DIGITAL ECONOMY WHITEBOOK 2023-2024

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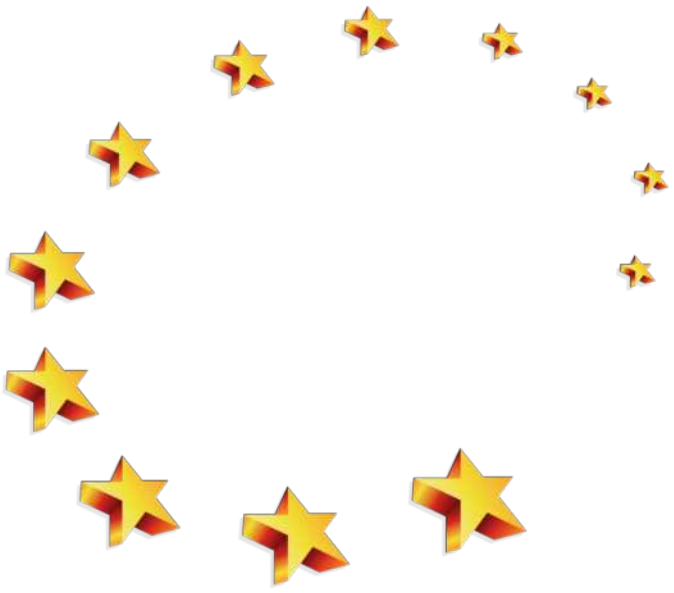

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GOLD MEMBERS

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MESSAGE

from Gan Kim Yong, Minister for Trade and Industry, Republic of Singapore

Digitalisation has become a key driver for innovation, growth, and transformation, enabling individuals and businesses to access new opportunities in the emerging digital economy. Singapore and the EU can play a leading role in strengthening international cooperation on digital economy, building on our longstanding and robust economic relations underpinned by the 2019 EU-Singapore Free Trade Agreement.

Indeed, Singapore and the EU have been enhancing and growing our cooperation in the digital realm. The EU-Singapore Digital Partnership signed on 1 February 2023 provides an overarching framework that supports cooperation in different areas in the digital economy, ranging from paperless trading to digital technologies such as Artificial Intelligence (AI) and 5G/6G networks, as well as upskilling for workers and the transformation of businesses. As a first deliverable of the Digital Partnership, both sides also established a set of Digital Trade Principles.

On 20 July 2023, Singapore and the EU further deepened our digital cooperation by launching negotiations for a legally binding digital trade agreement. Areas that may be covered include digital trade documentation, electronic authentication, personal information protection, and cross-border data flows.

I would like to congratulate EuroCham for launching the Digital Economy Whitebook. It is a timely and valuable contribution to growing our understanding of the digital economy landscape. It also underscores the significant role that the private sector can play in advancing digital linkages between Singapore and the EU.

I look forward to continued partnership between Singapore and the EU – together with our companies and stakeholders – to unlock greater opportunities presented by the digital economy, and bring our economic and digital partnership to new heights.

MESSAGE

from Iwona Piórko, Ambassador of the European Union to Singapore

We are living in an age where digital technologies are transforming our world, impacting all aspects of our economies and societies. Over 60% of global Gross Domestic Product are now linked to digital transactions; the internet redefines the way we work, learn, play, shop and socialise.

Making Europe fit for the digital age therefore sits at the heart of the European Union's agenda. In 2021, the European Commission put forward the Digital Decade policy programme, guided by the 2030 Digital Compass – a plan to achieve the digital transformation of the EU economy and society, and securing a human-centred digital ecosystem, where citizens are empowered and where businesses prosper.

The European institutions have worked to deepen digital harmonisation for a fully functioning Digital Single Market. They are also shaping a regulatory framework that enables businesses to make the most of digitalisation opportunities while preserving core human values: the Digital Services and Digital Market Acts are beginning to apply, the Artificial Intelligence Act is expected to be adopted soon.

At the same time, geopolitical tensions are threatening open economies, questioning features of the internet's model of governance, as well as universal meaningful connectivity. Beyond actively participating in multilateral initiatives such as the UN-led Global Digital Compact, which outlines principles for an open, free and secure digital future for all, the EU is engaging in ambitious bilateral and regional partnerships.

The EU-Singapore Digital Partnership is a key step in the implementation of the EU Strategy for Cooperation in the Indo-Pacific. Both sides have agreed to work on critical areas such as trusted data flows and data innovation, standards and regulatory approaches for artificial intelligence, digital trade facilitation, digital skills for workers and digital transformation of businesses and public services.

The EU and Singapore share the same commitment to an open, fair and competitive digital economy. In July 2023, they opened negotiations for a bilateral Digital Trade Agreement. This follows the adoption of EU-Singapore Digital Trade Principles, covering data governance, digital trade facilitation, consumer and business trust. Building upon the EU-Singapore Free Trade Agreement adopted in 2019, the new agreement will elevate consumers' trust and ensure predictability and legal certainty for businesses.

The EU and Singapore can play a leading role in setting high standard digital trade rules between our regions and in raising the ambition of global digital standards. For instance, we have developed a Joint Guide comparing EU and ASEAN contractual clauses that aims at ensuring appropriate data protection for data transfers across jurisdictions. It will help companies in both regions with their compliance efforts.

The EuroCham Digital Economy Whitebook is an important and timely contribution to our dialogue. It gathers vital perspectives from industry and European businesses and helps foster our dynamic relations with Singapore – an open, connected and innovative economy, a vibrant logistics and financial hub in Southeast Asia, and a key like-minded partner.

MESSAGE

from Jens Rübbert, President of EuroCham

I am pleased to introduce the Digital Economy Whitebook 2023 by EuroCham Singapore.

The signing of the EU-Singapore Digital Partnership (EUSDP) marked a significant milestone, highlighting the shared commitment of both regions to navigate the dynamic landscape of the digital economy. The rapid advancements in technology have ushered in a new era of possibilities and challenges, demanding a collective effort from individuals, businesses, governments, and communities. The global upheaval caused by the COVID-19 pandemic further emphasised the critical role of digitalisation in ensuring resilience and sustainable growth.

As we delve into the realm of digitalisation and its transformative power, we recognise the need for a comprehensive approach that encompasses public and private sector collaboration. The European Commission and the Singapore government have demonstrated their dedication to advancing digital innovation and infrastructure. Their actions – now with Digital Trade Agreement (DTA) being in negotiation and EUSDP having been signed – as well as investment in technological infrastructure, and encouragement of digital literacy, have set the stage for a future where the digital economy thrives on a global scale.

Choosing digital economy (and digital transformation) as the focal point for our Whitebook in 2023 reflects the growing role of technology-driven strategies in shaping contemporary business landscapes. Recent business trends underscore an accelerating shift towards digitalisation and innovation, as companies worldwide strive to remain competitive and resilient in an ever-evolving market. In parallel, Singapore and the European Union have independently pursued comprehensive digitalisation policies aimed at fostering economic growth, enhancing efficiency, and stimulating innovation. Singapore's 'Smart Nation' initiative and its robust support for start-ups have positioned the country as a regional tech hub. The EU's commitment to harnessing the potential of digital technologies is evident through its 'EU Digital Decade' policy, which sets forth ambitious goals to make Europe a global leader in the digital domain.

In alignment with these objectives, we proudly present this Digital Economy Whitebook, containing a general introduction to the concept of a "Digital Economy Agreement," an analysis of Singapore's other Digital Economy Agreements signed, a survey report, and industry insights which explore specific themes expressed in the EUSDP as well as general digitalisation trends.

EuroCham thrives on engaging both European and Singapore businesses on a platform where partnerships and collaborative efforts flourish. As the voice of European businesses in Singapore, we advocate for an open and thriving market which fuels innovation, while ensuring the growth of the population in alignment with progressive digital policies and governmental directives.

Under the Digital Economy Programme, our Chamber in 2022 focused on four pivotal pillars that hold significance for Singapore and Europe: Data-Driven Economy, Hyperconnectivity, Digital Talent Gap, and Digital for Sustainability. The disruptions brought about by recent events compel us to accelerate digitalisation efforts to meet emerging needs. It is now opportune for our two regions to engage in an open dialogue, exchanging insights to drive economic prosperity while upholding the highest standards of digital security and well-being.

The realisation of this Digital Economy Whitebook owes its gratitude to the invaluable support of the Digital Committee and its Chair, Dr Lovneesh Chanana. Our heartfelt appreciation goes out to our Diamond members – Accenture, Airbus, BNP Paribas, Booking.com, HERE Technologies, XCL World Academy, and XCL American Academy – and all our Gold and Regular members for their unwavering commitment to our initiatives and activities. Special recognition is extended to our key stakeholders: the EU Delegation to Singapore and H.E. Iwona Piórko, Ambassador of the EU to Singapore for their guidance, various Singaporean government bodies such as the Ministry of Trade and Industry and the Infocomm Media Development Authority for their collaboration, and the contributors and editors whose efforts culminated in this Whitebook. It is through such partnerships that we can collectively address the challenges and opportunities presented by our digital world, both present and future.

With enthusiasm, we continue to contribute to the strengthening of the Singapore – Europe business agenda, fortified by our shared dedication to the digital economy and transformation. Looking ahead, we anticipate vibrant exchanges between the private and public sectors, propelling us toward a future of digital prosperity.

MESSAGE

from Nele Cornelis, Executive Director of EuroCham

It has been a transformative year for the European Chamber of Commerce, marked by our embrace of the digital economy as our central theme. This year stands as a testament to our commitment to championing digital transformation, a commitment that has gained even more relevance following the signing of the EU Singapore Digital Partnership (EUSDP) on February 1, 2023 and as we look forward to the upcoming Digital Trade Agreement (DTA).

Europe has been a steadfast partner to Singapore in the realm of digital innovation. Given EuroCham's dedication to driving thought leadership in digital transformation, this focus was a natural progression for this year's Whitebook initiative. The topic's resonance is amplified by the resounding success of last year's activities, coupled with the growing number of EuroCham's members and stakeholders who are elevating digitalisation to the core of their business strategies. Aligned with both the European digital agenda and Singapore's digital ambitions, this choice of topic holds substantial promise.

In 2022, with invaluable guidance from our Digital Economy Committee, EuroCham launched the Digital Economy Programme. The programme entailed a year-round series of interactive and enriching sharing sessions and webinars. EuroCham also organised key consultation and feedback sessions in 2022 between its members and stakeholders in Singapore and EU respectively. These included a virtual closed-door roundtable dialogue in June with representatives from the Directorate-General for Communication Networks, Content and Technology as well as the Directorate-General for Trade (European Commission), and a consultation session in September with representatives from the Ministry of Trade and Industry (Singapore). During both engagements, EuroCham members had the opportunity to discuss the content of the EUSDP, and to share their views on how the Digital Partnership can be designed to benefit European businesses operating in Singapore.

Subsequently, on February 1, 2023, amidst the signing of the EUSDP, EuroCham organised a Business Forum & Networking session in Brussels at the premises of Grimaldi Alliance. During the forum, the Minister-in-charge of Trade Relations for Singapore S Iswaran, and Deputy Director-General for Communication Networks, Content, and Technology Renate Nikolay engaged in a fireside chat. The Forum and the succeeding networking session provided the attendees with the opportunity for meaningful dialogue with Minister S Iswaran and Deputy Director-General Renate Nikolay on the EUSDP's future impact on European businesses.

Considering the significant interest generated by the Business Forum, EuroCham recognised the necessity for a Whitebook as the second phase of the Digital Economy Programme.

The Digital Economy Whitebook 2023-2024 contains an analysis of Singapore's digital economy agreements, how the EUSDP might affect European businesses operating in Singapore, and noteworthy industry insights for policymakers and fellow business leaders. EuroCham also conducted a survey that engaged fifty industry experts from European organisations based in Singapore and fellow EuroCham members to better understand how digitalisation is affecting corporations.

Acknowledging the need to compile expert input and industry insights from our members and stakeholders, EuroCham leverages our programming efforts to engage in meaningful knowledge generation. I am most appreciative of the support extended by BearingPoint, SAP, Standard Chartered, TÜV SÜD, Tradeflow Capital Management, the EuroCham Digital Economy and Intellectual Property Rights (IPR) Committees, as well as the IPR SME Helpdesk in the preparation of the various chapters in this Whitebook. I would also like to thank our skilled intern, Aakruti Ganeshan, who assisted in an editorial and content-generation capacity. Conducting the reports and articles would not have been possible without their efforts.

This first-ever Digital Economy Whitebook of EuroCham offers insight into the regulatory policies and business strategies in Europe and in Singapore as well as the calibrated opportunities European companies bring to Singapore. We hope that this Whitebook will serve as inspiration among stakeholders in both the private and public sectors, encouraging them to forge partnerships that surmount enduring and emerging challenges.

This publication is the product of tireless endeavour by numerous stakeholders. In addition to the dedicated contributors, editors, partners, and advertisers who have brought this Whitebook to fruition, I extend my heartfelt appreciation to our Diamond, Gold, and regular members for their generous support. It is this united effort that enables EuroCham to rigorously champion the business interests of your organisations in Singapore.

ABOUT

EuroCham SINGAPORE

WHO WE ARE

EuroCham is an independent non-profit organisation governed by members, representing the common interest of the European business community in promoting bilateral trade, services, and investments between Europe and Singapore and the region.

WHAT WE DO

EuroCham represents the voice of the European business community in Singapore. We provide our members with a forum for advocacy, networking and information sharing within the European, and Singaporean business communities and governmental circles.

OUR NETWORK

EuroCham gives you access to a large networking pool consisting of the bilateral National Business Groups, European companies operating in Singapore, the Singaporean government, the Singaporean business community, the diplomatic circle and key partners across ASEAN.

Through a wide range of events such as closed-door discussions with the Singapore Government, prestigious gala dinners attended by the local, and European business community, the diplomatic circle and key partners across ASEAN, we connect you with business leaders from a variety of business industries through flagship events like the Europe Business Summit, Sustainability Awards Gala Dinner, and stimulating year-round panel discussions with expert speakers. We welcome you to participate to provide your company with increased corporate visibility.

OUR COMMITTEES

Our committees provide a common European platform to exchange information, discuss common issues businesses face, and undertake coordinated initiatives. Through 12 committees we carry out advocacy work and publish position papers to put forward our recommendations.

- AEROSPACE & AIR TRAVEL
- DIGITAL ECONOMY
- FINANCIAL SERVICES
- HEALTHCARE
- HUMAN DEVELOPMENT
- INTELLECTUAL PROPERTY RIGHTS (IPR)
- CIRCULAR ECONOMY
- REGIONAL TAX
- SMART MOBILITY
- SUPPLY CHAIN
- SUSTAINABILITY
- WINE & SPIRITS

INTRODUCTION

Digital transformation is a cornerstone of the shift towards a digital economy – an economy that is powered by the internet, electronic means and data. The Fourth Industrial Revolution has rendered the digital economy an inevitability. The signing of the EU-Singapore Digital Partnership (EUSDP) between the European Union and Singapore in February 2023 marks digital transformation as a focal point for collaboration between both regions. Following this, in July of the same year, the EU and Singapore opened negotiations on a legally binding digital trade agreement. These two developments indicate a growing shift towards policy that attempts to both regulate and enhance digital innovation.

Digitalisation of the economy can lead to benefits for both businesses and consumers. As businesses digitalise their processes, they can benefit from increased efficiency, innovation, productivity and an overall reduction in costs. Consumers can benefit from better living standards, transparency and more employment opportunities. Digitalisation can also help improve the sustainability of organisations through reducing the environmental impact and improving source efficiency of business processes. However, digitalisation can also pose certain risks to businesses – data loss, job losses, security breaches, and a pressure to modernise.

In the ASEAN region, Singapore is a pioneer of digitalisation. Owing to its strong digital and physical connectivity, Singapore has pursued collaborative initiatives on digitalisation with several other regions. In turn, according to the European Commission, the European Union is also beginning its Digital Decade. As such, the European Chamber of Commerce, Singapore recognises the unique opportunities for businesses operating within the context of these two regions. Our strategic position as the bridge between businesses, governments and communities leaves us well-poised to support this digital economic transformation. In 2023, digitalisation continues to be a driver of our advocacy programmes and activities. Specifically EuroCham has identified three pillars of advocacy in the digital economy:

1. The EU-Singapore Digital Partnership
2. Digital for Sustainability
3. Digital Economic Transformation.

Just last year, EuroCham collaborated with companies to hold several best practice sharing sessions on various topics related to the digital economy. For instance, in October 2022, the Chamber held a sharing session on creating trust in digital sustainability disclosures in collaboration with TÜV SÜD and Accenture, and in November, partnered with WeWork and ING to hold a session on the role of big data in fintech. These sessions featured distinguished speakers from various companies with relevant expertise, and consisted of lively, engaged discussion between key stakeholders.

This Whitebook exemplifies EuroCham's commitment to supporting digital transformation, both for our members and beyond. The publication consists of four major sections. First, the Whitebook opens with a general introduction to the concept of a "Digital Economy Agreement". Subsequently, the Whitebook features an analysis of Singapore's Digital Economy Agreements signed with other nations. This analysis seeks to illuminate the potential touchpoints for private sector involvement in light of the EUSDP and DTA negotiations.

This is followed by the third section, which consists of the Digital Economy Survey Report for 2023. With over 50 respondents from different sectors, the survey results provide a qualitative understanding of how digitalisation and the digital economy are affecting/ may affect corporations. Next, EuroCham's 2023 DE Whitebook contains a sector dedicated to industry insights around four core themes expressed in the EUSDP as well as general digitalisation trends:

1. Digital for Sustainability
2. Digital Trade
3. AI Quality Management
4. Intellectual Property in the Digital Age

Authored with research support and expert input from our members, these industry insights highlight valuable perspectives for businesses and governments to advance digital economic transformation in their operations. This section elucidates the context and nuances of deploying digitalisation in various fields to achieve a myriad of goals.

Lastly, the Whitebook displays a series of Company Profile Articles featuring the best digitalisation practices and expertise of each participating member. These articles reflect EuroCham member companies' continuous efforts in digitalisation of business processes, contextualised mainly to Singapore.

In tracing the EU-Singapore nexus on digital economic transformation, this Whitebook symbolises a continuous dialogue between Singapore and Europe that will fuel the digitalisation agenda for years to come.

EUROCHAM BUSINESS FORUM & EUSDP SIGNING

1 FEBRUARY 2023, WEDNESDAY (BRUSSELS, BELGIUM)

EuroCham Singapore organised a Business Forum & Networking session in Brussels at the premises of Grimaldi Alliance. During the forum, the Minister-in-charge of Trade Relations for Singapore S Iswaran, and Deputy Director-General for Communication Networks, Content, and Technology Renate Nikolay engaged in a fireside chat, which was moderated by the former President of EuroCham Singapore Federico Donato. The Forum and the succeeding networking session provided the attendees with the opportunity for an open and meaningful dialogue with Minister S Iswaran and Deputy Director-General Renate Nikolay regarding the EU-Singapore Digital Partnership and what it would mean for European businesses going forward.

Earlier the same day, the EUSDP was signed by Singapore's Minister-in-charge of Trade Relations S Iswaran and European Commissioner for Internal Market Thierry Breton in Brussels on February 1, 2023. The EUSDP is intended to strengthen connectivity and interoperability between both digital markets, enabling people and businesses to more seamlessly engage in digital transactions at lower costs.

As a first deliverable of the EUSDP, Minister Iswaran and Executive Vice President for an Economy that Works for the People and Trade Commissioner Valdis Dombrovskis signed the EU-Singapore Digital Trade Principles.

[From left to right] Managing Partner of Grimaldi Alliance Francesco Sciaudione, Deputy Director-General for Communications Networks, Content and Technology for the European Commission Renate Nikolay, and Minister-in-charge of Trade Relations for Singapore S Iswaran.

INTRODUCTION TO DIGITAL ECONOMY AGREEMENTS

EuroCham SINGAPORE

European Chamber of Commerce (Singapore)

INTRODUCTION TO DIGITAL ECONOMY AGREEMENTS

Around 50% of the world's traded services have already been digitised, while approximately 12% of the global goods trade is conducted via international e-commerce.[1] These figures herald the growing impact of the Fourth Industrial Revolution on trade mechanisms.[2] Digital payments, data flows, data services, as well as emerging technologies like blockchain and AI are all fundamentally altering the global trade landscape.[3] Accordingly, the term "digital economy" refers to the economic activity resulting from a myriad of everyday online connections between and among people, businesses, devices, data, and processes.[4] The growing digital transformation of international economic and business processes has rendered the concept of digital economy increasingly relevant – as digitalisation becomes more ubiquitous, so do the potential threats and gains of the digital economy.

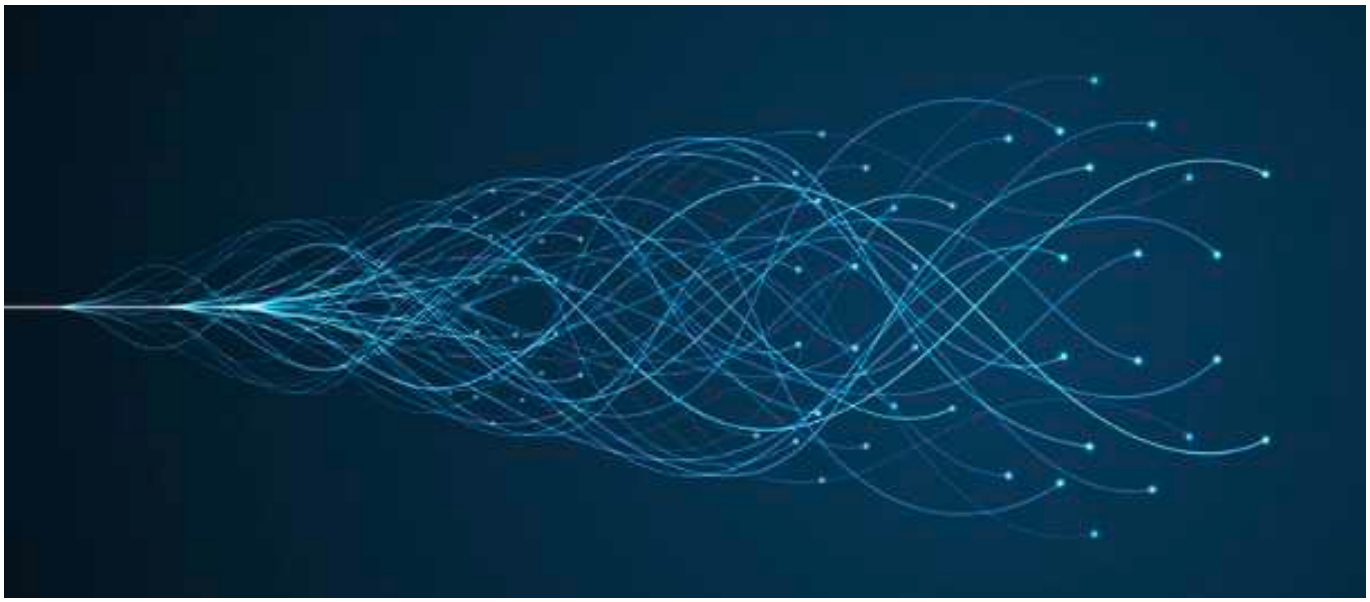
While the digital economy presents several opportunities, these emerging technologies also pose several challenges at the regulatory level. Specifically, the Organisation for Economic Cooperation and Development (OECD) identifies four critical challenges:

1. Pacing problem – Digital technologies tend to develop faster than the regulation governing them, necessitating legislation (when it exists) to consistently be updated.
2. Designing "fit-for-purpose" regulatory frameworks – Digitalisation blurs the boundaries between markets and sectors as well as consumers and producers, affecting regulatory interventions.
3. Enforcement challenges – Digitalisation questions traditional notions of liability by making it difficult to apportion and attribute harms caused by technology to end-users.
4. Institutional and transboundary challenges – Digitalisation does not abide by jurisdictional boundaries and amplifies the intensity of cross-border flows and transactions. This transboundary quality is at odds with the fragmentation of regulatory frameworks across jurisdictions.[5]

Especially at the international level, governments are challenged by balancing the need to alleviate digital policy fragmentation and modernise regulatory frameworks with the impetus to drive, rather than stifle, innovation.

This context defines the emergence of digital economy agreements (DEAs). Governments are creating comprehensive "digital-only" agreements that establish trade rules and facilitate interoperability between 2 or more digital economies.[6] In contrast to traditional trade agreements which focus heavily on market access, DEAs typically encourage domestic regulatory reform and cross-border collaboration on a range of pertinent issues, including data innovation, digital identities, cybersecurity, consumer protection, and digital inclusion.[7] Given the variations in digital trade regulation, DEAs aim to encourage consistency and interoperability, while leaving space for the rapid development of new digital technologies and progress. DEAs also intend to be beneficial to Small and Medium Enterprises (SMEs) who have the most to gain from cohesiveness. Under the general umbrella of these agreements, countries also sign specific Memorandums of Understandings (MOU) that outline more specific avenues for cooperation. Several examples of existing Digital Economy Agreements include the Digital Economy Partnership Agreement between Singapore, Chile, and New Zealand (DEPA), the UK-Singapore Digital Economy Agreement (UKSDEA), Singapore-Australia Digital Economy Agreement (SADEA), Korea-Singapore Digital Partnership Agreement (KSDPA), and the US-Japan Digital Trade Agreement. In Asia-Pacific alone, stand-alone digital trade or economy agreements are becoming more

1 James Manyika et al., "Digital Globalization: The New Era of Global Flows" (McKinsey, February 24, 2016), https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/digital-globalization-the-new-era-of-global-flows.
2 Industry 4.0
3 Michelle Warren and Ziyang Fan, "Digital Economy Agreements Are a New Frontier for Trade – Here's Why | World Economic Forum," World Economic Forum, August 24, 2022, https://www.weforum.org/agenda/2022/08/digital-economy-agreements-trade/.
4 Damian Heath and Ludwig Micallef, "What Is Digital Economy?," Deloitte Malta, accessed July 10, 2023, https://www2.deloitte.com/mt/en/pages/technology/articles/mt-what-is-digital-economy.html.
5 Nick Malyshev and Céline Kauffman, "Regulatory Effectiveness in the Era of Digitalisation," OECD Regulatory Policy Division, June 2019, https://www.oecd.org/gov/regulatory-policy/Regulatory-effectiveness-in-the-era-of-digitalisation.pdf.
6 Warren and Fan, "Digital Economy Agreements Are a New Frontier for Trade – Here's Why | World Economic Forum."
7 Ibid.



popular, raising concerns about a new "digital noodle bowl," that refers to a series of disparate bilateral trade agreements.[8] Still, these stand-alone digital trade agreements create an innovative regulatory space for an increasingly relevant field.

Broadly speaking, digitalisation regulation in Asia-Pacific is proceeding along two tracks – the negotiation of legal disciplines in trade agreements, and the development of non-binding principles. Digital Economy and Trade Agreements fall in the first camp; the development of Digital Trade/Economy Principles or Partnerships are an example of the latter. Digital Economy and Trade Agreements are legally binding, while principles or partnerships are not. Both seem to promote the same tools and goals for supporting the digitalisation of the economy. Concurrently, one benefit of trade agreements as a means for promoting digitalisation is that they are legally binding and enforceable – which becomes especially important in areas where clear legal obligations are desirable, such as no customs on electronic transmissions and processing expedited shipments.[9] For businesses, digital economy agreements also enable companies to connect with overseas partners in digital trade more seamlessly, therefore cutting down operational costs, increasing business processing efficiency, and facilitating enhanced access to overseas markets.[10] With regard to the development of non-binding principles, Digital Economy Partnerships and other alliances also are working to build consensus on digitalisation and governance. These non-binding agreements enable experimentation and allow relevant signatories to quickly address new issues without being entangled in exhaustive negotiations.[11] Moreover, these partnerships leave space to address the ever-evolving nature of the digital economy by being relatively more open in their provisions.

ASEAN is a particularly important landscape for DEAs. The region is home to the fastest growing internet market in the world, with a digital economy that is forecast to grow by more than 6% annually. ASEAN is also home to a thriving technologically astute population and increasingly significant e-commerce sector.[12] In Singapore specifically, the digital economy is estimated to reach USD 30 billion by 2025 – primarily driven by the e-commerce and online sector.[13] While there is no recent study of country-wide digital technology adoption among firms, a sense of the digitalisation landscape in Singapore can be gleaned from the 2016 study by IMDA. The study suggests that almost all (more than 80%) firms have adopted basic digital tools, but less than 35% of firms have adopted advanced digital tools (i.e. IoT, AI, data analytics). Approximately 83% of SMEs in Singapore had digital transformation strategies in place in 2021.[14] The overall population in Singapore is highly connected to the internet (about 96.9% internet users),[15] while digitally skilled workers currently represent

8 Yann Duval and Natnicha Sutthivana, "Trade Agreements in Asia and the Pacific : Bigger, Deeper, Digital and More Supportive of Sustainable Development?" (Economic and Social Commission for Asia and the Pacific, November 10, 2022), https://www.unescap.org/kp/2022/trade-agreements-asia-and-pacific-bigger-deeper-digital-and-more-supportive-sustainable-20222023.

9 Matthew P. Goodman and Pearl Risberg, "Governing Data in the Asia-Pacific" (Center for Strategic and International Studies (CSIS), April 2021), https://www.jstor.org/stable/resrep31139.

10 Taylor Lam, Gary Wu, and Roger Yun Tai Chung, "Technology-Empowered Digital Trade in Asia Pacific" (Deloitte China, December 2021), https://www2.deloitte.com/cn/en/pages/technology-media-and-telecommunications/articles/deloitte-launches-technology-empowered-digital-trade-in-asia-pacific-report-summary.html.

11 Goodman and Risberg, "Governing Data in the Asia-Pacific."

12 Anthony Toh Han Yang, "ASEAN's Splintering Digital Economy Governance," East Asia Forum, April 20, 2023, https://www.eastasiaforum.org/2023/04/20/aseans-splintering-digital-economy-governance/.

13 Ibid.

14 "Digital Adoption Among Firms and Impact on Firm-Level Outcomes in Singapore," Ministry of Trade and Industry, May 21, 2019, https://www.mti.gov.sg/Resources/feature-articles/2019/Digital-Adoption-Among-Firms-and-Impact-on-Firm-Level-Outcomes-in-Singapore.

15 "Understanding Singapore's Digital Footprint," We Are Social Singapore, February 15, 2023, https://wearesocial.com/sg/blog/2023/02/understanding-singapores-digital-footprint/.

63% of Singapore's workforce.[16] Singapore's Digital Government Blueprint focuses on digitalising all government services and by 2021, 99% of government services were able to be completed digitally end-to-end.[17]

More broadly, the ASEAN region as a whole currently lacks a digital regulatory framework, resulting in the private sector being constrained by fragmented digital regulations at both the national and supranational level. Countries like Indonesia and Vietnam, for instance, tend to have more restrictive regulatory requirements or cross-border data flows as compared to nations like Philippines and Singapore.[18] Furthermore, given that more than 97% of firms in the ASEAN region are micro, small, and medium-sized enterprises (MSMEs), restrictions of cross-border flows can disproportionately disadvantage these MSMEs and the region as a whole.[19] Singapore is well-positioned to catalyse progress in the ASEAN region given its cutting-edge physical and digital infrastructure, a strong digital talent base, and a robust Intellectual Property (IP regime).[20] The Singaporean government has expressly stated their goals to be a leading digital economy.[21] DEAs and similar partnerships can further this endeavour by enabling Singapore to act as a pathfinder within the region for successful digital transformation.

On February 1st 2023, the Singaporean government signed the EU-Singapore Digital Partnership with the European Union (EU). This partnership, while being expressly non-binding, is unique in that it contains a set of digital principles – core ideas and commitments through which bilateral cooperation between the EU and Singapore on the digital economy is to proceed.[22] The EU is a particularly important trade partner for Singapore.[23] As such, bilateral cooperation on furthering the digital economy is especially desirable for both the public and private sectors in both these regions. Here, however, it is significant to note that the Digital Partnership signed with the EU differs from Singapore's other digital economy agreements, especially because the EU is not a single nation but made up of various regions with assorted priorities. For example, the uptake of advanced digital technologies varies largely between EU countries, with some regions being more digitally advanced than others. This creates a digital divide within the EU that needs to be addressed. Singapore, on the other hand, has a more consistent and coherent digitalisation strategy across its sectors and society, driven by its smart nation initiative.

