SG:D
EMPOWERING POSSIBILITIES

DIGITAL ECONOMY
FRAMEWORK FOR ACTION
SINGAPORE

IMDA
INFOCOMM
MEDIA
DEVELOPMENT
AUTHORITY

Contents

Singapore Digital in the making: a snapshot

> "This is an age of unprecedented possibilities.
>
> Worldwide, digital transformation is changing the way businesses operate, creating new growth prospects for firms, and providing new opportunities for the people.
>
> The Singapore Digital movement is our response to digital transformation – to help our businesses and workforce prepare for and embrace these possibilities.
>
> Businesses need to digitalise, innovate and adjust business models to capture new revenue streams for both here and abroad. Workers in all sectors must continually learn, re-skill and up-skill themselves to take on better and more fulfilling jobs enabled by the digital economy.
>
> Working together, we will make Singapore a leading digital economy in the world, continually reinventing ourselves to seize new growth opportunities."
>
> **S ISWARAN**,
> Minister for Communications and Information

In the first three months of 2008, mobile users in Singapore transmitted about 515,000 gigabytes of data, including text, photos and videos, nearly as much as the 591,000 gigabytes of data for the entire 2007.

That was the start of what would be an explosion of data. One decade on in 2017, mobile data consumption has risen some 300-fold to 175.5 petabytes.[1]

The smartphone has not only influenced our day-to-day activities like paying bills and consuming news; it has revolutionised the way relationships are built and communities are formed.

The advent of mobile is just one aspect of how technology has impacted our lives.
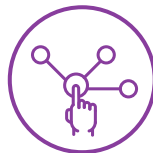
Technology has opened up greater access to the economy for SMEs, and empowered individuals to become content creators and service providers.

Technology has reshaped businesses, industries, and economies. It has opened up greater access to the economy for SMEs, and empowered individuals to become content creators and service providers.

The already rapid pace of change we have seen in the past decade is expected to further accelerate in the decade ahead.

Against this backdrop, Singapore must prepare our businesses, workers and people for the digital economy that is upon us. The digital economy will bring new possibilities and opportunities as it transforms businesses, industries, jobs and lifestyles.

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[1] IMDA – Fact and Figures: Telecommunications (2018, Mar 27). Retrieved from https://www.imda.gov.sg/industry-development/facts-and-figures/telecommunications#9x. Accessed on 2018, May 16.
(to visualise a Petabyte – if the average MP3 encoding for mobile is around 1 MB per minute and the average song lasts about four minutes, then a petabyte of songs would last over 2,000 years playing continuously – Wes Biggs, CTO at Adfonic,ComputerWeekly March 2013)

Building from a position of strength

Singapore is digitalising our economy from a position of strength. Our traditional strengths are numerous: we have a world-class infrastructure, a highly-educated and trained workforce and a stable government. As a regional financial hub, we are positioned strategically in Asia, functioning as a gateway between east and west.

Our strengths extend into the digital realm and Singapore continues to push the boundaries of digital and tech in many sectors. For instance, Singapore's S$225 million financial technology (Fintech) fund aims to propel the development of Singapore into a digital financial centre. Singapore is ranked 1st in the IFZ Global Fintech Rankings[2], outpacing traditional financial market strongholds such as Zurich and New York. Our start-up scene continues to grow and attract some of the brightest talents in the world, with Singapore coming in third in Bloomberg's 2018 Innovation Index[3].

With a world-class infrastructure, a highly-educated and trained workforce, as well as a stable government, Singapore is digitalising its economy from a position of strength.

Singapore's strategy to sharpen our digital edge

To guide the collective way forward in the digital economy, Singapore's framework for action focuses on three pillars of growth.

1. **Accelerate**: To accelerate the digitalisation of our existing industries for productivity improvements, efficiency gains and new revenue opportunities.

2. **Compete**: To enhance our economic competitiveness by fostering new integrated ecosystems converged around customers' needs.

3. **Transform**: To develop the next generation digital industry as an engine of growth for the economy, and a driver of digitalisation across all industries.

Four cross-cutting enablers will support these pillars of growth.

- **Talent**: To continually up-skill, re-skill and raise the digital capabilities of the workforce.

- **Research and Innovation**: For firms to innovate and leverage intellectual property for competitive advantage, harnessing the capabilities in our research and innovation community.

- **Policy, Regulations and Standards**: To ensure that our policy and regulatory environment, including the environment for data innovation, is globally competitive in a digital world.

- **Physical and Digital Infrastructure**: To ensure that connectivity, platforms, data and other infrastructure well-support the growth of the digital economy.

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[2] 2017 IFZ Global FinTech Rankings (2017, Apr 11). Retrieved from https://innovation.thomsonreuters.com/en/labs/portfolio/global-fintech-rankings.html#/. Accessed 2018, 16 May.
[3] Singapore ranks third in innovation rankings, South Korea tops index: Bloomberg (2018, Jan 23). Retrieved from https://www.channelnewsasia.com/news/business/singapore-ranks-third-in-innovation-rankings-south-korea-tops-9886414. Accessed 2018, 16 May.

Embracing opportunities

There is a range of programmes aimed at supporting companies and individuals to embrace opportunities in the digital economy.

For companies looking to acquire digital capabilities, transform digitally and evolve their business models, there is a ladder of support to accelerate their push. Creating a conducive environment for innovation, as well as putting in place programmes tailored to groom companies at varying levels of digitalisation, will also open up new growth areas and opportunities. In addition, those looking to target new markets overseas or innovate using technology will be supported by relevant programmes.

Our people will also benefit. Programmes are in place for workers to upgrade and pick up relevant digital skills. At the same time, programmes for the community will ensure that our citizens are ready for the digital future for a better quality of life.

The SG:D movement encourages companies, organisations and individuals to work together to thrive in the digital economy.

A Framework for Action in the Digital Economy

To seize new opportunities afforded in the digital economy, each of us must take action. The Singapore Digital (SG:D) movement was introduced last year to encourage the government, companies, organisations and individuals to work together to thrive in the digital economy. The SG:D movement is our response to digital transformation – to help our businesses and workforce prepare for and embrace these possibilities.

This living document – A Framework for Action in the Digital Economy – seeks to provide a guide for us to do so.

The Digital Imperative sets out Why Singapore should pay attention to the digital economy.

Framing a World-Leading Digital Economy outlines How Singapore can tackle challenges and seize the opportunities of the future.

Taking Action in a Digital Economy of New Opportunities lists What opportunities and programmes are available for companies, workers, and communities to act on.
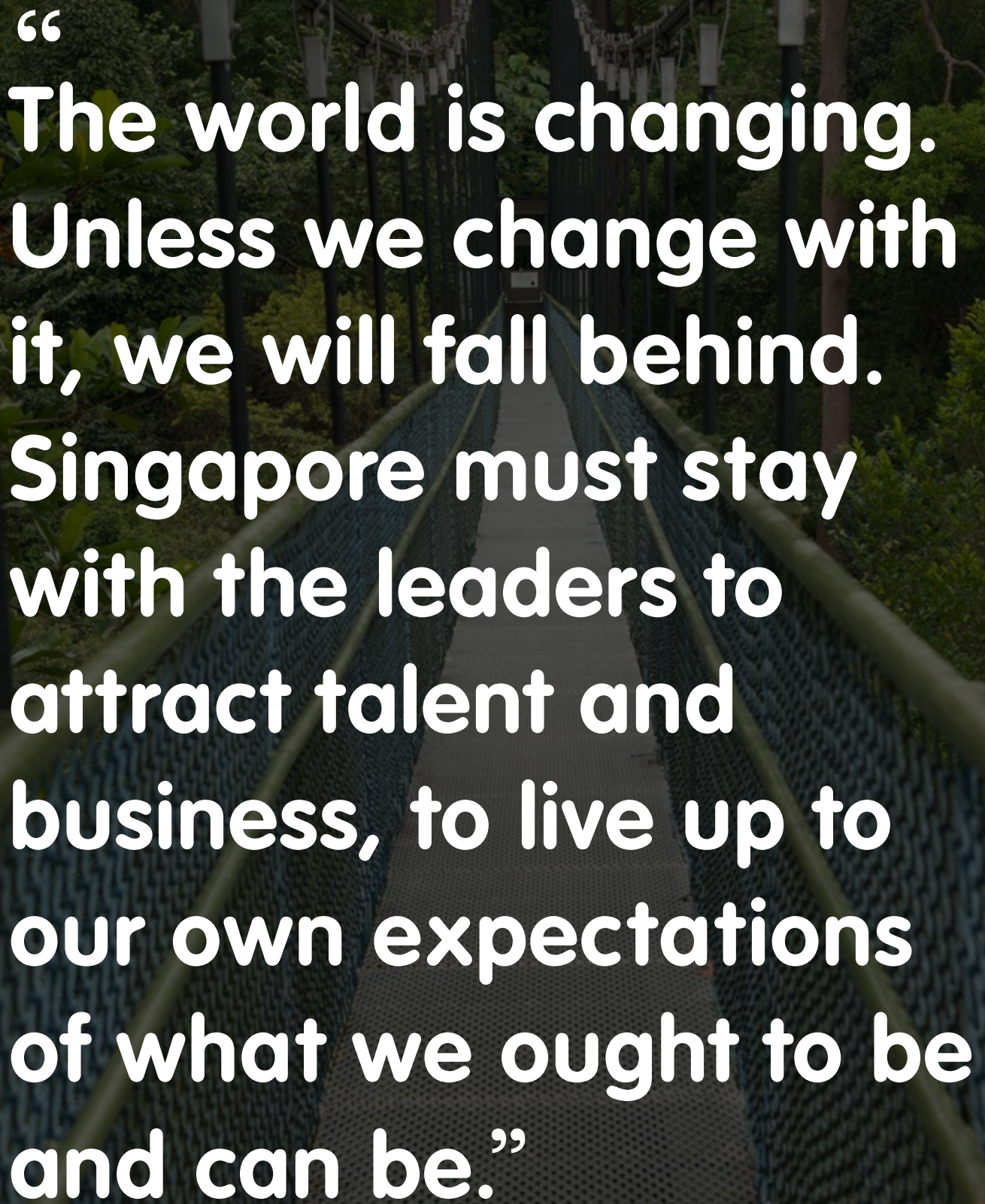
Singapore's goal is to be a leading digital economy that continually reinvents itself. The very nature of the digital economy requires us to relook, refresh and reinvent our strategies as the environment changes. This document is just the opening chapter in an ongoing conversation. The government will work together with businesses, individuals and other stakeholders to co-create the future, and keep Singapore ahead in the ever-evolving landscape.

Our digital economy future is bright, **giving everyone more reasons to smile**.

THE DIGITAL IMPERATIVE

"The world is changing. Unless we change with it, we will fall behind. Singapore must stay with the leaders to attract talent and business, to live up to our own expectations of what we ought to be and can be."

