bottlenecks identified will enable Singapore to take a big stride towards our vision of success.**
9. As a starting point, the AfA decided to first **focus its efforts on developing local capabilities for IVD product design and pilot manufacturing.** Specifically, the AfA identified **growing Singapore's capability in lyophilisation for IVD products as a potential area that can be quickly executed.** Lyophilisation, also known as freeze-drying, is a critical process used within the Biomedical and Food Manufacturing sectors to improve product stability and increase shelf life, while preserving its potency and protecting it from degradation for subsequent storage, transportation, and export. However, such lyophilisation capabilities for IVD development are currently lacking in Singapore, resulting in the need for shipment of reagents to other countries for lyophilisation, thereby delaying speed-to-market and the ability to effectively scale up process development seamlessly from pilot to full manufacturing scale. Building such local lyophilisation capabilities will allow Singapore to anchor end-to-end activities in the IVD product development and commercialisation value chain in Singapore.

<sup>22</sup> IVD refers to tests done on samples taken from the human body, such as blood or tissue, to diagnose diseases or monitor a person's health.

## RECOMMENDATIONS

10. Following engagements with industry stakeholders, **the AfA recommends building on the existing capabilities of Diagnostics Development (DxD) Hub, and rounding it off with commercial-grade and manufacturing-ready lyophilisation facilities (whether sited within DxD Hub or externally; and jointly with industry stakeholders such as CDMOs). Collectively, this could form an open-access<sup>23</sup> lyophilisation platform that will offer the IVD ecosystem end-to-end lyophilisation expertise, resources, and facilities.** This will complete Singapore's IVD productisation capabilities, enabling the entire productisation life cycle to be effectively executed locally in an end-to-end manner: from biomarker discovery, prototyping, product-process design, pilot production, clinical validation, regulatory approval, to mass manufacturing. Building on its existing work, DxD Hub can play a convening role to explore this recommendation. If successful, businesses and the research community would be able to collaborate more closely to develop and commercialise IVD innovations. Beyond IVD, such lyophilisation capabilities could also serve other areas including life sciences, pharmaceuticals, and vaccines. Enabling speed-to-market in a cost-competitive manner will contribute to the development of a vibrant MedTech ecosystem.
11. **The AfA also recommends a roadmap for Singapore to progress towards the vision of success as a leading global hub for MedTech be charted, under the ambit of the FEC.** A possible thrust could ride on the global interest in ensuring greater preparedness for Disease X, and would leverage the progress Singapore has achieved in IVD, as well as novel Point-of-Care diagnostic solutions such as Sunbird Bio's Envision, or Breathonix's breath-based diagnostics instrument. Progressing on from an initial Infectious Disease focus, these medical device platforms could then expand in short order into other areas like metabolic diseases, which have large or growing global market share. Another thrust could focus on using our local robotics capabilities to develop responsive automation solutions for MedTech manufacturers, as successfully demonstrated by Singapore's Advanced Remanufacturing and Technology Centre (ARTC) during the COVID-19 pandemic. **Such efforts would catalyse Singapore's progression towards being a trusted location for end-to-end design, development, and manufacturing of MedTech products, and enable the creation of good jobs in the MedTech sector in the medium- to long-term.**

<sup>23</sup> Some companies may have in-house capabilities, but these are not generally open to the wider ecosystem of smaller players in Singapore.