Another difference is the approach to digital regulation and governance. The EU has a more stringent and comprehensive regulatory framework for data protection, privacy, and cybersecurity, such as the General Data Protection Regulation (GDPR) and the Network and Information Security Directive (NISD).[24] These regulations aim to protect the rights and interests of individuals and businesses in the digital

16 Mindy Tan, "Singapore Needs 1.2m More Digital Workers by 2025 to Remain Competitive: Report," The Business Times, February 25, 2021, https://www.businesstimes.com.sg/international/asean/singapore-needs-12m-more-digital-workers-2025-remain-competitive-report.
17 "Digital Government," Smart Nation, accessed August 23, 2023, https://www.smartnation.gov.sg/about-smart-nation/digital-government/.
18 Sithanonxay Suvannaphakdy, "Fragmented Digital Regulations Are Constraining ASEAN's Digital Economy," FULCRUM, February 17, 2023, https://fulcrum.sg/fragmented-digital-regulations-are-constraining-aseans-digital-economy/.
19 Ibid.
20 "National-Level Priorities to Grow the Digital Economy: Spotlight on Singapore," Tech for Good Institute, accessed July 11, 2023, https://techforgoodinstitute.org/blog/articles/advancing-digital-economy-through-national-level-priorities-spotlight-on-singapore/.
21 Infocomm Media Development Authority, "Digital Economy Framework for Action," IMDA, April 4, 2023, https://www.imda.gov.sg/about-imda/research-and-statistics/sgdigital/digital-economy-framework-for-action.
22 Infocomm Media Development Authority, "Singapore and the European Union Sign Digital Partnership," IMDA, February 1, 2023, https://www.imda.gov.sg/resources/press-releases-factsheets-and-speeches/press-releases/2023/singapore-and-the-european-union-sign-digital-partnership.
23 Department of Statistics Singapore, "Singapore's International Trade in Services," SingStat, February 27, 2023, https://www.singstat.gov.sg/-/media/files/news/tis2021.ashx.
24 Formiti-Robert Healey, "Singapore PDPA Vs. GDPR: How Do They Stack Up?," Lexology, January 18, 2021, https://www.lexology.com/library/detail.aspx?g=6ea0c296-fc79-4cf7-9878-d98e57b4c062.

domain, but they also pose some challenges for cross-border data flows and innovation. Singapore has a more flexible and pragmatic approach to digital regulation, balancing the need for security and trust with the need for innovation and growth. Singapore has adopted various frameworks and standards for data protection, such as the Personal Data Protection Act (PDPA), the Model Artificial Intelligence Governance Framework (MAIGF), and the Data Protection Trustmark (DPTM). These frameworks are designed to be adaptable and compatible with different jurisdictions and technologies. Moving forward, the EUSDP will likely evoke differentiated progress between Singapore and EU member states depending on nations' varying capacities for digitalisation.

Like ASEAN, in the European Union, MSMEs are also lagging in digitalisation efforts, with only 30% of European micro-enterprises taking steps to improve digitalisation in 2022.[25] The introduction of the EUSDP, then, is intended to be especially beneficial to those MSMEs operating in both regions. Furthermore, the EUSDP's provisions on facilitating exchanges on an effective cross-border data flow regime could encourage bilateral coherency and cooperation on cross-border data flows. The recent publication of the "Joint Guide to ASEAN Model Contractual Clauses and EU Standard Contractual Clauses" indicates movement towards a thorough understanding of data transfer regimes. This progress towards consistency can be especially useful to corporations operating in either, or both, of these regions. More generally, any subsequent MoUs or pilot projects stemming from the EUSDP in areas like AI governance, digital identities, digital trade, and digital skills will also provide opportunities for the private sector. In any case, assessing the possible benefits of the EUSDP to businesses necessitates an understanding of how Singapore's previous digital economy agreements have provided opportunities for corporations.

Following are the areas that can be explored further for mutual benefit and cooperation under the EUSDP:

1. Digital trade

    - Transition to paperless trade affects all companies in how trade information is stored, processed and sent/received
    - Electronic authentication (signatures, IDs, etc) must be legally accepted – companies are able to invest in e-signature and e-invoicing solutions compatible with EU standards that are guaranteed to be accepted by counterparties
    - Storage and retrieval of trade documents (e.g. contracts)
    - Overall benefits resulting from digital trade access include accessing greater B2B and B2G networks, reduction of manual errors, overall increases in efficiency from reduction of manual processing (e.g. tracking of paper invoices), reduced costs of validating identities and signatures, cross-border data flow, etc
    - The private sector of both countries stand to benefit from free and open data flows (including government data) between both countries, which would provide legal certainty for cross-border undertakings and increase market access

2. Mutual cooperation in the development of cybersecurity and AI governance systems

    - May lead to improvements in the overall security of platforms commonly used by businesses (e.g. e-commerce, web portals, banking) and create solutions that enhance data protection
    - AI governance framework potentially increases consumer confidence in the employment of AI technologies

3. Promote digitalisation in the financial sector

    - This includes boosting innovation and transition to a low-carbon economy for the sector as a whole
    - For financial services companies, this could increase the overall competitiveness of businesses that seize the opportunity to develop new and innovative products and services

4. SME digital transformation

    - For SMEs, this could mean access to digital tools that were not previously available to them, and which are tailored to the needs of SMEs
    - Benefits could include improvement in capabilities and market reach, access to capital and credit, participation in government procurement opportunities, and access to platforms that link them up with international suppliers, buyers and potential business partners

5. Digital education and training

    - The EUSDP includes a commitment to share best practices and continue dialogues on digital education and training, including digital skills for the general workforce, ICT specialists and women

25 Serena Sertore, "Digitalisation in the European Union: Progress, Challenges and Future Opportunities," European Investment Bank, May 25, 2023, https://www.eib.org/en/press/all/2023-203-digitalisation-in-the-european-union-progress-challenges-and-future-opportunities.

- Increasing the availability of digitally skilled workers would allow more companies to embark on digital transformation programmes (since a large deterrence for many firms is the lack of a skilled workforce)[26]

To that end, the next section will analyse Singapore's other DEAs to parse the possible effects of the such a partnership on private businesses.

*** A list of all acronyms relevant to this publication can be found on pages 67-68.*

ACKNOWLEDGEMENTS

We would like to thank the following people and entities who have contributed to this paper.

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26 "EU-Singapore Digital Partnership | Shaping Europe's Digital Future," European Commission, February 1, 2023, https://digital-strategy.ec.europa.eu/en/library/eu-singapore-digital-partnership.

FORGING A DIGITAL SYNERGY BETWEEN THE EU AND SINGAPORE

A REVIEW OF SINGAPORE'S DIGITAL AGREEMENTS

EuroCham SINGAPORE

European Chamber of Commerce (Singapore)

SUMMARY

The EUSDP, as well as the negotiations surrounding a future Digital Trade Agreement, signal that Singapore and the EU are set to embark on collaboration on a wide range of issues pertaining to the digital economy. The private sector will likely play a crucial role in facilitating this collaboration. As such, the progress made on Singapore's preceding Digital Economy Agreements – the Singapore-Australia Digital Economy Agreement (SADEA), UK-Singapore Digital Economy Agreement (UKSDEA), and the Korea-Singapore Digital Partnership Agreement (KSDPA) – can demonstrate the potential opportunities and areas for business involvement. This analysis seeks to shed light on the possible trajectory of the EUSDP and a future DTA as it pertains to the private sector.

In brief, the instances of private sector partnerships or involvement that have transpired under the guidance of the other three agreements are outlined in the table below. They are organised by the general thematic areas of collaboration which will also be explored in further detail in the subsequent sections.

	SADEA	KSDPA	UKSDEA
Artificial Intelligence (AI)	The MOU between Singapore and Australia on AI specifies that the participants will explore ways to better link the AI ecosystems of Singapore and Australia to identify commercialisation opportunities. In February 2023, Enterprise Singapore partnered with Australian startup incubator Haymarket HQ to launch the Singapore-Australia Accelerator; through this program, Singapore's tech startups in smart cities, Web3, fintech, and deep tech will be offered guidance on integrating into Australia's business ecosystem.	The AI-related MOU signed between Singapore and South Korea also leaves space open for public-private partnerships – with a specific focus on three areas of collaboration: a. Joint research grants to allow experts from both countries to work together on sustainable infrastructure b. Align their AI policies and governance to facilitate the deployment of "trustworthy AI" c. Sharing best practices in regulating and deploying AI in healthcare solutions.	
SME Transformation	Enterprise Singapore has set up global innovation alliances in Australia to encourage SMEs to embark on innovation and collaboration. The Global Innovation Alliance (GIA) supports Singapore-based startups and SMEs to expand overseas, and also supports international startups to expand in the region by using Singapore as a springboard. IMDA's Open Innovation Platform (OIP) initiative which allows businesses to submit problems, proposals to outlined problems, and apply to collaborate with the IMDA.		

	SADEA	KSDPA	UKSDEA
Digital Trade	Under the MOU signed on Trade Facilitation, IMDA and Australian Border Force (ABF) embarked on a blockchain trial in November 2020 to simplify cross-border trade between Singapore and Australia by demonstrating that trade documents could be issued and verified digitally across two independent systems. Participants of the trial included regulators and financial institutions from Australia and Singapore, who provided feedback on the effects of paperless trading.		Singapore and the UK signed a MOU on Digital Trade Facilitation. This MOU is more specific about associated projects and desired outcomes, referring to a pilot project between companies from the respective jurisdictions to validate the benefits of e-invoicing.
			IMDA has worked with UK's Centre for Digital Trade and Innovation (C4DTI) to conduct TradeTrust pilots, which involved testing for the efficacy of quantum-secure cross-border electronic trade document transactions. The pilot entailed the transportation of sample building products from the UK to Singapore – transporting a pre-existing shipment dispatched by Permavoid Limited.
Digital Finance	In 2022, the Australia Treasury and Monetary Authority of Singapore (MAS) signed the Australia-Singapore FinTech Bridge Agreement which aims to build on the overarching framework of the SADEA. Section 4 of this MOU supports the mutual establishment of FinTech companies in the respective jurisdictions.		The UK and Singapore also signed a MOU on the UK-Singapore FinTech Bridge, which contains a specific section about B2B promotion of the bridge. This states that both the UK and Singapore will ease UK FinTech firms doing business in Singapore and vice versa, as well as generally promoting engagement between industry bodies in both countries.
Supply Chain Monitoring		Several South Korean and Singapore companies met in May 2023 at the Digital Economy Dialogue to discuss participation in the agreement – indicating that discussions about cooperation on the logistics sector are ongoing.	
Enforcement of Laws on Certain Unsolicited Communications	Singapore and Australia signed an MOU on the Cooperation in the Enforcement of Laws on Certain Unsolicited Communications. Through this MOU, Singapore and Australia expressed an aim to facilitate collaboration on "technically and commercially viable" solutions to spam and spam communications.		

1.0 INTRODUCTION

The EU-Singapore Digital Partnership (EUSDP) covers an expanse of topics related to digital economies: including digital trade, infrastructure, connectivity, data flows, cybersecurity, supply chain resilience, artificial intelligence (AI), online platforms, digital identities and electronic authentication, digital transformation of SMEs, digital education and skills, and standards, technical regulations, and conformity assessment procedures (STRACAP).

In summation, the EUSDP covers the following areas:

1. Exchanges on AI governance and standards
2. Exchanges on best practices (such as the eIDAS/eID wallet) and exploring use cases, paving the way for the mutual recognition of digital identities.
3. Defining projects and exchanging best practices in the area of SME digital transformation
4. Defining projects such as e-invoicing and exchange best practices to facilitate digital trade.
5. Digital connectivity, which includes enabling an environment for "secure, resilient, and sustainable digital infrastructure," including data centres and submarine telecommunications cables.
6. Ensuring trusted cross-border data flows
7. Exchanging information and sharing best practices on digital finance
8. Cooperating on supply chain monitoring
9. Enhancing information sharing and cooperation on cybersecurity regulatory frameworks and technical standards
10. Encouraging the adoption of international standards relating to the digital economy
11. Enhancing cooperation and information sharing in the area of platform governance and regulation
12. Developing a shared global vision of 5G and stimulating 6G ecosystems
13. Enhancing digital education and digital skills.[1]

Significantly, the EUSDP is not the first digital partnership that Singapore has embarked upon; previously, Singapore has signed digital economy agreements (DEAs) with New Zealand and Chile, Australia, the United Kingdom, and Republic of Korea. Notably, these agreements are legally *binding*, while the EUSDP (as an overarching framework for all areas of bilateral digital cooperation between the EU and Singapore) does not entail formal obligations. Additionally, as of July 2023, the EU and Singapore have opened negotiations on a legally binding digital trade agreement (DTA) – though the exact provisions of such an agreement are currently being discussed.[2] This report will analyse the content and trajectory of three of Singapore's other digital economy agreements: the Singapore-Australia Digital Economy Agreement (SADEA), the UK-Singapore Digital Economy Agreement (UKSDEA), and the Korea-Singapore Digital Partnership Agreement (KSDPA). Given that the EUSDP shares thematic overlaps with these three agreements, and the upcoming DTA with the EU, this analysis may help businesses glean a better understanding of their opportunities in the upcoming months.

1.1 EUSDP AS A "PATHFINDER"

Given that the EUSDP, unlike the SADEA, UKSDEA, and KSDPA, is a non-binding partnership, we must first develop an understanding of the scope and goal of the partnership. The EUSDP intends to outline the scope of cooperation between the EU and Singapore in the digital space. Because digitalisation is an emerging and uneven field – the EUSDP has the potential to parse out the areas that might be suitable for future legally binding commitments, as well as the areas that might be better poised for exploratory agreements or partnerships. Some issues outlined by the EUSDP (such as digital trade) may require legally binding rules in the future.[3] Therefore, the EUSDP could be construed as a "non-binding framework" that accounts for the diverse set of issues in the digital space. Compared to the SADEA, UKSDEA, and KSDPA, the EUSDP is better thought of as a mechanism of determining which specific issues under the digital economy will require future legally binding cooperation, and which may not.

Another key point of comparison is that the EUSDP has the potential to serve as the overarching framework for 27 European Union member states, unlike the other agreements which only cover Singapore and one respective nation. The EUSDP could be intended as the umbrella framework for numerous other initiatives conducted between EU member states and Singapore. To evidence this, we might refer to the first

1 "EU-Singapore Digital Partnership," signed 1 February, 2023, Annex, https://www.mti.gov.sg/Tradehttps://www.mti.gov.sg/Trade/Digital-Economy-Agreements/EUSDP/Digital-Economy-Agreements/EUSDP

2 Tay Hong Yi, "EU and Singapore Open Negotiations on Digital Trade Agreement," The Straits Times, July 20, 2023, https://www.straitstimes.com/business/eu-and-singapore-open-negotiations-on-digital-trade-agreement.

3 "Joint Statement on the Launch of Negotiations for an EU-Singapore Digital Trade Agreement," European Commission, July 20, 2023, https://policy.trade.ec.europa.eu/news/joint-statement-launch-negotiations-eu-singapore-digital-trade-agreement-2023-07-20_en.

deliverable from the EUSDP that was officially signed was the Digital Trade Principles which acts as the "first step towards a legally binding digital trade agreement between the EU and Singapore."[4]

Furthermore, the EUSDP is likely complementary with other bilateral cooperation agreements – such as the current framework for sustainability and innovation with Germany and the France-Singapore Digital and Green Partnership. The MTI envisions the development of portfolio use cases between both sides under these agreements. Furthermore the EUSDP is also unique as a pathfinder because it is intended to envision solutions that can be scaled up to the Asiatic region as the EU improves links and trade with South East Asia as a whole. The EUSDP could conceivably allow the EU to leverage the bilateral relationship with Singapore to identify solutions that can be applied at the regional level.

1.2 CURRENT PROGRESS

According to Minister S Iswaran, the Minister for Transport and Minister-in-charge of Trade Relations at the time of the EUSDP's signing, as of May 2023, the EU and Singapore are in the process of identifying possible projects – like proof-of-concept trials for cross border transactions and exchanges and partnerships on AI governance frameworks and standards.[5] Significantly, Minister Iswaran highlighted how the private sector has an "important role to play," in this dimension, because the private sector can contribute use cases and ideas that can be developed under the Digital Partnership.[6] There is already evidence of collaborative efforts under the digital partnership – SQREEM, a Singapore based AI analytics company, and the Dutch AI software company SemLab B.V have worked together to develop a tracker that leverages AI engines to predict the impacts of an infectious disease outbreak on a scalable level. Accordingly, the Minister expressed his anticipation that the Digital Partnership will facilitate more B2B digital partnerships that can be piloted and scaled up for broader applications. This is especially important because these pilots can help identify regulatory barriers that impede productive collaborations in the digital space. As such, the EUSDP also provides ample space for identifying future regulatory issues.[7]

2.0 DELIVERABLES

2.1 EXCHANGES ON AI GOVERNANCE AND STANDARDS

All three agreements oblige the relevant parties to "endeavour to" cooperate on international responsible AI frameworks.[8] Therefore, while the DEAs contain more specific clauses, the general message around AI is consistent with the EUSDP's AI provision – which signals that both sides "intend to cooperate and seek to align positions" in practical AI initiatives.[9] So, the EUSDP seems to possess just as much normative power as the other agreements despite being non-binding, because it also encourages (rather than requires) international cooperation.

2.2 DIGITAL IDENTITIES, 2.3 SME TRANSFORMATION

Accordingly, with respect to digital identities and SME digital transformation, the EUSDP and "binding" DEAs possess similar regulatory power because neither of them obliges its signatories to engage in specific efforts. Despite the lack of "binding" power, the SADEA has been critical to becoming a "pathfinder" for bilateral cooperation.[10] Despite not mandating its parties to support the development of

4 "Singapore and the European Union Sign Digital Partnership," Infocomm Media Development Authority, February 1, 2023, https://www.imda.gov.sg/resources/press-releases-factsheets-and-speeches/press-releases/2023/singapore-and-the-european-union-sign-digital-partnership.
5 "Opening Remarks by Minister S Iswaran at EU-Singapore Digital Partnership Outreach Event," Ministry of Trade and Industry, May 29, 2023, https://www.mti.gov.sg/Newsroom/Speeches/2023/05/Opening-Remarks-by-Minister-S-Iswaran-at-EU-Singapore-Digital-Partnership-Outreach-Event.
6 Ibid.
7 Ibid.
8 "Singapore-Australia Digital Economy Agreement (SADEA)," signed June 29, 2015, Ministry of Trade and Industry, Article 31, https://www.mti.gov.sg/Trade/Digital-Economy-Agreements/The-Singapore-Australia-Digital-Economy-Agreement; Digital Economy Agreement between the United Kingdom of Great Britain and Northern Ireland and the Republic of Singapore (UKSDEA)," signed 25 February, 2022, Article 8.61-R, https://www.mti.gov.sg/Trade/Digital-Economy-Agreements/UKSDEA; "Digital Partnership Agreement between the Government of the Republic of Korea and the Government of the Republic of Singapore (KSDP)," signed 21 November, 2022, Article 14.28, https://www.mti.gov.sg/Trade/Digital-Economy-Agreements/KSDPA;
9 "EU-Singapore Digital Partnership, (" signed 1 February, 2023, Article 29 https://www.mti.gov.sg/Trade/Digital-Economy-Agreements/EUSDP
10 Ry Crozier, "Singapore, Australia Discuss Digital and Cybersecurity Cooperation," ITnews Asia, May 2, 2023, sec. Digital Transformation, https://www.itnews.asia/news/singapore-australia-discuss-digital-and-cybersecurity-cooperation-593893.

SMEs, Minister for Trade and Industry Gan Kim Yong stated that Enterprise Singapore has set up global innovation alliances in Australia to encourage SMEs to embark on innovation and collaboration.[11] The Global Innovation Alliance (GIA) supports Singapore-based startups and SMEs to expand overseas, and also supports international startups to expand in the region by using Singapore as a springboard. According to the GIA's map of acceleration programs and co-innovation networks, there are pilot programmes in Stockholm, GIA nodes in Berlin, Munich, and Paris, and Co-innovation networks in Germany and France.[12] Another important initiative is the IMDA's Open Innovation Platform (OIP). Through this, businesses can submit problems, proposals to outlined problems, and apply to collaborate with the IMDA to solve challenges.[13] The OIP platform consists of a repository of tech tools, open source datasets, and APIs as well as a digital sandbox for testing Proof of Concepts. These features are intended to fastrack digital innovation through collaboration between both foreign and domestic entities as well as the Singaporean government. The OIP platform also explicitly has helped brand names as well as SMEs with their challenges.[14]

2.4 DEFINING PROJECTS SUCH AS E-INVOICING AND EXCHANGE BEST PRACTICES TO FACILITATE DIGITAL TRADE

The SADEA and UKSDEA mandate the parties to take into account international standards, guidelines or recommendations when developing measures relating to e-invoicing.[15] The EUSDP states that both sides should seek to find a "common understanding" of digital trade principles and "share best practices'' and interoperable frameworks. Under the EU-Singapore Digital Trade Principles (the first deliverable of the EUSDP), the parties are specifically encouraged to adopt "domestic measures related to electronic invoices that support cross-border interoperability, and where appropriate, build on existing international frameworks like Peppol."[16] This clause bears similarities to the SADEA and UKSDEA's recommendations for e-invoicing. Regarding other digital trade practices, the Digital Trade Principles contain clauses that encourage similar obligations to the ones contained in the other agreements. For instance, all three agreements require that neither party reject the legal validity of an electronic signature solely because the signature is in electronic form.[17] In the Digital Trade Principles, clause 1.4.2 states that "it is key that electronic signatures are not denied legal effect, legal validity, or admissibility."[18] While the language (not legally binding) does not create specific requirements for the parties, the themes of the Digital Trade Principles echo the stipulations emulated in the other agreements. The EUSDP only identifies the intention of both parties to collaborate on an information exchange on digital signatures.

2.5 DIGITAL CONNECTIVITY, WHICH INCLUDES ENABLING AN ENVIRONMENT FOR "SECURE, RESILIENT, AND SUSTAINABLE DIGITAL INFRASTRUCTURE," INCLUDING DATA CENTRES AND SUBMARINE TELECOMMUNICATIONS CABLES

The UKSDEA and SADEA refer to submarine telecommunications cable systems (there are no such references in the KSDPA), outlining specific provisions that implore both parties to "endeavour to mitigate the risk of damage to submarine telecommunications cable systems that are operated, owned, or controlled by a person of the other party."[19] The SADEA outlines detailed specifications to improve the transparency around the permits for vessels when they are operated, owned, or controlled by a person or organisation from the other party.[20] The UKSDEA also states that the parties should ensure access to submarine cable landing stations and cable systems on "reasonable, non-discriminatory, and transparent terms and conditions." Generally, the agreements aim to minimise red tape as it relates to the installation, maintenance, and repair of submarine telecommunications cable systems. The EUSDP states that "both sides will foster an enabling environment for secure, resilient, and sustainable digital infrastructure, which includes data centres and submarine telecommunications ca-

11 Ibid.
12 "Global Innovation Alliance (GIA)," Enterprise Singapore, accessed August 5, 2023, https://www.enterprisesg.gov.sg/grow-your-business/innovate-with-us/market-access-and-networks/global-innovation-alliance/overview.
13 "IMDA Open Innovation Platform," IMDA, accessed August 5, 2023, https://www.openinnovation.sg/.
14 Ibid.
15 "SADEA," Article 9; "UKSDEA," Article 8.61-A, "KSDPA," Article 14.8
16 "EU-Singapore Digital Trade Principles," signed January 31, 2023, Ministry of Trade and Industry, https://www.mti.gov.sg/-/media/MTI/Microsites/DEAs/EUSDP/EU-Singapore-Digital-Trade-Principles.pdf
17 "SADEA," Article 9; "UKSDEA," Article 8.61-A, "KSDPA," Article 14.8
18 "EU-Singapore Digital Trade Principles."
19 "SADEA," Article 22; "UKSDEA," Article 8.38
20 "SADEA," Article 22

bles. "Efforts may include…facilitating the expeditious and efficient installation, maintenance, and repair of submarine telecommunications cables."[21] While the other agreements are more specific in their language, we might infer that the EUSDP encourages general cooperation on the welfare of submarine telecommunication systems, similar to the other agreements.

2.6 ENSURING TRUSTED CROSS-BORDER DATA FLOWS

The KSDPA, SADEA, and UKSDEA agreements promote "data innovation," which supports the "cross-border transfer of information by electronic means."[22] This is similar to the EUSDP's data flow provision which expresses the desire to facilitate "cross-border data flows with trust through model data protection contracts and the use of emerging technologies."[23] The other agreements specifically state that parties should endeavour to "cooperate on policies and standards for data mobility, including consumer data portability."[24] Following the EUSDP, the development of the Joint Guide to ASEAN Model Contractual Clauses (MCCs) and EU Standard Contractual Clause (SCCs) for International Data Transfers demonstrates a similar impetus to develop policies and standards for consumer data portability.[25] The MCCs and SCCs are a voluntary framework to ensure that personal data is protected and, more importantly, to ensure that international data transfers meet the ASEAN Personal Data Protection (PDP) and the EU's General Data Protection Regulation (GDPR). This particular guide compares the ASEAN MCCs and EU SCCs to make it easier for companies to meet the respective requirements of the contractual clauses.

2.7 EXCHANGING INFORMATION AND SHARING BEST PRACTICES ON DIGITAL FINANCE

The EUSDP expresses a commitment to support digitalisation in the financial sector, which (compared to the agreements) is a more vague term.[26] For instance, the UKSDEA expresses a commitment to "support innovation in financial services, in areas such as, but not limited to FinTech and RegTech," while the KSDPA and SADEA only have defined articles about FinTech. Indeed, FinTech is an important regional market, especially as FinTech investments in Singapore in 2022 soared despite a global decline in investment and deal volume.[27] The SADEA and UKSDEA's provisions on FinTech have provoked further interest in the field – in 2022, the Australia Treasury and Monetary Authority of Singapore (MAS) signed the Australia-Singapore FinTech Bridge Agreement (another MOU) which aims to build on the overarching framework of the SADEA.[28] Section 4 of this MOU supports the "mutual establishment of FinTech Firms" in the respective jurisdictions.[29] Similarly, the UK and Singapore also signed a MOU on the UK-Singapore FinTech Bridge, which contains a specific section about "Business-to-Business" promotion of the bridge.[30] This states that both the UK and Singapore will ease UK FinTech firms doing business in Singapore and vice versa, as well as generally promoting engagement between industry bodies in both countries. If these agreements are any indication, any future collaborative efforts stemming from the EUSDP pertaining to FinTech might provide unique opportunities for European FinTech companies to enhance their operations and voice in Singapore.

2.8 COOPERATING ON SUPPLY CHAIN MONITORING

On the subject of supply chain management, the UKSDEA and KSDPA both require the parties to "endeavour to share best practices" in the logistics sectors, specific to last-mile deliveries, the availability of cross-border options for the delivery of goods, and new delivery and business models for logistics.[31] This is not dissimilar from the EUSDP's clause on supply chain resilience, however, in this case, the EUSDP's provision seems to be far more specific in discussing the semiconductor supply chain resilience and Singapore's unique position as a logistics hub. In May 2023, South Korean Deputy Trade Minister Jeong Dae-jin met with Singaporean counterpart Jane Lim to affirm the logistic

21 "EUSDP," Clause 44
22 "SADEA," Article 26; "UKSDEA," Article 8.61-1; "KSDPA," Article 14.25
23 "EUSDP," Article 26
24 "SADEA," Article 26; "UKSDEA," Article 8.61-1; "KSDPA," Article 14.25
25 "Joint Guide to ASEAN Model Contractual Clauses and EU Standard Contractual Clauses," published May 24, 2022, https://asean.org/wp-content/uploads/2023/05/The-Joint-Guide-to-ASEAN-Model-Contractual-Clauses-and-EU-Standard-Contractual-Clauses.pdf
26 "EUSDP," Article 32
27 Dashveenjit Kaur, "Singapore Records Highest FinTech Funding in Three Years amidst a Global Slowdown," Tech Wire Asia, February 20, 2023, https://techwireasia.com/2023/02/singapore-records-highest-fintech-funding-in-three-years-amidst-a-global-slowdown/.
28 Monetary Authority of Singapore, "Australia and Singapore to Deepen Collaboration in FinTech," April 13, 2022, https://www.mas.gov.sg/news/media-releases/2022/australia-and-singapore-to-deepen-collaboration-in-fintech.
29 "Memorandum of Understanding on the Australia-Singapore FinTech Bridge" signed 11 April, 2022, https://www.dfat.gov.au/sites/default/files/australia-singapore-mou-on-fintech-bridge.pdf"
30 "Memorandum of Understanding on the United Kingdom-Singapore FinTech Bridge" published 25 November, 2022, https://www.gov.uk/government/publications/memorandum-of-understanding-on-the-united-kingdom-singapore-fintech-bridge/memorandum-of-understanding-on-the-united-kingdom-singapore-fintech-bridge
31 "UKSDEA," Article 8.61-C; "KSDPA," Article 14.9

sectors clause, agreeing to increase bilateral cooperation on supply chains in response to fast-changing global trade circumstances.[32] In terms of private company involvement, though there are no specific pilot cases demonstrating cooperation yet, several South Korean and Singapore companies met in May 2023 at the Digital Economy Dialogue to discuss participation in the agreement – which indicates that discussions about cooperation on the logistics sector are ongoing.[33] The EUSDP specifies that the private sector will be involved in both anticipating and mitigating disruptions to the supply chain.[34] As such, compared to the other three agreements, the EUSDP is unique in that it explicitly affirms the role of the private sector in supply chain resilience. In the near future, there is potential for a B2B or B2G dialogue about amplifying supply chain resilience following the EUSDP.

2.9 ENHANCING INFORMATION SHARING AND COOPERATION ON CYBERSECURITY REGULATORY FRAMEWORKS AND TECHNICAL STANDARDS

The exchange of information concerning cybersecurity frameworks is common to all three agreements. The UKSDEA, KSPDA, and SADEA all recognise the importance of building national capabilities, leveraging existing collaboration mechanisms, and promoting workforce development in cybersecurity. The EUSDP's focus seems to be on promoting secure digital trade and a "peaceful" ICT arrangement. However, there is a possibility that any expansion of the partnership might include similar provisions about national capabilities, collaboration, and amplifying the cybersecurity workforce. The latter may prove especially relevant given the APAC's gap in its cybersecurity workforce, and simultaneously, the EU's possession of one of the largest cybersecurity workforces globally.[35]

2.10 ENCOURAGING THE ADOPTION OF INTERNATIONAL STANDARDS RELATING TO THE DIGITAL ECONOMY

Lastly, concerning the development of general standards, technical regulations, and conformity assessment procedure (STRACAP), the EUSDP expresses both sides' commitment to encourage the adoption of international/internationally recognised standards related to the digital economy. This partnership specifies that there needs to be an exploration of projects to develop a greater understanding of STRACAP amongst the public and private sectors. Similarly, SADEA affirms that Parties should endeavour to "identify, test, and develop with industry participants…cross border projects that demonstrate standards…[for] digital trade," while the UKSDEA, in relation to STRACAP, encourages the signatories to "cooperate between governmental and non-governmental bodies."[36] The KSDPA also echoes the call to "foster cooperation between governmental and non-governmental bodies of the Parties."[37] Therefore, long term, there could be space for the private sector to directly become involved in cross-border research or test-bedding projects in this realm.

3.0 MEMORANDUMS OF UNDERSTANDING

Under the rubric of the other three DEAs, MOUs have been signed to collaborate on specific areas of interest. Given that Singapore is party to the EUSDP, and is in negotiations for a DTA with the EU, there is the potential for MOUs on the horizon. In this subsection, the report will briefly list the MOUs under the other three DEAs, and indicate areas of digital collaborations. Consequently, the report will suggest how these MOUs might have enabled private-public partnerships, which provides an understanding of how the EUSDP and/ or the DTA may inform future collaborations.

32 "S. Korean, Singaporean Companies Discuss Cooperation on Digital Economy," Yonhap News Agency, May 19, 2023, https://en.yna.co.kr/view/AEN20230519001600320.
33 Ibid.
34 "EU-Singapore Digital Partnership," signed 1 February, 2023, Annex, https://www.mti.gov.sg/Trade/Digital-Economy-Agreements/EUSDP
35 Jennifer Gregory, "Asia Pacific Faces a Severe Cybersecurity Worker Shortage," Security Intelligence (blog), February 8, 2023, https://securityintelligence.com/news/asia-pacific-faces-a-severe-cybersecurity-worker-shortage/; Amanda Steinman, "(ISC)2 Announces Pledge with the European Commission to Increase the Cybersecurity Workforce throughout the European Union," (ISC)2, April 19, 2023, https://www.isc2.org:443/News-and-Events/Press-Room/Posts/2023/04/19/ISC2-Announces-Pledge-to-increase-the-Cybersecurity-Workforce-throughout-the-EU.
36 "SADEA," Article 30; "UKSDEA," Article 8.61-D
37 "KSDPA," Article 14.31

3.1 SADEA

1. MOU on Cooperation on Artificial Intelligence

The MOU between Singapore and Australia on Artificial Intelligence specifies that the participants will "explore ways to better link the AI ecosystems of Singapore and Australia (research, industry, venture capital, and start-ups) to identify commercialisation opportunities for innovative AI firms."[38] Accordingly, in February of this year, the government agency Enterprise Singapore partnered with Australian start-up incubator Haymarket HQ to launch the Singapore-Australia Accelerator; through this program, Singapore tech start-ups in smart cities, Web3, fintech, and deep tech will be offered guidance on integrating into Australia's business ecosystem.[39]

2. MOU on Cooperation for Electronic Invoicing

3. MOU on Cooperation in the Enforcement of Laws on Certain Unsolicited Communications

Keeping in mind the global impact and source of scams, this MOU covers cooperation in key areas like information sharing and assistance in investigations relating to scams, spam calls, and short message services. Through this MOU, Singapore and Australia have expressed an aim to facilitate collaboration on "technically and commercially viable" solutions to spam and spam communications, and mutual exchanges of knowledge and expertise.[40] The development of these solutions will likely involve the telecommunications industry, and thus enable private-public collaboration in the bilateral efforts against spam communications.