LEE HSIEN LOONG,
Prime Minister of Singapore[4]

[4] National Day Rally 2017 (2017, August 20). Retrieved from http://www.pmo.gov.sg/national-day-rally-2017. Accessed on 2018, May 15.
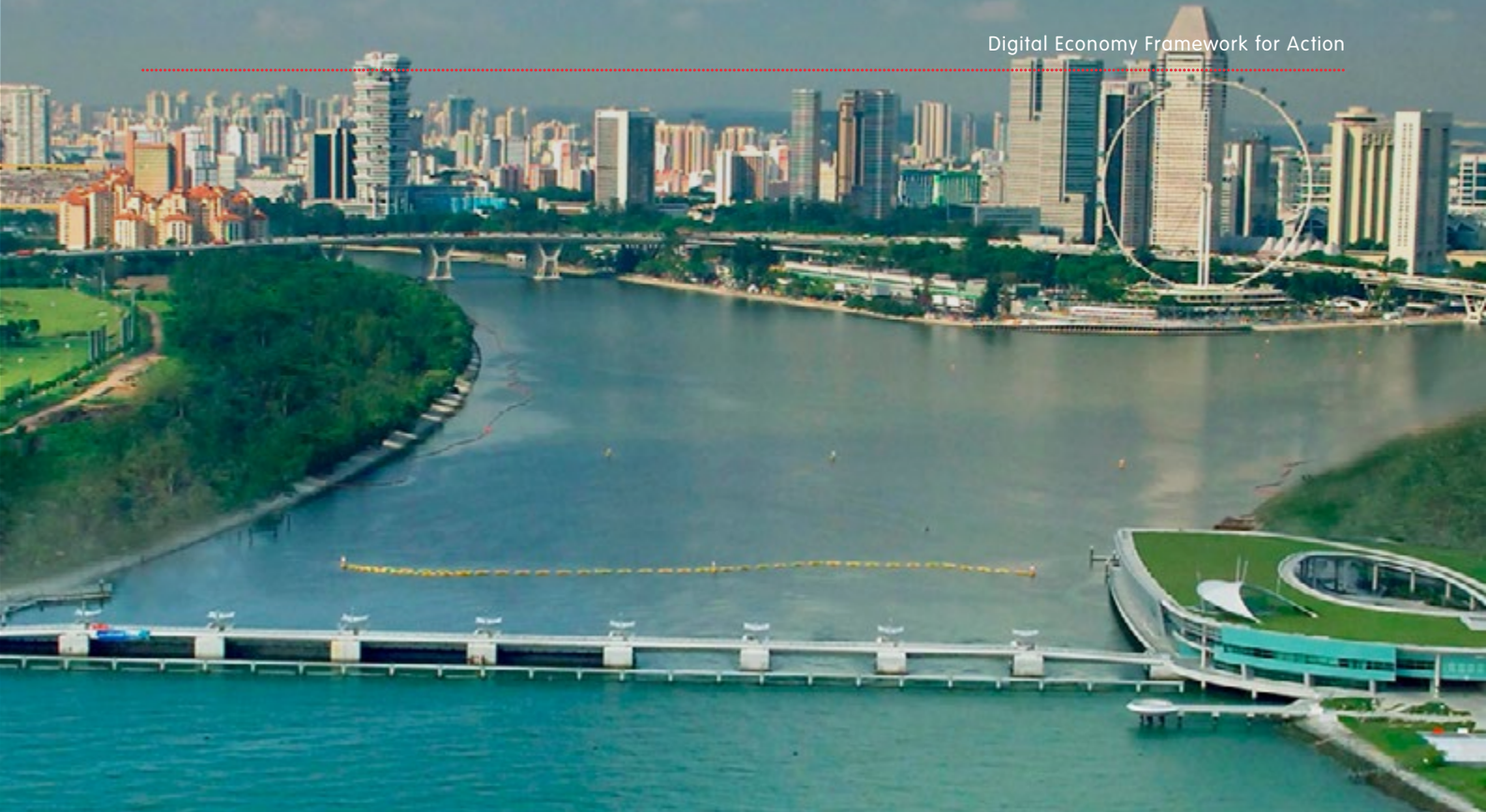
The Digital Imperative

When ride-hailing app Grab first opened its doors in 2012, the response was overwhelming. It received 11,000 downloads that day and ended up not having enough drivers to go around.

Today, Grab has completed more than one billion rides across eight countries[5]. In March 2018, it announced its acquisition of rival Uber's South-east Asian business, beating the start-up that revolutionised public transportation in the region.

In the financial sector, DBS has also led the way in digital transformation, and was named the World's Best Digital Bank by Euromoney in 2016[6].

> Countries, businesses and individuals will have to adapt to this new reality in which digital technologies become embedded in daily activities.

As digital becomes the cornerstone of the future economy, it is imperative for companies to evolve business models, processes and technologies to keep pace with the changing market. Many companies are already leveraging on the latest technologies - cloud computing, big data, Internet of Things (IoT), artificial intelligence, among others - to improve and transform their businesses.

Countries, businesses and individuals will have to adapt to this new reality in which digital technologies become embedded in daily activities. Going digital is no longer simply part of how an economy functions - it is the economy.

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[5] You're One In A Billion! (2017, November 6). Retrieved from https://www.grab.com/sg/blog/youre-one-in-a-billion/. Accessed 2018, May 16.
[6] "World's Best Digital Bank 2016" (2016, July 6). Retrieved from https://www.euromoney.com/article/b12kq6p8mv5rh3/world39s-best-digital-bank-2016-dbs, Accessed 2018, May 15.

The digital economy

The World Economic Forum and the Group of Twenty (G20) define the digital economy as a broad range of economic activities comprising all jobs in the digital sector, as well as digital occupations in non-digital sectors. These include activities that use digitised information and knowledge as the key factor of production; modern information networks as an important activity space; and Information and Communication Technology (ICT) to drive productivity growth and optimise economic structures[7].

In simple terms, the digital economy is a marketplace that is defined, organised, enabled, and facilitated by technology.

Take the booming e-commerce sector as a prime example. In 2017 Chinese e-commerce giant Alibaba generated sales of 168.3 billion yuan (US$25.3 billion) in just 24 hours during its Singles' Day event. Similarly, US-based Amazon doubled its net sales revenue in three years, jumping from US$88.9 billion in 2014 to US$177.8 billion in 2017[8].

In a sign of growing confidence in digital, Alibaba is pumping in another US$2 billion into its Singapore-based e-commerce platform, bringing the total investment to US$4 billion, while Amazon launched its inaugural two-hour delivery Prime Now service in Singapore in July 2017[9].

All of this comes at a time when the traditional retail sector is facing deepening woes. In the United States, long-time retail giants such as Walmart and Macy's have been closing stores amid falling sales, while Toys 'R' Us filed for bankruptcy in September 2017.

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[7] G20 Digital Economy Development and Cooperative Index (2016). Retrieved from http://www.mofa.go.jp/files/000185874.pdf. Accessed on 2018, May 15.

[8] Amazon Annual Revenue 2004 – 2017. Retrieved from https://www.statista.com/statistics/266282/annual-net-revenue-of-amazoncom/. Accessed on 2018, 15 May.

[9] Amazon Enters Singapore With Most Aggressive Service Yet (2017, July 27). Retrieved from https://www.bloomberg.com/news/articles/2017-07-27/amazon-enters-singapore-with-two-hour-prime-now-delivery-service. Accessed on 2018, 15 May.

> **Digital technologies and businesses models are transforming every sector, from manufacturing to logistics, from finance to healthcare. And the Digital Economy is also constantly disrupting itself.**

THARMAN SHANMUGARATNAM,
Deputy Prime Minister
of Singapore[10]

The development of the Digital Economy is brought about not just by a specific isolated change in technology. The current wave of technological advancements are game changers in the following ways:

1. **Redefined Boundaries**: Digitalisation has shrunk the world where geographical boundaries are no longer a constraint for competition. New entrants from afar are challenging incumbents in markets across the world.

2. **Connectivity**: Information exchange has been reshaped. Multiple-sided digital platforms have replaced traditional market operations, disrupting the system of intermediaries. The explosion in use of smart phones and social media has enabled new business models centred around big data.

Big data, 3D printing, robotics, cloud computing and machine learning have given businesses and individuals a huge jump in their capabilities.

3. **Disruptive Technology and Innovation**: Big data, 3D printing, robotics, cloud computing and machine learning have given businesses and individuals a huge jump in their capabilities. Adopters of these innovations are shaking up their industries by becoming faster, more flexible, more precise and more able to produce customised goods and services of a higher quality. As a result of some of these technologies, the nature of jobs will also change, and workers will have to continually re-skill and up-skill.

4. **Accelerated Change:** Changes are taking place faster than ever before. On the economic front, this means that business operating models, goods and services consumed, and skills have increasingly shorter lifespans.

Singapore and the digital economy

Data flows have changed how countries and companies do business globally. According to McKinsey Global Institute, global cross-border data flows have soared 45 times since 2005. Data flows in 2014 contributed to an estimated US$2.8 trillion in global GDP[11], and will continue to create both immense opportunities and challenges in the world.

The digital revolution has altered the economics of doing business by lowering barriers and bringing down costs of cross-border interactions, and enabling the virtual and instant creation and trade of digital goods and services. With the blurring of sector and national boundaries in the digital realm, competition has also been redefined globally.

Singapore's economic survival has been premised on being relevant to the global economy. We must therefore ensure we remain a leading participant in the digital economy – seizing new opportunities and capturing value that arise from this global trend.

Digitalisation is vital to our businesses in terms of raising productivity, driving top-line growth, reaping value in adjacencies, harnessing new ecosystems and accessing new markets overseas. It takes more than just using the latest technologies – it involves transforming business models and rethinking operating approaches to take full advantage of the capabilities that digital offers.

The value of digitalisation is immense — Microsoft estimates that the digital economy will contribute an additional US$10 billion to Singapore's GDP by 2021.

The Committee on the Future Economy (CFE), which was formed to chart the next phase of Singapore's economic growth, has affirmed the importance for Singapore to take the lead in the global digital economy.

> " As part of Singapore's roadmap to become a Smart Nation, our enhanced growth strategy for the digital economy will go hand-in-hand with our digital government strategies. "

DR. YAACOB IBRAHIM,
Former Minister for Communications and Information[12]

Smart Nation is about Singapore taking full advantage of technology to (1) make our economy more productive; (2) make our lives more convenient; and (3) make Singapore an outstanding city to live, work and play in.

- At the most basic level, Smart Nation is convenience and improving lives. We can use technology to improve the quality of our lives – monitor our health, reduce time spent on administrative tasks, plan our commute, etc. We can also leverage technology to make daily transactions easy and seamless, be it making a payment, applying for a permit, etc. The technology that enables this smooth process should be invisible, and the design should be intuitive, so anyone can use it.

- At a broader level, Smart Nation is about achieving efficiencies and effectiveness for enterprise, be it leveraging sensors and data to better manage traffic or monitor for security threats. Cost savings brought about by digitalisation is also key to growing businesses.

- Most importantly, Smart Nation is about transforming our economy, and ensuring that we grow our businesses and create jobs and opportunities.

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[11] Digital Globalisation: The New Era of Global Flows (2016, February). Retrieved from https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows. Accessed on 2018, May 15.
[12] Speech by Dr. Yaacob Ibrahim, Former Minister for Communications and Information at Smart Nations Innovations, innofest unbound 2017 (2017, May 3). Retrieved from https://www.mci.gov.sg/pressroom/news-and-stories/pressroom/2017/5/smart-nations-innovations-innovfest-unbound-2017

Sharpening Singapore's digital edge from a position of strength

Singapore is looking to become a leading digital economy from a position of strength. There are multiple reasons why Singapore is well poised to achieve its ambitions.

New industries, new markets, new jobs

Singapore's scarce land resources and limited population have been our main constraints to growth. Digitalisation provides new options to overcome these constraints. Singapore has successfully ridden consecutive waves of digital transformation, starting from the national computerisation efforts of the 1980s. This latest digital transformation will open up opportunities on three fronts: new industries, new markets and new jobs.

Technologies such as AI have the potential to completely rewire whole industries, from finance to shipping and manufacturing.

This latest digital transformation will open up opportunities for Singapore on three fronts: new industries, new markets and new jobs.

New industries will be formed even as older ones start to evolve and transform. For instance, technological giants Google and Facebook have redefined advertising and created new channels in the form of pay-per-clicks and other types of innovations. This has, in turn, forced advertising agencies to adapt and spawned new forms of media buy models.

The rise of new industries will also be accompanied by the creation of new markets. For small companies, this means the ability to tap onto foreign markets using digital channels with relatively low start-up costs. For example, e-commerce platforms such as Amazon and Lazada allow anyone from farmers to fine jewellers to sell their goods across the globe.

With new industries and markets, new jobs will also be created. Digitalisation can reshape the typology of jobs within the labour market. Automation can augment our limited manpower resource, and allow employers to overcome labour constraints while creating more meaningful jobs for Singaporeans.

World-class digital infrastructure and strong enablers

Infrastructure & Connectivity

Singapore's physical infrastructure ranks as one of the best in the world. The Republic has high-quality fixed-line networks, with a wireless broadband penetration rate of 200 per cent and a mobile phone penetration rate of 150 per cent[13]. It also ranks first in terms of 4G speed by OpenSignal[14]. The Nationwide Broadband Network, which provides Singaporeans with affordable ultra-high-speed broadband, forms the foundation on which future digitalised services can be developed[15].