### What Is Lyophilisation and Why Is It Used?

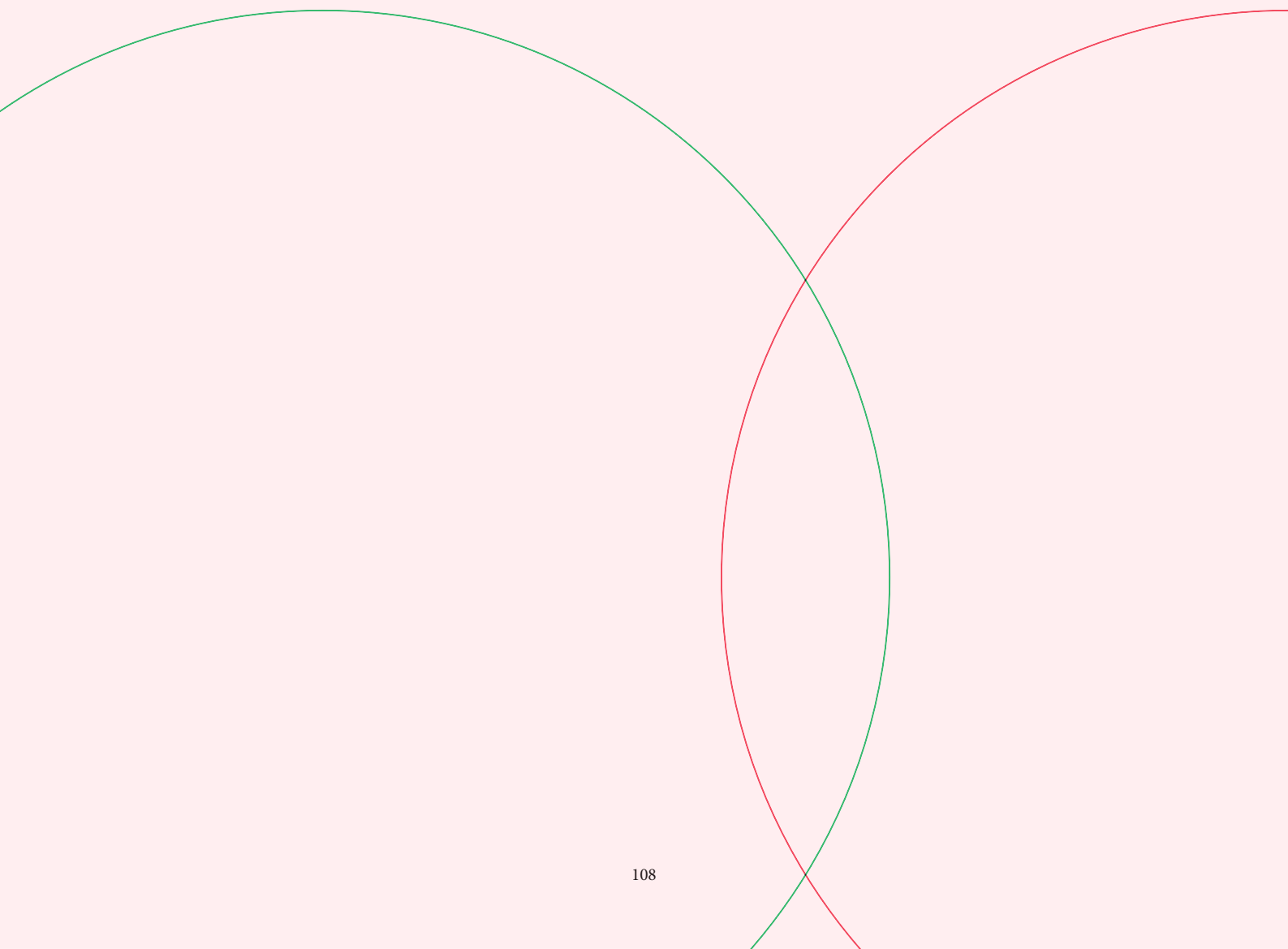
Lyophilisation is a freeze-drying process that removes water from a product after it is frozen and placed under a vacuum. The process is necessary for drug ingredients or drugs that are not stable in liquid or frozen form, due to chemical reactions, degradation, heat sensitivity or even biological growth. Lyophilisation enables longer shelf life, often as long as two to five years, and makes the product much easier to transport, especially because they can be stored at room temperature and will not require cold-chain logistics.

The process occurs in three stages: (a) freezing, (b) primary drying, and (c) secondary drying. Beginning with freezing, this takes place in the freeze dryer, with temperatures around -40°C. The product then goes from frozen state to dry powder through the process of sublimation. Depending on the type of product and quantity, it can take 12 to 72 hours to go through all three stages.

The lyophilisation process is complex, often messy, and can also be expensive, requiring large capital investments. However, interest in lyophilisation continues to grow, mainly due to the large and growing number of biologic drugs in development, potential applications across the pharmaceutical, medical, and food industries, and the technological advancements in lyophilisation methods.

ANNEX II:

# LIST OF CONTRIBUTORS



## EST MEMBERS

<b>Desmond Lee (Co-Chair)</b>	Minister for National Development, and Minister-in-Charge of Social Services Integration
<b>Tan Chong Meng (Co-Chair)</b>	Group CEO, PSA International
Amos Leong	President and CEO, Univac Group
Andrew Kwan	Founder and Group Managing Director, Commonwealth Capital
Azlinda Anwar	Director, Grants & IP Administration, and Coordinating Director, Temasek Life Sciences Laboratory
Caesar Sengupta	General Manager and Vice President, Payments and Next Billion Users, Google
Dilys Boey	Assistant CEO, Enterprise Singapore
Edmund Koh	President, UBS Asia Pacific of UBS Group AG and UBS AG, and Member of the UBS Group Executive Board
Fidah Alsagoff	Joint Head, Enterprise Development Group, and Head, Life Sciences, Temasek International
Gan Seow Kee	Vice Chairman and Honorary Treasurer, Singapore Business Federation
Jessie Yeo	Executive Secretary, Singapore Port Workers Union, and Human Resource Director, NTUC
Koh Lian Pin	Professor of Conservation Science, Technology and Policy, and Director, Centre for Nature-based Climate Solutions, National University of Singapore
Kwee Wei-Lin	President, Singapore Hotel Association, and Head of Hotels, Pontiac Land Group
Lee Chee Koon	Group CEO, CapitaLand Ltd
Lee Seow Hiang	CEO, Changi Airport Group
Lim Ming Yan	Chairman, Singapore Business Federation
Loo Choon Yong	Executive Chairman and Co-Founder, Raffles Medical Group
Peter Ho	CEO, HOPE Technik
Piyush Gupta	CEO, DBS Group
Sunny Verghese	Co-Founder and Group CEO, Olam International Ltd
Tan Chin Hwee	CEO-Asia Pacific, Trafigura
Vincent Chong	President and CEO, ST Engineering
Ye Gang	Co-Founder and Group COO, Sea Ltd

## MEMBERS OF ALLIANCES FOR ACTION

### Alliance for Action on AgriTech

**Andrew Kwan (Co-Lead)**

Founder and Group Managing Director, Commonwealth Capital

**Azlinda Anwar (Co-Lead)**

Director, Grants & IP Administration and  
Coordinating Director, Temasek Life Sciences Laboratory

Peter Ho

CEO, HOPE Technik

Sunny Verghese

Co-Founder and Group CEO, Olam International Ltd

Allan Lim

Founder, Comcrop

Lim Kok Thai (Senior Government  
Resource Person)

CEO, SFA

### Alliance for Action on Digitalising Built Environment

**Lim Ming Yan (Lead)**

Chairman, Singapore Business Federation

Lee Chee Koon

Group CEO, CapitalLand Ltd

Lee Seow Hiang

CEO, Changi Airport Group

Tan Chong Meng

Group CEO, PSA International

Tan Boon Khai

CEO, JTC

Lee Chuan Seng

Emeritus Chairman, Beca Asia Holdings Pte Ltd, and  
Co-Chair, Integrated Digital Delivery Steering Committee

Ng Yek Meng

President, Singapore Contractors Association Ltd

Cheng Hsing Yao

Managing Director, GuocoLand Group

Chia Ngiang Hong

President, Real Estate Developers' Association of Singapore

Tony Khoo

President, Singapore International Facility Management Association

Seah Chee Huang

President, Singapore Institute of Architects

Kelvin Wong (Senior Government  
Resource Person)

CEO, BCA

### Alliance for Action on EduTech

**Dilys Boey (Co-Lead)**

Assistant CEO, Enterprise Singapore

**Tan Chin Hwee (Co-Lead)**

CEO-Asia Pacific, Trafigura

Edmund Koh

President, UBS Asia Pacific of UBS Group AG and UBS AG, and  
Member of the UBS Group Executive Board

Peter Ho

CEO, HOPE Technik

Sunny Verghese

Co-Founder and Group CEO, Olam International Ltd

Ong Tze Chin	CEO, SSG, and Deputy Secretary (SkillsFuture), MOE
Henry Kwan	Independent
Lai Chung Han (Senior Government Resource Person)	Permanent Secretary (Education), MOE
<b>Alliance for Action on Enabling Safe and Innovative Visitor Experiences</b>	
<b>Kwee Wei-Lin (Co-Lead)</b>	President, Singapore Hotel Association, and Head of Hotels, Pontiac Land Group
<b>Lee Seow Hiang (Co-Lead)</b>	CEO, Changi Airport Group
Loo Choon Yong	Executive Chairman and Co-Founder, Raffles Medical Group
Aloysius Arlando	President, Singapore Association of Convention & Exhibition Organisers & Suppliers, and CEO, Singex Holdings
Cheong Wei Yang	Deputy Secretary (Special Projects), MOH
Han Kok Juan	Deputy Secretary (Hub Strategy), MOT
Thien Kwee Eng	CEO, Sentosa Development Corporation
Jayson Goh	Managing Director, Airport Operations Management, Changi Airport Group
Lim Ching Kiat	Managing Director, Air Hub Development, Changi Airport Group
Margaret Heng	Executive Director, Singapore Hotel Association
Steven Ler	President, National Association of Travel Agents Singapore
Tan Hee Teck	Chairman and CEO, Resorts World at Sentosa Pte Ltd
Keith Tan (Senior Government Resource Person)	CEO, STB
<b>Alliance for Action on Facilitating Smart Commerce</b>	
<b>Lee Chee Koon (Co-Lead)</b>	Group CEO, CapitaLand Ltd
<b>Ye Gang (Co-Lead)</b>	Co-Founder and Group COO, Sea Ltd
Lim Ming Yan	Chairman, Singapore Business Federation
Loo Choon Yong	Executive Chairman and Co-Founder, Raffles Medical Group
Tan Chong Meng	Group CEO, PSA International
Ervin Yeo	Managing Director, Southeast Asia, CapitaLand Ltd
Chris Chong	Managing Director, Retail, CapitaLand Ltd
Tan Sze Chern	Senior Manager, Sea Ltd
Tan Siew June	Head, Strategic Business Partnerships, CapitaLand Ltd