4. MOU on Cooperation in the Field of Digital Identity

The MOU signed with Australia specified that "business processes" in the context of digital identity policies were within the scope of the agreement, and highlighted the identification of "use cases and implementation of pilots" as a modality for cooperation.[41] Though no projects can be definitively linked back to these MOUs, the MNC Okta has integrated its customer identity and access management service with Singapore's digital identity service Singpass. Okta is also concurrently working with various government agencies in Australia on digital identities.[42] Digital identities are also a hot button subject in the EU – with space for private sector involvement. The EU Commission has mandated that by 2024, every EU member state must notify at least one form of electronic Digital ID Wallet. The wallet may be issued by a government department or private-sector provider.[43] In Singapore, several commercial companies have integrated their services with Singpass. Notably, all these companies so far have been local.[44] As such, given that the EUSDP expresses the intention to expand the capacities for digital identities/digital wallet, the opportunities for the private sector to get involved could increase.

5. MOU on Cooperation in Personal Data Protection

6. MOU on Data Innovation

7. MOU on Electronic Certification Cooperation

8. MOU on Trade Facilitation

The IMDA and Australian Border Force (ABF) embarked on a blockchain trial in November 2020 to simplify cross-border trade between Singapore and Australia by demonstrating that trade documents could be issued and verified digitally across two independent systems. Significantly, the trial involved testing paperless trade using TradeTrust (IMDA) and the ABF's Intergovernmental Ledger (IGL). Participants

38 "Memorandum of Understanding between Government of Australia and the Government of the Republic of Singapore on Cooperation on Artifical Intelligence," signed 23 March, 2020, Paragraph VI, https://www.dfat.gov.au/sites/default/files/australia-singapore-mou-artificial-intelligence.pdf

39 Eileen Yu, "Singapore Tech Firms Offered Acceleration Scheme to Expand in Australia," ZDNet, February 13, 2023, sec. Business, https://www.zdnet.com/article/singapore-tech-firms-offered-acceleration-scheme-to-expand-in-australia/.

40 Anjali Raguraman, "Singapore, Australia Ink Agreement to Tackle Scams and Spam Calls," The Straits Times, July 21, 2022, https://www.straitstimes.com/singapore/courts-crime/singapore-australia-ink-agreement-to-tackle-scams-spam-calls.

41 "Memorandum of Understanding between the Smart Nation and Digital Government Office of the Republic of Singapore and the Digital Transformation Agency of Australia Concerning Cooperation in the Field of Digital Identity," signed 17 March, 2020, Paragraph 2 , Sec. C and D, https://www.mti.gov.sg/-/media/MTI/Microsites/DEAs/Singapore-Australia-Digital-Economy-Agreement/MOUs/MOU-on-Cooperation-in-the-Field-of-Digital-Identity.pdf

42 Aaron Tan, "Okta Integrates with Singapore's National Digital ID System," Computer Weekly, April 12, 2023, https://www.computerweekly.com/news/365535103/Okta-integrates-with-Singapores-national-digital-ID-system.

43 "EIDAS 2: The Countdown to a Single European Digital ID Wallet Has Begun," Thales Group, accessed May 24, 2023, https://www.thalesgroup.com/en/markets/digital-identity-and-security/government/identity/eidas-regulations.

44 Masha Borak, "Singpass Launches Digital Driver Licences for Professionals, Integrated by Okta," Biometric Update, April 12, 2023, https://www.biometricupdate.com/202304/singpass-launches-digital-driver-licenses-for-professionals-integrated-by-okta.

of the trial included regulators and financial institutions from Australia and Singapore, who provided feedback on the effects of paperless trading.[45] This initiative shows how private entities can contribute to projects stemming from MOUs or agreements by providing active feedback which can shape the implementation of policy.

3.2 UKSDEA

1. MOU on Cyber Security Cooperation

2. MOU on Digital Trade Facilitation

Concerning digital trade, parallel to the UKSDEA, Singapore and the UK signed a Memorandum of Understanding on Digital Trade Facilitation. This MOU is more specific about associated projects and desired outcomes, referring to a "pilot project between companies/organisations from the Participants' respective territories to…validate the benefits of e-invoicing."[46] The MOU also specifies project milestones over the next 24 months; several steps include identifying suitable companies/organisations and facilitating the necessary meetings for implementing the pilot project. Furthermore, under the UKSDEA, IMDA has worked with UK's Centre for Digital Trade and Innovation (C4DTI) to conduct TradeTrust pilots, which involved testing for the efficacy of quantum-secure cross-border electronic trade document transactions.[47] The pilot entailed the transportation of sample building products from the UK to Singapore – transporting a pre-existing shipment dispatched by Permavoid Limited, a subsidiary of the U.K based Genuit Group. Another specialist consultancy, AG Midgley, also played a role in seeing the consortium through from inception to conception.[48] This example demonstrates how foreign international companies may play a role in facilitating pilot programs developed by the government that are part of MOUs.

3. MOU on Digital Identities Cooperation

This MOU specifically mentions the private sector – highlighting the "understand[ing] the role of industry and the role of relying on parties in engaging with interoperability strategies and plans" as part of the scope of activities, as well as the prioritisation of use cases that would bring "tangible benefits to users and businesses."[49]

Generally speaking, the MOUs and UKSDEA have opened more avenues for British and Singaporean companies – in September 2022, Singapore hosted a delegation of 24 British companies working on a diverse array of projects, including driverless vehicles, law tech, cybersecurity, and deeptech.[50]

3.3 KSDPA

1. MOU on Implementing the Korea-Singapore Digital Economy Dialogue

2. MOU on the Electronic exchange of Data to Facilitate the Implementation of the Korea-Singapore Digital Partnership

3. MOU on Cooperation on Artificial Intelligence

Though there is no detailed information on ongoing projects, the AI-related MOU between Singapore and Korea also leaves space open for public-private partnerships – with a specific focus on three areas of collaboration:

a. Joint research grants to allow experts from both countries to work together on sustainable infrastructure
b. Align their AI policies and governance to facilitate the deployment of "trustworthy AI"
c. Sharing best practices in regulating and deploying AI in healthcare solutions.[51]

*** A list of all acronyms relevant to this publication can be found on pages 67-68.*

45 Kala Anandrajah, Tanya Tang, and Alvin Tan, "Developments in Cross-Border Paperless Trade" (Rajah & Tann Asia, August 2021), https://eoasis.rajahtann.com/eoasis/lu/pdf/2021_08_Cross-Border_Paperless_Trade.pdf.
46 Memorandum of Understanding on Digital Trade Facilitation," published 22 December, 2021, https://www.gov.uk/government/publications/memoranda-of-understanding-with-singapore-digital-trade-facilitation-digital-identity-and-cyber-security/memorandum-of-understanding-on-digital-trade-facilitation.
47 Brian Canup, "Consortium Successfully Executes First Cross Border Quantum-Secure Digital Trade Transaction," Trade Finance Global, June 14, 2023, https://www.tradefinanceglobal.com/wire/consortium-successfully-executes-first-cross-border-quantum-secure-digital-trade-transaction/.
48 Arqit, "Consortium Delivers World's First Cross-Border Quantum-Secure Digital Trade Transaction," June 15, 2023, https://www.prnewswire.com/ae/news-releases/arqit-consortium-delivers-worlds-first-cross-border-quantum-secure-digital-trade-transaction-301851443.html.
49 "Memorandum of Understanding on Digital Identities Cooperation," published 21 December, 2021, https://www.gov.uk/government/publications/memoranda-of-understanding-with-singapore-digital-trade-facilitation-digital-identity-and-cyber-security/memorandum-of-understanding-on-digital-identities-cooperation
50 Department for International Trade and Foreign, Commonwealth & Development Office, "UK Tech Companies Eye Singapore as Gateway for Regional Expansion," GOV.UK, September 22, 2022, https://www.gov.uk/government/news/uk-tech-companies-eye-singapore-as-gateway-for-regional-expansion.
51 Chang May Choon, "Singapore, South Korea Sign MOU on Artificial Intelligence," The Straits Times, December 7, 2022, https://www.straitstimes.com/asia/east-asia/singapore-south-korea-sign-mou-on-artificial-intelligence.

DIGITAL ECONOMY SURVEY REPORT 2023

EuroCham SINGAPORE

European Chamber of Commerce (Singapore)

EXECUTIVE SUMMARY

In light of the EUSDP, the European Chamber of Commerce, Singapore (EuroCham) conducted a survey to parse the priorities and current capabilities of organisations with a vested interest in digitalising their operations. This survey sought responses related to areas covered in the EUSDP from European organisations operational in Singapore and ASEAN as well as members of EuroCham, garnering a total of over 50 responses altogether. The intention of this survey is to understand the specific areas in which the EUSDP may advance organisations' digital goals, and by extension, how the EUSDP's specific clauses can relate to organisations' current operational needs. Furthermore, this survey intends to assess the private sector's opinions on a future binding Digital Economy Agreement (DEA) between the EU and the Singapore government. Additionally, this survey explores companies' opinions on the relationship between digitalisation and sustainability.

The survey began with a query about the most important principles (to respondents) for a future legally binding agreement. Next, this questionnaire gauges the current operational capabilities and gaps of the respondents in relation to specific subjects broached by the EUSDP including e-commerce, digital identities, digital skills, and AI governance. Through this, the survey attempts to understand the opportunities for the EUSDP to promote growth and build on existing mechanisms.

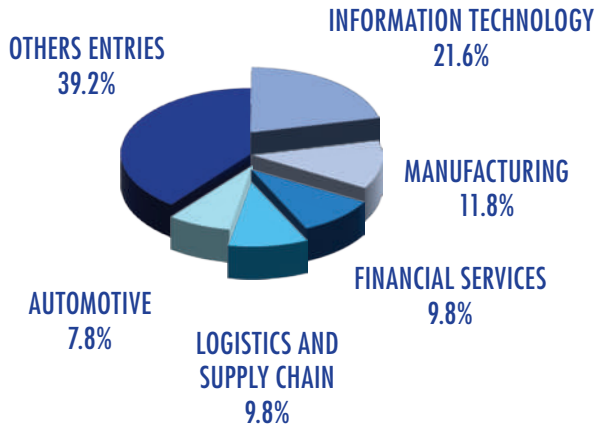
The respondents ranked several clauses in the EUSDP relating to digital trade as particularly important – specifically, electronic transactions, e-commerce, paperless trade, and e-payment systems. Around 40% of the organisations surveyed reported existing reliance on or usage of e-commerce and AI in their operations. Over half of the organisations indicated reliance on digital identities. These figures indicate that digitalisation is well underway at many of these organisations. However, many respondents also highlighted ongoing challenges with digitalisation, including the tech skills gap, the ability to shape the digital customer experience, and a limited implementation of AI systems.

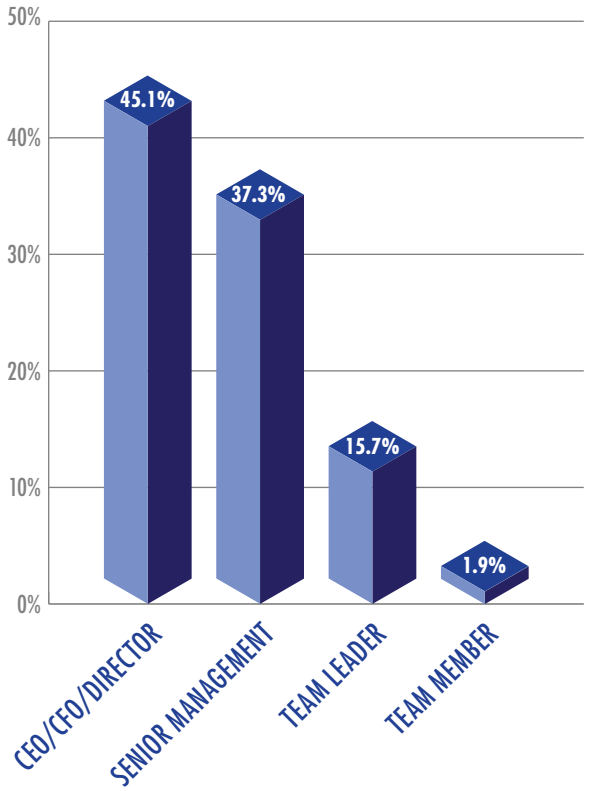
Furthermore, respondents were asked about digitalisation as a driver for sustainability – the overwhelming majority believe that digital transformation can support environmental goals, and in turn, that an Environmental, Social, and Corporate Governance (ESG) framework can accelerate digital transformation. As such, the findings from this questionnaire should drive a thorough understanding of the EUSDP's goals as they pertain to European organisations operating in Singapore, as well as the overall future of digitalisation within these companies.

EuroCham would like to thank each and every respondent for taking the time to respond to this survey. We value their openness and transparency in answering all relevant questions to drive an understanding of digitalisation. We are excited to continue informing on digitalisation in the near future.

RESPONDENT DEMOGRAPHICS

We received 51 responses from various organisations. 21.6% of the respondents are in the information technology (IT) sector, 11.8% specialise in manufacturing, 9.8% are localised to financial services, and 9.8% are in the logistics/ supply chain sector. 39.2% of the survey participants identified themselves as being in other industries, providing responses ranging from food and beverage to real estate.





There seems to be a range of industries represented in this particular sample of respondents. Furthermore, the respondents are fairly well distributed across categories, indicating that the responses are meaningful to a variety of corporations.

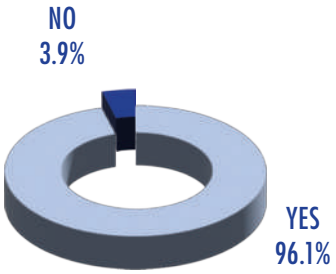
The majority of respondents are in senior positions at their companies. 45.1% of the respondents are in executive level positions – functioning as CFOs, CEOs, or Directors of their respective organisations. Accordingly, 37.3% of respondents are in senior management positions.

Therefore, the data from this survey has been garnered from individuals in leadership positions who can best speak to the present and future potential of digitalisation efforts within their organisations.

EUROPEAN UNION-SINGAPORE DIGITAL PARTNERSHIP

Would you welcome in the future a legally binding digital trade agreement between the EU and Singapore?

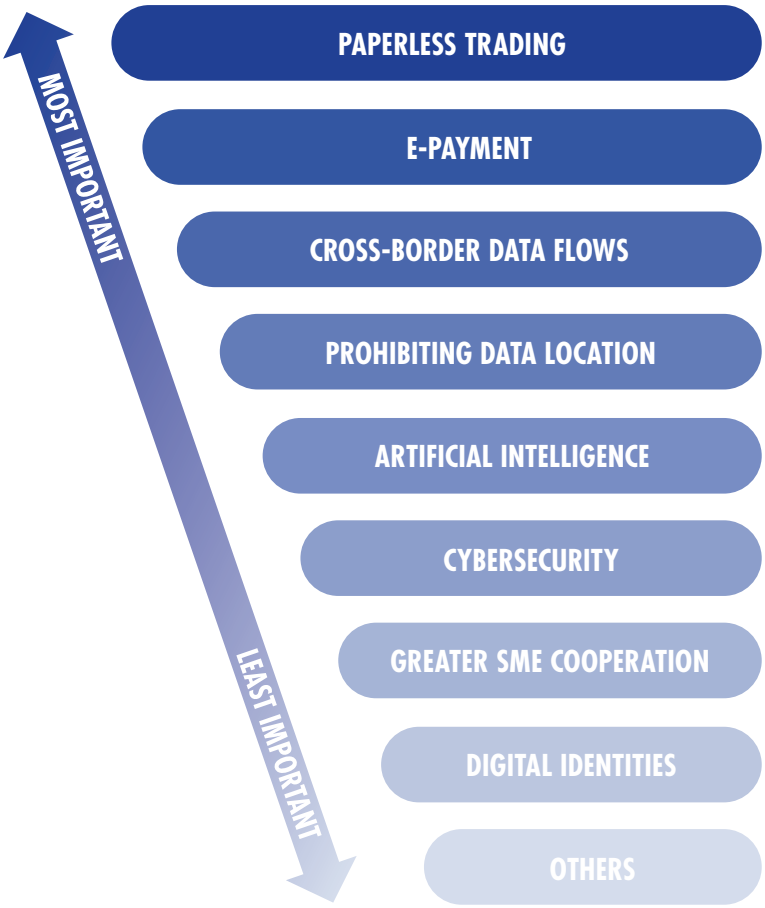
The overwhelming majority of respondents (96.1%) would welcome a legally binding digital trade agreement between the EU and Singapore in the future.



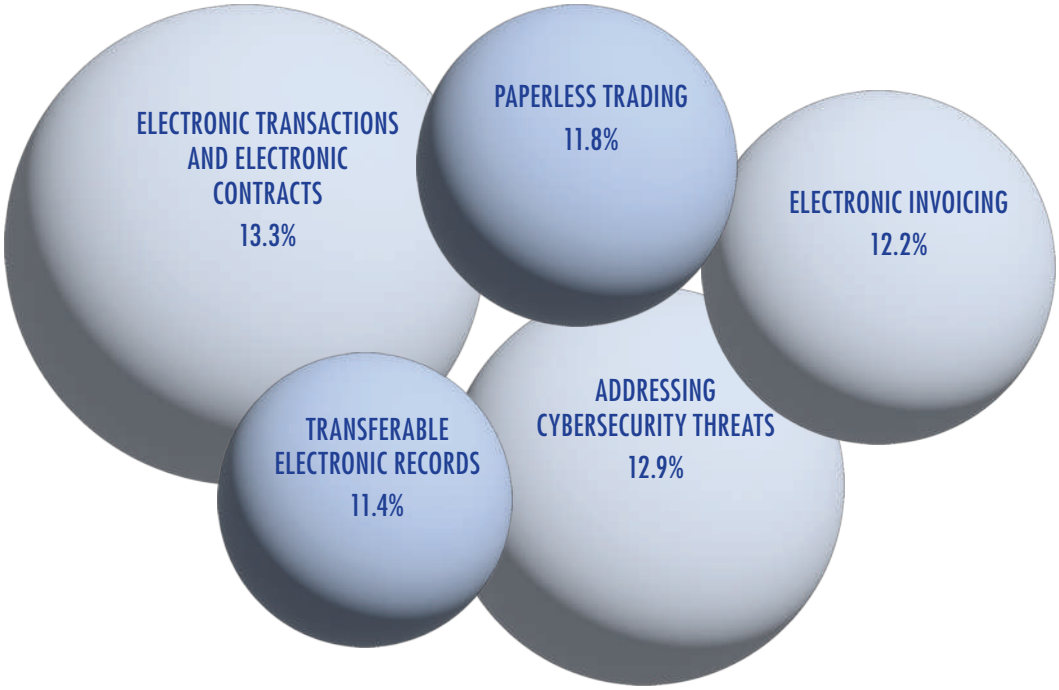
If yes, rank the potential benefits of such an agreement in order of importance.

Respondents ranked the given options in order of their importance.

As such, respondents felt that paperless trading and e-payment systems would be the most important potential benefits of a legally binding digital trade agreement between the EU and Singapore. Cross-border data flows and preventing data localisation were also ranked highly as possible benefits of such an agreement. However, the participants ranked greater SME cooperation and digital identities as less important benefits of a legally binding digital trade agreement.



Select 5 Digital Trade Principles of the EUSDP that are most important to your organisation.



Respondents were asked to choose five principles from the EUSDP that were most important to their organisation. The diagram above demonstrates the five principles that were selected most often. The other principles listed in the survey were:

- Free flow of protected data
- Regulation and collaboration on Artificial Intelligence
- Protection of source code and use of cryptography
- Single trade windows
- Online consumer protection
- Promoting open internet access

As the diagram demonstrates, respondents frequently highlighted the principles pertaining to digital trade as important – including electronic transactions and electronic contracts, electronic invoicing, paperless trading, and transferable electronic records. Respondents also indicated that addressing cyber-security threats was important to their organisations.

Interestingly, online consumer protection (4.3%) and promoting open internet access (4.3%) were least frequently chosen as important digital trade principles. This indicates that for the organisations surveyed, consumer–oriented principles were considered as less significant aspects of the EUSDP.

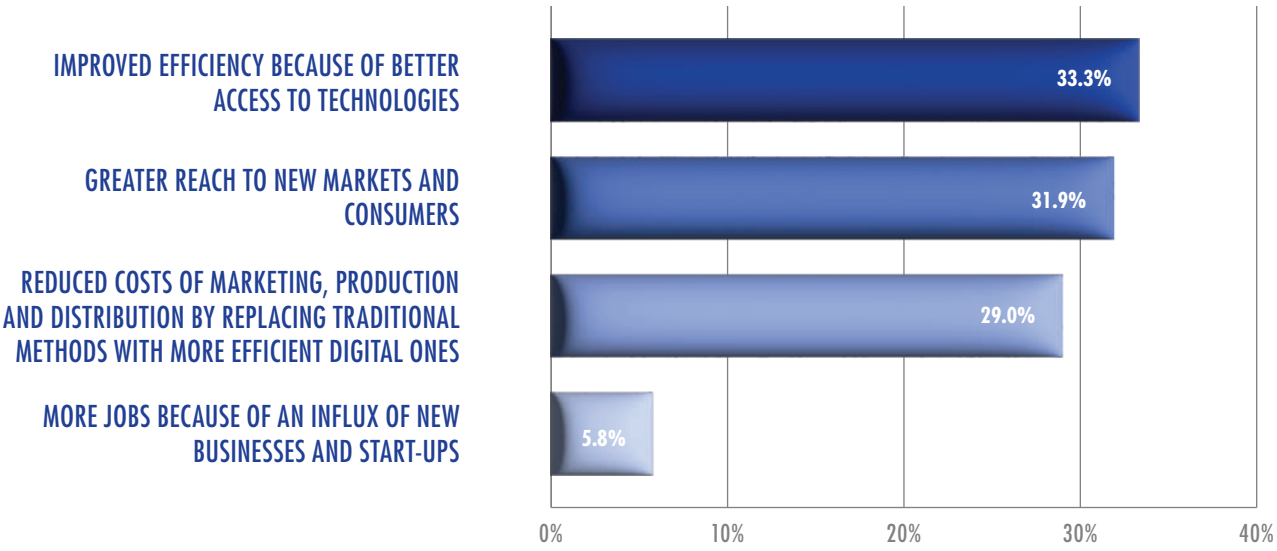
E-COMMERCE (*)

(*) E-commerce refers to transactions conducted electronically via the internet.

Does your business rely on e-commerce?

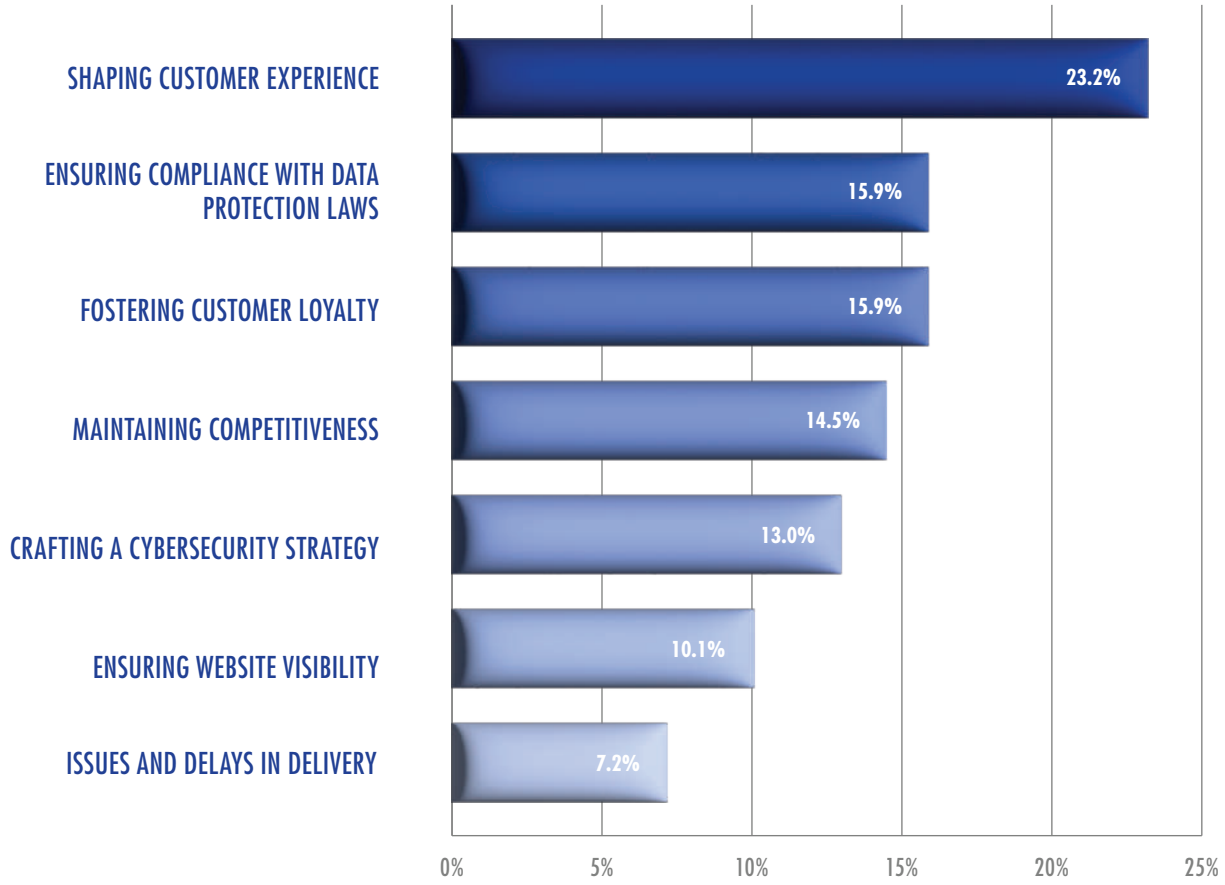
Slightly under half of the respondents (45.1%) rely on e-commerce as part of their business.

If yes, select 3 opportunities that e-commerce has brought to your business.



Around a third of respondents whose businesses rely on e-commerce indicated that e-commerce improved their efficiency, expanded their reach to new markets and customers, and reduced marketing, production, and distribution costs. Contrastingly, very few survey participants (5.8%) noted that e-commerce generated more jobs.

If your business relies on e-commerce, select 3 challenges that e-commerce has brought to your business.



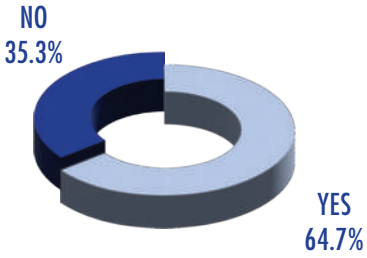
Of the respondents who indicated that their business was reliant on e-commerce, 23.2% noted that their businesses faced challenges with shaping customer experience.

Survey participants with e-commerce reliant businesses also highlighted ensuring compliance with data protection laws, fostering customer loyalty, and maintaining competitiveness as obstacles. Respondents selected website visibility as well as issues and delays in delivery less often as challenges related to e-commerce.

DIGITAL IDENTITIES (*)

(*) A digital identity is a body of information about a person, organisation, etc that allows for a computer to mediate relationships online. Businesses often use digital identities to be able to verify with whom they are transacting.

Does your business rely on digital identities?

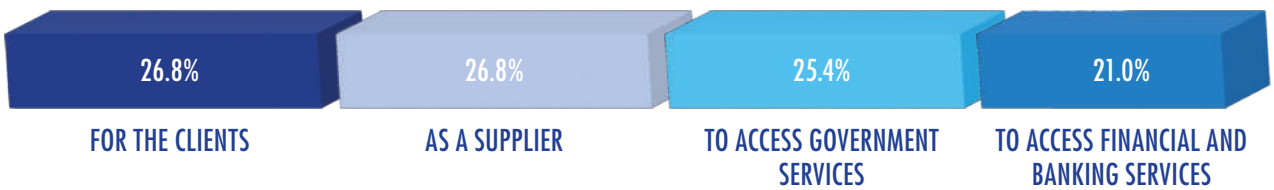


Our survey found that over half of the respondents' (64.7%) businesses rely on digital identities.

If yes, do you consider your current technological infrastructure sufficient to support the use of digital identities?

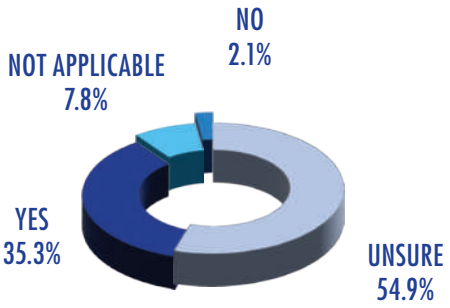
78.8% of the respondents whose businesses rely on digital identities indicated that they find their current technological infrastructure sufficient to support the use of digital identities.

If yes, in what form do you use digital identities?



Of the businesses that rely on digital identities, 26.8% of respondents use digital identities for their clients and 26.8% use digital identities as a supplier. 25.4% use digital identities to access government services and 21.0% use these identities to access financial and banking services. The distribution of respondents across the various purposes for digital identities seems relatively even – indicating that there is no singular overwhelming use for digital identities.

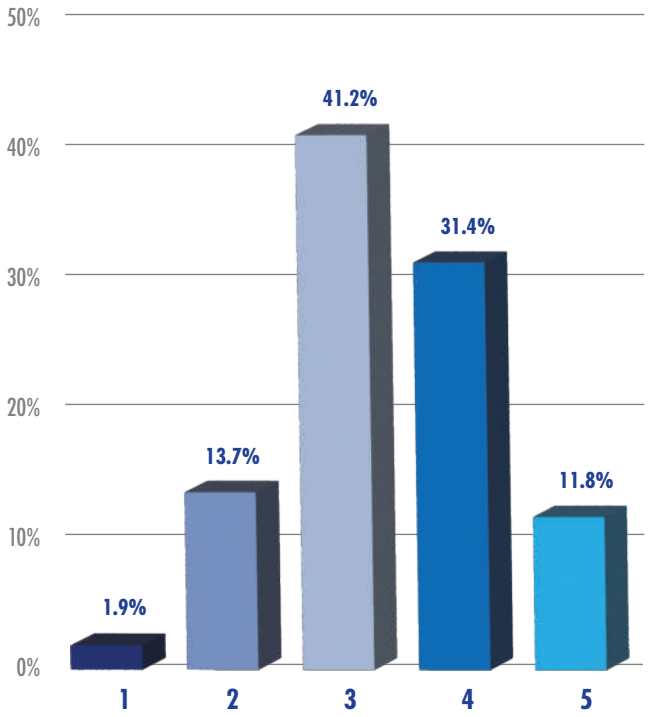
Would you support a regulation on blockchain enabled Direct Inward Dialling to route incoming calls to specific private branch systems without an operator?



Slightly over half of the respondents (54.9%) were unsure about supporting a regulation on blockchain enabled direct inward dialing that would route incoming calls to specific private branch systems without an operator. This could be because the question is relatively niche, or alternatively because the effects of such a regulation are relatively unknown.

How useful is blockchain enabled technology to your operations?

Rate from a scale of 1 - 5, with 1 being the least useful and 5 being the most useful.



Respondents were asked to rate blockchain enabled technology's utility.

The highest percentage of respondents (41.2%) rated utility as "3" indicating that blockchain-enabled technology is somewhat useful to their operations.

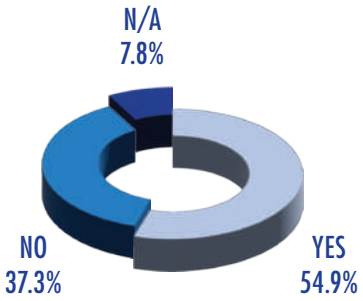
The distribution of answers is slightly skewed to the left, which means that more respondents rated blockchain technology as very useful as compared to not useful at all.