The Economist Intelligence Unit Asian Digital Transformation Index, which measures digital readiness, has ranked Singapore first in Asia due to its strengths in digital infrastructure and industry connectivity[16]. Singapore has also made substantial investments in building research and development (R&D) ecosystems with "living labs" for experimentation to test solutions and create new products and services.
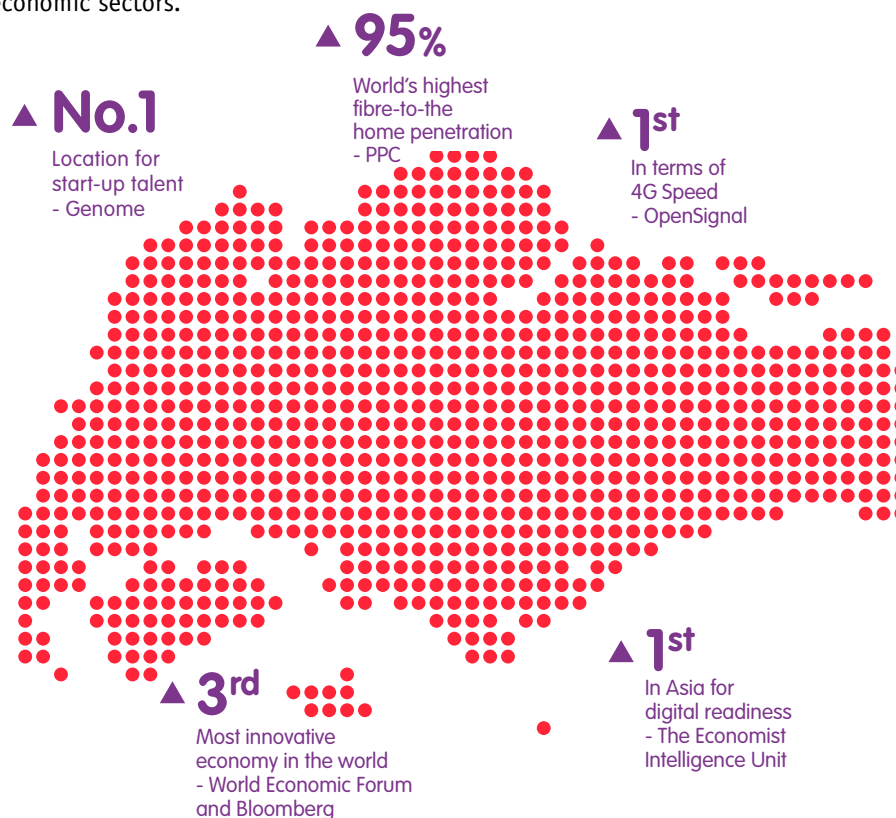
Talent & Innovation

The Singapore workforce is well-educated and well-positioned to adapt for the future with initiatives such as SkillsFuture, which aims to help the working population continually re-skill and up-skill for the changing environment.

Singapore's economy is also regarded as one of the most innovative in the world. Both the World Economic Forum[17] and Bloomberg[18] ranked Singapore as the third most innovative economy in the world, topped only by South Korea and Sweden. Our start-up ecosystem is one of the most exciting ones globally, and has attracted world class

talent from all over the world. Start-up Genome hailed Singapore as the world's No. 1 location for start-up talent[19], citing the country's innovative policies as a key reason for its success.

Business Environment & Government

Singapore is also one of the easiest places in the world to do business, and ranks 2nd out of 190 countries according to the World Bank for ease of doing business. The Edelman Trust Barometer which measures the level of trust the people have in the Government ranks Singapore 2nd out of 26 economies. The Government continues to demonstrate its strong commitment to drive the growth of the digital economy with the recommendations of the Committee on the Future Economy in 2017. The S$4.5 billion Industry Transformation Programme will support sectors to transform, and achieve their digitalisation potential, guided by the Industry Transformation Maps for the 23 economic sectors.

▲ **No.1**
Location for start-up talent - Genome

▲ **95%**
World's highest fibre-to-the home penetration - PPC

▲ **1st**
In terms of 4G Speed - OpenSignal

▲ **3rd**
Most innovative economy in the world - World Economic Forum and Bloomberg

▲ **1st**
In Asia for digital readiness - The Economist Intelligence Unit

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[13] IMDA – Fact and Figures: Telecommunications – Statistic on Telecom Service for 2018 Jan (2018, May 14). Retrieved from https://www.imda.gov.sg/industry-development/facts-and-figures/telecommunications/statistics-on-telecom-services/statistic-on-telecom-service-for-2018-jan. Accessed on 2018, May 16.

[14] The State of LTE (2016, November). Retrieved from https://opensignal.com/reports/2016/11/state-of-lte. Accessed on 2018, May 15.

[15] Next Gen NBN (2017, December 8). Retrieved from https://www.imda.gov.sg/industry-development/infrastructure/next-gen-national-infocomm-infrastructure/wired/next-gen-nbn. Accessed on 2018, May 15.

[16] Connecting Capabilities (2018). Retrieved from http://connectedfuture.economist.com/connecting-capabilities/article/connecting-capabilities/. Accessed on 2018, May 15.

[17] McKenna, J. South Korea and Sweden are the most innovative countries in the world (2018, February 6). Retrieved from https://www.weforum.org/agenda/2018/02/south-korea-and-sweden-are-the-most-innovative-countries-in-the-world/. Accessed on 2018, May 15.

[18] Jamrisko & Lu. The U.S. Drops Out of the Top 10 in Innovation Ranking (2018, January 23). Retrieved from https://www.bloomberg.com/news/articles/2018-01-22/south-korea-tops-global-innovation-ranking-again-as-u-s-falls. Accessed on 2018, May 15.

[19] Williams, A. Singapore No. 1 in world for start-up talent: Report (2017, March 22). Retrieved from http://www.straitstimes.com/singapore/singapore-no-1-in-world-for-start-up-talent-report. Accessed on 2018, May 15.

Located in the heart of a dynamic region

Singapore sits right in the heart of one of the most exciting and dynamic growth regions in the world. South-east Asia is seen as the next frontier of a booming digital economy, and it is easy to see why.

Collectively, ASEAN is the world's sixth largest economy with a combined GDP of US$2.5 trillion. The region will also reap the benefits of its demographic dividend over the next decade or so. About 40 per cent of its over 600 million-large population are younger than 30 years old, and 90 per cent of them have access to the Internet[20]. The online population in the region is growing by 124,000 users every single day. Mobile penetration in South-East Asia is among the most prevalent in the world, at a staggering 1.41 mobile connections per citizen[21], with each citizen spending an average of 3.6 hours on their mobile devices each day, the highest utilisation rate in the world[22].

The tech-savvy young population, high Internet and mobile penetration, coupled with the frequent and extensive online activity underpins the demographic dividend that will supercharge the region's digital

A study by investment firm Temasek and Google showed that the region's Internet economy is expected to grow to more than US$200 billion by 2025.

economy in the decades ahead. A study by investment firm Temasek and Google showed that the region's Internet economy is expected to grow to more than US$200 billion by 2025[23]. Internet-based business accounted for 2 per cent of the regional economy in 2017 but this is expected to rise to 6 per cent by 2025.

Coupled with our world-class digital infrastructure, Singapore's location has made us an ideal place for some of the biggest technology companies to establish their presence. Large companies are investing heavily into Singapore to establish research and development outfits and get nearer to their key markets in Asia. Our good governance and strategic geographical location among fast-growing economies such as China, India and Indonesia also add to the Singapore advantage.

Online payment services giant PayPal, for instance, has opened its international headquarters in Singapore to represent all of its business outside the US, while Amazon made its first foray into South-east Asia with Prime Now in Singapore, offering free ultra-fast two-hour delivery of products from groceries to electronics and sporting goods. Google has also sunk in S$675 million to build cutting-edge green data centres in Singapore to support its operations around the region.

[20] Phidel Marion, V. S. Rajaratnam School of International Studies - ASEAN Digital Economy: A New Pillar? (2018, February 9). Retrieved from https://www.rsis.edu.sg/rsis-publication/cms/co18020-asean-digital-economy-a-new-pillar/#.WvwnV4iFOHt. Accessed on 2018, May 16.

[21] Simon, K. Digital in 2018: World's Internet Users Pass The 4 Billion Mark (2018, January 30). Retrieved from https://wearesocial.com/blog/2018/01/global-digital-report-2018. Accessed on 2018, May 16.

[22] Anandan & Sipahimalai. 330 million internet users accelerating the growth of Southeast Asia's internet economy (2017, Dec 12). Retrieved from https://www.blog.google/topics/google-asia/sea-internet-economy/. Accessed on 2018, May 15.

[23] Anandan & Sipahimalai. 330 million internet users accelerating the growth of Southeast Asia's internet economy (2017, Dec 12). Retrieved from https://www.blog.google/topics/google-asia/sea-internet-economy/. Accessed on 2018, May 15.

14

SG:D
EMPOWERING POSSIBILITIES

Singapore Digital
charting a
movement forward

"

Everyone has a stake in the future of our economy; everyone has a critical role to play; and everyone has to act as one."

HENG SWEE KEAT,
Minister for Finance and Chairman
of the Future Economy Council[24]

Digitalisation is about enabling new possibilities across the economy, with business growth and better jobs. Grasping these opportunities will allow Singapore to remain a smart and thriving nation that continually attracts investments and talent to her shores.

Going digital is a national imperative for a better future for Singaporeans. Singapore must be proactive and quick to translate these possibilities to reality. The Singapore Digital (SG:D) movement was launched in support of the future economy, to spur our digitalisation efforts, with the Government, companies, organisations and individuals working together to reap the benefits of the digital economy.

The future is full of possibilities, giving everyone something to smile about.

[24] Ministerial address by Mr Heng Swee Keat, Minister for Finance, at the Future Economy Conference and Exhibition (2017). Retrieved from https://www.sbf.org.sg/images/2017/Future-Economy-Conference_Minister_Heng_Speech.pdf. Accessed on 2018, May 15.

FRAMING A WORLD-LEADING DIGITAL ECONOMY

Framing a World-Leading Digital Economy

> ❝
> We have what it takes to achieve this vision — the capabilities and daring to pull it all together and to make a quantum leap forward. ❞

LEE HSIEN LOONG,
Prime Minister of Singapore[25]

Singapore's goal is clear: To be a leading digital economy that continually reinvents itself.

Informed by a framework for action, Singapore's digital economy transformation is focused around three priorities, which are in turn supported by four enablers.

The framework for action, represented by the acronym **ACT**, aims to build a thriving network of businesses and workers that is fully-immersed in the digital economy.

1. **Accelerate**: We will accelerate the digitalisation of industries, and support businesses and workers to use technology more intensively in their operations and workplace. Ramping up digital adoption across our economic sectors will better position our companies to seize growth opportunities, boost labour productivity and provide an uplift to economic growth in the medium term.

2. **Compete**: Digitalisation is hastening the blurring of sector boundaries. Enabled by digital platforms, customers can increasingly dictate how products and services are designed and delivered around their needs, resulting in the formation of new business ecosystems and market intermediaries. These new ecosystems will form the foundation of future industries. Singapore aims to foster a conducive environment for the growth of such integrated ecosystems and support our businesses to innovate and evolve their business models, and become competitive in the global marketplace.