Justin Chan	Lead, Brand Acquisition, Shopee Singapore
Png Cheong Boon (Senior Government Resource Person)	CEO, ESG
<b>Alliance for Action on MedTech</b>	
Amos Leong (Co-Lead)	President and CEO, Univac Group
Fidah Alsagoff (Co-Lead)	Joint Head, Enterprise Development Group, and Head, Life Sciences, Temasek International
Loo Choon Yong (Co-Lead)	Executive Chairman and Co-Founder, Raffles Medical Group
Derric Lee	Vice President and General Manager, Illumina
James Lim	Executive Vice President, and President of Greater Asia, BD (Becton, Dickinson and Company)
Lihan Zhou	CEO and Co-Founder, MiRXES Pte Ltd
Sidney Yee	CEO, DxD Hub
Frederick Chew (Senior Government Resource Person)	CEO, A*STAR
<b>Alliance for Action on Robotics</b>	
Peter Ho (Co-Lead)	CEO, HOPE Technik
Vincent Chong (Co-Lead)	President and CEO, ST Engineering
Quek Tong Boon	CEO, National Robotics Programme, A*STAR
Michael Deeb	CEO, DSC Corporation
<b>Transport</b>	
Cheng Siak Kian	CEO, SBS Transit
Gerry Ong	Founder and Managing Director, GPS Lands
Jarrold Ong	CEO and Co-Founder, SWAT Mobility Pte Ltd
Neo Kian Hong	Group CEO, SMRT Corporation
Jonathan Kua	Senior Vice President, Group Strategy & Sustainability, ST Engineering
Hoe Yeen Teck	Head of Autonomous Transport, ST Engineering
<b>Service (Cleaning)</b>	
Ang Chor Chen	CEO, SESTO
Chen I-Ming	CEO and Co-Founder, Transforma Robotics
Derrick Yap	CEO, PBA
Dylan Ng Terntzer	CEO and Co-Founder, Lionsbot

Edy Tan	CEO, Chye Thiam Maintenance Pte Ltd
Gan Heng	General Manager, Facilities Management, Changi Airport Group
Gareth Tang	Senior Vice President (Technology), and Head (Innosparcs), ST Engineering
Jeffrey Chua	Senior Managing Director (Operations), CapitaLand Ltd
Jeremy Ong	CEO, Universal Consultants
Kung Teong Wah	General Manager, Corpthorne Kings Hotel
Mohan Rajesh Elara	Co-Founder, Lionsbot
Terence Wee	Executive Director, EMAS
Michael Leong	COO, HOPE Technik
Tung Meng Fai	Director, National Robotics Programme, A*STAR
Ng Lang <small>(Senior Government Resource Person)</small>	CEO, LTA
Tan Meng Dui <small>(Senior Government Resource Person)</small>	CEO, NEA
<b>Alliance for Action on Supply Chain Digitalisation</b>	
<b>Tan Chong Meng (Co-Lead)</b>	Group CEO, PSA International
<b>Tan Chin Hwee (Co-Lead)</b>	CEO-Asia Pacific, Trafigura
Gan Seow Kee	Vice Chairman and Honorary Treasurer, Singapore Business Federation
Piyush Gupta	CEO, DBS Group
Sunny Verghese	Co-Founder and Group CEO, Olam International Ltd
Ye Gang	Co-Founder and Group COO, Sea Ltd
Chong Kok Keong	CEO, Global eTrade Services (GeTs)
Geraldine Chin	Chairman and Managing Director, ExxonMobil Asia Pacific Pte Ltd
Himanshu Maggo	Head of Trade Products Management, Transaction Banking, Singapore, Standard Chartered Bank
Ho Ghim Siew	Head, Group Commercial, Strategy & Cargo Solutions, PSA International
Jeffery Soong	Regional Manager, Trafigura
Lew Chuen Hong	CEO, IMDA
Ng Peng Khim	Head of Institutional Banking Group Technology, Digital Innovation and Data Management, DBS
Lee Chuan Teck <small>(Senior Government Resource Person)</small>	Permanent Secretary (Development), MTI