DIGITAL SKILLS(*)

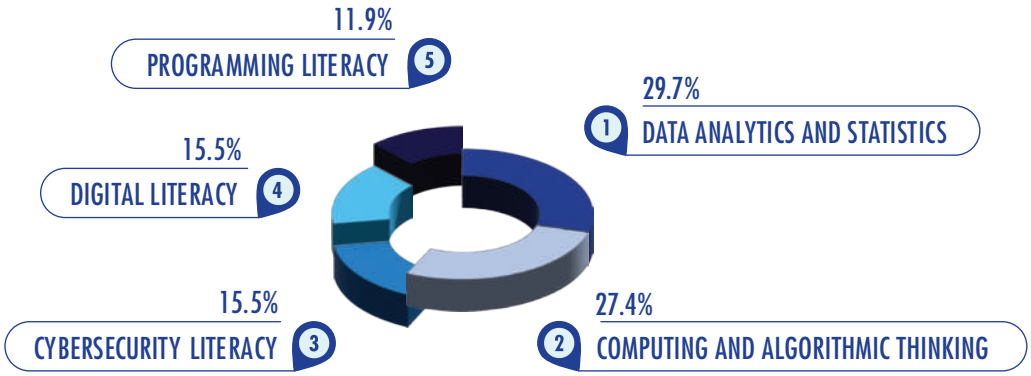
(*) Digital skills are defined as the skills needed to use digital devices, communication platforms and networks to manage and access information.

Is your organisation challenged by the tech skills gap or shortage in Singapore?

Over half of the respondents (54.9%) reported that their organisations were challenged by the tech skills gap or shortage in Singapore. Over a third (37.3%) of those surveyed noted that they did not feel challenged by the tech skills gap or shortage.



If yes, select 3 prominent concerns about the tech skills gap or shortage in your organisation.



Respondents were asked to select three (out of the five options shown above) concerns relating to the divide or shortage in technological skills. Almost a third of survey participants mentioned being concerned with data analytics and statistics (29.7%) and computing and algorithmic thinking (27.4%).

This demonstrates the need for digital up-skilling in these particular areas. Our survey showed that cybersecurity and digital literacy were less significant concerns, with only 15.5% of respondents mentioning these respective skills as concerns within their organisation. Only 11.9% of survey participants indicated being concerned about the gap or shortage in programming literacy.

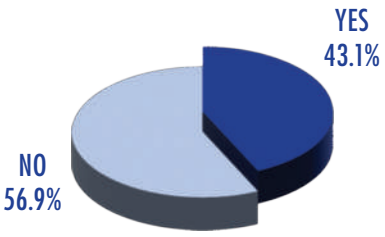
How often does your company send employees for digital upskilling?

The majority of respondents (60.8%) reported sending their employees for digital upskilling "sometimes." Notably, 35.3% of respondents send their their employees for digital upskilling "often" – indicating that some, although not all, companies are investing in empowering their employees with digital skills.

ARTIFICIAL INTELLIGENCE GOVERNANCE AND STANDARDS(*)

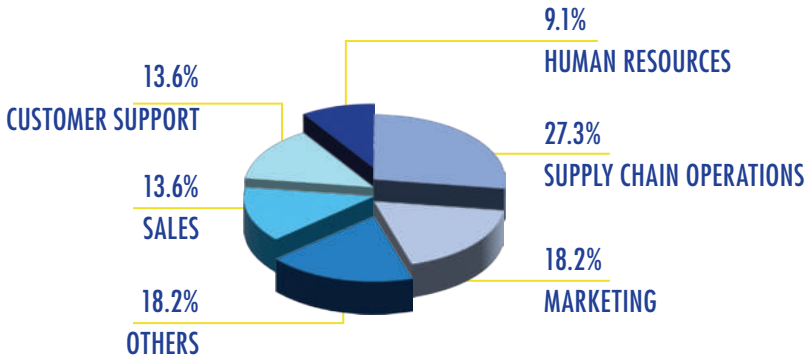
(*) Artificial Intelligence leverages machines and computers to mimic the problem solving and decision making capabilities of the human mind.

Does your business rely on Artificial Intelligence (AI) for its operations?



Amidst growing discussions about the applications for AI, our survey indicated that 43.1% of respondents' organisations currently rely on AI for their operations. We might expect a shift in this in the near future as more businesses obtain the technology and know-how to further the transition to AI.

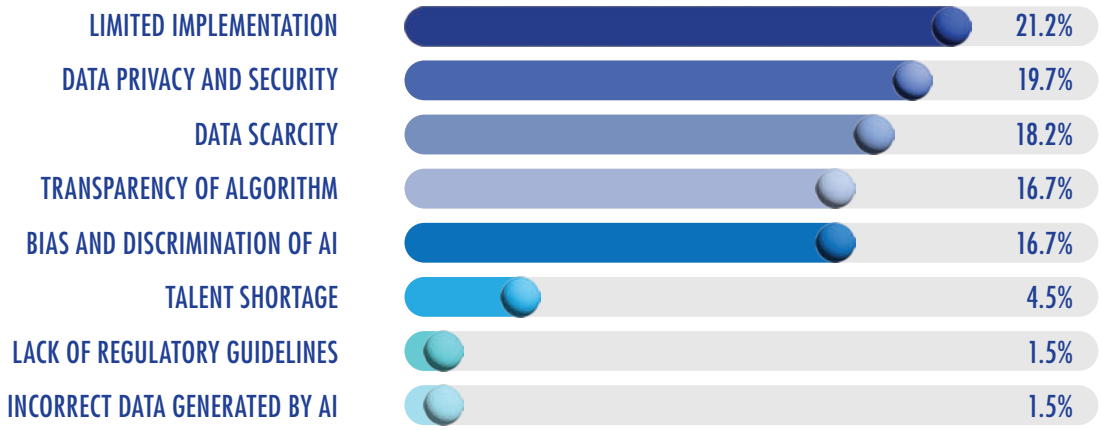
If yes, select the business area in which you most use this technology.



27.3% of the respondents who reported a reliance on AI selected supply chain operations as the area in which they most use AI technology. However, the distribution of AI usage across various business areas seems relatively even.

ARTIFICIAL INTELLIGENCE GOVERNANCE AND STANDARDS

If your business relies on AI, select 3 prominent challenges faced by your company in implementing AI systems.



For businesses that rely on AI, 21.2% of respondents said they faced issues with limited implementation. This could be for a variety of reasons.

- Initial costs
- Capital required to wield AI in business operations
- Lack of expertise
- Opacity around AI.

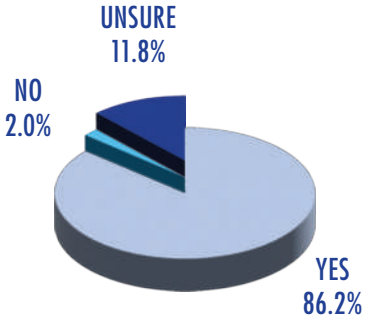
Interestingly, 19.7% of respondents cited data privacy and security as a challenge to implementing AI systems, and 18.2% claimed that data scarcity impeded their ability to use AI systems. Only very few businesses reliant on AI said that the lack of regulatory guidelines and incorrect data generation posed significant issues.

DIGITAL FOR SUSTAINABILITY(*)

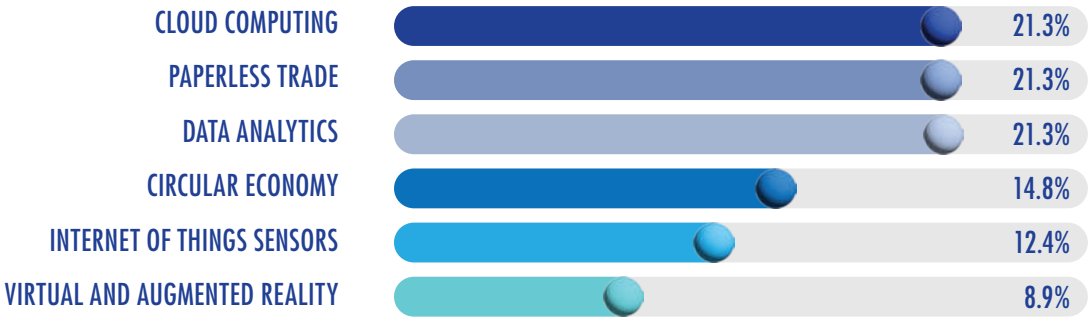
(*) Digital technologies can be used by businesses to reduce the environmental impact and to meet their sustainability goals.

Do you think that the drive towards digital transformation can support the environmental goals of your organisation?

The majority of respondents (86.2%) believe that the drive towards digital transformation can support the environmental goals of their organisation.



Select the digital technologies used by your company to support sustainability efforts.



21.3% of respondents utilise cloud computing, 21.3% of respondents use paperless trade, and 21.3% use data analytics as a means to support sustainability efforts. Very few (8.9%) of respondents use virtual and augmented reality to support sustainability efforts.

Environmental, Social, and Corporate Governance (ESG) is a set of criteria used to evaluate a company's sustainability and ethical practices. Do you think an ESG framework can accelerate digital transformation efforts for your company?

The majority of respondents (76.5%) think that an ESG framework can accelerate digital transformation efforts.

*** A list of all acronyms relevant to this publication can be found on pages 67-68.*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INDUSTRY INSIGHTS

EuroCham SINGAPORE

European Chamber of Commerce (Singapore)

DIGITAL FOR SUSTAINABILITY

SAP Asia Pacific

CHAPTER 1: OPTIMISING SUSTAINABILITY THROUGH DIGITAL TOOLS

The past several years have been marked by two significant business trends – the green transition and digital transition. As highlighted by Forbes magazine, these two transitions are inextricable from one another, "neither can succeed without the other."[1] Hence, the modern age has seen the emergence of the term "digital for sustainability" or "digital sustainability." This concept can generally be defined as the organisational activities that seek to advance sustainability goals through the creative deployment of technologies that use, transmit, or source electronic data.[2] The technologies most commonly deployed in digital for sustainability activities include distributed ledger technologies (blockchain), artificial intelligence and machine learning (AI/ML), Big Data Analytics, mobile technology devices, sensors, and other IOT devices, as well as other telemetry tools.[3]

However, pursuing the general goal of "sustainability" is not enough to ensure that digital technologies reach their maximum efficacy – digital sustainability entails addressing "specific issues" with "problem-specific solutions."[4] As such, the discussion around digital sustainability often converges with the concept of Environmental, Social, and Governance (ESG) commitments. More specifically, digital tools can be used to attain, track, or enhance specific ESG efforts. Addressing ESG efforts using digital technologies entails a harmonised architecture on two levels: developing and using the right enablers for use cases, and integrating individual ESG efforts in a company-wide IT architecture.[5] Accordingly, digitalisation can help manage ESG efforts by providing "real-time operational data and information" on the impacts of a business's processes and activities.[6] The level of data and increased control afforded to a business through digital tools allows businesses to effectively manage their whole-life environmental footprint and address sustainability requirements across the full value chain. Digital technologies can enable visibility and allow for the optimisation of an organisation's sustainability goals.

In terms of best practices in the digital for sustainability realm, any discussion should begin with setting specific goals. Following this, companies should endeavour to develop a comprehensive company-wide architecture that may enable the visibility, progress, and eventual optimisation of reaching specific sustainability targets. To illustrate these principles, we might look to SAP's implementation of an environmental dashboard at WayCool Foods in India.

CASE STUDY: SAP'S ENVIRONMENTAL DASHBOARD FOR WAYCOOL FOODS

BACKGROUND

WayCool Foods is India's leading food and agri-tech company, using innovative food development and distribution technology to scale and operate a complex supply chain, from farm to fork. WayCool's consumer brands basket consists of Madhuram, Kitchenji, L'exotique, Dezi Fresh and Freshey's.

SUSTAINABILITY OBJECTIVES

Since its inception in 2015, WayCool has focused strongly on its sustainability objective to deliver both positive impact and profitability. The company has invested in solar roof-top projects to harness green power as well as water treatment and reuse systems. These interventions across its operations have not only resulted in avoiding 120 tons of carbon emissions and saving 1,980 KL of freshwater, but also delivered economic savings of $12,500 in FY2022-23.

Focusing on innovation and efficient supply chain systems, WayCool has managed to restrict the food loss in its supply chain to less than 2%, compared to the Food and Agriculture Organisation (FAO) food loss projection of 14.7%. Furthermore, the company has electrified

1 Tomoko Yokoi, "Leveraging Digital Towards Improving Sustainability," Forbes, March 2, 2023, https://www.forbes.com/sites/tomokoyokoi/2023/03/02/leveraging-digital-towards-improving-sustainability/.
2 Gerard George, Ryan K. Merrill, and Simon J. D. Schillebeeckx, "Digital Sustainability and Entrepreneurship: How Digital Innovations Are Helping Tackle Climate Change and Sustainable Development," Entrepreneurship Theory and Practice 45, no. 5 (September 1, 2021): 999–1027, https://doi.org/10.1177/1042258719899425.
3 Ibid.
4 Pete Swabey, "What Is Digital Sustainability and How Can It Support ESG Goals?," Tech Monitor (blog), November 19, 2021, https://techmonitor.ai/leadership/sustainability/what-is-digital-sustainability-how-can-it-support-esg-goals.
5 Marcus Goetz et al., "The Digital Path to Sustainability and Net Zero" (Deloitte, December 2022).
6 Michael Majster, Joeri Samyn, and Victor Debray, "Digital & Sustainability," Arthur Little, May 11, 2023, https://www.adlittle.com/en/insights/viewpoints/digital-sustainability-new-convergence.

22% of its last last-mile delivery fleet, covering 1.2 million kms and eliminating 289 tons of logistic carbon emissions. The company has a commitment to shift to 100% EVs in its last-mile delivery by 2030.

ENVIRONMENTAL DASHBOARD

SAP helped WayCool embrace digital transformation in its sustainability journey through the design, development, and implementation of an environmental dashboard based on the SAP Analytics platform.

The dashboard collects raw data from various disparate sources, including IoT devices, transactional data from its SAP enterprise resource planning system, as well as application databases, converting these data into productive into productive insights to make informed business decisions.

It provides a comprehensive view of sustainability key performance indicators with over 90% accuracy across various parameters including clean energy generation, energy efficiency, water efficiency and treatment, and waste management. It also provides a fully-fledged greenhouse gas emissions measurement (GHG) to benchmark past and present performance, identify any anomalies, and holistically report sustainability performance.

The advanced analytics powered E&S dashboard has not only enabled WayCool to visualise the ground level impact of its environment initiatives but, by publishing reliable real-time data, facilitate better decision-making backed by insights. This is a significant step in the organisation's net-zero journey as it demonstrates how climate-smart initiatives can translate into "business-smart" strategies by enhancing profitability.

As such, SAP's implementation of the environmental dashboard at WayCool is one example of how companies can best engage in digital for sustainability by creating a framework that tracks progress on specific sustainability targets. Accordingly, such a digitally oriented framework could be applied across all company operations rather than being limited to any one ESG department – such that sustainability is conceived of in a truly holistic manner.

CHAPTER 2: ENHANCING SUSTAINABLE SUPPLY CHAIN MANAGEMENT THROUGH DIGITALISATION

One of the most essential aspects of business is the downstream and upstream activities between different stakeholders across functional verticals, i.e: the supply chain. However, supply chain activities can often produce harmful externalities to economic, environmental, regulatory, and social issues – and subsequently threaten consumer trust in the firm. As such, the concept of sustainable supply chain management has become increasingly relevant to private companies.[7] Generally, sustainable supply chain management centres around the triple bottom line (TBL) model targeting environmental protection, social responsibility, and economic prosperity.[8] Given that modern supply chain systems tend to be multilayered, interconnected, and highly globalised, traditional information technology (IT) systems may not possess the capabilities necessary to achieve the safe, transparent, and reliable documentation of product and process exchanges among the relevant stakeholders.[9]

Given the increasing complexity of supply chains, blockchain technology (BT) is widely considered essential to a company's ability to achieve supply chain sustainability.[10] BT can be characterised as a decentralised, shared ledger that can store verified and synchronised data from peer-to-peer networks. These records are permanent and tamper-proof, allowing online transactions to be documented accurately and available for instant confirmation.[11] Blockchain is crucial to supply chain management because of its key characteristics: high

7 Saumyaranjan Sahoo et al., "Blockchain for Sustainable Supply Chain Management: Trends and Ways Forward," Electronic Commerce Research, May 27, 2022, https://doi.org/10.1007/s10660-022-09569-1.
8 Ibid.
9 Ibid.
10 Büşra Ayan, Elif Güner, and Semen Son-Turan, "Blockchain Technology and Sustainability in Supply Chains and a Closer Look at Different Industries: A Mixed Method Approach," Logistics 6, no. 4 (December 2022): 85, https://doi.org/10.3390/logistics6040085.
11 Ibid.

consistency, data veracity, traceability, and cybersecurity.[12] Blockchain has a high level of credibility because the ledgers allow for verified information without the need for a third-party regulator, and because once transactions are approved and recorded they cannot be altered. BT can be used to enhance the sustainability of the supply chain in key areas:

1. Sourcing and manufacturing – BT allows all parts of the supply chain to access and track data about suppliers, products, and/or components in real time, facilitating transparency that improves accountability.
2. Inventory management – BT offers real-time, consistent updates on inventory units, as well as a permanent record of when units change ownership or status. This can prevent inefficiencies and excess stock purchases.
3. Distribution and delivery – BT can monitor shipments and transactions throughout the supply chain, increasing visibility, and safety of transactions. This enhances consumer trust, and prevents fraud.
4. Retail – BT can reduce operating costs of retail through automation.
5. Customer experience – BT can improve traceability and verifiability for consumers.[13]

To better illustrate how blockchain can be wielded to enhance supply chain sustainability, we can refer to SAP's implementation of their GreenToken program at DIC.

CASE STUDY: SAP GREENTOKEN PROGRAMME AT DIC

BACKGROUND

DIC is one of Japan's leading fine chemical manufacturers, producing and selling a range of products including polystyrene, a synthetic resin used in a wide range of applications including plastic food containers.

As part of DIC's sustainability strategy, the company launched a recycling initiative for food packaging in November 2020, bringing together new technologies and collection systems with its partner company to recycle more products like polystyrene that are normally not suitable for material recycling.

"Strong consumer awareness about circular economy has increased the demand for sustainable packaging," said Yuji Morinaga, Executive Officer and General Manager of the Packaging Materials Product Division of DIC.

GREENTOKEN

DIC Group collaborated with SAP on a pilot of GreenToken by SAP, using BT to boost sustainable outcomes and increase circularity in the chemicals industry by better recovering waste plastics.

The project uses SAP GreenToken to track raw materials along DICs extended supply chain, from the initial stage of raw material receival to an end-product. That process creates a chain of custody that shows the material flows during the manufacturing process, including ESG properties such as the origin of recycled materials to better understand how much circular material is contained in products they produce.

"The work with GreenToken helps substantiate environmental claims and supports our mission to advance the recycling of plastics and build a completely circular process with chemical recycling," continued Mr Morinaga.

GreenToken uses digital twin token technology on a private blockchain to make the supply chain transparent and track the process of plastic materials throughout the resource lifecycle. Founded and developed in Asia Pacific and Japan as part of the SAP.io intrapreneurship start-up program, GreenToken by SAP can follow plastics from raw materials to the manufacture, sale, and use of products, through collection and pulverisation to recycling and reuse.

This digital twin records information such as unique attributes related to the origin of raw materials, carbon footprint, the origins of recovered goods, and sustainability certification data. This solution, which utilises tokens, allows materials to be tracked even when they are mixed with other raw materials and processed into new products.

James Veale, co-founder of GreenToken by SAP, said "Chemical recycling is key to accelerating the shift to a circular economy. Feedstock from chemically recycled plastic waste is indistinguishable from feedstock from conventional sources. Our solution proves that new plastic

12 M. Adeel Munir et al., "Blockchain Adoption for Sustainable Supply Chain Management: Economic, Environmental, and Social Perspectives," Frontiers in Energy Research 10 (2022), https://www.frontiersin.org/articles/10.3389/fenrg.2022.899632.
13 Rita Maria Difrancesco, Purushottam Meena, and Gopal Kumar, "How Blockchain Technology Improves Sustainable Supply Chain Processes: A Practical Guide," Operations Management Research 16, no. 2 (June 1, 2023): 620–41, https://doi.org/10.1007/s12063-022-00343-y.

resins made from recycled feedstock really are circular plastics and provides complete, auditable supply chain transparency. That means more trust from customers when they choose products marked as circular and ultimately less waste in the environment."

DIC and SAP will continue to partner to support DIC's focus on increasingly urgent social imperatives and realising a sustainable society.

BEST PRACTICES

Given the potential for BT to improve the sustainability of supply chains, companies need to also be aware of the most effective ways to implement such a technology. The following insights can be essential to successfully using blockchain.

It is important to limit the participants in a blockchain system to known entities. As such, each member of a supply chain must be vetted and approved before they can become a blockchain participant. The open and decentralised structure of the blockchain system improves its transparency, however, such a ledger could contain crucial competitive intelligence that needs to be protected. Therefore, building such a trusted group of partners will require a governance system to determine who can join the network, what data is shared, and how this information will be encrypted. Companies should also have the foresight to address the possible effects of increased supply chain transparency on economic sustainability – including changes to pricing and inventory allocation.[14]

Companies need to determine a simple consensus protocol, i.e., a mechanism for maintaining a single, undisputed, transaction history. Because blockchain technology networks are operated on a peer-to-peer basis sans mediator, most networks employ a "proof-of-work" method which requires that transactions registered on the network are accepted by the majority of participants. However, this can limit the rate at which new blocks are added, which may not be appropriate for the speed and volume of transactions in supply chains. As such, companies should consider simpler proof-of-work methods, such as the round-robin protocol, where the right to add a block "rotates among the participants in a fixed order."[15]

Lastly, blockchain records are still vulnerable to contaminated/illicit products being introduced to the supply chain, as well as issues with inaccurate inventory data. Companies can take several precautions to avoid this – including conducting physical audits, building distributed apps to communicate with the blockchain to prevent errors, and using other digital tools (like IoT devices and sensors) to automate scanning products and therefore reduce human error.[16]

In conclusion, BT is poised to be increasingly relevant in ensuring supply chain sustainability in all three relevant pillars: economic prosperity, social responsibility, and environmental impact. SAP's implementation of GreenToken at DIC provides a concrete example of how this technology can be used to create positive externalities to the environment. However, industry players should also be aware of the nuances of BT as they apply to the supply chain, and take special care to adapt the technology to supply chain management and account for its limitations. Blockchain technology has the potential to transform supply chain sustainability – but companies must employ the right toolkit in unleashing it.

*** A list of all acronyms relevant to this publication can be found on pages 67-68.*

ACKNOWLEDGEMENTS

We would like to thank the following people and entities who have contributed to this paper.

Case Studies Support

SAP Asia Pacific

Co-authors

Persa Chowdhury, EuroCham Singapore
Aakruti Ganeshan, EuroCham Singapore

Editorial Support

Nele Cornelis, EuroCham Singapore

14 Vishal Gaur and Abhinav Gaiha, "Building a Transparent Supply Chain," Harvard Business Review, accessed August 8, 2023, https://hbr.org/2020/05/building-a-transparent-supply-chain.
15 Ibid.
16 Ibid.

DIGITAL TRADE

Tradeflow Capital Management
Standard Chartered

The flow of goods and services between private companies and/or public entities requires the transfer of information between all relevant parties, including to and from suppliers, customs, regulatory authorities, sellers, buyers, and logistics providers. In recent years, these information flows have become increasingly digitised, culminating in the "digital trade" phenomenon. Digital trade broadly refers to all cross-border trade transactions being digitally ordered, facilitated, or delivered – as such, it can encompass the process of trade itself, the logistics, and the transactions governing any exchange.[1] This section will cover industry insights on various aspects of digital trade, including paperless trade, digitisation of logistics systems, and digital finance.

CHAPTER 1: PAPERLESS TRADE AND CROSS-BORDER PAPERLESS TRADE SYSTEMS

One aspect of digital trade is the digitisation of documents to do with cross-border transfers and exchanges, i.e. "paperless trade."[2] This phenomenon refers to the transformation of a traditionally paper-based system into an electronic format. Within the literature on paperless trade, analysts often focus on the potential benefits of paperless trade to cross-border transactions, where the digitisation of trade documents will reduce the estimated 4 billion paper-based documents being processed at any point in time around the world and could decrease the incurred costs by around 75%.[3] However, at present, paperless trade systems in both B2G and G2G systems are mainly developed and used at the domestic level – this is because trade facilitation measures are typically implemented within an economy because a country only has jurisdiction over the trade transactions occurring in its domestic area.[4]

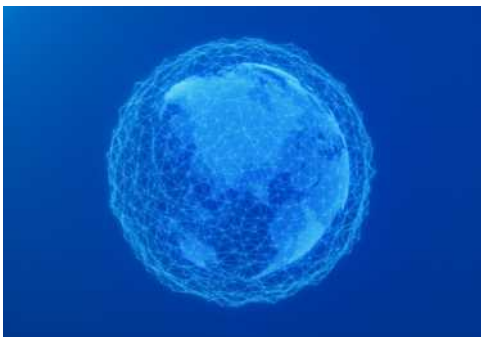
According to the ASEAN Development Bank, developments in the international supply chain demonstrate the significance of paperless trade mechanisms.[5] More specifically, as supply chains across borders become significantly integrated, and products involve import and export activities among several international players, cross-border paperless trade can enhance efficiency and integration. Efficiency in information sharing is also critical to maintaining short production life cycles. Furthermore, numerous export markets have implemented initiatives to augment the security of their supply chains, and paperless trade may be better suited to meet these requirements (some of which have mandatory use of paperless trade practices). Lastly, paperless trade promotes the predictability of the business environment by increasing transparency, which is crucial to facilitating development and innovation within the business market.[6]

The EU is performing above the average rate of implementation for cross-border paperless trade measures, in part because of the supporting EU regulations promoting the electronic exchange of trade and customs data, and the growing adoption of standardised electronic data exchange methods, as per the findings of a report by the United Nations Economic Commission for Europe.[7] Many countries in the region have also implemented various measures under the more general banner of paperless trade –most commonly, electronic/automated customs systems, electronic submission of customs declara-

1 Organisation for Economic Co-operation and Development and the IMF's Statistics Department, "Handbook on Measuring Digital Trade," Organisation for Economic Co-operation and Development, July 28, 2023, https://www.oecd.org/sdd/its/Handbook-on-Measuring-Digital-Trade.htm.
2 World Economic Forum, "Paperless Trading: How Does It Impact the Trade System?," November 2, 2017, https://www.weforum.org/whitepapers/paperless-trading-how-does-it-impact-the-trade-system/.
3 Rebecca Harding, "Quantitative Analysis of the Move to Paperless Trade," Commonwealth, 2022, https://thecommonwealth.org/quantitative-analysis-move-paperless-trade.
4 Heun Ha Sung, The Progress of Paperless Trade in Asia and the Pacific: Enabling International Supply Chain Integration (Asian Development Bank, 2014), https://www.adb.org/publications/progress-paperless-trade-asia-and-pacific-enabling-international-supply-chain.
5 Ibid.
6 Ibid.
7 United Nations Economic Comission for Europem, "Trade Facilitation and Paperless Trade Implementation," 2017, https://www.unescap.org/resources/trade-facilitation-and-paperless-trade-implementation-carec-countries.

tions, and internet connection for trade control agencies and customs and border crossing. In the Asia-Pacific region, based on a survey examining the implementation of trade facilitation and paperless trade measures, the regional implementation of comprehensive trade facilitation measures in Asia-Pacific is around 46.5%.[8] Singapore is one of the countries that is leading the charge for the region – with an implementation rate in excess of 85%.[9]

CASE STUDY: TRADETRUST



Industry players can devise their own paperless trade systems – they can also adopt pre-existing systems. As a relevant case study, we can look to Singapore's development of the TradeTrust system as an example of how paperless trade mechanisms developed by regulatory authorities can provide opportunities for businesses. The TradeTrust system is an open source, free-to-use, electronic trade documentation system developed by the Infocomm Media Development Authority (IMDA) that aims to facilitate trade by digitising trade documents and certificates. This allows for faster, more secure and more efficient trade financing and logistics. The system is a blockchain-based platform that allows businesses to verify the authenticity of documents and transactions. It uses a distributed ledger to store data about documents and transactions, making it tamper-proof and secure. TradeTrust also uses smart contracts to automate the verification process, making verification more efficient and cost-effective. In terms of concrete impact on businesses, TradeTrust can help companies improve the efficiency and security of their trade finance transactions. The platform is easy to use and provides a number of features that can help businesses to mitigate risk and improve their bottom line.

TradeTrust has many potential applications. One of TradeTrust's most important features is the issuing of various crucial documents. As such, it is vital for industry players to stay updated on both the current and future capabilities of platforms like TradeTrust – companies should check which relevant digital documents are currently available so that they can assess their own capabilities to digitise these documents. Accordingly, institutions should check that relevant beneficiaries are comfortable with a transition to paperless modalities.[10] With regards to TradeTrust, the platform can issue letters of credit issued by banks to facilitate international trade. This would simplify the letter of credit process and reduce processing times. Banks and traders could issue, verify and manage letters of credit electronically through TradeTrust. The system could also issue electronic bills of lading (eBLs) – critical documents used in transportation of goods – which would streamline the logistics process.

Furthermore, because TradeTrust can be relevant for electronic documentation relevant to across a breadth of industries, another key recommendation is that companies consider digitising elements of the full transaction.[11] By considering every step of the supply chain, companies can pinpoint where each stage can be digitised, and check that any other parties involved have the capability to accommodate the digital transition. In the case of TradeTrust, the system can also issue digital certificates of origin that can be easily verified, as well as Sanitary and Phytosanitary Certificates, which would allow for faster clearance of these products at borders. TradeTrust could be used to issue, manage and verify electronic insurance documents for goods being traded, which would allow insurers to process claims faster since documents would be instantly verifiable.

For concrete examples of how TradeTrust is already being implemented, we can look to examples of Singaporean companies and industries that have adopted or are working with the system:

- DBS Bank is one of the first banks to adopt TradeTrust. The Bank uses it to issue digital letters of credit to their corporate clients. The Bank uses it to issue digital letters of credit to their corporate clients. They see TradeTrust as a way to simplify trade financing processes and provide a better customer experience.
- OCBC Bank is also actively exploring the use of TradeTrust, particularly for digitalising trade documents like certificates of origin and bills of lading. They view TradeTrust as a platform to further innovate their trade financing solutions.
- APL Logistics, a global logistics company, is working with TradeTrust to digitise their supply chain documentation. They aim to improve transaction speeds, reduce costs, and increase security through the use of eBLs and invoices on TradeTrust.

Additionally, several agri-food companies in Singapore are working with TradeTrust to digitise their sanitary and phytosanitary certificates. They see the platform as a way to accelerate the clearance times for their agricultural and food imports and exports. Singapore Customs is also exploring integrating TradeTrust with their TradeNet customs declaration system. This would allow for electronic trade documents on

8 Yann Duval, Tengfei Wang, and Utoktham Chorthip, "Trade Facilitation and Paperless Trade: State of Play and the Way Forward for Asia and the Pacific," Studies in Trade and Investment, 2015.
9 Ibid.
10 Rogier Van Lammeren, "The Path to Paperless: Five Tips for UK Businesses to Prepare for Digital Trade Documents," Trade Finance Global, May 25, 2023, https://www.tradefinanceglobal.com/posts/lloyds-path-to-paperless-five-tips-for-uk-businesses-for-digital-trade-documents/.
11 Ibid.

TradeTrust to be automatically validated during customs clearance. In summary, Singapore's TradeTrust system has the potential to significantly improve trade financing and logistics through the digitalisation of key trade documents. As a case study, TradeTrust demonstrates the need for companies to assess their own capabilities and exposure to the digital transition, and to consider the full breadth of their supply chain. Platforms like TradeTrust can streamline processes, reduce costs and speed up clearance times through applications like electronic letters of credit, bills of lading, certificates of origin and insurance documents – but, for companies to use the platform effectively, they need to understand the extent of its potential.

REGIONAL AND GLOBAL INTEROPERABILITY: LAW ON ELECTRONIC TRANSFERABLE RECORDS (MLETR)

Another important feature of TradeTrust is that it harmonises the legal recognition of digital documentation between different jurisdictions which have adopted the United Nations Commission on International Trade Law (UNCITRAL) Model Law on Electronic Transferable Records (MLETR).[12] Cooperation on frameworks like the MLETR is strengthening interoperability at the regional level.[13] Additionally, the increasing international integration of the global supply chain has rendered cross-border paperless trading mechanisms very significant.[14] This is why private-public partnerships like TradeTrust are very important – because frameworks developed by regulatory authorities can often be relevant to a wider range of regional or global players, and can account for jurisdictional differences.