3. **Transform**: A strong Infocomm Media (ICM) sector that is competitive and dynamic will be crucial for Singapore to realise its digital economy aspiration. We will continue to partner the industry to transform the ICM sector, nurture the next generation of digital champions and develop the sector as a key engine of growth for Singapore's future economy.
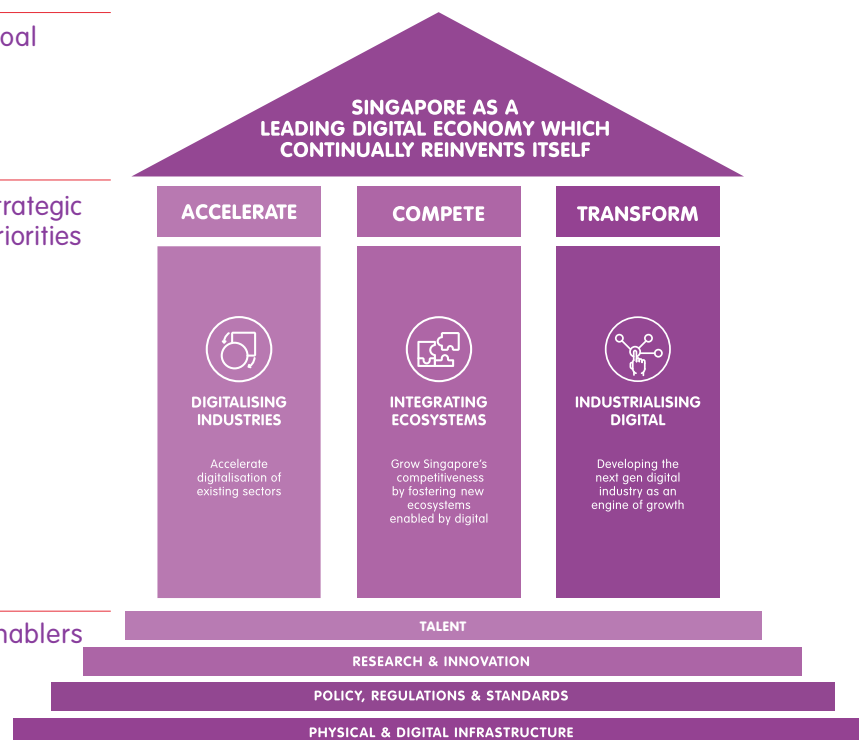

Figure 1. A framework for action to develop Singapore's Digital Economy

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[25] Transcript of Prime Minister Lee Hsien Loong's speech at Smart Nation launch on 24 November (2014, November 24). Retrieved from http://www.pmo.gov.sg/newsroom/transcript-prime-minister-lee-hsien-loongs-speech-smart-nation-launch-24-november. Accessed on 2018, May 15.

The following enablers are crucial in delivering our priorities:

- **Talent** development efforts must be intensified to continually up-skill, re-skill and raise the digital competencies of the workforce across the economy.

- **Research and Innovation** will allow businesses to gain a competitive advantage; yet mobilising them to innovate will require significant effort to engender an innovation community.

- **Policy, Regulations and Standards** will play a central role to pivot Singapore to the digital economy. We have to ensure that our policy and regulatory environment is globally competitive and appropriate for a digital world so that Singapore remains a hub for talent, capital and ideas.

- The explosion of data flowing in the digital economy, and the rise of platform and digital businesses enabled by evolving and new technologies, will require Singapore to constantly ensure that our **Physical and Digital Infrastructure** is robust.

This chapter will elaborate on each of the priorities and enablers.

18

Accelerate: Digitalising Industries

> " We also want to enable our small and medium-sized enterprises (SMEs) to continually benefit from innovative digital solutions; boosting companies and workers' efforts to deepen digital capabilities, and picking up new skills to stay relevant. "

TAN KIAT HOW,
Chief Executive of the Infocomm Media Development Authority[26]

The first strategic priority is centred on giving every business the opportunity to be a digital one. This is particularly critical for Singapore's small and medium enterprises.

Digital transformation will bring different benefits to a business, depending on the sector it is operating in, the stage of its digitalisation journey and its value proposition to customers, among others. For some it can be about cost efficiencies; for others, digitalisation can mean reaching out to a broader customer base or tapping new markets.

Companies will face challenges and constraints in their journey towards digitalisation. Some may worry about the costs, or whether they have the scale to do so. Others may not see the immediate benefits over how digitalisation can create new value and revenue streams.

To help companies overcome these obstacles and grow, the Government has put in place a comprehensive economic digitalisation plan. This is aimed at companies across the economic spectrum; a plan that involves broad-based digital transformation efforts as well as sector transformation efforts.

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[26] Tan, L. Inclusive push to go digital (2017, November 19).
Retrieved from http://www.straitstimes.com/singapore/inclusive-push-to-go-digital. Accessed on 2018, May 15.

Broad-based digital transformation efforts

The backbone of the economy, SMEs make up 99% of all enterprises, employ 70% of the workforce, and contribute nearly half of Singapore's GDP[27]. The Government has in place a set of broad-based support programmes for SMEs.

At the industry level, 23 Industry Transformation Maps (ITMs) were rolled out to help companies prepare for the future economy through innovation and productivity boosting measures. At Budget 2017, the Government introduced the SMEs Go Digital programme to help SMEs build their digital capabilities at each stage of their growth and make it simple for SMEs to digitalise.

SMEs are a key driver of the digital economy, and can expect support on their digitalisation journey.

As part of this effort, the Industry Digital Plans (IDPs) are step-by-step guides for SMEs on their digital journey. The IDPs are customised for SMEs by industry sectors, and are aligned with the broader ITMs. For a start, the IDPs will be developed for six sectors - Retail, Logistics, Food Services, Wholesale Trade, Environmental Services and Security.

SMEs can also seek advisory services and assistance to customise and design their digitalisation journey, and financial support for pre-approved technology solutions.

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[27] SMEs are at the heart of our economy (2017, March 3). Retrieved from https://www.gov.sg/microsites/budget2017/press-room/news/content/smes-are-at-the-heart-of-our-economy. Accessed on 2018, May 15.

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PROGRAMMES

Transformative potential of digitalisation - Kampong Glam Retail Neighbourhood

Kampong Glam, an area of Singapore steeped in Malay culture and history, will become Singapore's first digitally-enabled retail neighbourhood. Digital capabilities of merchants in the neighbourhood will

Kampong Glam is a prime example of the importance of merchants taking ownership of their neighbourhood's digital transformation.

be enhanced using technologies such as data analytics, taking into consideration their varying levels of digital adoption and readiness. Meanwhile, visitors can look forward to better experiences such as digital navigation tools that leverage augmented reality technologies.

This digitalisation journey will not be successful without the buy-in and support of the merchants. Kampong Glam is a prime example of the importance of merchants taking ownership of their neighbourhood's digital transformation.

The Kampong Glam demonstration will showcase the digitalisation potential for other retail neighbourhoods, and bring the opportunities of digitalisation to life for other merchants.

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Sector transformation efforts

In addition to enterprise-level initiatives, the Government is also committed to driving cross-cutting digitalisation initiatives to transform at the sector-level.

For example, digitalisation can bring many benefits to the retail sector, such as providing retailers with opportunities to create better customer experiences online and offline. This could require retailers within a neighbourhood to come together to offer the customer an integrated experience by adopting digital technologies.

Catalysing digital platforms

Supporting digitalisation efforts that benefit a large number of companies, across multiple sectors, is also an important step.

Invoicing is an example of a business-to-business (B2B) transaction that cuts across businesses and sectors. E-invoicing will help businesses speed up business transactions, minimise disputes and reduce errors and operating costs.

A nationwide e-invoicing framework will be established in 2018. This is an important step in our effort for a set of end-to-end digital transactions for Singapore's businesses.

The nationwide e-invoicing framework will help businesses speed up business transactions, minimise disputes and reduce errors and operating costs.

PROGRAMMES

Nationwide e-invoicing framework

E-invoicing is the automated creation, exchange and processing of request for payments between suppliers and buyers using a structured digital format. This is different from existing digitised invoices (PDF, word or scanned invoices) that require some level of human input to process.

E-invoicing will help businesses strengthen their competitiveness in a rapidly digitalising marketplace, through reducing operating costs, speeding up business transactions, minimising disputes, and reducing errors. As invoicing is a common function for all businesses, e-invoicing will have economy-wide impact and network benefits, as well as being a starting point for end-to-end digitalisation of businesses.

The Government announced plans to develop a nationwide e-invoicing framework during Budget/Committee of Supply 2018. Central to this is the latest development that Singapore will adopt an e-invoicing standard called the Pan European Public Procurement Online (PEPPOL), which is also widely adopted in Europe. Singapore is the first National PEPPOL authority outside Europe, and the first country in Asia to adopt the PEPPOL standard. Being an open standard, PEPPOL will enable businesses in Singapore to exchange e-invoices with their buyers and suppliers, both domestically and internationally. This is expected to be ready in 2019.

"We must continue to forge closer partnerships and strengthen our innovation ecosystem, so that our people and firms can innovate rapidly and meaningfully to create new value and keep Singapore competitive and relevant to the world."

HENG SWEE KEAT,
Minister for Finance and Chairman of the Future Economy Council[28]

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[28] Speech by Mr Heng Swee Keat, Minister for Finance, at the Leaders in Science Forum (2017, August 16). Retrieved from https://www.a-star.edu.sg/News-and-Events/News/Speeches/ID/5649. Accessed on 2018, May 15.

Compete: Integrating Ecosystems

With data flows and platforms, the digital economy opens up tremendous opportunities for new growth areas. To capture these opportunities, Singapore will need to sharpen its digital edge by helping companies evolve their business models and create an environment conducive for innovation. Efforts will also be aimed at helping companies target new markets overseas using digital platforms and technologies.

Moving from sectors to ecosystems

The economy of the past was made up of multiple sectors, neatly categorised according to their different outputs. Manufacturing, for instance, is the production of goods, while construction is focused on activities to do with buildings and real estate. Services encompass everything from legal services to healthcare and social work.

The future economy will look very different from today. Digitalisation will fundamentally alter the supply and demand dynamics in the economy. Ecosystems, and not sectors, will define economic activities. In ecosystems, value chains will converge. Barriers to entry will shift from large capital investments to large customer networks as distribution models shift from a single point to that of multiple nodes. Today's nascent ecosystems are the building blocks for tomorrow's industry sectors.

The implications of these shifts are important. Companies with traditional customer networks will have to plug into digital platforms and find new partners. Grocery chains may turn to e-commerce platforms to reach out to customers, migrating away from retail stores. Many companies will find that it is no longer sufficient to distribute through just one or two channels — they will have to list their products on several platforms, from Taobao to Amazon and Lazada.

The future economy will look very different from today. Digitalisation will fundamentally alter the supply and demand dynamics in the economy.

At a broader level, these platform-driven multi-sided marketplaces are driving the shift towards integrated ecosystems by creating business models that facilitate efficient connectivity between both consumers and producers. They typically offer businesses ways to scale up with minimal startup costs and grow rapidly with network effects, generating new pools of revenue. Grab, a ride-sharing company, is now moving rapidly into e-payments.

The breaking down of traditional nodes of distribution will also mean opportunities for companies to expand their market footprint quickly, across sectors and into adjacent businesses, generating new streams of revenues. For example, US telco Verizon has made significant investments in the IoT space. The telco bought Fleetmatics for US$2.4 billion, a software-as-a-service company that works on fleet management solutions[29]. In Singapore, fintech company Fundsupermart has moved from selling unit trusts to become a fully-fledged online financial portal, offering insurance, stocks and bond products for investors across the region.

New business models will emerge within these ecosystems, made possible by leveraging digital platforms to reach multiple channels. Such digital platforms are enabling new forms of production to create new revenue streams. Singapore-based Sea, or formerly, Garena, rose in the digital space, creating a platform for games, before expanding into e-commerce and e-payments for the region.

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[29] Lunden, I. Verizon buys Fleetmatics for $2.4B in cash to step up in telematics (2016, August 1). Retrieved from https://techcrunch.com/2016/08/01/verizon-buys-fleetmatics-for-2-4b-in-cash-to-step-up-in-telematics/. Accessed on 2018, May 15.

Fostering a community of innovators

Opportunities within converging ecosystems are premised on new technology and/or innovation in business models. Winning these opportunities involves supporting Singapore-based companies as they rethink and develop new business models.

To this end, the Government will explore opportunities to bring together problem owners and problem solvers for collaboration.

One initiative that aims to do this is the Open Innovation Platform (OIP). With the support of a structured innovation process, the OIP facilitates collaboration between problem owners and Infocomm Media (ICM) companies to accelerate the development of innovative, new and scalable solutions that address real business problems.