## Alliance for Action on Sustainability

### Piyush Gupta (Co-Lead)

CEO, DBS Group

### Sunny Verghese (Co-Lead)

Co-Founder and Group CEO, Olam International Ltd

Gan Seow Kee

Vice Chairman and Honorary Treasurer, Singapore Business Federation

Koh Lian Pin

Professor of Conservation Science, Technology and Policy, and  
Director, Centre for Nature-based Climate Solutions,  
National University of Singapore

Tan Chin Hwee

CEO-Asia Pacific, Trafigura

Loh Boon Chye

CEO, SGX

Dilhan Pillay

Executive Director and CEO, Temasek International

Chng Kai Fong

Managing Director, EDB

Ravi Menon (Senior Government  
Resource Person)

Managing Director, MAS

## OTHER CONTRIBUTORS

### Professional Services and Think Tanks

Accenture  
Bain & Company  
Boston Consulting Group Digital Ventures  
Design Singapore Council  
McKinsey & Company (Singapore)  
PebbleRoad  
Platformation Labs  
PricewaterhouseCoopers  
Singapore Institute of International Affairs  
The Afternaut  
ThinkPlace

### Unions, Associations, and Co-Operatives

Amalgamated Union of Public Employees  
Amalgamated Union of Statutory Board Employees  
Attractions, Resorts and Entertainment Union  
Association of Consulting Engineers Singapore  
Banking and Financial Services Union  
Building Construction and Timber Industries Employees Union  
Chemical Industries Employees' Union  
Creative Media and Publishing Union  
Food, Drinks and Allied Workers' Union  
Global Compact Network Singapore  
Healthcare Services Employees' Union  
Housing and Development Board Staff Union  
Mercatus Co-operative Ltd  
Metal Industries Workers' Union  
National Trades Union Congress  
National Instructors and Coaches Association  
National Private Hire Vehicles Association  
Port Officers' Union  
Professional Photographers Association (Singapore)  
Public Utilities Board Employees' Union  
Scoot Staff Union  
Shipbuilding and Marine Engineering Employees' Union  
SIA Engineering Company Engineers and Executives Union

Singapore Airport Terminal Services Workers' Union  
 Singapore Chinese Teachers' Union  
 Singapore Industrial and Service Employees' Union  
 Singapore Insurance Employees' Union  
 Singapore Maritime Officers' Union  
 Singapore Organisation of Seamen  
 Singapore Production Management Association  
 Singapore Port Workers' Union  
 Singapore Teachers' Union  
 Singapore Urban Redevelopment Authority Workers' Union  
 Supply Chain Employees' Union  
 Sustainable Energy Association of Singapore  
 Tech Talent Assembly  
 Union of ITE Training Staff  
 Union of Power and Gas Employees  
 Union of Security Employees  
 Union of Telecoms Employees of Singapore  
 United Workers of Electronics & Electrical Industries  
 Visual, Audio, Creative Content Professionals Association (Singapore)

---

## SECRETARIAT

Adrian Chua, MTI  
 Tan Lin Teck, MTI  
 Melody Hong, EDB  
 Ang Sin Lek, MTI  
 Davina Lim, MTI  
 Dayna He, MTI  
 Hannah Cai, MTI  
 Janice Lim, MTI  
 Justin Woo, MTI  
 Lau Sing Wei, MTI  
 Lee Pei Xuan, MTI  
 Poline Lim, MTI  
 Sue-Anne Tang, MTI  
 Yang Yixuan, MTI  
 Amanda Toh, EDB  
 Brandon Chew, EDB  
 Chow Yi Ling, EDB  
 Leong Wai Yee, EDB  
 Tan Cui-Yun, EDB  
 Agatha Lim, PMO  
 Gan Su Yi, PMO  
 Lim Seok Hui, PMO  
 Bryan Lim, SNDGO  
 Charmaine Lee, MSF  
 Chelsea Wong, MSF  
 Cheryl Tan, MSF  
 Jonathan Tan, MSF  
 Tan Xin Yi, MSF

---

## COMMUNICATIONS AND ENGAGEMENT TEAM

Lim Weilin, MTI  
 Aileen Lim, MTI  
 Tangie Kay, MTI  
 Joseph Khong, MTI  
 Lea Yi-Long, MTI  
 Lynn Yee, MTI  
 Valerie Koh, MTI  
 Karen Ngui, DBS Group  
 Chong Ee Rong, Raffles Medical Group

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