The MLETR heralds the growing international interoperability of electronic transaction frameworks. The UN Commission on International Trade Law (UNCITRAL) adopted the UN Model Law on Electronic Transferable Records (MLETR) in 2017. The MLETR aims to offer a standardised legal framework that countries can use as a basis to enact laws facilitating cross-border trade through electronic transferable documents. If adopted widely, the MLETR could significantly improve the efficiency of documentation processes involved in global trade. At the time of writing (July 2023), so far the MLETR has been adopted by around 20 countries and several other countries are in the process of reviewing the model law. Other than Singapore, other countries that have adopted or are in the process of adopting MLETR-based laws include Switzerland, Belarus, Georgia, Armenia, Ecuador and Samoa. The growing adoption of the MLETR in both developed and developing countries demonstrates its potential to standardise rules for cross-border electronic trade documentation, as well as increase the efficiency of trade with these areas.

Some European nations are considering adopting or exploring the possibility of embracing the MLETR framework, including Germany and France.[15] The European Union has adopted the eIDAS (electronic identification and trust services') regulation, which is a cross-border legal framework intended to ensure the interoperability of electronic identification systems across EU member states.[16] The eIDAS is specifically focused on electronic signatures and identification; meanwhile, while the MLETR does have a requirement for electronic signatures, it also covers electronic transferable records.[17] Currently, the European Union does not yet have a comprehensive framework analogous to the MLETR.

Despite this, as a platform, Trade Trust is flexible enough because it is based on open standards. TradeTrust has already facilitated a trial with eBLs between Singapore and the Netherlands.[18] The collaboration featured industry partners in the shipping industry and was performed across the Singapore-based Distributed Ledger Technologies and Rotterdam-based Naviporta platform, supported by TradeTrust. The trial demonstrated that an eBL issued by one platform could be verified and processed by another digital trade platform.[19] Furthermore, the Netherlands is working to adapt their legislation to accept eBLs as legally valid via pilot projects alongside industry partners.[20] This example also demonstrates how private companies may support the development and proliferation of paperless trade legislation by getting involved in pilot projects and trial cases. Therefore, there can be opportunity for private sector involvement at the regulatory level of paperless trade.

12 Amit Roy Choudhury, "World's First Paper-Less Cross-Border Trade Conducted - Digital Transformation - ITnews Asia," ITnews Asia, March 30, 2023, https://www.itnews.asia/news/worlds-first-paper-less-cross-border-trade-conducted-592738.
13 "Assessment and Best Practices on Paperless Trading to Facilitate Cross Border Trade in the APEC Region" (CTI Sub-Fora & Industry Dialogues Groups, Digital Economy Steering Group (DESG), June 2010), https://www.apec.org/publications/2010/06/assessment-and-best-practices-on-paperless-trading-to-facilitate-cross-border-trade-in-the-apec-regi.
14 Ibid.
15 Luca Castellani, "Status Update: MLETR Adoption in the G7 and Emerging Markets," Trade Finance Global, July 11, 2023, https://www.tradefinanceglobal.com/posts/status-update-mletr-adoption-in-the-g7-and-emerging-markets/.
16 Digital Signature: The European Union's EIDAS Regulation, Explained," D4D Access, May 28, 2023, https://d4daccess.eu/en/digital-signature-the-european-unions-eidas-regulation-explained.
17 Sullivan & Worcester LLP, "Digital Trade Transactions - What Next?," Lexology, August 13, 2021, https://www.lexology.com/library/detail.aspx?g=d6ca5fe1-8c64-4406-ae1e-17ba49a94802.
18 "Singapore and Rotterdam Successfully Complete Trial with Electronic Bill of Lading | Port of Rotterdam," Port of Rotterdam, May 12, 2021, https://www.portofrotterdam.com/en/news-and-press-releases/singapore-and-rotterdam-successfully-complete-trial-with-electronic-bill-of.
19 Ibid.
20 Ibid.

CONCLUSION

The general takeaway regarding paperless trade and authentication systems, especially in Singapore, is that public-private partnerships are crucial to the success of such regimes. As such, businesses can endeavour to engage with the frameworks developed by regulatory authorities; these frameworks can be relevant to the broader region and also account for jurisdictional differences. To prepare for the ongoing shift towards digital trade, companies stay updated on existing and forthcoming legislation and be considerate of both their exposure and potential for change. This consideration should also include checking the capacities of other relevant parties across the supply chain for the shift towards digital transactions. Paperless trade certainly has the potential to make global transactions more efficient, transparent, and less prone to error. However, this potential can only be realised through an active engagement between the public and private sector, and a meaningful intention to collaborate.

CHAPTER 2: LOGISTICS

Another pertinent aspect of digital trade is the creation of digital trade lanes. In particular, maritime efficiency can be achieved by creating a digital trade lane where data, electronic documentation, and standards can be shared. This should facilitate the seamless movement of vessels, cargo, and optimise just-in-time arrival of vessels from port to port.[21] The use of digital technologies in the maritime logistics sector is still in its nascent stages, but it has the potential to revolutionise the way goods are moved around the world. By improving efficiency and productivity, digital technologies can help to make the logistics sector more sustainable and competitive. A study by S&P Global found that cloud computing is considered the most impactful technology for transformation among shipping and logistics firms, followed by IoT connectivity technology, and AI/ML.[22] AI is being used to automate tasks such as cargo handling, scheduling, and routing. This can help to improve efficiency and reduce costs. Additionally, the logistics sector also uses blockchain technology. Port operators are using blockchain to track the movement of goods, verify the authenticity of documents, and manage payments. As digital technologies continue to develop, we can expect to see even more innovation in the logistics sector. This will help to make the logistics sector more efficient, sustainable, and competitive.

21 "Maritime and Port Authority of Singapore and Port of Rotterdam to Establish World's Longest Green and Digital Corridor for Efficient and Sustainable Shipping | Port of Rotterdam," Port of Rotterdam, August 2, 2022, https://www.portofrotterdam.com/en/news-and-press-releases/maritime-and-port-authority-of-singapore-and-port-of-rotterdam-to-establish.

22 Mark Fontecchio, "Logistics Sector Prioritizes Digital Transformation, but Needs Technology Leadership, Skills," SP Global, accessed August 24, 2023, https://www.spglobal.com/marketintelligence/en/news-insights/blog/logistics-sector-prioritizes-digital-transformation-but-needs-technology-leadership-skills.

CASE STUDY: PORT OF ROTTERDAM

The Port of Rotterdam has implemented several digital initiatives:

1. Port Call Optimization: The port utilises the Pronto platform, a digital scheduling tool that optimises port calls by coordinating and sharing real-time data between port authorities, shipping companies, and service providers.
2. Smart Infrastructure: The port has installed sensors and IoT devices across its infrastructure to monitor conditions in real-time, enabling predictive maintenance and minimising downtime.
3. Digital Twin: The port is developing a digital twin, a virtual replica of the infrastructure, to simulate and analyse operations, predict issues, and test potential solutions.
4. Blockchain Technology: The port collaborates with blockchain initiatives like BlockLab, aiming to secure and streamline logistics and operational processes.

However, despite these advancements, the Port of Rotterdam faced several challenges:

1. Data Security and Privacy: The increased use of digital technologies raised concerns about data security and privacy, requiring substantial investments in cybersecurity measures.
2. Integration of Legacy Systems: The integration of new digital technologies with existing legacy systems was a complex process.
3. Change Management: The transition required significant changes in work processes and culture, necessitating extensive training and change management efforts.

The digitisation efforts of the Port of Rotterdam have yielded significant results:

1. Increased Efficiency: The port has seen improved operational efficiency, reducing port call times and increasing throughput.
2. Enhanced Decision Making: Real-time data and predictive analytics have enabled more informed decision-making.
3. Sustainability Goals: Digitisation has facilitated the port's efforts to reduce emissions and achieve sustainability goals.

The case of the Port of Rotterdam illustrates both the potential benefits and challenges of digitising port operations. While the transition to digital is not without its hurdles, the resulting improvements in efficiency, decision-making, and sustainability demonstrate the transformative power of digitisation in the logistics sector. Other port operators looking to digitise can learn valuable lessons from Rotterdam's experience. In terms of best practices, we might identify the following insights.

For one, to realise the full benefits of digital transformation technologies in the logistics sector, companies cannot solely acquire and use those technologies – they should endeavour to take the steps of data capture and communication, data storage and analysis, and value extraction from the data, so as to connect technologies as a tool to enable data-driven services. According to a study by the University of Berlin, across companies, the best digital practices enable real time visibility for logistic processes. Their best practice analysis found that it is not the acquisition and implementation of technologies like AI and digital twin that facilitate success, but the services and advanced processes enabled by such technologies that add concrete customer value.[23] Technological advantages need to be transformed into "tangible customer value added" to fully reap the benefits of digital transformation in the logistics.[24] Furthermore, to add value to logistics services, companies should endeavour to set ambitious standards or traditional logistics KPIs (delivery time and flexibility), hybrid product-service bundles (dash buttons), and customer centric reverse logistics (free returns).[25] Implementing these services usually necessitates a mastery of supply chain analytics – which can be bolstered through increasing data availability. In addition, the best practices of companies for management include ICT enabling decentralised working, a strategy that prioritises agile and independent teams, supply chain analytics to accelerate decisions, and the freedom for employees to promote entrepreneurship at companies.[26]

23 Junge Lisa Anna et al., Pathway of Digital Transformation in Logistics: Best Practice Concepts and Future Developments (Universitätsverlag der TU Berlin, 2019).
24 Ibid.
25 Ibid.
26 Ibid.

CHAPTER 3: DIGITAL FINANCE

Lastly, an additional salient aspect of digital trade is the creation of digital trade finance ecosystems. This involves the digitalisation of assets that allows for seamless integration, exchanges, and transactions.[27] A digital asset is anything of value whose ownership is represented in a digital or computerised form – this is achieved through "tokenisation," a software programme that convert ownership rights over an asset into a digital token.[28] Though many items can be tokenised, this section will focus particularly on the tokenisation of financial assets. The Monetary Authority of Singapore (MAS) is particularly focused on the digital asset ecosystem – i.e: the combination of digital assets and blockchain, wherein digital assets are deployed on distributed ledgers that record the ownership and transfer of ownership.[29] One of the core aspects of MAS' overall FinTech agenda is to build an innovative and responsible digital asset ecosystem.[30] To this end, MAS has engaged in "Project Guardian," a joint effort by the Monetary Authority of Singapore and the Bank of International Settlements to develop standards for financial applications on blockchain. The overall goal is to promote compatible systems, broader participation, and to limit market fragmentation.[31]

Asset tokenisation can potentially fuel economic growth, improve access, and widen investment options. Project Guardian introduces a framework for designing open and interoperable digital asset networks based on tokenised real-economy assets and financial assets, which represent a form of best practices for asset tokenisations. MAS has developed a series of principles for Financial Market Institutions (FMIs) that could guide their application to digital asset networks:

1. Clear and Transparent Government Arrangements – The distributed nature of a digital asset network may result in the network operating in a multi-jurisdictional environment. As such, FMIs should have documented governance that provide clear and direct lines of responsibility and accountability.
2. Principles for Credit Risk Management – A notable feature of digital asset networks is shorter settlement cycles. Faster (or even instant) settlements could reduce replacement cost risks and reduce the amount of margins required, however, this would most likely necessitate pre-positioning cash and digital assets before trade, increasing liquidity costs. As such, FMIs need to adhere to standards that account for these credit and liquidity risks.
3. Settlement – FMIs often face settlement risks, i.e. the risk that a settlement will not take place as expected. Digital asset networks could change the settlement mechanism used. As such, FMIs should clearly understand how the settlement is achieved operationally, and legally define the point at which settlement becomes unconditional. Another novel feature of digital asset networks is that the cash tokens can be used for money settlement could represent a claim on a specific settlement institution (as is traditional for FMIs), represent a claim on underlying assets, or some other right or interest. As such, institutions need to understand the nature, timelines, and enforceability of settlement claims, the nature and sufficiency of the assets backing the claim, and how the value of the claim could be affected by changes in the value of underlying assets.
4. Central Securities Depository – Central securities depositories play a crucial role in the protection of securities. In digital asset networks, securities are tokenised – which means that FMIs will have to consider appropriate risk management arrangements for tokenised securities. For example, underlying assets would be kept in custody and not used while their tokens are in circulation to avoid the unauthorised creation of securities.
5. Default Management – Because digital ledgers can act as the single source of truth regarding beneficial ownership, this may make it easier for FMIs to observe the segregation and portability principle as pertaining to participant defaults.
6. Operational Risk Management – Since the operational arrangements supporting digital asset networks are notable, FMIs should thoroughly consider how these operational arrangements can affect observance of the operational risk principle.
7. Access – Digital asset networks would have to justify why risk related participation requirements are not necessary to manage the risks that actual or prospective participants might pose – because digital asset networks on public networks allow virtually unfettered access.

27 Deepesh Patel, "Digital Ecosystems in Trade Finance," Trade Finance Global, accessed August 24, 2023, https://www.tradefinanceglobal.com/blockchain/digital-ecosystems-in-trade-finance/.
28 "'Yes to Digital Asset Innovation, No to Cryptocurrency Speculation' - Opening Address by Mr Ravi Menon, Managing Director, Monetary Authority of Singapore, at Green Shoots Seminar on 29 August 2022," Monetary Authority of Singapore, August 29, 2022, https://www.mas.gov.sg/news/speeches/2022/yes-to-digital-asset-innovation-no-to-cryptocurrency-speculation.
29 Ibid.
30 Ibid.
31 "Investors Buy up StanChart's Trade-Finance Ethereum Pilot," Digital Finance Group (blog), July 14, 2023, https://www.digfingroup.com/trade-finance-ethereum/.

8. Transparency – FMIs should be transparent in their disclosure of rules, key procedures, and market data to allow participants and other parties to clearly discern the risks and controls in participating on a digital asset network.[32]

CASE STUDY: STANDARD CHARTERED'S DEVELOPMENT OF AN INITIAL TOKEN OFFERING PLATFORM

As part of Project Guardian, Standard Chartered developed an initial token offering platform to "issue asset-backed security tokens listed on the Singapore Exchange."[33] Standard Chartered partnered with Linklogis, using Ethereum base because investors can use it to directly access tokenised assets in both primary and secondary markets. Accordingly, Ethereum offers "transparency and traceability," of the tokens, allowing for real-time updates related to the underlying asset.[34] The use of smart contracts renders the issuance and distribution of these assets far more cost-effective and efficient – likely leading to better yields for investors. Standard Chartered's pilot program also enhanced transparency. Their program is meant to improve upon paper based asset-based securitisation (ABS), which typically suffers from "information asymmetry," with the investor having little to no visibility about the underlying assets. In this pilot, disclosure of certain information is embedded into the token, which can be updated simultaneously across the network – boosting investor confidence and helping to grow demand for tokenised assets.[35]

However, this pilot program has also illustrated two challenges:

1. Transparency and Data Protection – Issuers do not want to release private details about their loans, and investors do not wish to disclose details of their holdings.
2. Governance – Financial institutions are minor players in maintaining blockchain, which relies on proof-of-stake consensus (i.e. a consensus protocol where user or users validate new blocks of transactions).
   a. Despite the notion that Ethereum is fully decentralised, of the 4,653 active nodes maintaining the network, 64% of the staked Eth was held by five accounts. Therefore, because it is not fully decentralised, there is a need for an independent third party to validate the status of the underlying asset – Standard Chartered is still vetting potential custodians to serve this function.[36]

In lieu of a custodian, investors must practise self-custody. In the event that the program is extended beyond the pilot, it is usually legally required to use third-party custodians to safekeep assets.

As such, this case study demonstrates Standard Chartered's tokenisation of digital assets in a real-life setting. Importantly, it highlights several strengths of digital assets: including transparency, real-time updates, cost efficiency, and boosting investor confidence. However, there are still hurdles to do with governance and data protection that need to be further explored before digital asset-backed security tokens can become the norm.

*** A list of all acronyms relevant to this publication can be found on pages 67-68.*

ACKNOWLEDGEMENTS

We would like to thank the following people and entities who have contributed to this paper.

Case Studies and Research Support

TradeFlow Capital Management
Standard Chartered Bank

Co-authors

Persa Chowdhury, EuroCham Singapore
Aakruti Ganeshan, EuroCham Singapore

Editorial Support

Nele Cornelis, EuroCham Singapore

32 Monetary Authority of Singapore, "Project Guardian," October 19, 2022, https://www.mas.gov.sg/schemes-and-initiatives/project-guardian.
33 Claire HuangBusiness Correspondent, "MAS Expands Blockchain Tech Pilots to Include More Asset Classes," The Straits Times, June 26, 2023, https://www.straitstimes.com/business/mas-expands-blockchain-tech-pilots-to-include-more-asset-classes.
34 "Investors Buy up StanChart's Trade-Finance Ethereum Pilot," Digital Finance Group (blog), July 14, 2023, https://www.digfingroup.com/trade-finance-ethereum/.
35 Ibid.
36 Ibid.

AI QUALITY MANAGEMENT

TÜV SÜD

Experts and business leaders expect AI to become the transformative technology of the current decade. AI is already being used successfully for various use cases in all major industry sectors. It will significantly affect businesses, society, and the environment, causing disruption within organisations and redefining competition.

The potential risks presented by AI Technology for individuals, society, and the environment have also prompted governments to regulate the use of AI. Countries across the world are currently grappling with this issue, with over 127 countries already passing AI related legislation, and more than 37 specific AI laws passed in 2022 alone. One of the most advanced and comprehensive frameworks, the EU AI Act, is set to be implemented in 2025 with an anticipated global impact. This will have a wide-ranging effect on the market, not only on product manufacturers, but also importers, distributors, and even users of AI Systems.

With the rapid advancements in AI Technology and complexity of the AI ecosystem, organisations are now presented with a range of new areas to master. This includes:

1. Proper scaling of AI
2. Complying with and understanding applicable regulation
3. Demonstrating responsible use of AI

Unfortunately, most businesses are not well positioned to deal with these challenges. This issue can, however, be addressed by introduction of a suitable AI Quality Management System. The best practice for companies looking to implement any AI ecosystem, or who currently are using such technology, can be to implement some form of AI Quality Management System that addresses a range of quality aspects.

The most suitable AI Quality Management System for an organisation requires very careful consideration as the system will differ depending on the scope of the AI application. Different quality aspects such as safety, security, legal, ethics, performance, and sustainability, will need to be addressed, but the significance of each aspect needs to be tailored/weighted to the specific needs of a business. The quality criteria must also be transparent and measurable so that the assurance of quality is auditable – a prerequisite for an effective AI ecosystem.

There are several benefits of implementing an effective AI Quality Management System to businesses.

- Cost reduction

By controlling the quality of AI, the likely success rate of projects is increased, and resources are saved. This can lead to significant cost savings for the organisation.

- Risk reduction

Assuring the quality of the AI system reduces the overall risk. This includes technical aspects of the AI system, which, in turn, increases the likelihood of the system working as expected. Also, this minimises the potential legal and liability risks, as these aspects are considered as part of the AI Quality Management System. Ultimately, this helps to protect the organisation's reputation.

- Facilitate market access

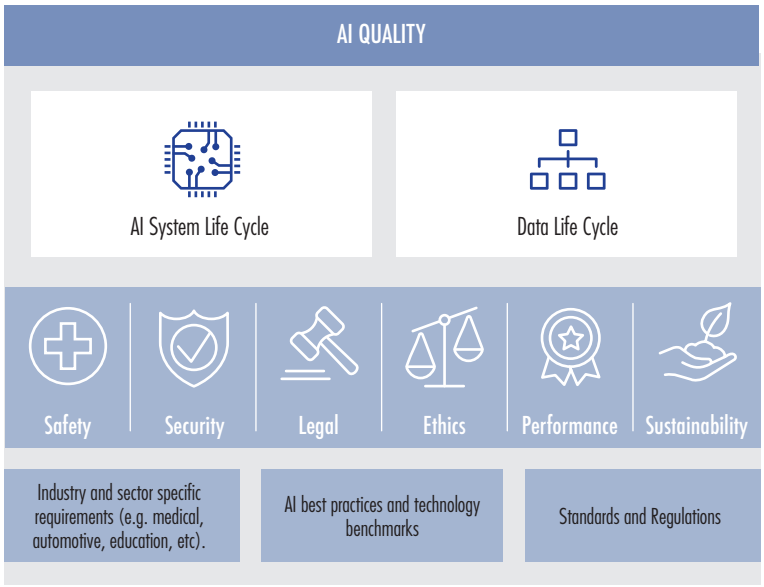
An effective AI Quality Management System ensures compliance with applicable regulations, and that the AI system is also based on applicable standards and best practices to ensure effective current and future market access.

- Higher product acceptance

Meeting the quality of AI builds trust in AI products, which leads to higher consumer acceptance and better business.

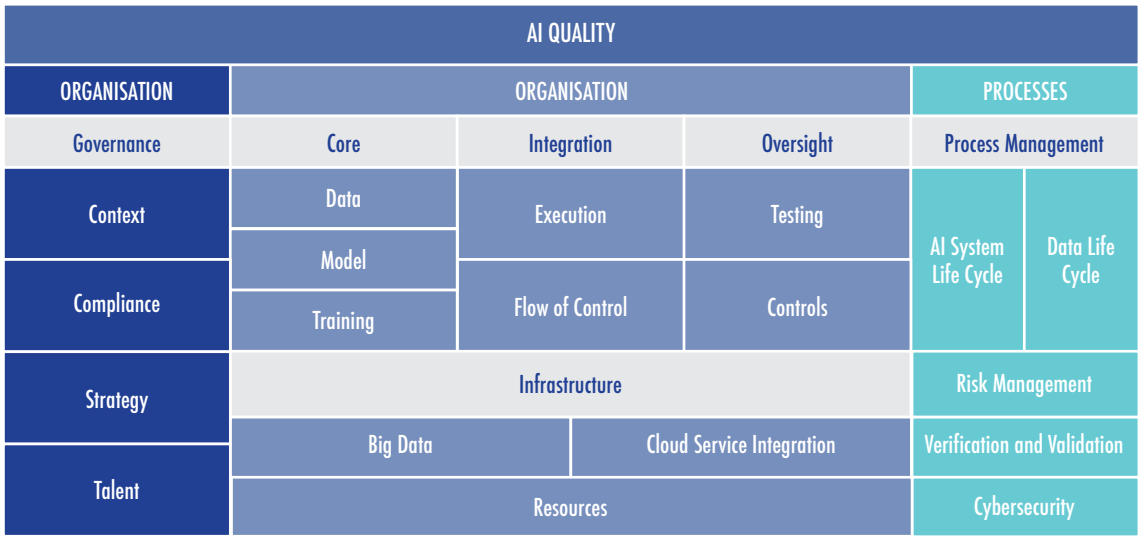
CASE STUDY: TÜV SÜD AI QUALITY FRAMEWORK

TÜV SÜD has developed a unique AI quality framework that consolidates standards, regulations, and best practices and comprehensively covers all pertinent aspects of AI quality.



Necessary quality features are extracted and clustered into six pillars – which accounts for AI quality throughout the entire life of the AI system.

1. The first stage to establishing AI quality is to identify relevant quality characteristics and target requirements.
2. Second, a risk assessment of the quality characteristics in the six pillars provides a company-specific risk profile that generates the target quality requirements for an AI system to meet.
3. Lastly, these quality requirements are mapped into assessment dimensions of the AI quality framework, which includes organisational, technical, and process related aspects (see below).



This AI Quality Framework was applied through a Readiness Assessment for NeuroBrowser™ by Mindsigns Health™. NeuroBrowser™ is a cloud-based software that uses AI to process and classify clinical EEG data, and automates the interpretation and analysis of EEG waveforms of epilepsy and Neuro-ICU patients. The NeuroBrowser™ software, mainly used by doctors and healthcare practitioners, facilitates the diagnosis and management of epilepsy and non convulsive seizures that rely on the visual inspection of EEGs.

The assessment addressed the maturity of Mind Signs Health™ to manage AI and associated quality risks appropriately. In a workshop, all relevant quality characteristics across all six pillars are checked and assessed. A subsequent risk assessment provides a company specific risk profile for each of the quality pillars. Given this profile, a prioritisation of pillars can be developed: in this case, relative to the risk mitigation already in place, the safety and ethics pillars needed to be prioritised, while the sustainability pillar required lower prioritisation.

Furthermore, given the residual risk profile generated, Mindsigns Health™ was able to glean a maturity analysis comprising Organisation, Processes and the specific AI system. Four dimensions for future prioritisation were identified: Talent, Training AI model, Testing, and Controls. TÜV SÜD's AI quality framework thus added value in the following ways:

1. It generated a common understanding of AI quality and its relevance to Mindsigns Health™
2. Identified relevant risks associated with AI
3. Determined AI quality readiness and gaps, allowing for risk management and prioritising certain measures
4. Laid the foundation for compliant and trustworthy AI
5. Demonstrated the responsible use of AI

As such, this framework allows for organisations to scale AI, comply with regulation, and demonstrate a responsible use of AI. To conclude, AI governance within private organisations can be achieved through the responsible and rigorous implementation of such quality assurance frameworks, such as the one developed by TÜV SÜD.

*** A list of all acronyms relevant to this publication can be found on pages 67-68.*

ACKNOWLEDGEMENTS

We would like to thank the following people and entities who have contributed to this paper.

Case Studies and Research Support

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Editorial Support

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INTELLECTUAL PROPERTY IN THE DIGITAL AGE

South-East Asia IP SME Helpdesk

EuroCham IPR (Intellectual Property Rights) Committee

Rapid digital transformation, as well as forthcoming innovation of the digital economy, has brought new challenges and opportunities for businesses, legislators, and consumers in the Intellectual Property (IP) sector. Intellectual property, broadly defined, refers to "products of original human thought."[1] The growing popularity of virtual assets, online marketplaces, general online platforms, and artificial intelligence has raised a number of salient considerations in the IP realm. This particular section will consider this broad issue from two perspectives. With the contribution of the IP SME Helpdesk, the first section examines the top issues to do with IP and the digital economy in Singapore, as well as solutions from the Government to address IP-related challenges. The subsequent section uses contributions from EuroCham's IPR (Intellectual Property Rights) Committee to examine the issues with IPR infringement on e-commerce platforms, and posits potential regulatory and digital solutions to these challenges.

THE ROLE OF INTELLECTUAL PROPERTY (IP) IN THE DIGITAL ECONOMY IN SINGAPORE

INTRODUCTION

The EUSDP marked a milestone in digital cooperation.[2] The development of the digital economy with new forms of technological trends continues to create challenges for legislators and consumers. IP protection is a crucial driver of economic growth and industry transformation in the global market, particularly in Singapore. Within this context, EU enterprises need to be aware of the main IP issues and given the necessary tools to manage their IP effectively to maximise their economic upswing in Singapore.

1 "Intellectual Property," Cornell Law School, June 2023, https://www.law.cornell.edu/wex/intellectual_property.
2 Johannes Bahrke et al., "Joint Statement on the EU-Singapore Digital Partnership," European Commission, December 14, 2022, https://ec.europa.eu/commission/presscorner/detail/en/statement_22_7743.

TOP IP ISSUES IN THE DIGITAL ECONOMY IN SINGAPORE

IP AND DIGITAL TRANSFORMATION

The integration of digital technology in business activities not only affects the companies' inherent business model but also changes the ways of approaching customers when providing services/goods. To thrive in the digital economy, companies should prioritise online experiences. This may generate some IP issues: a new software or technology implies a licensing strategy and the need to synthesise an IP protection strategy as one's IP rights (trademark, patent, copyright, and trade secret) will be vulnerable in an unknown environment (ownership of virtual assets, online enforcement, etc).[3]

IP AND ONLINE PLATFORMS

IP infringement and data theft are now widespread across online platforms which serve as a prominent environment for the digital economy. This raises obligations to regulate data use, storage, and security, along with a necessity to implement cybersecurity measures.[4] On an online platform, you may not only suffer from IP infringement but you could also be held liable for letting infringers take advantage of your platform to violate third-party's IP rights – notably, trademark and copyright on music and/or e-commerce platforms.

IP AND ARTIFICIAL INTELLIGENCE (AI)

AI evolution contributes significantly to economic development; however, it raises several IP issues. A concern emerges with copyright ownership for AI-generated content/work. For instance, Singapore requires the existence of one or more human authors in the creation process for the work to be eligible for copyright protection.[5] Furthermore, by using AI systems trained on large datasets (including trade secrets), many companies may face the risk of losing their valuable business information. Companies may also commit or be victims of copyright and patent infringement. When using open-source software (OSS), risks may arise when a licensed OSS is used outside the scope of permission granted under the OSS licence terms.[6]

A new digital era comes with new potential threats; therefore, IP owners should constantly adapt by increasing IP protection, monitoring new forms of infringement, and handling cross-border enforcement issues as well as data theft/leaking. Fortunately, business adaptation is now greatly facilitated by Singapore's IP initiatives.

PRACTICAL SOLUTIONS FROM THE GOVERNMENT OF SINGAPORE

Singapore is considered a global and regional IP hub with a strong IP regime and well-developed IP infrastructure presenting practical solutions. This environment makes it an attractive destination for businesses that wish to protect their digital innovations. In 2021, the IP office of Singapore (IPOS) published the Singapore IP Strategy (SIPS) 2030, confirming its IA/IP-driven vision to support businesses.

IPOS MOBILE GO

This world's first mobile app for trademark registration has served as an efficient platform to file trademark applications directly and quickly. This process is very efficient, only taking approx. 10 minutes overall. Via this app, IP owners may also file IP renewals (trademarks, patents, designs) and conduct IP searches to detect prior rights.

ACCELERATION PROGRAMS

To reduce a usually lengthy and expensive procedure for patent protection, Singapore is a party to certain 'Acceleration Programs' that EU enterprises may utilise, such as the PCT-Patent Prosecution Highway and the ASEAN Patent Examination Cooperation (ASPEC).[7] Through these programs, the patent examination results from members' IP offices can be used as a reference in the examination process. The national acceleration program SG IP Fast Track may also help expedite patent, trademark, and design grant processes.[8]

3 Anne-Marie Allgrove, "International: Top 5 IP and Data and Technology Issues in a Digital Economy," Baker McKenzie, accessed July 25, 2023, https://insightplus.bakermckenzie.com/bm/intellectual-property/international-top-5-ip-and-data-and-technology-issues-in-a-digital-economy.
4 Ibid.
5 Pin-Ping Oh, "Copyright Protection for AI-Generated Works in Singapore," Bird & Bird, August 1, 2022, https://www.twobirds.com/en/insights/2022/singapore/copyright-protection-for-ai-generated-works-in-singapore.
6 "IP and Artificial Intelligence Note" (Intellectual Property Office of Singapore, n.d.), https://www.ipos.gov.sg/docs/default-source/default-document-library/ip-and-ai-info-note.pdf.
7 "PCT-Patent Prosecution Highway Program (PCT-PPH and Global PPH)," WIPO, January 19, 2023, https://www.wipo.int/pct/en/filing/pct_pph.html.; "What Is ASPEC," ASEAN Intellectual Property Portal, accessed July 25, 2023.
8 Intellectual Property Office of Singapore, "Acceleration Programmes, Expedite Patent Filing," IPOS, June 30, 2023, https://www.ipos.gov.sg/about-ip/patents/how-to-register/acceleration-programmes.

IP AND ARTIFICIAL INTELLIGENCE INFORMATION NOTE

In support of the objective and implementation of the Singapore National AI Strategy (NAIS), the IPOS released a note focusing on key IP issues and different IP rights protections related to AI. The note also lists national incentives for AI innovators.[9]

CONCLUSION

IP is essential to Singapore's digital economic growth and development. By being aware of IP-related issues and the advantages of the IP regime in Singapore, European enterprises can better protect their IP and secure their competitive advantage. Enhancing the IP environment in Singapore (awareness and protection) also helps to boost exchanges and cooperation between countries in the digital sector. As negotiations have recently started for a digital trade agreement between the EU and Singapore, new challenges in the IP sector will require novel solutions.[10]

Article drafted on 24 July 2023 by the South-East Asia IP SME Helpdesk,[11] a European Commission initiative providing free, confidential, business-focused advice relating to IP rights in SEA to small and medium enterprises in the EU and other countries of the Single Market Programme.[12]

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9 "National Artifical Intelligence Strategy" (Smart Nation Singapore, November 2019), https://www.smartnation.gov.sg/files/publications/national-ai-strategy.pdf.; "IP and Artificial Intelligence Note" (Intellectual Property Office of Singapore, n.d.), https://www.ipos.gov.sg/docs/default-source/default-document-library/ip-and-ai-info-note.pdf.

10 Tay Hong Yi, "EU and Singapore Open Negotiations on Digital Trade Agreement | The Straits Times," Straits Times, July 20, 2023, https://www.straitstimes.com/business/eu-and-singapore-open-negotiations-on-digital-trade-agreement.

11 "South-East Asia IP SME Helpdesk," European Commission, https://intellectual-property-helpdesk.ec.europa.eu/regional-helpdesks/south-east-asia-ip-sme-helpdesk_en.