There are also several physical spaces that help concentrate the convergence of ideas and innovation. Start-up accelerators such as JTC's Launchpad and Cleantech Park
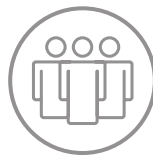
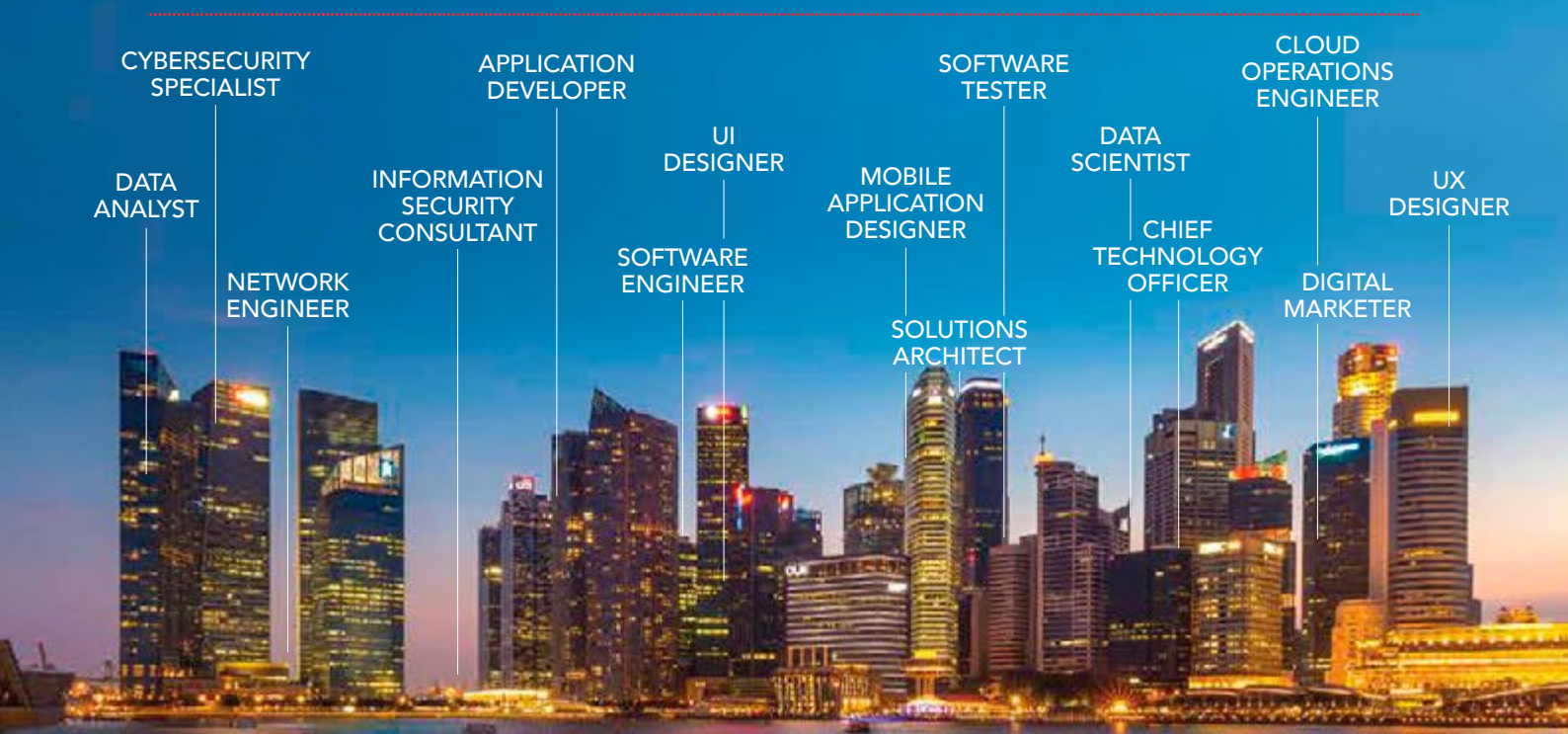The OIP brings together problem owners and problem solvers for collaboration.

contain significant amounts of expertise, network, and businesses to support the development of innovative start-ups. IMDA's PIXEL is another example of a facility that aims to spur innovation and creativity through collaboration.

Going Global

The digital frontier is borderless. Businesses that are digital by design can also make the jump to go global. With digital capabilities and channels, businesses will no longer be restricted to just the domestic market nor have to invest huge amounts of money to sell directly to customers all over the world.

There are many examples of Singapore-based digital companies that are targeting the global market from inception. Carousell, for example, grew from a local digital platform to being active in seven countries within four years. With over 57 million products, it has grown from a team of 3 to one of 140.

The Government is taking steps to encourage companies to take the leap overseas by tapping on markets through the use of Singapore's connectivity, infrastructure and opportunities in the digital world.

CYBERSECURITY SPECIALIST

APPLICATION DEVELOPER

SOFTWARE TESTER

CLOUD OPERATIONS ENGINEER

DATA ANALYST

UI DESIGNER

DATA SCIENTIST

UX DESIGNER

INFORMATION SECURITY CONSULTANT

MOBILE APPLICATION DESIGNER

NETWORK ENGINEER

SOFTWARE ENGINEER

CHIEF TECHNOLOGY OFFICER

DIGITAL MARKETER

SOLUTIONS ARCHITECT

Transform: Industrialising Digital

The third strategic priority rests on bolstering Singapore's ICM and technology sector to develop the next generation of digital expertise and businesses.

The ICM sector is a key component of the Singapore economy, contributing around 8% of nominal Gross Value Added (GVA) as of 2017. It has the potential to ride on the waves of change to serve new demand as digital economies open up around the world and become a key growth driver of the Singapore economy.

With its strong technical capabilities and deep talent pool, Singapore's ICM sector can be the digital technology hub of Asia. To this end, the Government will focus on two key areas: deepening capabilities and grooming digital champions in Singapore.

Deepen eco-system capabilities

Four frontier technologies were identified for investment and deep capability building — Artificial Intelligence (AI) and Data Science, Immersive Media, Internet of Things (IoT) and Cybersecurity. At the same time, technologies relevant to the digital economy will emerge, for example, blockchain.

While the Government continues to develop technology road-maps and engage industrial stakeholders in these efforts, the private sector will continually chart the way forward for Singapore.

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Artificial Intelligence (AI): Singapore aims to build a vibrant core of AI developers and companies and improve industry adoption through raising awareness of AI implementation benefits. Some of these efforts have materialised – AI Singapore deepens Singapore's AI expertise and the AI Business Partnership Programme brings AI companies together to drive greater use of AI in all sectors. The Government will help grow industry capabilities by working closely with the industry on developing governance frameworks and guidelines on the use of AI.

Immersive Media: Virtual reality and augmented reality are increasingly being used not just in media sectors but also in other industries, including retail, defence, construction and education.

Through developing the capabilities to harness technology, local media companies and professionals would be able to create and deliver incredible stories that capture the imagination and senses of media consumers. Ample support will be provided by the Government to assist these efforts of local media companies and professionals.

Internet of Things (IoT): The exponential growth in processing power, Internet connectivity and usage of mobile devices has led to rapid growth of IoT.

The IoT ecosystem is diverse and fragmented. To enable the development and adoption of IoT solutions, the Government will work with industry to form partnerships, develop standards and strengthen capability.

To support the growth of IoT, the Government will partner the industry to develop and put in place future communications infrastructure that will benefit both consumers and businesses across sectors. This includes enhancements to the Nationwide Broadband Network, introduction of 5G mobile networks, and rolling out more IoT and sensor networks.

> The Government will help grow industry capabilities by working closely with the industry on developing governance frameworks and guidelines on the use of AI.

Cybersecurity: Protecting institutions, companies and individuals from rising cyber threats is a national priority as well as an area of economic opportunity. By 2020, the fast-growing cybersecurity market here could generate $900 million in revenue[30]. It is integral to ensuring that Singapore remains secure in the digital economy, and a cornerstone of trust in Singapore's Smart Nation initiative.

In 2015, to address the global trends of growing digital threats, Singapore formed the Cyber Security Agency (CSA) as the lead agency to oversee cybersecurity operations, strategy and education. Aware that cybersecurity underpins trust in digital advancement, the CSA launched the Singapore Cybersecurity Strategy in 2016, which sets out Singapore's vision, goals and priorities for cybersecurity to create a resilient and trusted cyber environment.

New cybersecurity technologies and entrepreneurship will be consistently generated, with a deep pool of cybersecurity talent created through the ICE71 ("Innovation Cybersecurity Ecosystem at Block 71") initiative, scholarships and professional courses.

Multidisciplinary skillsets
As the landscape becomes more digital, companies will need to acquire capabilities and skillsets across multiple domains that will allow them to deliver better digital services and products.

For example, local media enterprises and professionals may acquire capabilities, such as design thinking, to help them better create end-to-end products or services that address the needs of their target market.

Further, companies can also create content that is data driven, and engage their customers better through compelling and immersive storytelling.

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[30] Baharudin, H. Cyber security can be a 'growth engine' for Singapore: Yaacob (2018, March 7). Retrieved from http://www.tnp.sg/news/singapore/cyber-security-can-be-growth-engine-singapore-yaacob. Accessed on 2018, May 15.

Grooming Digital Champions

Singapore can leverage on its position as a trusted brand to groom tech and digital companies that are regionally or globally-competitive.

Having them embedded in Singapore's economy will have multiplier effects on not just economic growth but also on talent flows and innovation capabilities. These digital champions also add buzz and vibrancy, lifting the entire eco-system.

The Government will work with the industry to anchor and grow promising companies.

The Government will work with the industry to grow promising digital companies that are regionally or globally competitive.

Accreditation@SG:D aims to level the playing field for promising Singapore-based technology companies to win projects, grow and compete in the global market by helping them establish their credentials and facilitating access to Government and large enterprise buyers. It gives accredited companies the opportunity to be better-recognised overseas with a trusted Singapore branding.

The Government will also facilitate overseas growth of Singapore companies through targeted programmes for Singapore enterprises. IMDA's Strategic Partners Programme is an example of this, launched to help Singapore-based tech companies scale up and improve their digital capabilities, as well as expand their network and globalise through collaborations with multinational companies in Singapore.

Critical Enablers

To reinforce the three strategic priorities, the Government will work to augment Singapore's foundation in the four key critical enablers.

Talent

The digital economy will not be successful without a strong pool of Singapore talent. From expert coders to UX designers, it is imperative that Singapore maintains a pipeline of well-trained and digitally-ready talent.

Singapore aims to be a hub for digital talent by working on three fronts:

First, to narrow the widening Infocomm Media (ICM) manpower gap. This will be done through continuous training and placement efforts in emerging skills for ICM professionals. At the same time, the Government will scale up training efforts for infocomm professionals and groom Digital Leaders across SMEs.

Second, it will deepen the skills of the existing ICM workforce. It will work with employers for upgrading and re-skilling programmes. This will allow the ICM professionals to continually respond to the rapid development of technology.
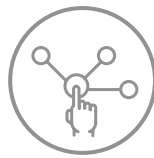
Programmes are in place in schools to equip young students with a strong base of digital skills, to prepare them with the necessary digital skills and training for the future.

Third, increase support for displaced workers and those more at risk of displacement. For those who do lose their jobs due to restructuring, there are a plethora of courses and programmes aimed at helping these workers gain new skills and improve their employability.

These programmes, delivered through the government-industry TechSkills Accelerator initiative, will go a long way to addressing the immediate talent shortage in the industry. Over the longer term, programmes are in place in schools to also equip young students with a strong base of digital skills, from coding to design thinking, and prepare them with the necessary digital skills and training for the future.

In a digitalised world, employees will generally be required to have digital competencies in order to leverage the new digital tools and improve productivity. Besides the ICM workforce, it will also be important to grow the digital fluency of all workers.