12 At the time of writing, the Single Market Programme countries are currently all EU member states plus Norway, Iceland, Liechtenstein, Turkey, Ukraine, and North Macedonia.

TARGETING INTELLECTUAL PROPERTY RIGHT INFRINGEMENTS IN THE ONLINE MARKETPLACE

INTRODUCTION

Digital commerce represents a permanent change in how people shop. Revenue in the e-commerce market is projected to reach US$1,811.00 billion in 2023.[13] In Southeast Asia specifically, between 2016 and 2023, the total value of e-commerce grew 40% annually.[14] In the digital age, and especially following the COVID-19 pandemic, e-commerce is amassing momentum at an unprecedented rate. However, the growth of e-commerce has also brought several challenges, especially in the intellectual property realm. For instance, the rise of eCommerce marketplaces has proved an especially lucrative breeding ground for counterfeit and contraband goods that may lead to trademark infringement.[15]

Intellectual property crime encompasses the manufacturing, transporting, storage, and sale of counterfeit or contraband goods when the consent of the rights holder has not been obtained.[16] Aside from tarnishing brand reputation, the sale of these counterfeit or countraband goods not only result in tax loss in government revenue, but could also potentially fund organised crime due to the lucrative risk reward calculation – as is the case, for instance, with luxury goods, e-vapourisers and motor parts. In the Singapore context, it is significant to note that the current legal framework places e-commerce platforms in a situation where they bear limited liability or obligation once they've received a notification from an Intellectual Property Right (IPR) owner. Consequently, even if notified, the platforms are not compelled to remove counterfeit or contraband listings. Abroad, efforts such as the implementation of the Digital Services Act in the EU and the Inform Consumers Act in the US have effectively elevated the accountability of platforms. Accordingly, there are opportunities for Singapore to enhance their regulatory stance in the e-commerce domain, and take further steps to hold e-commerce platforms accountable for proliferating counterfeit or contraband goods.

GENERAL CHALLENGES

Some of the main challenges with contraband and counterfeit goods being sold on e-commerce platforms in Singapore are:

1. Disclosure of information

Unlike the US Inform Consumers Act, there is no law in Singapore to mandate the disclosure of the identity of the sellers in e-commerce platforms to consumers or right owners. Any disclosure would require a court order, which is an expensive process. E-commerce platforms would regularly cite privacy laws to deny requests for disclosure by the right owners. They also know that the prohibitive costly court process will deter right owners from using this process. Therefore, sellers of contraband and counterfeit goods in e-commerce platforms could rely on the platforms to conceal their identities both from rights owners and consumers who were fraudulently misled into purchasing these items.

13 "ECommerce - Asia | Statista Market Forecast," Statista, August 2023, https://www.statista.com/outlook/dmo/ecommerce/asia.
14 Sal Arora et al., "E-Commerce in Southeast Asia Is Entering a New Phase | McKinsey," McKinsey & Company, December 21, 2022, https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/e-commerce-is-entering-a-new-phase-in-southeast-asia-are-logistics-players-prepared.
15 Yoav Keren, "Stopping the Trillions of Dollars in Online Counterfeit Goods Sales," The Oxford Strategy Review, April 24, 2022, https://www.oxfordstrategyreview.com/content/stopping-the-trillions-of-dollars-in-online-counterfeit-goods-sales.
16 "Organized Crime Module 16 Key Issues: Intellectual Property Crime and Terrorism," United Nations Office on Drugs and Crime, accessed August 28, 2023, //sherloc.unodc.org/cld/en/education/tertiary/organized-crime/module-16/key-issues/intellectual-property-crime-and-terrorism.html.

2. Repeat Infringers

In Singapore, at present, there is no overarching law mandating e-commerce platforms to impose effective sanctions against repeat infringers or recidivists. While some e-commerce platforms impose point-based penalties against sellers who were found selling counterfeits and contraband goods, the system has limited efficacy as the threshold of suspending a seller's trading account is usually set very high. In addition, many sellers of counterfeits and contraband often have more than one account. Hence, the suspension of a single account would have minimal impact on his trade. Given that the presence of repeat infringers/power sellers exposes the inefficacy of existing prevention/screening schemes (if any), platforms should be compelled to provide additional information regarding these particular sellers.

3. Onboarding Process

Currently, there is no overarching regulation in Singapore requiring an e-commerce platform to conduct due diligence before onboarding a seller. A more robust onboarding process could involve filtering some contraband and counterfeit sellers from participating in the e-commerce trade.

BEST PRACTICES FROM A REGULATORY STANDPOINT

One way to target this issue is from a regulatory standpoint which could involve joint collaboration between regulatory agencies, platforms and brands – for example, incentivising e-platforms to proactively take down listings, and taking action against sellers of contraband and counterfeit goods locally and overseas that target local consumers. One such approach is the EU's digital regimes that effectively protect IPR in the e-commerce marketplace. The EU Digital Services Act created new obligations for providers of "intermediary services", including online marketplaces and social media platforms, to prevent the online spread of illegal content including counterfeit and contraband goods. Similarly, online platforms are required to ensure that information such as a trader's name, address, contact information, ID, and payment account details are provided and verified, before the trader may use the platform to offer products to consumers in the EU.

There are also several pertinent examples in Asia. In Korea, for instance, the E-commerce Act requires the disclosure of certain seller's information, including:

- Trade name.
- Representative's name.
- Address, telephone number, and email address.
- Business entity registration number.
- Terms and conditions of use for consumers.
- Trade name of the hosting company.
- Online retail business registration number and agency.

The information provided allows the brand owner to take appropriate action against counterfeit and contraband sellers, such as sending cease and desist letters or filing lawsuits. This provision is highly beneficial for brand owners as it enables them to track and address repeated infringements. Korean law enforcement agencies also very actively enforce online infringements with swift actions. In Hong Kong, on the other hand, HK Customs has a dedicated team focused on online enforcement. They initiate investigations against online sellers on e-commerce platforms and cooperate with brand owners to conduct raid actions. They also receive reports from brand owners or the public regarding online targets and subsequently investigate and determine appropriate actions.

For regulators, then, the best practices may be gleaned from looking at regimes in other countries in Asia, or abroad. Furthermore, by facilitating an active dialogue with brands, lawmakers can better contextualise the sorts of protections and regulations that would allow for the most effective remedy to contraband and counterfeit goods.

BEST PRACTICES FOR E-COMMERCE PLATFORMS

E-commerce platforms in Singapore can also undertake several mechanisms to target the sale of contraband and counterfeit goods and IPR infringements.

PRE-SCREENING

A possible practice could be a requirement for pre-screening (e.g., requiring at least the seller's full name, NRIC, address, and corporate details if applicable) in order to register as a seller on e-commerce platforms. Presently, the process of becoming a seller on these platforms in Singapore is quite accessible. Increasing the barriers to entry for counterfeit and contraband sellers might disincentivise them to join such platforms.

TERMS OF SERVICE

Ideally, platforms should have or create Terms of Service ("TOS") between themselves and their sellers allowing the platforms to disclose the sellers' personal data in the event of contraband and counterfeit sales being detected/notified by brand owners. While many platforms already have such TOS in place, there is currently no mechanism/particular motivation to compel them to exercise this disclosure. While incentivising platforms to maintain a rigorous TOS may be in regulators' hands, e-commerce platforms can limit harm to both their consumers and brands IPR rights by implementing a TOS that allows them to disclose data in the event of infringement.

ELECTRONIC DATABASE

Maintaining an electronic database of sellers of counterfeiter and contraband could assist in creating an effective blacklist against IPR infringers and organised crime. The blacklist could be used to bar repeat offenders from trading across various e-commerce platforms. For instance, the online marketplace for luxury consignment, The RealReal developed the "Shield" system. Shield collects information about a consignor and alerts if the consignor has submitted fakes to the website before.[17] The RealReal uses a three-strike policy to detect "obvious intent to defraud," after which they hand the counterfeit item over to law enforcement. Inevitably, the effectiveness of a blacklist would depend on the verity of information disclosed by the e-commerce platforms relating to these infringers, which is why this solution should be combined with a regulatory approach that incentivises e-commerce platforms to provide accurate information. The efficacy of such a database would also be greatly enhanced by the requirement for certain details to be provided in order to become a listed seller on the platforms, e.g., particulars of incorporation/UEN, NRIC, name, address, so that any blacklist does not consist solely of unverifiable identities. Furthermore, any list of repeated infringers stemming from this database should be shared with law enforcement and the online intermediary.

AI/MACHINE LEARNING TOOLS

Companies such as Barcelona-based Red Points, as well as the Scottish company SnapDragon exemplify using AI/ML tools to help protect shoppers from counterfeit goods. RedPoint, for instance, uses machine learning and AI to monitor the internet and online marketplaces for counterfeit products (i.e online intellectual property infringements).[18] Similarly, SnapDragon utilises AI and machine learning to monitor online marketplaces and social media platforms for counterfeit products and trademark infringements.[19] Resale platforms, generally, can deploy machine learning to train their authentication algorithms to recognise patterns and features to distinguish genuine products from counterfeits – analysing for logo placement and trademarks.[20]

In Singapore, the Health Sciences Authority (HSA) is trialling an e-commerce surveillance tool to limit contraband products sold online. The bot was developed by the Home Team Science and Technology Agency (HTX) and uses robotic process automation and artificial intelligence to scour listings for contraband listings – including illegal drugs, health products, and cosmetics. The tool analyses information from the listings, like pictures, descriptions, or profiles, and then flags products that contain illegal or dangerous ingredients. Following

17 Julia Waldow, "To Fight Counterfeits, Resale Platforms Use Machine Learning," Modern Retail, June 27, 2023, https://www.modernretail.co/technology/resale-platforms-are-employing-machine-learning-to-fight-the-war-against-counterfeits/.
18 Courtney Goldsmith, "Red Points: Artificial Intelligence Key to Tackling Counterfeit Goods Market," European CEO, March 4, 2019, https://www.europeanceo.com/industry-outlook/red-points-artificial-intelligence-key-to-tackling-counterfeit-goods-market/.
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being flagged, items are reviewed by enforcement officers. From January to May 2021, the HSA was able to remove more than 3,200 listings of contraband health products from local e-commerce platforms.[21] This example demonstrates how digital tools can be used to flag contraband items. It also signals the prospect for public-private collaboration in effectively targeting IPR infringements.

INDUSTRY COLLABORATION

In 2017, Alibaba announced the formal launch of the Big Data Anti-Counterfeiting Alliance, an initiative aimed at fostering industry collaboration and promoting analytics and technology against counterfeits. Alibaba pledged to establish a "Intellectual Property Advisory Board," which received support from brands, trade associations, intellectual property experts, and regulators. The platform provided the members of this alliance with advanced technological support necessary to enable their IP enforcement work, with specific tools to block, screen, and remove infringing listings.[22] This example illustrates the need for cross-industry collaboration, between brands, online platforms, as well as regulators, to more effectively address the challenges of protecting IPR on e-commerce platforms.

Rapid digitalisation has allowed for e-commerce that increases both the efficiency and reach to consumers for businesses. Yet, digitalisation has also allowed for syndicates to be more creative in how they market counterfeit and contraband goods. Data protection regulations and anonymity online have unwittingly created a market that allows counterfeit and contraband goods to thrive. Yet, regulations in other countries demonstrate that lawmakers can respond to these unique challenges through prioritising brand protection, consumer safety, and rapid enforcement. Digitalisation can also be the source of safeguards that can protect consumers and brand owners, through pre-screening mechanisms, rigorous terms of service, the maintenance of an electronic database of repeat infringers, and algorithms that identify suspicious goods or users. Ultimately, a unique, collaborative approach is necessary to address the novel challenges presented by e-commerce platforms in the digital age.

*** A list of all acronyms relevant to this publication can be found on pages 67-68.*

ACKNOWLEDGEMENTS

We would like to thank the following people and entities who have contributed to this paper.

Case Studies and Research Support

EuroCham IPR (Intellectual Property Rights) Committee

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22 Daphne Howland, "Alibaba Launches Big Data Anti-Counterfeiting Alliance," Retail Dive, accessed August 24, 2023, https://www.retaildive.com/news/alibaba-launches-big-data-anti-counterfeiting-alliance/434214/.

LIST OF ACRONYMS

ABF	Australian Border Force
ABS	Asset-based Securitisation
AI	Artificial Intelligence
APAC	Asia-Pacific
ASEAN	Association of Southeast Asian Nations
B2B	Business-to-Business
B2C	Business-to-Consumer
B2G	Business-to-Government
BT	Blockchain Technology
C4DTI	(United Kingdom) The Centre for Digital Trade Inclusion
CEO	Chief Executive Officer
CFO	Chief Financial Officer
DE	Digital Economy
DEA	Digital Economy Agreement
DEPA	Digital Economy Partnership Agreement between Singapore, Chile, and New Zealand
DPTM	Data Protection Trustmark
DSA	Digital Services Act
DTA	Digital Trade Agreement
eBLs	electronic Bill of Lading
EEG	Electroencephalogram
eIDAS	electronic Identification, Authentication and trust Services
ESG	Environmental, Social, and Corporate Governance
EU	European Union
EUSDP	EU-Singapore Digital Partnership
FAO	Food and Agriculture Organisation
FMI	Financial Market Institution
G2G	Government-to-Government
GDPR	General Data Protection Regulation
GHG	Greenhouse Gas
GIA	Global Innovation Alliance
HSA	(Singapore) Health Sciences Authority
HTX	(Singapore) Home Team Science and Technology Agency
ICT	Information and Communications Technology
IMDA	Infocomm Media Development Authority
IoT	Internet of Things
IP	Intellectual Property
IPOS	Intellectual Property Office of Singapore
IPR	Intellectual Property Rights
IT	Information Technology
KPI	Key Performance Indicator
KSDPA	Korea-Singapore Digital Partnership Agreement
MAIGF	Model Artificial Intelligence Governance Framework
MAS	Monetary Authority of Singapore
MCC	Model Contractual Clauses
MLETR	Model Law on Electronic Transferable Records
MNC	Multinational Corporation
MOU	Memorandum of Understanding
MSME	Micro, Small and Medium Enterprises
MTI	Ministry of Trade and Industry
NAIS	Singapore National AI Strategy
NISD	Network and Information Security Directive

LIST OF ACRONYMS

NRIC	National Registration Identity Card
OECD	Organisation for Economic Cooperation and Development
OIP	Open Innovation Platform
OSS	Open-Source Software
PDPA	Personal Data Protection Act
SADEA	Singapore-Australia Digital Economy Agreement
SCC	Standard Contractual Clause
SME	Small and Medium Enterprise
STRACAP	Standards, Technical Regulations, and Conformity Assessment Procedures
TBL	Triple Bottom Line
TOS	Terms of Service
UEN	Unique Entity Number
UKSDEA	UK-Singapore Digital Economy Agreement
UNCITRAL	United Nations Commission on International Trade Law

EUROPEAN EXCELLENCE IN THE DIGITAL ECONOMY

EuroCham SINGAPORE

European Chamber of Commerce (Singapore)

AUDI SINGAPORE

Driving Smarter, Driving Digital

An automotive brand offering sales of new cars, used cars and aftersales, Audi has been operating in Singapore from 2007. The Audi Group is one of the world's leading producers of premium cars – playing an instrumental role in shaping the future of premium mobility. At its core, Audi is focused on sustainability, design, and digital transformation as a means of promoting a new era of mobility.

SHIFT TO DIGITALISATION

Audi's digital transformation is proceeding with three major goals:

1. "Be digital first"
2. Emphasising seamless, omni-channel customer-centric approach
3. Evolving into a data-driven company

Since the Covid period, the shift to digitalisation within the automotive industry has grown exponentially. It quickly moved to online sales of new cars and has continued to evolve. In line with this shift, Audi Singapore is working towards providing their customers a seamless, omni-channel experience, including several projects aimed at the expansion of digital sales capabilities (online store, flagship stores on retail portals, etc.)

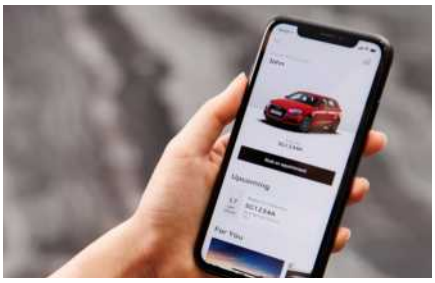
DIGITAL TRANSFORMATION INITIATIVES

Amidst the pandemic in 2020, Audi worked with a Singapore dealer to launch a stock reservation tool called Audi Online Showroom. Customers looking to purchase service care plans, parts, and accessories can find this tool available on Audi's online Flagship store. Other digital initiatives included real-time test drive appointment confirmation and also stock availability tools to assist customers in their purchase journey.

From a post-sales perspective, customers are able to book their service appointments in real-time via Audi Service app. This app also allows them to track their mileage and request roadside assistance in emergency situations. Customers can also digitally sign up for myAudiworld, a loyalty program which gives them access to curated lifestyle events and tailor-made content according to their lifestyle profiles.

SHOWCASING DIGITALISATION EFFORTS

In March 2023, Audi held an experiential event at the ArtScience Museum at Marina Bay in line with the company's "grandsphere concept," challenging the boundaries of automotive design[1]. Conceptually, the exhibition combined luxury air travel with Level 4 autonomous driving, and also presented several vehicles from Audi's roster of electric vehicles. The event also featured a series of thought leadership panel discussions to uncover insights about mainstreaming Greentech.



At the 2023 Greentech Festival in Berlin, Audi showcases its efforts in the circular economy through Audi's "GlassLoop" project in cooperation with its partner companies. The windshields in the Audi Q4 e-tron will use glass made of up to 30 percent recycled material from car windows damaged beyond repair. Audi's "GlassLoop" project demonstrated that glass could be reused at comparable quality – the project was honored with the German Award for Sustainability Projects in the "Recycling Concept" category.

HOLISTIC DIGITAL INTEGRATION FOR SUSTAINABILITY

With its systematic electrification strategy, Audi has set the course for a sustainable future. The Four Ring's commitment to becoming the leading provider of sustainable premium mobility is based on a holistic strategy that touches every division of the company.

Sustainability achievements are assessed as tangible outcomes, and the performance of digitalisation is not measured separately, but as a function to improve business KPIs. For example, Audi measures the effectiveness of their digital sales tools via the assessment of Sales Performance KPIs (e.g. EV-share). A great amount of consideration is being given to digital tools to make the overall sustainability journey more effective and efficient.

1 "Audi Opens House of Progress Exhibition in Singapore's ArtScience Museum," Channel News Asia Luxury, March 31, 2023, https://cnaluxury.channelnewsasia.com/obsessions/audi-house-progress-exhibition-artscience-museum-singapore-224946.

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ECCO

Digital Transformation to Enhance Customer Experience

ECCO is a Danish footwear brand founded in 1963. The company envisions being the leading premium brand for shoes and leather goods. ECCO operates globally with 4 owned and operated tanneries, 6 factories, and retails to over 100 countries via 2,250 ECCO stores and 14,000 sales points. The company first began operating in Singapore in 2014.

CUSTOMER-CENTRIC TRANSFORMATION

ECCO places the customer, both external and internal, at the centre of digital transformation. They achieve this by looking at the customer journey and identifying digital touchpoints – facilitating a premium shopping experience. Alongside this, ECCO identifies critical business challenges and pinpoints how digitalisation can solve or improve upon these pain points. For instance, ECCO makes use of e-commerce, CRM, PIM, Digital Asset Management, Cloud, and Payment Gateways to alleviate business challenges.

ECCO's employees, the customer, and the solution provider are the driving forces behind their digitalisation initiatives. As such, ECCO has identified several priority initiatives crucial to digital transformation – including Big Data and Cloud Computing. Other initiatives in progress include Cybersecurity, Digital Infrastructure, and Robotic Process Automation. ECCO is committed to identifying other forms of digital transformation that might enable a better customer experience – consequently, the team is also exploring how artificial intelligence, cross-border data flows and cross-border digital connectivity can facilitate the company's strategic goals.

DIGITAL FOR SUSTAINABILITY

ECCO's goals are to reduce waste and energy consumption at the factories and tanneries of the future via digitalisation. This has been achieved through new technologies – in 2019, ECCO leather introduced DriTan™ technology as a means of achieving water-free leather fabrication, and as of current, most of ECCO's international production is powered by renewable energy sources. However, ECCO also uses digital tools to consistently track and analyse their progress against their global sustainability KPIs. This allows the company to continuously improve upon and monitor their sustainability metrics.

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CMA CGM

Fostering Digital Innovation to Optimise Logistics Solutions

The CMA CGM Group, a global player in sea, land, air and logistics solutions, serves more than 420 ports around the world across 5 continents, with a fleet of around 600 vessels. In 2022, the Group transported 21.7 million TEU containers (twenty-foot equivalent units). Present in 160 countries, the Group employs 155,000 people worldwide, including nearly 4,000 in its head office in Marseille.

The world has reached an unprecedented level of interconnectivity and the pandemic has acted as catalysts for digitalisation in all sectors. The stakeholders within the shipping industry are no different and have also embraced this trend. One of CMA CGM's key strategic priorities is accelerating innovation and digitalisation.

ACCELERATING INNOVATION THROUGH ZEBOX AND TANGRAM

To build on the entrepreneurial spirit and foster innovation in digital transformation, CMA CGM launched its Asia-Pacific hub of ZEBOX (an accelerator founded in 2018) to fuel co-innovation for smart shipping, logistics, and supply chains, in Singapore. ZEBOX specialises in artificial intelligence, robotics, cybersecurity, blockchain, augmented reality and the Internet of Things (IoT), to address the top focus areas of corporations today. The ZEBOX community currently consists of more than 100 start-ups that receive support.

The CMA CGM Group has established TANGRAM, a new centre of excellence open to all parties collaborating on the sustainable transport and logistics of tomorrow. TANGRAM's goal is to make a pivotal contribution to the transport and logistics sectors in response to the major challenges facing the world today. One of the major challenges TANGRAM aims to respond to is digitalisation and technological innovation by developing new solutions, including autonomous vehicles, robotics, metaverse, smart data, and AI.

INVESTING IN DIGITAL TOOLS AND INITIATIVES

CMA CGM also has an initiative to digitise the shipping line pricing process using a data analytics and simulation platform to optimise rate decisions across Asia Pacific. The group is attempting to strengthen depot efficiency such that empty containers may be released for priority shipments, and so that customer pick-ups or no shows may be more visible to inform fee-waiver decisions. Relatedly, the company's "Ship Tracking" platform is an all-in-one tool that integrates the necessary information to monitor the ship's movement which also ensures the safety and security of the vessel at sea. It helps to optimise operational efficiency and reduce CO2 emissions.

Last year, the Group transformed its pricing offering with a new online tool SpotOn, which simplifies customer's spot booking process by attaching an instant quote with a guaranteed price and loading priority to each booking. This is a noteworthy digital transition in their pricing system as it provides customers with greater flexibility to adapt to rapid changes in the market.

Furthermore, by investing in R&D, IoT, artificial intelligence and blockchain solutions, the Group also aims to develop smarter and more secure service offerings to deliver a seamless user experience for customers and employees. In terms of Robotic Process Automation, APAC Automation COE works with the business to optimise, automate, and improve key processes such as quotation creation, customer credit status and invoicing to increase productivity and performance. CMA CGM is also focused on digitalising the monitoring of sales activities using the Salesforce platform. Through this, the company aims to improve their customer service experiences using customer relationship management functions and marketing automation.

INDUSTRY TRANSFORMATION

The digital transformation within our company expands beyond the doors of our offices. By taking a leadership seat at the Digital Container Shipping Association (DCSA), CMA CGM ensures global standardisation and best practices in cybersecurity for the industry. In Asia Pacific, the company is undergoing an IT Transformation to focus on value creation which will enable their businesses through revenue or productivity improvements via IT solutions.

DIGITAL FOR SUSTAINABILITY

The Group is committed to achieving Net Zero Carbon by 2050. They rely strongly on existing solutions and innovation to optimise operations, upgrade assets, and develop a global supply chain for alternative energies. Recently, CMA CGM leveraged virtual tapes on the cloud to store backup data, thereby reducing the usage of tape hardware, tapes, and offsite transport. Moving to virtual tapes has translated into 44% of cost savings and 93% reduction in CO2 emissions yearly across Asia Pacific[1].

COLLABORATIVE DIGITAL TRANSFORMATION EFFORTS

CMA CGM is engaging in collaborative digital transformation efforts – recently signing a Memorandum of Understanding (MOU) with the Maritime and Port Authority of Singapore (MPA) to initiate collaboration on the development of capabilities and solutions across maritime decarbonisation, digitalisation and innovation.[2] CMA CGM is also adopting PSA's Opt-E-Arrive digital solution to reduce carbon emission of vessels arriving at the Singapore port. Opt-E-Arrive is programmed to enable CMA CGM vessels to skip the anchorage stop and arrive just-in-time at berth in Singapore. By synchronising transparent real time activities and automating the data exchange between the systems of the carrier and port operator, Opt-E-Arrive enables CMA CGM vessels to optimise vessel speed and reduce greenhouse gas emissions.

The CMA CGM Group is also participating in the world's longest Green and Digital Corridor between Singapore and Rotterdam by the Maritime and Port Authority of Singapore (MPA) and the Port of Rotterdam Authority. The Corridor will explore emerging alternative fuels for future trials and deployment. It will also create a digital trade lane where data, electronic documentation, and standards can be shared for optimal maritime efficiency, safety, and transparent flow of goods. The cross-industry partnerships as part of this corridor are set to bring about the first sustainable vessels sailing on the route by 2027. The initiative seeks to raise investment confidence, attract green financing, and kickstart joint bunkering pilots and trials for digitalisation as well as the use of low and zero carbon fuels along the route.

CMA CGM is adopting PSA's Opt-E-Arrive digital solution to reduce carbon emission of vessels arriving at the Singapore port.

1 These statistics were calculated through AWS Pricing Calculator, AWS Customer Carbon Footprint Tool, and the SP Group's Carbon footprint calculator.
2 "CMA CGM Group and MPA Collaborate to Advance Maritime Decarbonisation, Digitalisation, Innovation and Workforce Development," Maritime & Port Authority of Singapore (MPA), June 24, 2022, http://www.mpa.gov.sg/media-centre/details/cma-cgm-group-and-mpa-collaborate-to-advance-maritime-decarbonisation-digitalisation-innovation-and-workforce-development.

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GREEHILL

Digitalisation of the Urban Environment

greehill provides insights which revolutionise green space management and city planning through digital transformation. The company develops digital tools to evaluate the impact of urban trees on urban life and monitor changes in urban forests over time to inform environmental management decisions. greehill's mission is to enable cities to enhance urban sustainability, biodiversity, climate resilience, and citizen well-being through nature-based solutions.

SMART TREE INVENTORIES AT THE HEART OF STRATEGY

greehill was built around the implementation and execution of digital transformation. The digitalisation of the urban environment is a very active area of digital transformation, but before greehill, no company adequately focused on the digitalisation, analysis, monitoring and management of urban greenery. greehill's ultimate goal is to protect and preserve urban greenery. In turn, greenery will protect from the negative effects of ongoing climate change. In the pursuit of this goal, greehill also aims to save cities time and money, improve the quality of their work, and generate a huge amount of data relevant to climate change. As such, the company's strategy is to complement existing digital transformation initiatives with the digitalisation of urban greenery to enable well founded, substantiated climate resilience actions.

REVOLUTIONISING SINGAPORE'S NATIONAL PARKS THROUGH TECHNOLOGY

greehill's primary digital transformation and sustainability initiative in Singapore has been to digitise urban tree management to increase operational efficiency and inform strategic planning. The company was founded out of a research and development project for the National Parks Board of Singapore (NParks) in 2017. In 2019, NParks became greehill's flagship customer. The two work together in close partnership to digitise and manage Singapore's urban forests. For Nparks, greehill collects data about the urban environment through a combination of remote sensing and high-resolution imagery. The company's key innovation comes from their machine learning-based 3D Digital Twin Technology. greehill's algorithms have been trained to automatically recognise and segment urban trees from the surrounding environment and extract relevant metric information.

By adopting greehill's platform, NParks has been able proactively manage more urban trees while maintaining the same number of staff. The data on tree condition and diversity is being used to conduct risk assessments and inform tree planting initiatives. Now that greehill's technology has been embraced by NParks, the company is scaling their activities to other organisations in Singapore, other cities in the Asia-Pacific region, most of Europe, and even the North American region.

SUPPORTING SINGAPORE'S GREEN INITIATIVES

greehill's strategy and initiatives are aligned with the City in Nature and Resilient Future pillars of the Singapore Green Plan 2030. By mapping and monitoring green spaces in Singapore, the company provides the data and tools to quantify the extent of urban green spaces, identify open spaces for new tree planting or green space development, and objectively track progress towards the 2030 targets. The company also supports the Keeping Singapore Cool initiative of the Resilient Future agenda by providing tools to map urban heat islands, quantify the impact of urban trees on temperature, and identify areas for green development.

CONTINUOUS INNOVATION IN THE WORKPLACE

Digital transformation is part of the daily routine of almost all of greehill's employees: not only do they routinely apply the latest AI, ML, IoT and I4.0 technologies in their work, but greehill also pushes their employees to keep innovating and find even more advanced solutions in the vast problem space of urban green management.

greehill also has current and future initiatives to supplement: Big Data, cloud computing, cross-border data flows, cross border digital connectivity, digital infrastructure and the "internet of things." This indicates that

digital innovation and digitalisation are the norm at greehill.

greehill is a fast-paced organisation, constantly adapting and improving their methods and processes to meet new challenges. In addition to their internal innovation, greehill's extensive network of partners facilitates overcoming obstacles. Their partner network spans the fields of Greenery Management, Smart Cities, Academia and the GOs and NGOs active in the climate resilience field.

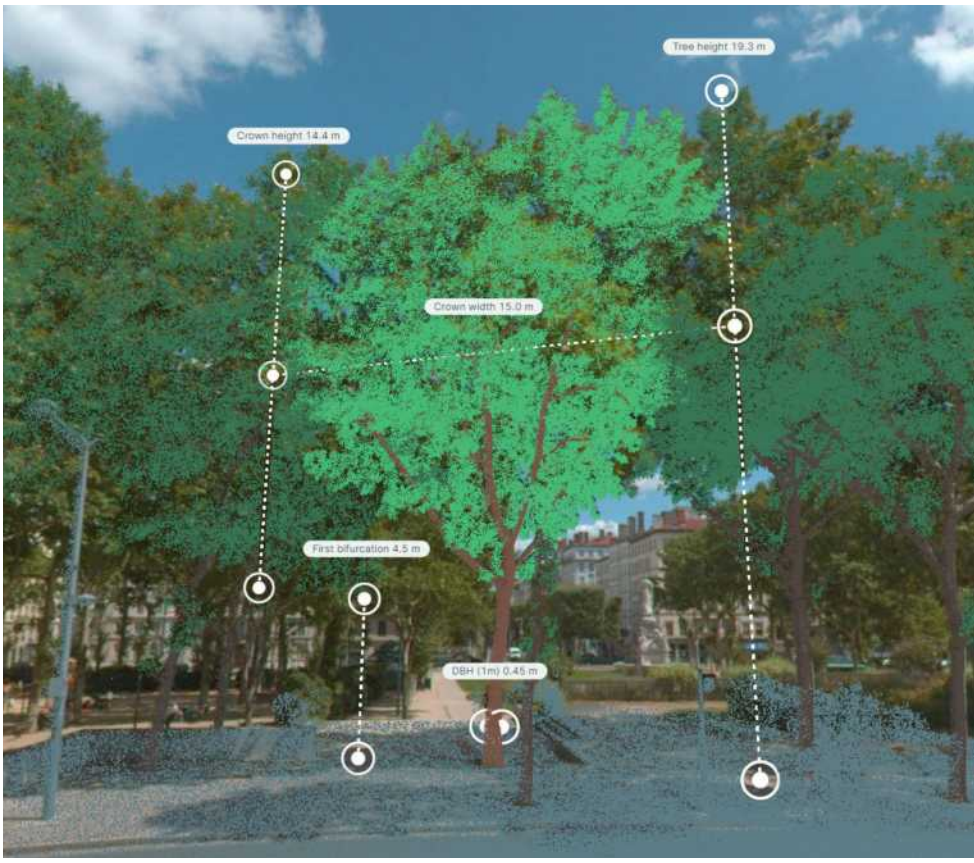
DEPLOYING DIGITAL TRANSFORMATION FOR URBAN RESILIENCE

greehill's mission is to empower cities to improve urban life through urban trees. The company strongly believes urban nature is key to combating global social, environmental, and economic problems. By bringing urban nature online, greehill strives to meet the following three internally identified targets:

1. Decrease the risk and increase the positive impact of urban trees on their surroundings through proactive maintenance.

2. Quantify and raise awareness about the services and benefits that vegetation provides to urban areas through precise data collection.