> " Beyond the formal school system, we have embarked on a national movement called SkillsFuture, urging all Singaporeans to participate in lifelong learning, to master their craft in their respective professional fields. We rolled out a national training program called SkillsFuture for Digital Workforce, to equip all Singaporeans – young and old, from all sectors – with the attitude and skills to work in a digitally enabled environment. "

ONG YE KUNG,
Minister for Education[31]

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[31] Speech by Mr Ong Ye Kung, Former Minister for Education (Higher Education and Skills) at the Welcome Dinner for 2017 Singapore Fintech Festival (2017, November 13). Retrieved from https://www.gov.sg/~/sgpcmedia/media_releases/mas/speech/S-20171113-1/attachment/Minister%20Ong%20Ye%20Kung%20Welcome%20address%20at%20Singapore%20FinTech%20Festival%202017%20Welcome%20Dinner.pdf. Accessed on 2018, May 15.
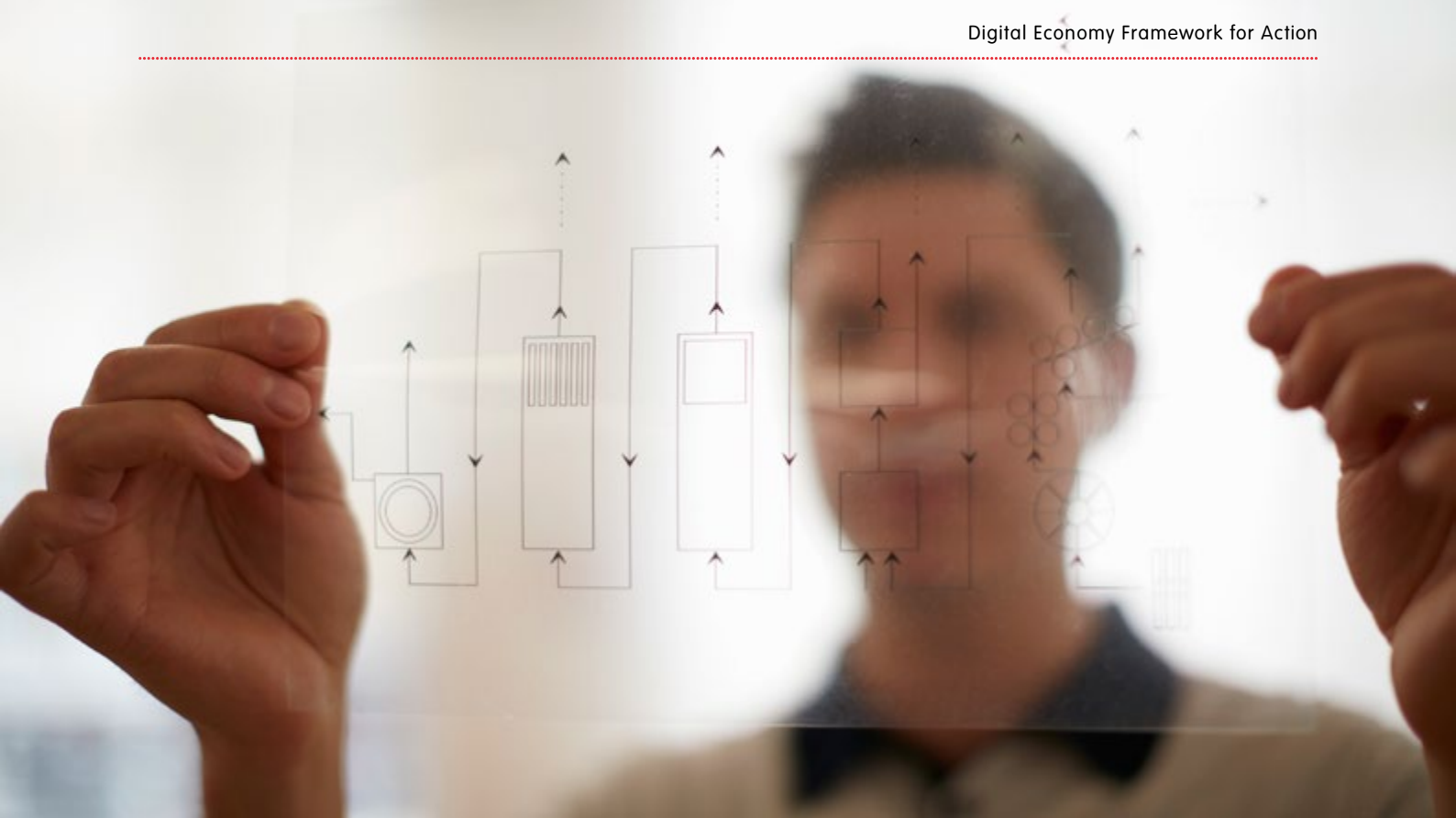
Research & Innovation

Research and innovation is vital to ensuring that Singapore remains at the vanguard of the digital era. Under the Research, Innovation and Enterprise (RIE) 2020 Plan, S$400 million has been committed to the Services and Digital Economy to support digital research and innovation that can be used as a force multiplier to grow our digital economy.

As an example, we have set up AI Singapore, a national programme in Artificial Intelligence (AI), to promote the AI industry, tackle impactful challenges faced by Singapore and beyond, as well as nurture new research capabilities. Up to S$150 million will be invested over five years in AI Singapore[32].

Beyond Research and Development (R&D), it is also important to ensure that the IP generated can be commercialised and translated into widespread adoption.

To power Singapore's AI efforts, S$150 million over five years has been granted to AI Singapore for research.

This could involve building a strong translation talent pool, driving greater industry pull for research through clarity of problem statements and needs, and building closer linkages between companies and the R&D community. The Government is looking into measures that will enhance this area. Under the RIE2020 plan, S$3.3 billion has been set aside to support Innovation & Enterprise, to build up a strong core of innovative enterprises that drive value creation and economic competitiveness.

At the broader level, keeping abreast of global technology trends is critical to keeping Singapore nimble and adaptable. Since July 2000, Singapore has embarked on seven technology roadmaps which aim to inform and anticipate new technological developments.

The Government will continue to scan the environment and look ahead as it rolls out new initiatives for the digital economy.

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[32] Loke, K. Singapore's artificial intelligence capabilities to get S$150m boost (2017, May 3).
Retrieved from https://www.channelnewsasia.com/news/singapore/singapore-s-artificial-intelligence-capabilities-to-get-s-150m-8813174. Accessed on 2018, May 15.

Policy, Regulations and Standards

The full benefits of the digital economy can only be realised if individuals and businesses have trust in the system. Policies and standards will be in place, not only to protect public interest and build trust, but also to keep pace with innovation and digitalisation trends. Striking the balance between an enabling business climate and a secure environment is the foremost of our policy agenda, such that Singapore remains safe, globally-competitive, and a hub for talent, capital and ideas.

The Government is stepping in to beef up cybersecurity efforts to secure our digital infrastructure in the new digital economy. The Cybersecurity Bill was passed in February 2018 to strengthen the protection of Critical Information Infrastructure and establish a regulatory framework for cybersecurity service providers.

Our Personal Data Protection Act (PDPA) facilitates organisations' legitimate needs to collect, use and share personal data while safeguarding consumer trust. The Government is looking into reviewing the PDPA to keep pace with technological developments and regulatory trends, to ensure that it remains appropriate and fit for purpose as we develop our Digital Economy.

Singapore's Personal Data Protection Commission (PDPC) has embarked on a series of initiatives to develop a trusted data ecosystem in Singapore. PDPC's initiatives include the launch of a regulatory sandbox for data sharing, participation in international frameworks for enabling data flows such as the APEC Cross-Border Privacy Rules and plans to introduce a Data Protection Trustmark certification scheme by the end of 2018. These initiatives will ensure that Singapore's data protection ecosystem facilitates an increase in data sharing activities in the digital economy in a trusted manner for the increased competitiveness of Singapore's economy.

The Government will develop capabilities locally to understand and mitigate potential AI risks, and put in place practical policy measures that support the trustworthy and accountable use of AI. The Government will also work with the industry to look into AI and data ethics, and to promote the responsible use of AI in the industry. The Government will continue to refine and add to efforts to calibrate the governance of data and use of advanced technologies such as AI so that we allow the technology to develop while protecting the public interest.

Physical and Digital Infrastructure

Singapore has benefitted from its investments in infrastructure, such as Wireless@SG and the Nationwide Broadband Network. However, the Government will constantly plan ahead to ensure resilience of our networks and boost connectivity and infrastructure as technology continues to evolve, so that Singapore can stay ahead of the curve and become a leading digital economy.

These plans include 5G wireless technology with the potential to transform the future mobile landscape and address the demands of future mobile communication, and strengthening our international connectivity through the landing of submarine cables to be a key node to capture global digital flows.

Besides enhancing connectivity, the IMDA has partnered other Government agencies

> The Government will constantly plan ahead to ensure resilience of our networks, and boost connectivity and infrastructure as technology continues to evolve.

and industry players to come up with a Singapore Standard for Green Data Centres (DCs), which aims to reduce the energy consumption and operating costs of the highly energy-intensive facilities and enhance the competitiveness of our data storage and processing infrastructure.

This strong foundation and continued investment in physical infrastructure would enable the development of digital infrastructure that provide key digital technologies such as e-Payments (e.g. PayNow), AI-as-a-service, data sharing and super-computing that businesses can plug into to build products and services.

Together, physical and digital infrastructure provide a nationwide foundation to develop and proliferate digital services.

> " Digitalisation is a mega trend that will impact all industries. Data will be the new economic asset of the future. Just as we have been successful as a container port, we must now strive to be a successful digital and data port in the future. Our infrastructure plans must respond to and keep pace with the digital economy. "

LAWRENCE WONG,
Minister for National Development[33]

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[33] Speech by Lawrence Wong, Minister for National Development and Second Minister for Finance at the 57th Anniversary Dinner of REDAS (2016, November 17). Retrieved from https://www.mnd.gov.sg/newsroom/speeches/view/speech-by-minister-lawrence-wong-at-the-57th-anniversary-dinner-of-redas. Accessed on 2018, May 16.

TAKING ACTION IN A DIGITAL ECONOMY OF NEW OPPORTUNITIES

> "
> **To tap these opportunities, our companies must be able to respond nimbly to political and economic shifts, shorter technology cycles and business model disruptions, they must have extensive networks, superior capabilities, innovative products and strong brands to compete in this globalised Digital Economy."**

S ISWARAN,
Minister for Communications and Information[34]

[34] Speech by Minister S Iswaran at the opening of the SBF Centre (2017, September 5). Retrieved from https://www.mti.gov.sg/NewsRoom/Pages/Speech-by-Minister-Iswaran-at-the-opening-of-the-SBF-Centre-.aspx. Accessed on 2018, May 15.

Taking Action in a Digital Economy of New Opportunities

The Government will work together with businesses, workers and citizens to maximise the opportunities that digitalisation brings. Unified under the SG:D movement, benefits need to be felt such that in Singapore:

- **Every business can be a digital business**
  From a local coffee shop using e-payments to the transformation of industry sectors through digital platforms, businesses can gain through digitalisation regardless of their starting points.

- **Every worker can be empowered by technology**
  Be it working in a traditional retail shop or a deep tech AI firm, the worker can benefit from new digital skills that are relevant for his/her current and future job needs.

- **Every citizen can be a connected citizen**
  All Singaporeans should possess basic skills and confidence to use digital technology in various areas of their daily lives, and have access to a high-quality digital infrastructure.

This chapter provides examples of the programmes that are available to help companies and individuals make the most of the digital economy. Programmes will continue to be refined and new initiatives will be launched.

Please visit www.imda.gov.sg/sgdigital for more information.

Opportunities for companies

> **" Technology and digitalisation can bring many opportunities. Whether you are a mom and pop shop or a large company, in any sector of the economy, you can seize the digital advantage to enhance your operations, serve your customers better, and more importantly find new sources of growth. "**

DR. YAACOB IBRAHIM,
Former Minister for Communications and Information[35]

Companies that want to accelerate their digitalisation journey and beef up their operations with the right technology and digital capabilities will find a comprehensive ladder of support regardless of their developmental stage and digital readiness.