3. Enhance the resilience of cities to climate change through nature-based solutions.



Ultimately, their priorities are to equip cities with more and more accurate information about their trees and green spaces so that these cities can make well informed decisions about future development projects and tree planting campaigns.

Internally, the company has specific sustainability targets. These targets include:

1. Bringing nature-based smart city solutions to the majority of cities.

2. Raising awareness about the value of urban trees across stakeholder groups.

3. Continuing to develop service offerings to execute their mission on a broader scale. greehill tracks the effectiveness of their digital tools through stakeholder interviews and reporting.

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ING

Empowering Business through Digital Innovation

A global bank with a strong European base, ING's purpose is to empower people to stay a step ahead in life and in business. ING offers a broad suite of services across sectors and products – providing specialised lending, tailored corporate finance, debt & equity market solutions, sustainable finance solutions, payments & cash management, and trade & treasury services. The bank began operating in Singapore in 1987 – today, it is home to ING's regional Asia-Pacific headquarters with 500-1000 employees. ING Singapore is the largest wholesale banking branch in Asia, with a focus on creating tailor-made solutions for specific companies and clients.

The ING difference lies in their global reach with local experts as no matter where their clients are in the world, their network of experts offers them a seamless local experience with a global view. They are also sector experts – they know their stuff and their clients trust them to deliver tailored solutions to meet their needs. With their focus on sustainability, ING is not just a green thought leader, they also work hand-in-hand with their clients to address some of the most pressing issues in the world today.

FOUR ENABLING PRIORITIES

ING has positioned themselves as a pioneer in both digital and sustainability efforts, adept at adapting to the trends that impact business and influence customer expectations. To fulfil their strategic ambitions, ING has four enabling priorities:

1. Providing seamless, digital services
2. Using scalable technology and operations
3. Staying safe and secure
4. Unlocking employees' full potential

DIGITAL TRANSFORMATION PROJECTS

Cloud Technology

ING Private Cloud (IPC) is a digital platform used to store and process data and IT services and it is hosted in ING data centres in the Netherlands. ING has successfully completed bringing the Singapore infrastructure and application onto IPC. This platform standardises the bank's IT infrastructure, simplifies and streamlines existing processes, and provides an automated and self-service infrastructure for the development and operations teams. ING currently runs more than 70 percent of its global infrastructure on IPC.

Cybersecurity

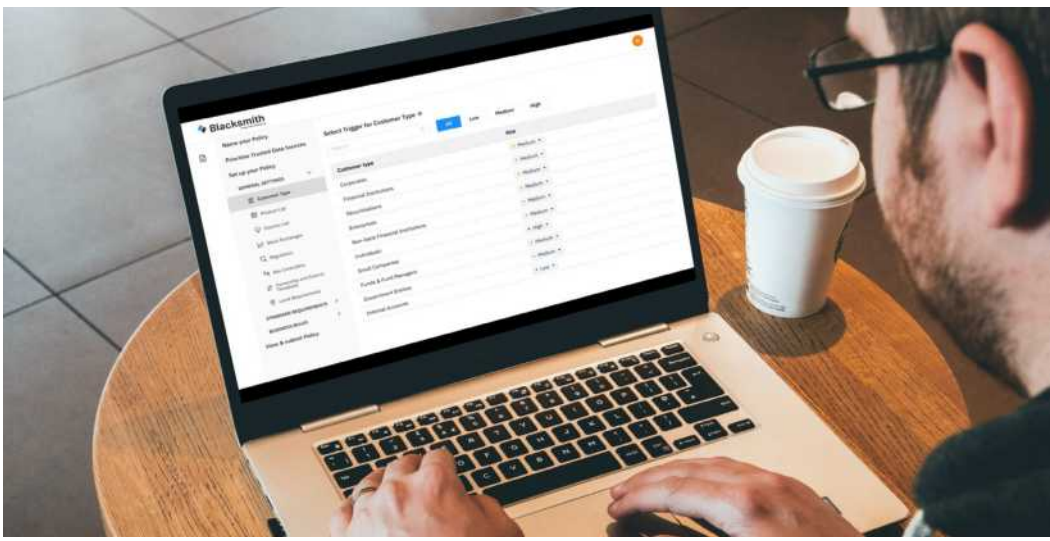
ING continues to stay at the forefront of the evolving nature of cybersecurity, including staying up-to-date on the latest methods and threats. Concurrently, ING is committed to becoming more cyber resilient. Internally, ING builds security awareness and conducts refresher programs for their employees about reducing the risk of falling victim to cybercrime and possible responses.

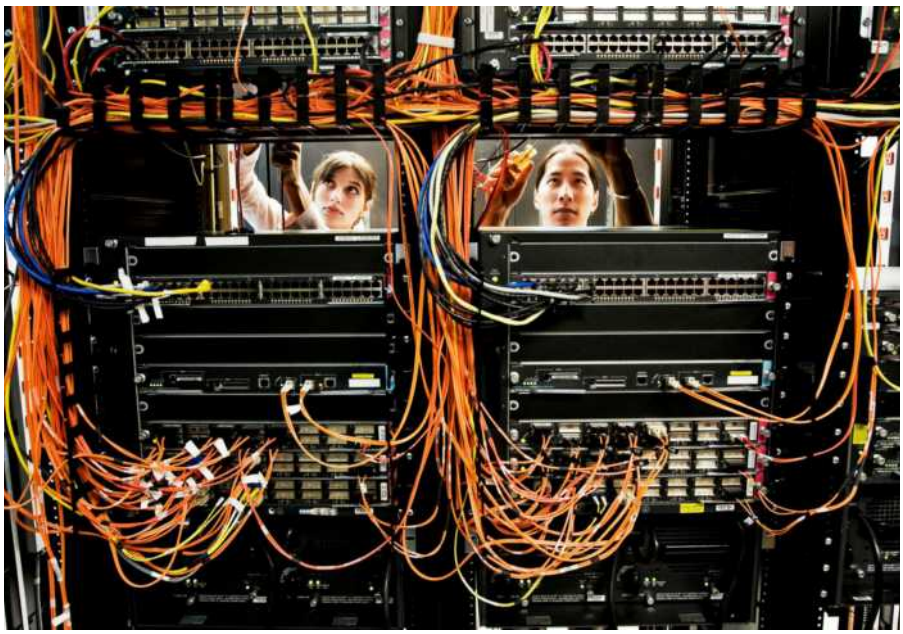
Blacksmith

Blacksmith, one of ING's key digital transformation initiatives, was founded in 2017 in Singapore. The platform was created to target the inadequate control of KYC (Know-Your-Customer) processes, exponential growth of KYC related costs, cumbersome and ever-changing regulations and policy guidelines, inefficient usage of data and never-ending IT implementations. Blacksmith prevents financial crime by facilitating a risk-based approach to customer due diligence, helping to safeguard the financial system. The solution utilises innovative cloud computing techniques, is fully API based and therefore enables plug and play implementation and/or easy integration in existing IT systems.

One of Blacksmith's goals is to enable banks on their journey to move from time-driven customer reviews to perpetual KYC and to focus risk reviews on customers that impose an additional risk. It leverages the latest technologies to enable ING and the industry to marry their specific KYC requirements with their processes and tooling, through a no-code user friendly interface.

Blacksmith employees operate from ING's branches in Singapore, Philippines, and the Netherlands. Since they are part of the global KYC and Wholesale Banking Operations domain, they are involved in various initiatives that ING deploys globally to transform their core processes. Blacksmith works closely and regularly with end-users (KYC





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analysts, compliance officers) to engage them in the improvement of the platform and development of value-adding features.

The platform also epitomises digital transformation through collaboration. Blacksmith collaborates with other banks to better understand and respond to their challenges and best practices. Through Blacksmith, ING also partners with leading data providers and other service providers in the industry – collecting data from local corporate registers in over 160 jurisdictions and notable global data vendors like SWIFT KYC Registry.

DIGITAL FOR SUSTAINABILITY EFFORTS

One of the overarching priorities of ING's "making the difference" strategy is to put sustainability at the heart of the bank's operations.

ING aims to reduce their technical footprint and IT landscape around the globe. As data centres are one of the key contributors on power consumption, ING is decommissioning and consolidating data centres. For instance, the company has already consolidated their data centres by moving them from Singapore to the Netherlands, allowing for an increase in economies of scale, and improvement in efficiency. This consolidation is also enabled by ING's transition towards cloud and third-party SaaS solutions. Two ConnectionHubs have been set up in Singapore to maintain high availability and network performance. In the consolidated data centres, ING works with IT suppliers to reduce future energy and waste.

On the client-facing side, ING works to capture relevant sustainability data to report on the company's performance in the relevant areas.

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MERCEDES-BENZ

Pioneering the Cars of Tomorrow

Singapore has been home to Mercedes-Benz for over 30 years, serving as a regional hub for Mercedes-Benz Group AG. The company is a leading producer of luxury cars and vans worldwide. Mercedes-Benz Financial Services offers a comprehensive range of services, including financing, leasing, fleet management and insurance as well as innovative mobility services. In addition, the company is a regional office for IT, Treasury, and Legal services.

Mercedes-Benz's objective is clear: to continue to be a leading vehicle manufacturer while developing into a leading provider of mobility services. Every strategic action revolves around the customer.

SHIFT IN "LUXURY" TO DIGITAL AND SUSTAINABILITY

Digital and sustainable innovations will be the number-one unique selling proposition (USP) driving desires in the future of luxurious individual mobility. Customers are increasingly viewing luxury through the lens of values and benefits that extend beyond physical experiences. Consumers are demonstrating a desire to show responsibility with their choices.

As a leading luxury car brand, Mercedes-Benz is consistently driving the luxury experience to new levels. This includes giving "luxury" new meaning for the electric and digital age. Driven by the innovative spirit firmly anchored in its brand DNA, and by its strategic goals of "lead in electric" and "lead in car software", Mercedes-Benz is pioneering the electric and digital transformation of the global automotive industry.

FUTURE DIGITALISATION EFFORTS

Mercedes-Benz will be exploring autonomous driving, as well as applying machine learning methods to advance combustion engine research and to develop new functions for future vehicles. The company is also enabling research into robotic process automation of the factory process, such as participating in the ARENA2036 research network. Relatedly, the Group is exploring the concept of fully-networked factories. In terms of cloud computing, they are also collaborating with Microsoft to optimise vehicle production and connect 30 passenger car plants to the cloud. Mercedes-Benz uses emerging technologies like Blockchain, harnessing its transparency and immutable properties to promote greater sharing across industries, while ensuring data privacy and control in enterprises.

DIGITAL FOR SUSTAINABILITY

The Group is committed to employing digital tools to advance sustainability goals. In product design and manufacturing, Mercedes-Benz uses digital tools and simulations to optimise vehicle designs, reduce material waste, and enhance energy efficiency in the production process. The company also employs digital technologies to track and manage suppliers, assess the environmental impact of raw materials, and improve transparency throughout the supply chain.

Mercedes-Benz also leverages connected technologies to enable more efficient driving, monitor vehicle performance, and optimise maintenance schedules, leading to reduced fuel consumption and emissions. Lastly, the company uses big data analytics and artificial intelligence to optimise operations, predict maintenance needs, and identify opportunities for sustainability improvements.

ACENTRIK, A STRATEGIC PRODUCT BY MERCEDES-BENZ SINGAPORE

Developed by a pioneering team at Mercedes-Benz Singapore, Acentrik is a technology provider for organisations to share and exchange data with absolute data sovereignty. The vision for this product is to enable greater data sharing and unlock greater value out of enterprise data. As a horizontal technology implemented across multiple industries, Acentrik is a turnkey solution to create scalable data ecosystems for both enterprises and governments.

A main USP of Acentrik is its privacy-preserving functions - Compute-to-Data, which ensures that raw data is not being transferred and kept at the data source. Greater

value of enterprise data can be extracted by running compute jobs on anonymised data, to get predictive analytics for industrial use-cases.

Acentrik has several use case applications. For instance, a network of healthcare clients and institutions could require a controlled data exchange platform, with the objective of enabling secure and compliant cross-border data exchanges amongst their specified participants while protecting sensitive data and adhering to legal standards. Another example is of a leading global retail company that aims to optimise its cross-border supply chain operations by leveraging on data exchanges with its external partners and internal systems. Lastly, given that governments hold a wealth of data that can unlock tremendous value when shared and analysed, a data exchange platform could help governments establish an interoperable and connected data landscape with trusted entities.

In Singapore, Mercedes-Benz continues to support and roll-out global initiatives towards digitalisation, the environment, and other key facets of their mid-to-long term strategy in the local market. While their products are being manufactured overseas and imported into Singapore, their local teams continue to collaborate with other like-minded individuals and entities in implementing global sustainable goals across the local landscape.

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NAVOZYME

Facilitating the Digital Transformation of the Global Maritime Industry

Navozyme is an award-winning technology scale-up on a mission to accelerate the digitalisation and decarbonisation of the global maritime industry. A Singapore headquartered company, Navozyme has entities in Barcelona, Spain, and a Centre of Excellence in Bilbao.

The Navozyme team presents N-Bunker at the DigiCirc Finals in Deloitte´s Milan Office, March 2023

The company works with a wide set of actors within the maritime ecosystem to create blockchain and AI solutions aimed at reducing complexity and friction for critical maritime processes. Beneficiaries of Navozyme's products include Port Authorities, Shipowners, Agents, MARPOL Operators, Maritime Training Institutions, and Seafarers. Navozyme's solutions facilitate the real-time interchange of authentic data amongst various actors enabling decarbonisation, higher productivity, enhanced compliance and cybersecurity. Specifically, the company's solutions enable:

1. Quicker ship turnaround via smarter Port Call Administration, including Port Clearances, Ships' Waste Declarations and Bunker optimisation.

2. Seafarers' Certificates Management.

DIGITAL TRANSFORMATION OF MARITIME CERTIFICATION PROCESSES

Navozyme was commissioned to assist with the digital transformation of Philippines' leading maritime institution, MAAP (Maritime Academy of Asia and the Pacific). MAAP is supported by the Philippines Seafarers' Union (AMOSUP) which consists of about 200,000 members, one of the largest representations of seafarers globally. Typically, maritime certificate issuers (Flag States and Maritime Training Institutions) and certificate receivers (largely seafarers) suffer through several pain points due to the paper-based certificate processes. Paper certificates are vulnerable to security issues, including loss, damage, and forgery, and also require extensive processing times. Furthermore, paper certificates allow fraud to proliferate because their authenticity cannot be guaranteed in real-time.

Navozyme pioneered the use of Blockchain Enabled Electronic-certificates (BEEs). Each BEE contains a unique hash and digital fingerprint, offers advanced security features, and provides real-time validation of data via distributed networks. MAAP adopted this technology to facilitate the management of seafarers' credentials. Consequently, the digital identity of the seafarers and their maritime training certificates are now easily verifiable. Seafarers are also able to carry their credentials in a secure form on their mobile wallets. Navozyme partnered with Hochschule Bremen (HSB) on a pilot project to enhance process efficiency related to maritime certifications – the project estimated that digitalising certifications reduced 15,000 waiting days and saved 13,000 paper sheets.

Navozyme at the startup event of the MWC-4YFN, April 2023

N-MAP S

Navozyme aims to facilitate the digital transformation of the global maritime industry via deeptech solutions. One of Navozyme's products, N-MAP S (Maritime Authentication Platform) has had positive effects for the port call ecosystem with considerable impact in 3 key areas: Safety, Sustainability, and Productivity. N-MAP S has improved safety , eliminating 18,000 physical contact points, and enhanced decarbonisation by eradicating 6,200 metric tons of CO2 and getting rid of 27,000 papers. Furthermore, N-MAP S has saved 3,500 admin hours and 10,200 hours of waiting time, ameliorating productivity. Consequently, N-MAP S has facilitated the quicker turnaround of ship vessels, drastically reducing waiting time and wasted fuel burn. These metrics indicate how Navozyme's solutions directly enable digital for sustainability goals in a myriad of ways.

ARTIFICIAL INTELLIGENCE

Navozyme is trialling an AI-ML algorithm for facilitating Just-In-Time (JIT) bunkering in the Port of Algeciras. The planning tool incorporates the Estimated Time Arrival (ETA) predictions for calling vessels with the bunker supplier and pilots plans to generate an optimal time window for bunkering operations. The aim is to reduce port congestion and wait time, eliminating wasted fuel burn which in turn will considerably reduce the GHG emissions in the port area.

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PIRELLI

Digitalisation to Improve Organisational Efficiency

Pirelli is among the world's major producers of tyres and associated services, and the only one focused solely on the consumer tyre market. The company produces tyres for cars, motorcycles and bicycles. With 18 production plants in 12 countries and a commercial presence in over 160 countries, Pirelli has around 30,700 employees and has a revenue about 6.6 billion Euro (FY 2022).

BALANCING SIMPLIFICATION WITH INTEGRATION

In 2018, Pirelli launched a major digital transformation project involving all company departments. The project stems from the company's drive to redesign its operating model to continually improve the organisation's efficiency through a more agile and digitised structure, and to generate new growth opportunities by strengthening Pirelli's positioning in the high-value market segments.

Pirelli's overall goal with digital transformation is to balance business process simplification with easy-to-use integration applications that can save time and reduce the complexity of day-to-day operations. The transformation is being applied in four strategic areas: sales, integrated planning, product development, and production.

ENHANCING B2B THROUGH DIGITALISATION

Following the pandemic and consequent acceleration of e-commerce, Pirelli Singapore consolidated its sales and relationship management efforts on websites and applications with dealers (tyre dealers, leasing companies, retailers) as well as with their own ASEAN network of importers and agents. In 2019, Pirelli Singapore completed its B2B+ (TyreClub+) Platform.

Subsequently, in 2023, Pirelli Asia began to adopt a Salesforce-based CRM platform to optimise the current operational B2B+ portal. The new Pirelli B2B Commerce platform, to be launched next year, will offer clients an enhanced self-service digital environment allowing end-to-end observability of the customer experience, including simplified order management and delivery tracking from the third party 3PL logistic warehouse in Singapore.

Digitalisation has fostered better coordination and collaboration among resources deployed in Singapore, Shanghai (APAC HQ) and Milan (Global HQ). Pirelli Asia is focusing on both internal processes and external ones, creating efficiencies in sales, marketing, and relationship management with dealers.

NEXT MODULAR INTEGRATED ROBOTICS SYSTEMS

MIRS (Modular Integrated Robotised System), developed by Pirelli and implemented in 2000, is a key indicator of Pirelli's long standing commitment to driving innovative processes in the digital field. MIRS allowed the work of robots to cover the entire production cycle for a Pirelli tyre. Through the MIRS process, a tyre is built continuously by robots around a drum that the machines pass "from one mechanical hand" to the next. This was followed by the next iteration of Pirelli's robotic tyre production system (NEXT MIRS) which enables a high product mix and consolidation of output volumes. This demonstrates how Pirelli has consistently kept pace with digital innovation updates in tandem with the emergence of new technologies. Furthermore, Pirelli facilities in Settimo Torinese will utilise the NEXT MIRS system alongside Pirelli's sustainable development strategies – demonstrating how digital efforts can further sustainability.

MANAGING THE CHALLENGES ASSOCIATED WITH DIGITALISATION

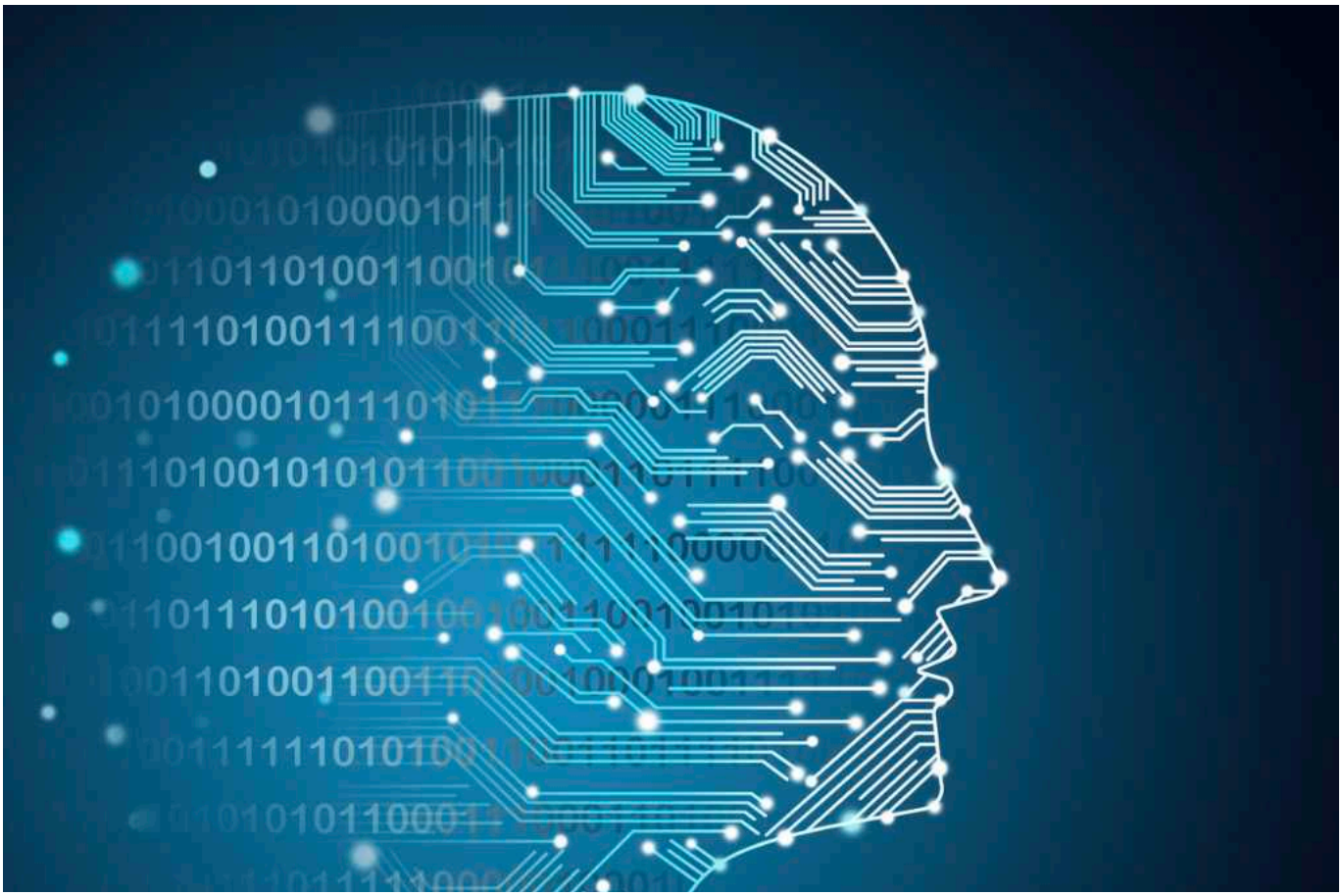
All organisations face cultural challenges and some level of "resistance" before and during the adoption of new enabling technologies. Training, education, and transparency are all integral to overcoming hesitance in the face of changes in working methods. Pirelli adopted a progressive approach to ensure that no employee was left behind in adopting new tools, focusing on data accuracy and system reliability. This approach also utilised new dashboards to facilitate collaboration between management and staff on shared cloud-based reports.

MSFT Teams propelled remote work, collaboration and knowledge sharing during and after the Pandemic. While it was originally a platform that Pirelli was "forced" to adopt, it has now become a norm: sharing data and information on distributed, integrated and on-cloud platforms like SalesForce.com has reduced duplication and increased savings, leaving more time to focus on customers' needs on a more proactive basis.

DIGITAL FOR SUSTAINABILITY EFFORTS

The Pirelli sustainability plan with targets for 2022, 2025, and 2030 supports eleven of the UN's seventeen 2030 sustainable development goals. More specifically, the company is committed to promote, develop and implement sustainable and responsible procurement. This commitment applies to fundamental cooperation with suppliers, digital monitoring of suppliers' performance, and collaboration on multi-stakeholder platforms.

Importantly, Pirelli pays great attention to the innovation of processes, including certification to ensure the sustainability of the materials' supply chain from its origins.



PATENTS SUPPORTING SUSTAINABLE INNOVATION

Pirelli is continuously striving to improve the sustainability, performance, and safety of its tyres. These objectives underpin the patents filed every year by the company with the European Patent Office (EPO) in Munich.

Patents were filed in several areas in 2022, but almost all conform to the ideals of sustainable innovation. Specific patents include vegetable oils, naturally occurring polymers, as well as textile and metal reinforcements to improve mileage, reduce tyre weight, minimise noise and decrease rolling resistance. The search for new materials and innovative tyre components has always driven Pirelli's patent applications, alongside the goal of raising awareness of and developing innovative processes.

MIRS (Modular Integrated Robotised System), developed by Pirelli and implemented in 2000, is a key indicator of Pirelli's long standing commitment to driving innovative processes in the digital field.

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SAP ASIA

Helping the World Run Better and Improving People's Lives

SAP is committed to enabling every organisation and every industry to become a network of intelligent, sustainable enterprises – bringing together the solutions, technology, and best practices needed to run integrated, AI-powered business processes in the cloud. SAP's strategy is to help every business run as an intelligent, sustainable enterprise. SAP's machine learning, Internet of Things (IoT), and advanced analytics technologies help transform customers' businesses into intelligent enterprises. SAP's end-to-end suite of applications and services enables business and public customers across 25 industries globally to operate profitably, adapt continuously, and make a difference. With a global network of customers, partners, employees, and thought leaders, SAP helps the world run better and improve people's lives.

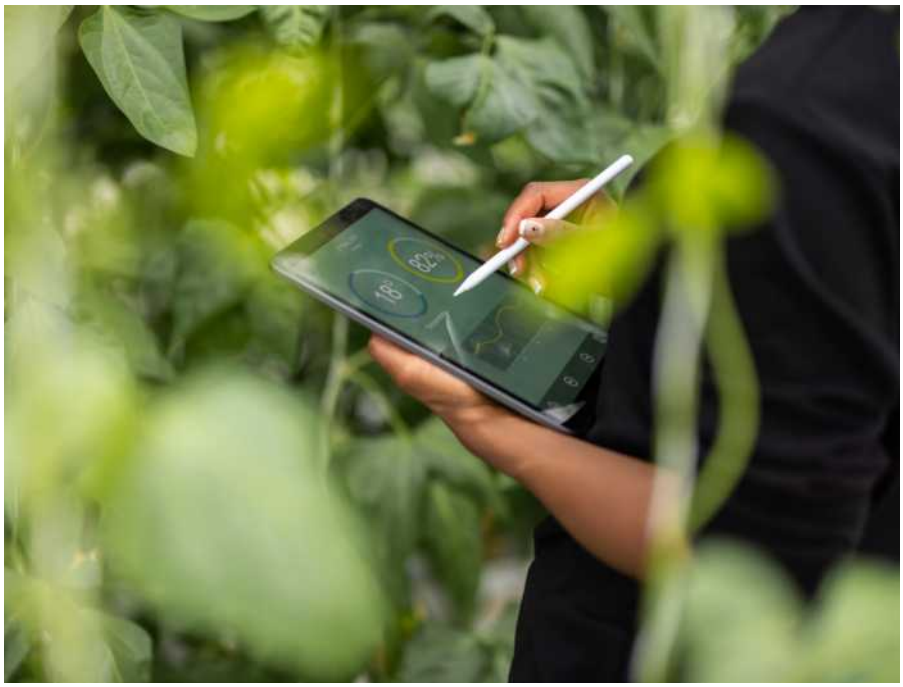
EMPOWERING SMES TO PURSUE DIGITAL INNOVATION

SMEs are the backbone of the Southeast Asian economy. Specifically for SMEs, SAP offers "GROW with SAP," a program that provides preconfigured best practices which allow midsize companies to immediately adopt cloud enterprise resource planning. The GROW with SAP offering also brings together SAP S/4HANA Cloud (public edition) with accelerated adoption services, a global community of experts, and free learning resources, which help businesses go live in as little as four weeks.

SAP LABS

In March 2022, SAP announced the launch of SAP Labs Singapore, a digital innovation hub in partnership with the Economic Development Board (EDB), Government of Singapore that will drive product leadership, foster local digital talent, and boost ecosystem and community engagement.

The new SAP Labs will catalyse deep technologies such as AI/ML and advance SAP solutions within the digital supply chain and business network. Fundamental to the mission of SAP Labs Singapore will be engagement with organisations to understand how innovation and new technologies are transforming their capabilities to weather challenges and drive long-term growth.



In June 2023, SAP Labs Singapore announced its intention to invest in hiring and development of approximately 200 AI engineers to become a key AI Hub and centre of excellence for the company globally. Over the next two years, SAP Labs Singapore plans to hire approximately 200 engineers to fill newly created roles in AI, with a focus on nurturing early-career talents from Singapore's local universities and institutions of higher learning.

ARTIFICIAL INTELLIGENCE PARTNERSHIPS

SAP has announced a Business AI strategy that uniquely positions SAP as the company that delivers Artificial Intelligence (AI) built for business. There have been three recent partnerships on AI:

1. SAP and IBM are partnering to embed IBM Watson AI capabilities into SAP solutions.

2. SAP and Google Cloud are expanding their partnership to build the future of open data and AI for future enterprises. The companies are introducing a comprehensive open data offering designed to simplify data landscapes and unleash the power of business data.

3. SAP and Microsoft extended their long-standing partnership, using Microsoft's latest enterprise-ready generative AI innovation to help SAP solve customers' most fundamental business challenges.

USING IOT TO ENHANCE OPERATIONAL EFFICIENCY

SAP helps organisations to transform operational sensor data into intelligent insights and actions. IoT-embedded Line of Business (LoB) applications help organisations to automate business processes. With IoT-em-

bedded LoB applications, organisations combine IoT data with business data to automate business processes and drive decisions based on the actual business context near real-time.

SAP's IoT-integrated Line of Business applications, such as SAP Asset Performance Management, SAP Enterprise Product Development, and SAP Digital Manufacturing, offer predictive asset health optimisation, automated maintenance generation, and generate valuable insights through IoT sensor data and machine learning models. This initiative represents SAP's innovative approach in enhancing operational efficiency and proactive business strategies by intertwining IoT capabilities with core business functions.

FINANCIAL TECHNOLOGY

SAP and Dediq formed a joint venture dedicated to the Financial Services Industry (FSI), "SAP Fioneer," which is jointly owned by the two companies. SAP Fioneer aims to enable FSI customers to transition into modern applications and cloud-based business processes and platforms.

SAP and Visa, the digital payments leader, have just announced the collaboration. Together with Visa, SAP will offer convenient B2B digital payment services to enterprises across Asia Pacific and Japan.

LEVERAGING ROBOTIC PROCESS AUTOMATION

There are several SAP solutions that leverage automation within its processes – including SAP Business Technology Platform, SAP Build, and SAP S/4HANA Cloud. Automation capabilities have been added to SAP Business Technology Platform and SAP Build. Within SAP Build, users have over 135 automation recommendations, with which customers can fully automate their

business processes at the task and system level. Businesses can leverage continuous process monitoring and AI to fix bottlenecks proactively.

Additionally, SAP S/4HANA Cloud makes companies resilient, agile, and responsive with low total cost of ownership. It offers the lowest TCI allowing companies to fit to standard and complete delivery of a pre-activated business innovation scope.

POWERING SUSTAINABILITY THROUGH ACCOUNTABILITY

SAP has recently announced solutions to reinvent carbon accounting and lead companies to a green ledger. The solution enables combined financial and environmental decision-making at different points across the business process. The green ledger offers deep insights by being embedded into RISE with SAP S/4HANA Cloud and the GROW with SAP solution, with additional capabilities added with every release.

With SAP Sustainability Control Tower, companies can extend transparency across financial, operational, compliance, environmental, and social parameters to show customers' impact on the environment, society, and communities based on established frameworks.

In 2023, Standard Chartered Bank in Singapore rolled out SAP Concur as part of their financial transformation journey. SAP Concur technologies allow Standard Chartered Bank to deliver on sustainability goals. The company uses functionality within Concur User Assistant by WalkMe to deliver pop-up messages to advise employees of their carbon impact when booking flights.

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SEVEN PEAKS SINGAPORE

Driving Human-Centric Digital Solutions

Established in Bangkok, Thailand, in 2014, Seven Peaks is a Norwegian-owned digital transformation firm that focuses on helping businesses flourish in the digital age. The company's more than 225 professionals specialise in disciplines spanning the product life cycle, delivering digital solutions that fuel growth and optimise performance. Seven Peaks' philosophy is to guide clients on transformational digital journeys, facilitating the creation of digital products that enhance their market presence and profitability.

A DIGITAL NATIVE ORGANISATION

As a digital native organisation, Seven Peaks maintains a robust digital transformation strategy. The company's system-driven strategy aims to enhance processes and improve operational efficiency with modern IT systems. By automating tasks and streamlining workflows, the company continually optimises both its own and client operations. This involves using technology like generative AI, big data analytics, cloud computing, 5G, and RBA as catalysts.