Some key initiatives that businesses can tap on include:

Accelerate: Acquiring and upgrading digital capabilities as a business
- SMEs Go Digital
- Industry Digital Plans for identified sectors

Compete: Enhancing competitiveness through innovation, technology and internationalisation
- Open Innovation Platform
- Punggol Digital District

Transform: Growing the next generation digital industry
- AI programmes
- Blockchain Challenge
- ICE@71
- Accreditation@SG:D
- Strategic Partners Programme
- Future of Media

Enablers:
- E-invoicing framework (see previous chapter)
- APEC Cross-Border Privacy Rules (CBPR) and Privacy Recognition for Processors (PRP)

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[35] Speech by Dr. Yaacob Ibrahim, Former Minister for Communications and Information at the launch of the Infocomm Media Industry Transformation Map (2017, November 3). Retrieved from https://www.mci.gov.sg/pressroom/news-and-stories/pressroom/2017/11/launch-of-the-infocomm-media-industry-transformation-map. Accessed on 2018, May 15.

SMEs Go Digital

SMEs are an important segment of the economy, making up 99% of all businesses in Singapore. To help SMEs digitalise in a simple and intuitive manner, the Government launched the SMEs Go Digital programme in April 2017.

At the heart of the SMEs Go Digital programme are the **Industry Digital Plans for SMEs (IDPs)**, each aligned to the respective Industry Transformation Maps. IDPs provide step-by-step guidance for companies on the adoption of digital technologies based on their growth stages.

Through the IDPs, SMEs can:

a.   have a digital roadmap to understand the digital readiness of their business and the training required to raise their employees' digital skills.

b.   identify pre-approved digital solutions that are relevant to their business, such as solutions for digital ordering, cashless payments, fleet management, and supply chain optimisation.

Launched in 2017, the SMEs Go Digital programme was designed to make going digital simple for SMEs.

c.   reach out to the SME Centres for basic advisory regarding their digital roadmap or pre-approved solutions. The SME Centres are established by SPRING (now Enterprise Singapore) in partnership with the five trade associations and chambers.

d.   approach the SME Digital Tech Hub if they require more advanced digital consultancy. The Principal Consultants at the Digital Tech Hub can guide SMEs on the development of the digital strategies or the application of specific advanced technology to their business.

e.   participate in projects led by prominent companies in their sectors to pilot emerging solutions that have potential to scale and uplift whole sectors. These projects are shaped jointly by IMDA and the industry.

f.   engage consultancy services from a curated panel of IT project managers to help with the implementation of their digital solutions, including reviewing business processes, redesigning jobs and managing project implementation.

Future of Media

The global media industry is undergoing a fundamental change. Digital platforms – from integrated eco-system players such as Google and Amazon, Over-The-Top (OTT) streaming services such as Netflix, and social media services like Facebook – are demonstrating the importance of consumer centricity in content creation and distribution.

Traditional media companies in Singapore will have to acquire new capabilities in order to stay relevant. To help the media sector in Singapore continue to thrive, the Government is adopting a collaborative "four pillar" strategy with the industry.

First, to provide customised support for promising local media businesses and groom them through partnerships with integrated ecosystem players. This aims to equip companies with the expertise to harness data-driven audience insights to create engaging content.

Second, to deepen the art of storytelling capabilities though capability development

Traditional media companies in Singapore will have to acquire new digital capabilities in order to stay relevant.

and complementing media with technology (e.g. VR/AR). This aims to nurture digital champions in the media sector and ensure a robust supply of media professionals.

Third, to foster collaboration with media businesses through partnerships. This aims to enable local media companies to scale and build a sustainable pipeline of monetisation opportunities in the growing digital content market.

Fourth, to raise awareness of local content so as to foster appreciation and demand for such local content through promotional campaigns in association with prominent media firms and institutions, for instance.

These four pillars are supported by sub-programmes that aim to strengthen, empower and digitalise the media sector in Singapore.

Photo: JTC

Open Innovation Platform

The Open Innovation Platform (OIP) is a virtual crowd-sourcing platform that will connect problem owners and problem solvers. This platform will enable Singapore-based companies to collaborate with start-ups, companies and research institutes with Infocomm Media (ICM) expertise in different fields to solve real business challenges and develop innovative solutions. It will be ready in the second half of 2018.

Through the platform, Singapore-based companies will have access to a large community of multi-disciplinary ICM talent, expertise and technology to accelerate their digitalisation journeys. The OIP will expand innovation capacity, especially for companies that may not have in-house resources, technology and expertise to address complex problems.

At the same time, ICM companies and research providers will be directly plugged into an ecosystem of problem owners and will have visibility of the innovation needs of potential customers. The OIP process will also offer opportunities for co-creation between customers and technology providers and facilitate commercialisation of new solutions.
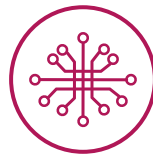
Through the OIP, Singapore-based companies will have access to a large community of multi-disciplinary ICM talent, expertise and technology to accelerate their digitalisation journeys.

Punggol Digital District

Punggol Digital District (PDD), Singapore's first enterprise district, will be a hub for the digital economy, housing a myriad of cybersecurity and digital technology businesses. Situated alongside the Singapore Institute of Technology, a university focused on science and technology, PDD is envisioned to be a vibrant digital district to create synergistic relationships between digital businesses, and increase better opportunistic matching by clustering related businesses in close proximity.

True to its nature, PDD will be underpinned by cutting-edge technology to make everyday living more convenient and sustainable. Innovative district-level infrastructure and technologies will help optimise the use of land as well as energy, alongside centrally provisioned services such as pneumatic waste conveyancing, IoT deployment of sensors, and a centralised urban logistics platform for the automated delivery of goods.

Digital businesses will find PDD an ideal basecamp in which to anchor their businesses, with the mix of tech businesses, academia, research expected to improve the cross-fertilisation of knowledge and lead to enhanced collaboration opportunities among students, faculty and industry professionals.

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PROGRAMMES

APEC Cross-Border Privacy Rules (CBPR) and Privacy Recognition for Processors (PRP)

In March 2018, Singapore joined the APEC Cross-Border Privacy Rules (CBPR) and Privacy Recognition for Processors (PRP) systems in a move to commit to responsible data sharing practices.

This is in line with the certification scheme that is being developed by the Singapore Personal Data Protection Commission (PDPC) which, once in place, will allow certified organisations to exchange personal data with certified organisations in participating APEC (Asia-Pacific Economic Cooperation) economies seamlessly.

The APEC CBPR and PRP systems are multilateral certification mechanisms that ensure certified organisations have data protection policies that are consistent with the APEC Privacy Framework, such that consumers can be assured that the cross-border transfer of their personal data will be subject to high standards of data protection.

Together, the CPBR and PRP systems make up a harmonised set of data protection standards across the Asia-Pacific, facilitating data transfers for certified organisations across participating economies. With easier cross border data flow, companies in Singapore will be able to better use data for innovation and delivery of services across the region.

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PROGRAMMES

Artificial Intelligence

With AI identified as one of the frontier technologies essential to growing Singapore's economy, AI Singapore was set up in May 2017 — a S$150 million national initiative to develop deeper AI capabilities that marries research with application and deployment of AI to transform businesses.

There are various components to AI Singapore. For example, the 100 Experiments (100E) project, which helps to match companies with local researchers to use AI to solve difficult problems. Another example is the Apprenticeship Programme to develop a vibrant talent pool of AI professionals for job roles such as AI Engineers, Machine Learning Specialists, Developers, AI Consultants and Dev Ops.

The IMDA has also launched two key programmes for AI — the AI Business Partnership Programme, which will facilitate partnerships between local companies and AI solution providers to solve business challenges, and the National Speech Corpus which supports a localised lexicon to allow more context-aware AI to be developed for the local market.

Singapore will continue to build on its solid regulatory base in data policy with forward-thinking and relevant AI and data governance guidelines. To this end, the IMDA is facilitating industry-led efforts to examine legal and ethical issues raised by commercial deployment of AI, and develop voluntary codes of practice that serve to guide corporate regulators and corporate decision makers. One such programme is the 5-year research grant call on Governance of AI and Data Use, jointly issued by the IMDA and the National Research Foundation, Singapore, to establish thought leadership in pioneering legal, regulatory, ethical and policy issues relating to AI.

PROGRAMMES

Blockchain Challenge

The Blockchain Challenge, launched in March 2018, aims to develop pioneering solutions and solve industry challenges, beyond financial applications. Companies are encouraged to explore business model innovation or transformation using blockchain technology.

Through the Challenge, participants will propose projects to produce successful Minimum Viable Products or Proof-of-concepts, that will address an industry need.

These projects can range from those that improve operational efficiency at the enterprise-level, to those that bring about transformative changes in how businesses, Government and society interact with one another.

PROGRAMMES

Strategic Partners Programme (SPP)

The digital economy is one that demands agility and expediency to support continued business growth. To this end, Singapore launched the Strategic Partners Programme (SPP) in July 2017 to help Singapore-based tech companies scale quickly, level up their digital capabilities, and expand their global reach through collaborations with prominent multinational enterprises (MNCs).

Through the SPP, tech companies improve the reach of their business offerings by bundling or co-developing new applications using the technology offered by the MNC platform partners. They can also tap on the partners' technical and domain expertise to augment their capabilities and knowledge in developing solutions, and also tap onto the partner's global market networks to gain international reach.

The MNCs partners can benefit by increasing the number of applications on their existing platforms. By guiding local tech companies to co-develop solutions in line with their own roadmaps, they can build up a local network of partners and suppliers to augment their offerings and portfolio in Singapore.

PROGRAMMES

ICE71

Singapore's first cybersecurity start-up accelerator focused on cybersecurity, Innovation Cybersecurity Ecosystem at Block 71 (ICE71) has been set up on the back of a fast-growing cybersecurity sector here, backed by rising demand for solutions to tackle sophisticated cyber threats.

The cybersecurity sector generated over S$600 million in 2016 — a figure set to exceed S$1 billion by 2020. In Asia Pacific, the market for keeping enterprises cyber secure is expected to reach US$30 billion[36] by 2020. As we progress into the digital economy, there remains a huge potential to further grow the sector in areas such as advanced managed security services, advanced security consulting, and security product development.

ICE71 will help grow cybersecurity innovation by supporting cybersecurity entrepreneurs, start-ups, accelerators, and cybersecurity-focused risk capital. It aims to establish ecosystems that can help cybersecurity entrepreneurs and start-ups rapidly scale and penetrate the global market through partnerships with IHLs, large local enterprises, and global cybersecurity accelerators over the next two years.

The Accreditation @SG:D programme levels the playing field and helps accredited companies win projects, grow and compete globally.

PROGRAMMES

Accreditation @SG:D

The Accreditation@SG:D programme was launched in July 2014 to help grow and nurture innovative Singapore-based Infocomm Media(ICM) companies and enable them to compete effectively on an international stage.

Accreditation@SG:D provides an independent third-party evaluation of the companies' products and their execution ability to guide them towards continued improvement, which in turn enables these companies to establish themselves as qualified contenders to Government and large enterprise buyers.

This levels the playing field and helps these accredited companies win projects, grow and compete globally. In three years, a project pipeline worth over S$200 million has been created for accredited companies, comprising over 1500 Government and enterprise project opportunities. Their success breeds greater success as they inspire the next generation of promising companies.

Accreditation@SG:D has also expanded its market access platforms by inking partnerships with leading corporations, which gives accredited companies better access to market opportunities through these partners' worldwide footprint.

Notably, the accreditation process and increased business traction have provided assurance and market visibility for investors. Two accredited companies, Deep Identity and Kai Square, were successfully acquired, while another firm, Anacle, was listed through an initial public offering.

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[36] MicroMarketMonitor, November 2015, Asia-Pacific Cyber Security Market Forecasts till 2020

Opportunities for workers

> " To progress as an economy, we must master new technologies, transform quickly and enhance our competitiveness. We must also enable Singaporeans to acquire new skills relevant to the industries and businesses of the future. "

JOSEPHINE TEO,
Minister for Manpower[37]

Human capital is our most valuable resource and ensuring the participation of skilled individuals is critical to the development of the digital economy. The Government will provide avenues for Singaporeans across all industries to continually up-skill and re-skill themselves with the knowledge, skills and capabilities to participate meaningfully in the digital economy.

For professionals, these avenues are delivered under the TechSkills Accelerator (TeSA), a SkillsFuture initiative. This national push for continuous upgrading of skills is in partnership with strategic partners such as Workforce Singapore (WSG) and SkillsFuture Singapore (SSG), and in collaboration with industry partners and hiring employers.

Key initiatives include:

- Critical Infocomm Technology Resource Programme Plus (CITREP+)
- Company-Led Training Programme
- Adapt and Grow Initiative (E.g. Career Support and Professional Conversion Programmes)
- National Cybersecurity Postgraduate Scholarship

- Skills Framework for ICT
- SkillsFuture Earn and Learn Programme
- SkillsFuture Study Award for the ICT Sector
- Tech Immersion and Placement Programme
- TeSA pilot immersive
- Digital Leadership

Students are also equipped to make informed decisions about career choices as well as supported in their first steps towards an exciting career in the growing and thriving digital industry.

Key initiatives include:

- Industry Preparation for Pre-graduates
- Infocomm Polytechnic Scholarship
- Media Education Scholarship
- National Infocomm Scholarship

To prepare younger students for the digital future, there are also programmes to increase their exposure to coding and building with digital technology, such as Code for Fun and Digital Maker.

For more information on each individual programme, please visit www.imtalent.sg

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[37] Tham, Y. Sustain Efforts to improve productivity, says Josephine Teo in May Day message (2018, Apr 29). Retrieved from https://www.straitstimes.com/politics/sustain-efforts-to-improve-productivity-josephine-teo. Accessed on 2018, May 16.

PROGRAMMES

SkillsFuture

SkillsFuture is a national movement launched in late 2014, to provide Singaporeans with the opportunity to develop their fullest potential throughout their lives, regardless of their starting point. It involves multiple stakeholders including individuals, businesses, employers, industry associations, unions and every citizen.

SkillsFuture initiatives empower Singaporeans to embark on lifelong learning, deepening their skills towards skills mastery, and supports Singaporeans in attaining the skills needed for current and future job needs in the face of today's fast-evolving digital world.

To prepare individuals for the new digital economy, programmes like SkillsFuture for Digital Workplace equip Singaporeans with basic digital skills, while the SkillsFuture Series helps equip working adults with skills in eight priority and emerging skills areas including Data Analytics, Cybersecurity, and Digital Media.

SkillsFuture supports Singaporeans in developing the skills needed for current and future job needs in the face of today's fast-evolving digital world.

PROGRAMMES

TechSkills Accelerator

With the rapid pace of technological development, our workers will need deep tech skills to stay relevant. Skills acquisition is not just for career switchers. Through TechSkills Accelerator (TeSA), a SkillsFuture initiative, both ICT-trained and non-ICT professionals can acquire tech skills to adapt to new job demands.

There are three key thrusts under the aegis of TeSA:

- **Skills Framework for ICT**
  Employers can use the Skills Framework to develop career maps and articulate job requirements, while individuals can use it as a guide to identify their skills and look at which areas they can develop to stay relevant.

- **Skills Acquisition and Validation**
  For the existing and employed workforce, the Government takes a broad-based approach to skills development — through modular and certifiable skills courses — that enables individuals to up-skill or deepen their knowledge in various areas to stay relevant with technology changes.

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- Broad-based skills development is achieved via the Critical Infocomm Technology Resource Programme Plus (CITREP+), which supports the ICT workforce in keeping pace with technology shifts, through continuous and proactive training of technical skillsets.

  This thrust also employs a more targeted approach with companies, coding schools, Continuing Education and Training providers, as well as other organisational partners to provide individuals with various pathways to join the ICT profession via up-skilling and re-skilling. Targeted skills development programmes include Company-led Training (CLT) that is closely linked to the requirements of actual jobs. There are also programmes which help to convert non-ICT professionals into industry-ready ICT professionals. The Tech Immersion and Placement Programme is one such programme, in which trainees will be placed into tech job roles after undergoing a short, intensive, and immersive training course delivered by industry practitioners.

- **Integrated Career Services**
  This is a coordinated career support ecosystem for job matching, group mentoring, and leadership programmes
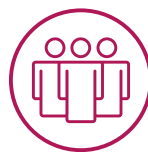
The Government will invest **$145 million** to support training efforts to develop tech capabilities in our workforce over the next three years.

by tripartite partners that include NTUC, e2i, Singapore Computer Society (SCS), SGTech, IMDA and Workforce Singapore. It provides dedicated and focused career advisory, facilitation and support services for people looking to join or develop their careers in ICT.

TeSA is pioneering a different way of developing manpower programmes through working closely with key hirers of ICT professionals in ICT, Finance and Healthcare sectors, jointly executed with key industry and trade associations, and government agencies. Newer efforts are being developed with the ICT industry associations to expand collaboration with other industry associations in more sectors of the economy. For example, in November 2017, IMDA and the Monetary Authority of Singapore (MAS), together with SkillsFuture Singapore, six local universities, and five financial associations, sealed a landmark Memorandum of Intent (MOI) for the TeSA FinTech Collective, to jointly develop industry-ready professionals in meeting the strong demands of emerging ICT skills.

As of February 2018, over 27,000 training places have been taken up or committed through TeSA. To help Singaporeans take advantage of the opportunities ahead, the Government will continue to invest another $145 million over the next three years to support training efforts in developing tech capabilities in our workforce.

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PROGRAMMES

Digital Leadership

As Singapore embarks on its move to embrace the Digital Economy and drives digital transformation in the various sectors, the demand for digital leaders with the calibre to helm digitalisation efforts will continue to increase.

To provide better opportunities for locals to be equipped with digital leadership skills, TechSkills Accelerator (TeSA) programmes will be expanded to support digital leadership with a balanced focus on both technical and soft skills, as well as relevant on-the-job developmental exposure. For instance, new company led training partners will develop a structured programme for Digital Leaders which could include local and overseas stints to prepare individuals to take on digital leadership roles.

TeSA programmes will be expanded to support digital leadership with a balanced focus on both technical and soft skills.

PROGRAMMES

Industry Preparation for Pre-graduate Programme

To build a pipeline of industry-ready graduates entering the workforce, the Industry Preparation for Pre-graduate Programme offers pre-graduates the opportunity to gain industry exposure and work experience through infocomm internships and industry projects, helping them develop industry-relevant digital skillsets and technical competencies. Students on this programme will also have the opportunity to undergo professional courses and certifications, and have opportunities to interact with industry experts and attend infocomm seminars and events.

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PROGRAMMES

Computational Thinking and Making as a National Capability

The Code for Fun Programme, a joint programme of IMDA and the Ministry of Education, is offered to all primary and secondary schools to increase students' exposure to coding and computational thinking since April 2014. The programme includes academic learning of related concepts using programming languages and microcontrollers to create an engaging coding experience for students.

The Digital Maker Programme aims to nurture a new generation of digital creators and makers by introducing a simple-to-use microcontroller called the micro:bit that allows students and adults to create and prototype their own inventions. Schools that sign up for the programme are provided with micro:bits and training for teachers to incorporate digital making into their school programmes.

The Digital Maker Programme aims to nurture a new generation of digital creators and makers.

Youth with an interest in further deepening their skills and knowledge can join the Infocomm and Media Clubs at schools, providing them with structured learning in the areas of application development, cybersecurity, data analytics and robotics. The Infocomm Media Learning Roadmap, launched in 2015, enables infocomm media club members to acquire specialised skills in these areas, with nearly 10,000 students benefitting from the courses offered in the Learning Roadmap. An existing industry collaboration with Apple to start an accelerator programme will expose talented students from infocomm clubs to a 140-hour curriculum on iOS app development using the Swift programming language. This programme provides students with insights and skills on commercial iOS app development, from brainstorming, to planning, prototyping and evaluating the final product.

PIXEL Labs@NLB, located at Jurong and Tampines Regional Libraries, offer library users a dedicated space with tools, equipment, and hardware kits that enable individuals to learn, create, invent, and share skills. In addition, there are also hands-on workshops and technology showcases for the general public, and crafting sessions for makers.

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Opportunities for the community

> **"** We will have to ensure everyone is equipped with a set of basic digital skills, be it for work or in our daily lives. This applies to all Singaporeans. **"**

DR. JANIL PUTHUCHEARY,
Senior Minister of State, Ministry of Communications and Information & Ministry of Transport[38]

All segments of society can benefit from the digital economy, whether for work, lifestyle or community interactions. While this helps our people to flourish in a digital economy, more importantly, the ambition is to ensure that no one is left behind in an increasingly digitalised world. Access to digital skills and confidence in using technology is thus a priority for the Government.

The Ministry of Communications and Information (MCI) has set up a Digital Readiness Programme Office to plan and drive programmes in building a digital society.

Further to this, the Digital Readiness Workgroup will be making recommendations on how to empower Singaporeans with technology and enjoy the benefits of Singapore's digitalisation journey.

[38] Daud, S. No one left behind in the Digital Revolution, says Janil Puthucheary (2017, Sept 12). Retrieved from https://mothership.sg/2017/09/no-one-left-behind-in-the-digital-revolution-says-janil-puthucheary/. Accessed on 2018, May 17.

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EMBRACING THE FUTURE

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We are now in an era where the effects of technological disruption are ubiquitous, touching all aspects of our lives – from the way we work, live and interact with one another. This wave of change, driven by digitalisation, has already impacted many sectors. In the manufacturing sectors, the enabling technologies behind "Industry 4.0", such as cyber-physical systems, the Internet of Things and cloud computing, are reshaping the manufacturing landscape and, with this, disrupting global value chains. In the services sectors, internet and mobile technologies have enabled the rise of new business models, such as the "sharing economy" and "open innovation", which have allowed societies and individuals to redefine the way people work and interact.”

CHAN CHUN SING,
Minister for Trade and Industry[39]

[39] Speech by Chan Chun Sing, Minister for Trade and Information at the SME Technology and Innovation Day at Resorts World Convention Centre (2018, May 15). Retrieved from https://www.mti.gov.sg/NewsRoom/Pages/Speech-By-Minister-Chan-Chun-Sing-at-the-SME-Technology-and-Innovation-Day.aspx. Accessed on 2018, May 16.

Embracing the future

This framework is a statement of intent and ambition that Singapore will be well-placed to succeed in this new digital world, while navigating the challenges that change may bring.

It guides the conversation on how the Government, businesses, workers and communities will work together for an exciting digital future.

As the economy shifts from traditional industry silos to integrated digital ecosystems, businesses that place their customers' experience first, that build on digital economies of scale and create new value, will thrive. Businesses will need to constantly take in new modes of operations and incorporate new technologies, and workers must similarly be open to picking up new skills and taking on different types of jobs in new industries.

Through the "**A**ccelerate", "**C**ompete" and "**T**ransform" thrusts of the SG:D Framework of Action, the Government will help our businesses and our people seize the opportunities ahead, through programmes and initiatives designed to support companies and workers, regardless of their starting points in their digital journey.
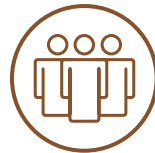
To embrace an exciting digital future, the Government will help our buinesses and our people seize the opportunities ahead, through programmes and initiatives.

At the same time, businesses and workers need to take ownership of their transformation effort to build future-ready capabilities. Importantly, each of us needs to "**ACT**" now.

We will have to be bold, nimble and responsive.

There is every confidence that Singapore — its businesses, workers and communities — will be able to thrive in the new digital economy. Singapore has always embraced agility, and we will continue to do so in the digital age.

The need to be open to change is also why this is a living document. Plans set out today will have to change to take into account tomorrow's developments. Over the coming months and years, as part of SG:D conversations, the Government will continue to engage with industry to discuss, collaborate and commit on the best ways to achieve our goals.

Together, we will create exciting digital possibilities for Singapore businesses, and good and fulfilling jobs enabled by technology for the workforce of the future.

The SG:D transformation has already begun. Join us to co-create more reasons to smile!

#SGDIGITAL

Singapore Digital (SG:D) gives Singapore's digitalisation efforts a face, identifying our digital programmes and initiatives with one set of visuals, and speaking to our local and international audiences in the same language.

The SG:D logo is made up of rounded fonts that evolve from the expressive dot that is red. SG stands for Singapore and :D refers to our digital economy. The :D smiley face icon also signifies the optimism of Singaporeans moving into a digital economy. As we progress into the digital economy, it's all about the people - empathy and assurance will be at the heart of all that we do.

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