A systematic approach underpins the firm's collaborations with clients across Southeast Asia and Europe, both directly and through its satellite company, Apphuset, in Norway. Working with global technology partners, including Amazon Web Services, Microsoft, Stripe, and Mixpanel, Seven Peaks helps companies stay ahead and improve operational efficiency.

GUIDING COMPANIES FROM IDEA TO GROWTH

Seven Peaks' holistic approach to product development balances four essential elements: tangible business value, user-centricity, technical best practices, and data-informed decisions supported by robust analytics. The company's top priority is delivering tangible business value by aligning product strategies with clients' business goals and challenges. Through in-depth user research and human-centred design principles, Seven Peaks crafts intuitive experiences designed to resonate with users. The company emphasises the use of data analytics in making informed decisions, optimising user experiences, and enhancing clients' digital products.

CLIENT PHILOSOPHY

Managing Products, Not Projects

Seven Peaks follows a "products, not projects" philosophy, promoting a long-term perspective centred on continuous product management and improvement. The company emphasises the importance of ongoing support, maintenance, and enhancement throughout the product life cycle. Ownership, accountability, and a user-centric approach enable dedicated teams to assume specific responsibilities and deliver continuous value. Seven Peaks also helps its clients adjust their internal processes. They encourage clients to adopt metrics that focus on the actual value and impact of their products, allowing for more effective product management.

Beyond client satisfaction

Seven Peaks employs a thorough discovery process that transcends fulfilling client wants, focusing on building what clients truly need. By engaging in meaningful conversations, Seven Peaks understands clients' objectives and challenges, allowing them to develop solutions addressing core needs. Rigorous research, market analysis, and user insights provide a solid foundation for identifying opportunities and guiding strategic decision-making. Through collaborative workshops, prototyping, and user testing, Seven Peaks ensures the final product aligns with long-term goals, mitigates potential pitfalls, and delivers meaningful outcomes, meeting the needs of end-users and driving desired business results.

ADOPTING A HUMAN-CENTRIC APPROACH

Morphosis

In 2022, Seven Peaks acquired the European-owned Southeast Asian-based design firm Morphosis to strengthen its discovery, design, and consulting services. Morphosis specialises in UX research, design thinking, and UX/UI design to create user-centric products that resonate with users. For Morphosis, a thorough understanding of the us-

er-base is integral to the success of digital transformation projects. At the discovery stage, the company conducts qualitative and quantitative research that is focused on user behaviours, needs, and pain points. This is then used to synthesise informed product decisions and iterations. During the UX/UI design phase, Morphosis leverages these findings to create intuitive products that enhance the user experience, which increases digital engagement and growth.

HELPING CLIENTS CREATE A SUSTAINABLE FUTURE

Part of Seven Peaks' aim in driving digital transformation is to reduce the carbon footprint of both itself and its clients by optimising digital services, improving efficiency, partnering with companies like Microsoft, and using their Emissions Impact Dashboard to calculate and lower their energy consumption. This also includes working with clients with similar values.

Partnering with Rêver to Launch BYD Electric Cars in Thailand

In 2022, electric vehicle manufacturer BYD partnered with Thai distributor Rêver to launch their cars in Thailand. Rêver engaged Seven Peaks to construct their entire digital ecosystem from scratch within three months. This ecosystem included advanced business intelligence and data analytic solutions as well as a dealership management system for Rêver's partners.

This meant a full digital transformation journey for the dealerships, introducing and equipping them with modern technologies. As another green initiative, an app for drivers that features real-time charging station maps and CO2 reduction incentives was developed. The team focused on streamlining and optimising supply chain management, sales workflows, customer service, and administrative systems in anticipation of future growth.

Despite the short timeline, Rêver launched successfully, doubling their sales target by selling 10,000 on the first day alone. The effectiveness and scalability of the system were instrumental in this achievement. Seven Peaks' approach supported Rêver and BYD's rapid growth and assisted their mission of transitioning the public to electric vehicles in Thailand.

WORKING ONSITE IN EUROPE THROUGH PARTNERS

Seven Peaks works closely with clients in Europe, often through their partner Apphuset in Norway, which has a product team on the ground to serve clients in Scandinavia. This model gives clients access to local product owners and planning teams, while production work is done in Thailand.

Collaborating with NodesNow to Create an Innovative Meeting Solution

The German startup NodesNow helps facilitate productive workshops and meetings through an integrated hardware and cloud-based software ecosystem. Seven Peaks and Morphosis designed and developed the software solution in Thailand for the client in Germany. This includes apps for large interactive touch-screen TVs, iOS and Android devices, web browsers, and desktop systems, plus client and admin portals that all need to communicate seamlessly.

NodesNow is projected to be in more than 10,000 offices and conference rooms by Q1 2024, which translates to hundreds of thousands of active users. As such, the Seven Peaks design and development teams were tasked with creating a user-friendly, technologically feasible, and cost-effective white-label solution for NodesNow. This solution, built with a focus on customisation for major clients, blends an intuitive interface, seamless multi-platform integration, and a scalable backend.

THE ROAD AHEAD

Moving forward, Seven Peaks' objective remains consistent: to equip businesses with the resources and approaches to thrive in an increasingly digital world. By concentrating on user-focused design, leading-edge technology, and decision-making grounded in data, Seven Peaks looks forward to engaging with future partnerships, managing challenges, and seizing opportunities for their clients.

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SIGNIFY (FORMERLY KNOWN AS PHILIPS LIGHTING)

Lighting the Path for Innovative Digital Transformation

Signify is the world leader in lighting for professionals, consumers and lighting for the Internet of Things (IoT). The company's energy efficient lighting products, systems and services enable its customers to enjoy a superior quality of light, safety, and comfort. Furthermore, Signify's products empower businesses to be more productive and make cities more liveable.

With 2022 sales of EUR 7.5 billion, approximately 35,000 employees and a presence in over 70 countries, Signify is unlocking the extraordinary potential of light for brighter lives and a better world.

THE POTENTIAL OPPORTUNITIES OF DIGITALISATION ON SOCIETY

In an increasingly digitised world, smart lighting is the entry point and backbone of a truly digital and smart city. Digitalisation of the lighting infrastructure is one of most effective ways of decarbonising the built environment and Signify estimates that doing so could eliminate 50 million of tons of carbon per year in the EU27 countries, and 1 million tons of carbon annually in Singapore alone.

DIGITAL TRANSFORMATION STRATEGY

Signify's strategy for digital transformation focuses on creating new digital offerings that enable greater sustainability outcomes, digitising customer interfaces to make it easier for customers to do business with them and using digitalisation to automate and streamline their internal processes, improving operational efficiencies and reducing costs, ultimately benefiting the customer.

DIGITALISING OFFERS

When light is connected and digitised, data informs decisions and drives innovation to improve the users' operations, improving energy efficiency and reducing costs. This is why Signify invested in digital technologies such as Interact, its secure, scalable IoT platform.

Interact offers data-based insights into energy usage and historical reporting, delivered via the Interact dashboard, to analyse and optimise energy consumption. Its connected LED lighting systems and embedded sensor networks are used in cities, offices and retail and hospitality business making them smarter, more lighting energy-saving (by up 80%) and more operationally efficient. To date, Signify's installed base of connected light points number 117 million globally and digitisation also enables Signify to explore new potential for the company, supporting business areas such as horticulture and entertainment. Signify continues to develop and invest in digital lighting technologies such as TruLiFi, Brightsites Smartpoles and its HUE smart lighting for the home. By doing so, Signify aims to create differentiated offers that meet consumers' evolving needs.

DIGITALISING CUSTOMER INTERFACES

Signify aspires to give customers the best digital experience possible, prioritising digitising the B2B and B2C customer interfaces. It knows that winning market share means ensuring its partners, agents, specifiers, wholesalers and end consumers have easy access to its products and can purchase them seamlessly.

An example is 'MyLighting', a 24/7 customer-centric web portal, an easy-to-use business platform which allows Signify's customers to interact with its product portfolios. Some of its key features including self-registration, pricing and availability information, order entry, order status etc to automatically speed up work-flows and enhance customer service delivery.

Another example – customers wishing to purchase luminaires incorporating recycled material have the freedom to customise, tailor and order their designed 3D printed luminaires via an online interface. With more than 500 customers globally, some of the customers using such sustainable 3D printed lighting include McDonald's and Taipei 101 Tower.

DIGITALISING INTERNAL PROCESSES

One of Signify's primary objectives is to define cost and operational performance by leveraging digital technologies to improve internal processes and reduce costs. Another goal is to enhance delivery capabilities and enable organisational agility. By investing in digital technologies and creating a more agile organisation, it can respond quickly to changing customer needs and market conditions.

Signify also aspires to improve go-to-market speed by upgrading the technology foundation. To this end, the company is leveraging advanced technologies such as AI, IoT, and data analytics to accelerate its product development and delivery processes.

STRENGTHENING EMPLOYEE ENGAGEMENT

One of the ways Signify has engaged its employees is by providing them with the necessary training and resources to become digital experts. The company has invested heavily in online training programs and workshops that teach employees everything from basic digital skills to more advanced topics like data analytics and AI.

Another way Signify is engaging employees is by enabling data-driven decisions. To achieve this, it has implemented several systems and tools that allow employees to collect, analyse, and act on data in real-time. This empowers its employees to take ownership of their work and make a tangible impact on the business.

As a local example, the team in Signify Singapore has developed a comprehensive sales dashboard, enabling the generation of self-service analytics, unlocking untapped product and channel insights from historical sales data, resulting in more informed business decisions.

BARRIERS TO DIGITAL TRANSFORMATION

To manage the costs associated with digitalisation, Signify has established a project and portfolio management office, ensuring that all digital transformation initiatives are scrutinised (financially and operationally) before undertaking them. This unit enables the maintenance of uniform standards and strong governance. Another challenge is end user awareness on cybersecurity, which Signify is targeting by planning phishing simulations and cyber security training.

DIGITAL FOR SUPPLY CHAIN AGILITY

By investing in an advanced Integrated Business Planning (IBP) digital platform, Signify is creating a more reliable, resilient, and agile supply chain. This enables the organisation to bring customers the right product at the right time and location.

Signify has heavily invested in digitalisation in every aspect of the company, from digitising its offers, to upskilling its employees, to ensuring that customers receive the optimal purchase journey. These efforts demonstrate how digital transformation can streamline a company's operations from start to finish.

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STANDARD CHARTERED

Banking Today, Innovating Tomorrow

With a history of 164 years in Singapore, Standard Chartered is part of a leading international banking group with a presence in 53 dynamic markets worldwide. The Bank supports both individual and corporate needs to grow wealth and drive commerce, offering a suite of services that range from personal, priority, and private banking to business, corporate, commercial and institutional banking.

DIGITAL CHANNELS AND DATA ANALYTICS UNIT

Standard Chartered's Digital Channels and Data Analytics unit (DCDA) sits at the forefront of the Bank's commitment to be "Here for good." By creating secure, reliable and innovative business solutions, DCDA delivers a market-leading set of propositions for evolving client needs. The Bank forges new connections with revolutionary fintech platforms and ecosystems, evolving markets and leading technology companies, combining their regulatory, banking and structural strengths with their agility and technology. The result: bespoke, holistic solutions for the Bank's traditional and emerging clients, enabling them to focus on growing their businesses in the new economy. 3 pillars deliver DCDA's promise.

1. Client Access

Omni-channel, seamless and always-on, DCDA provides access to the best that the Bank has to offer through almost every channel possible, and acts as a connector in the broader market ecosystem. This creates opportunities to deliver new business models, cater to a wide range of client needs, and places the client at the heart of the Bank's proposition. Whether through future-proof, channel-agnostic platforms, direct connectivity through host-to-host solutions and APIs or even blockchain-based solutions, Standard Chartered empowers their clients to act, react, and transact anytime and in any way.

2. Client Engagement

Data-driven, responsive, and contextual, DCDA's capabilities in data, machine learning and client interaction allow the Bank to partner with clients effectively. Analysing changing client behaviour, predicting next best actions and providing actionable, timely insights ensures that clients are assured of the Bank's responsiveness to their needs. The Bank has invested significantly in data analytics infrastructure and partnered with leading tech providers to ensure that clients receive the best service in the market, all while staying compliant with evolving data regulations.

3. Innovation

DCDA explores, builds and iterates solutions supporting a wide range of the Bank's capabilities, constantly testing how these expand or complement clients' businesses. To generate and tap into the innovation ecosystem, Standard Chartered teams are empowered to co-create solutions with clients and partners. They do this through four initiatives:

- SC Ventures Investments
- SC Innovate platform
- eXellerator innovation labs
- SuperCharger FinTech Accelerator Programme

In addition to corporate clients, the Bank works with universities, government bodies and non-profit organisations, supporting them in areas from identifying problem statements to the delivery of the final product. Through these initiatives, Standard Chartered supports early-stage start-ups and established scale-ups with access to market-entry resources, mentors, technology advice and joint-venture opportunities. In addition, the Bank taps into fintech ecosystems to gain early access to emerging technologies to aid in the delivery of these solutions. This approach has translated to the successful implementation of innovative business models that support clients' digital expansions and aspirations. Some examples of these successes include QR Cash, scan and pay, mobile unit trusts, mobile foreign exchange, Cloud-first payment platforms, global omni-channel collections, Standard Chartered's proprietary payment gateway platform Straight2Bank Pay, TAS-Connect, Zodia Custody as well as Zodia Markets, Mox and Trust Bank.

DIGITISING SUPPLY CHAIN MANAGEMENT

Standard Chartered has partnered with SAP Ariba, a procure-to-pay platform, that enables client companies to collaborate with suppliers, to digitise document and data exchange. This innovative mode of supply

chain management means corporates can offer suppliers in emerging markets the option of creating invoices in their local currency and negotiate better terms of use locally, as compared to using foreign currencies such as US dollars which will be subject to exchange rate fluctuations, to charge for the services provided. Such solutions place the Bank in the unique position of facilitating greater efficiency and transparency within the supply chain and playing an important part in helping more businesses reduce operational inefficiencies.

USHERING IN THE ERA OF DIGITAL TREASURY

One of the challenges of the modern era is determining the best ways of leveraging digital technologies within the treasury ecosystem, in a manner that continues to support the business most effectively. Standard Chartered is committed to meeting the needs of clients with fast-changing digital needs, and revolutionising money management by co-creating with clients and fintech partners to enable digitisation strategies for treasury. Synthesising such tailor-made solutions includes, for example, the support of new industry verticals in the area of digital platforms, while in the case of an NGO, a more secure and efficient cash distribution method will be recommended, such as employing the use of e-vouchers to monitor and provide data more accurately.

COMMITTED TO EXCELLENCE

The Bank is committed to excellence in their delivery of innovative digital solutions to meet evolving client needs and address market inefficiencies. This will continue to be a priority explored via ongoing collaborations and new engagements in the drive for greater digital transformation and innovation across a broad range of industry fields.

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VOLKSWAGEN

Navigating the Future Through Digitalisation

The Volkswagen Group is one of the world's leading automobile manufacturers and the largest car maker in Europe. Volkswagen Group Singapore is a subsidiary of Porsche Holding Salzburg, which is fully owned by the Volkswagen Group. The company's portfolio includes Volkswagen Passenger Cars, Volkswagen Commercial Vehicles, ŠKODA, CUPRA, and Das WeltAuto.

Volkswagen Group Singapore imports and retails Volkswagen Passenger Cars, Volkswagen Commercial Vehicles, Škoda, and CUPRA vehicles directly. By retailing directly to customers, Volkswagen Group Singapore is able to position itself at the forefront of Singapore's car market. This arrangement also allows for a closer relationship between the brands and the people who matter the most. Volkswagen Group Singapore provides its customers with the quality experience they expect from Europe's largest car maker.

DIGITAL STRATEGY

Volkswagen Group Singapore's strategic approach includes every facet of their business, spanning from wholesale entities to the retail activities of their dealerships. It encompasses a comprehensive range of digital initiatives that are implemented throughout all departments.

These digitalisation strategies serve to heighten their operational flexibility and empower Volkswagen Group Singapore's workforce through the adept utilisation of innovative technologies and seamless technical integrations across various systems. This, in turn, significantly enriches the experiences of customers and esteemed business partners.

At the heart of the company's digital transformation goals lies a two-fold commitment. First, Volkswagen Group Singapore aims to create a personalised customer experience that centres around the unique mobility needs of each individual. Second, their transformation aligns with a resolute dedication to sustainability, emphasising environmentally responsible actions that echo a responsibility towards the environment and the well-being of future generations.

DIGITISATION DRIVING SUSTAINABILITY AND CUSTOMER-CENTRIC EXPERIENCE

Digitalisation plays a pivotal role in Volkswagen Group Singapore's sustainability drive. By minimising paper usage and streamlining operations through system optimisations and automations, the company can significantly cut down on the volume of emails sent, which in turn reduces carbon emissions.

As the automotive industry undergoes transformation, especially with the impending introduction of the Volkswagen, ŠKODA and CUPRA electric vehicles by 2024, Volkswagen Group Singapore's sights are set on creating more digitally integrated customer journeys and enriching experiences.

Customers also now receive their vehicle sales agreements electronically, eliminating the need for physical paperwork. Similarly, quotes for service repairs are conveniently shared with customers digitally. Volkswagen Group Singapore has also introduced digital showrooms enabling customers to reserve vehicles with ease online.

Internally, the company is also driving process optimisation through advanced computerisation and workflow automation. This includes the integration of the group standard IT systems and the incorporation of locally developed and tailored solutions.

To ensure the attainment of sustainability goals, Volkswagen Group Singapore meticulously gathers, monitors, and analyses data on controlled measures such as energy consumption, employing IoT sensors. Simultaneously, they track indicators like printing and travel costs to gauge the efficacy of digital tools.

The company is also actively exploring opportunities to expand their deployment of IoT solutions. These include the potential integration of energy sensors on a per-floor

or per-section basis, as well as the incorporation of solar panels within the building infrastructure.

EMPLOYEE FOCUSED TRANSFORMATION

Digital excellence runs deep in the organisation, fostered by strong leadership and a culture that values it at every level. Porsche Holding's IT arm, Porsche Informatik, leads the way in-house with proprietary IT solutions. In the company's digital journey, employees are key, managing diverse challenges. Their focus is process improvement, agility, and competitiveness.

Through automation and innovation, Volkswagen Group Singapore ushers in new opportunities, like more self-learning time for employees and fresh skill-expanding tasks.

To ensure the attainment of sustainability goals, Volkswagen Group Singapore meticulously gathers, monitors, and analyses data on controlled measures such as energy consumption, employing IoT sensors.

BARRIERS TO DIGITAL TRANSFORMATION

Some barriers include change management and selecting appropriate technologies, taking into account factors like suitability, costs, and particularly IT security.

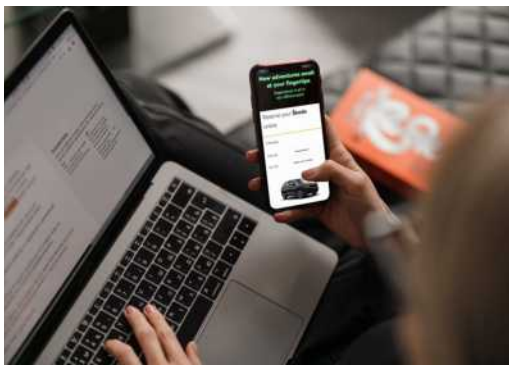
In the realm of change management, successful digitalisation projects heavily rely on the support and active engagement of management. The company's projects are meticulously structured from the outset to involve crucial stakeholders, with a particular focus on steering committees that encompass the management team.

In terms of technology selection, while core IT systems are predominantly provided centrally by the group, Volkswagen Group Singapore also develops locally tailored solutions to address the unique conditions of the Singaporean car market. This is because of their dual role as both the importer and retailer of the brands.

In these instances, the company's approach hinges on prioritising the evolving needs of customers, followed closely by internal capabilities, before embarking on any digitalisation endeavours. This ensures that the company not only partners with the most suitable business entities offering the right solutions or products but also guarantees their ability to effectively implement and sustain these solutions internally. Therefore, the company balances costs, security and aligning with customers' ever-changing requirements.

COLLABORATIVE DIGITAL TRANSFORMATION EFFORTS

Essentially, any ongoing or novel digital undertakings that hold relevance are seamlessly shared between the Singaporean and Malaysian office. An illustrative example lies in the successful implementation of a digital tool for scheduling service appointments, which was shared from Singapore to Malaysia, encompassing valuable technical insights. Likewise, the customer-centric mobile app was reciprocally shared from Malaysia to the local team.



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SINGAPOREAN AND REGIONAL EXCELLENCE IN THE DIGITAL ECONOMY

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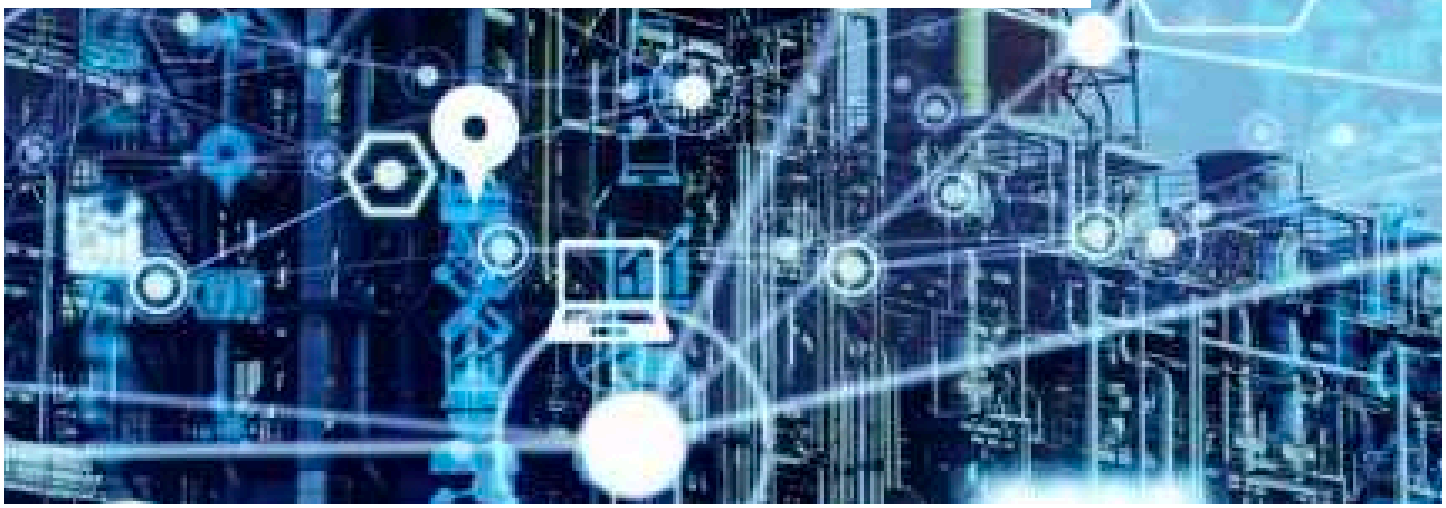

OCBC

Embracing the Digital Frontier

Formed in 1932 from the merger of three local banks, OCBC is the longest established Singaporean bank. The bank offers its customers a broad range of commercial banking, specialist financial and wealth management services in key markets in Singapore, Malaysia, Indonesia, and Greater China. With more than 420 branches and representative offices in 19 countries and regions, OCBC's purpose is to help individuals and businesses across communities achieve their aspirations through the provision of innovative financial services that cater to their needs.

BREAKING FROM CONVENTIONAL BANKING TO DRIVE PROGRESS

Over the years, OCBC has built up their digitalisation efforts, officially embarking on a digital core roadmap in 2019. During Phase I of this roadmap (2019-2022), they focused on modernising their technology to become modular and scalable, allowing them to rapidly deliver new digital capabilities. The next phase of the digital core roadmap is projected to occur between 2023 and 2025, with a focus on customer-led design and development.

As part of the roadmap, OCBC has rolled out innovative features for their customers, breaking away from conventional banking services. For example, in 2019, they were the first bank to offer customers the option to use QR codes to access their bank accounts at their ATMs. This feature was especially useful during the pandemic, when people were uncomfortable with touching the ATM keypads. In November 2022, OCBC was also the first bank to introduce digital passport authentication for foreign SME owners to open accounts. This eliminated the need for cumbersome paper documents and reduced the time needed to open an account. Furthermore, since early 2022, OCBC has enabled Singaporeans to withdraw their government payouts through facial verification at OCBC ATMs without requiring an OCBC account.

OCBC is also the first Singapore bank to enable fully digital account opening for foreigners. Individuals from Malaysia, Indonesia, Mainland China and Hong Kong SAR will be able to open Singapore dollar and multi-currency accounts on the OCBC Digital app remotely within minutes. This expedites the entire relocation process as a bank account facilitates two other key administrative arrangements – salary crediting and securing of accommodation. Currently, it takes days or even weeks to open a bank account as it entails travelling to Singapore and then walking into a bank branch to produce physical documentation for verification. To fully digitalise this process, OCBC has leveraged artificial intelligence, data analytics, biometrics, blockchain and cloud technologies from OneConnect Financial Technology, an associate company of Ping An Group. These technologies have been integrated with OCBC's proprietary digital process (e-KYC).

Programmable Money

OCBC strongly believes in breaking new ground with technology. The bank is in the midst of exploring and building capabilities of programmable payment and programmable money powered by distributed ledger technology (DLT) and smart contracts. Specifically, the bank is a key industry participant of Project Orchid, a project aiming to explore potential use cases for programmable money in Singapore and develop the technological infrastructure and technical competencies necessary to introduce a digital Singapore dollar. Purpose Bound Money (PBM), explored in Phase 1 of Project Orchid, builds upon the concept and capabilities of programmable payment and programmable money.

OCBC-NTU research collaboration signing: Singapore's Deputy Prime Minister, Coordinating Minister for Economic Policies, and Chairman of the National Research Foundation, Mr Heng Swee Keat (standing, middle), witnessed the signing of the research collaboration agreement between NTU Singapore and the bank.

Digital passport authentication: OCBC has leveraged digital passport authentication as part of its Know-Your-Customer process for foreign business owners of Singapore-incorporated SMEs.

Transforming Trade Finance

The bank has also embarked on projects to transform trade finance. Traditionally, the field has relied heavily on manual, paper-based processes, rendering it vulnerable to fraud and manual errors. Through their partnership with Singapore Trade Data Exchange (SGTraDex), OCBC developed use cases to synthesise a common trusted and secure data-sharing infrastructure for stakeholders in the supply chain ecosystem. The bank also obtained an equity stake in the leading commodities trade finance blockchain platform Komgo and have availed the platform to their customers. Komgo enables the digital and secure data exchange and documentation between stakeholders in the trade finance value chain, thus reducing the risk of fraud and manual errors.

Sustainability and Cyber Security

OCBC has also undertaken initiatives to enable their customers to progress on their sustainability goals with digital tools and data. The bank partnered with the Building and Construction Authority to help SMEs in the property value chain transition to sustainability by facilitating SMEs access to green loans using BCA's building energy efficiency assessment tool.

In November 2022, OCBC engaged in a collaboration with Nanyang Technological University (NTU) Singapore to develop innovative technological solutions in key areas such as data privacy and cyber security. This puts OCBC at the forefront of newer privacy enhancing technologies, which will be highly relevant to the future of banking.

The Future of Digitalisation

Most banks are attempting to digitalise and provide a seamless and personalised experience to customers. However, this transition will require time – legacy systems require sustained efforts to change. Nevertheless, given their early investments, OCBC is well-positioned to transform in this area. In 2017, the bank operationalised its $240 million data centre, which serves as the foundation for the development and scaling of digital capabilities.

REFINING OPERATIONS

Without fundamental changes to operating models, the implementation of digital technologies cannot propel transformation. Other than building digital capabilities, OCBC will continue to invest in refining operations and improving productivity. More specifically, the bank has been streamlining processes and improving their employee systems. For instance, they have streamlined more than 500 processes in the last 8 months and eliminated half a million emails annually from contact centre to support functions and operations. This not only hastens responses to customers but also drives a better working experience for their employees. Another example of a streamlined process is the shortened approval process for OCBC's product developers to roll out new products to the market. In 2022, the turnaround time was reduced by at least 40%.

BUILDING WORKFORCE CAPABILITIES

Since 2018, the company has been developing in-house capabilities in lieu of relying on external vendors with the goal of shortening development time and better meeting customer requirements. Furthermore, OCBC has been and intends to continue expanding their tech workforce within the bank, doubling their tech workforce between 2018 and 2023, and aiming to hire another 1,500 by 2025. The company also holds workshops, courses, and company-wide events to promote agile mindsets, design thinking, facilitate human-centred design, introduce new technologies around Large Language Models (LLMs), and inform on big data, modularised system architectures, among other topics. In terms of workforce development, OCBC has also begun organising their teams horizontally to bring different expertise and skill sets into one single unit to drive common goals for the bank. This shift is crucial to aligning priorities and driving success.

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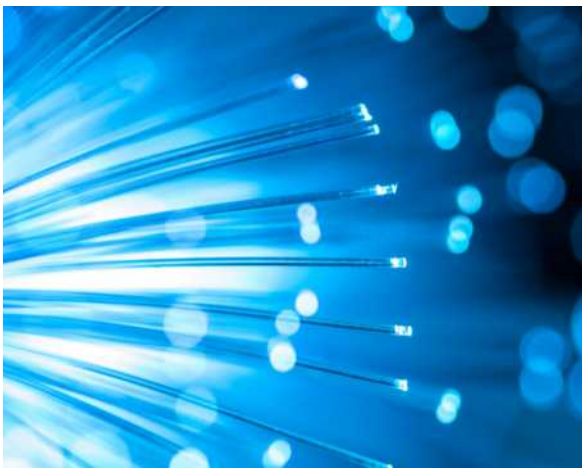
TELSTRA

Building a Secure and Connected Future

Telstra is a leading telecommunications and technology company with a proudly Australian heritage and a long-standing, growing international business. Today, it operates in over 35 countries outside of Australia, providing services to thousands of business, government, carrier and OTT customers. Telstra's services are underpinned by its subsea cable network, one of the largest in the Asia Pacific region, with licences in Asia, Europe and the Americas, and access to more than 2,000 Points-of-Presence around the world. Its global network stretches over 400,000km across the globe and carries over a third of the internet traffic in Asia.

Telstra Purple, Telstra's professional and managed services business, brings together people and innovative solutions to define and deliver a clear vision of customers' transformation journey, network foundation, and the protection they need to thrive.



TRANSFORMATIVE DIGITALISATION PROJECTS IN SINGAPORE AND ASEAN

Healthcare

Telstra is assisting a healthcare provider in Singapore to streamline and digitise its HR system by setting up and configuring a Power Platform and SharePoint Online Architecture. This will feature an account approval workflow feature to automate data extraction, approval workflow with notification, and data purging.

With this system in place, the healthcare provider's HR system will be able to pull new joiners' data from the HR management platform, prompt its Heads of Department to fill in access information for new joiners, send approval to various system owners, and purge records older than the stipulated time period.

Real Estate

Telstra provided a one-stop service for a leading global real estate services firm in Singapore that wanted its employees to be able to access voice and collaboration tools in one workspace on any device. Apart from a future-proof unified communications experience in adopting new technology and enhancing productivity, the business was looking to offload its IT management to reduce costs and the hassles of managing disparate systems and hardware.

Telstra's customer-centric approach gave it the flexibility and agility to complete the implementation of the Telstra Calling for Microsoft Teams solution for this firm within a tight timeline. By combining their its expertise in voice, networks, cloud, and professional services with Microsoft's proficiency in cloud, collaboration, and productivity, Telstra collaborated to create innovative solutions to support the customer's digital transformation journey.

Retail

Telstra has been supporting a global retailer which needed a technology partner to conduct a deep-dive assessment, review its on-premises IT infrastructure and applications, and recommend a consolidation and centralisation to Azure Cloud.

As part of the customer's Cloud Readiness Assessment, Telstra will be assessing its IT landscape in Singapore and extrapolating the findings to synthesise a consolidated view across other operating countries. This will enable the client to achieve higher consistency, security, optimisation, and cost-effectiveness.

DIGITAL TRANSFORMATION GOALS

Telstra launched its T22 transformation strategy in 2018 to fundamentally transform and radically simplify and digitise the company. Under this strategy, Telstra sought to transform and improve the core business while investing in new technologies, therefore simplifying its systems and removing customer pain points.

The T22 program – which concluded in June last year – has been a clear success and Telstra today is a much simpler, more agile, more customer-focused and more digitally-enabled business.

The organisation's T25 program is a strategy focused on growth by leveraging the capabilities built under T22. It is built around four key strategic pillars:

1. Provide an exceptional customer experience

2. Provide the leading network and technology solutions that deliver the future to customers

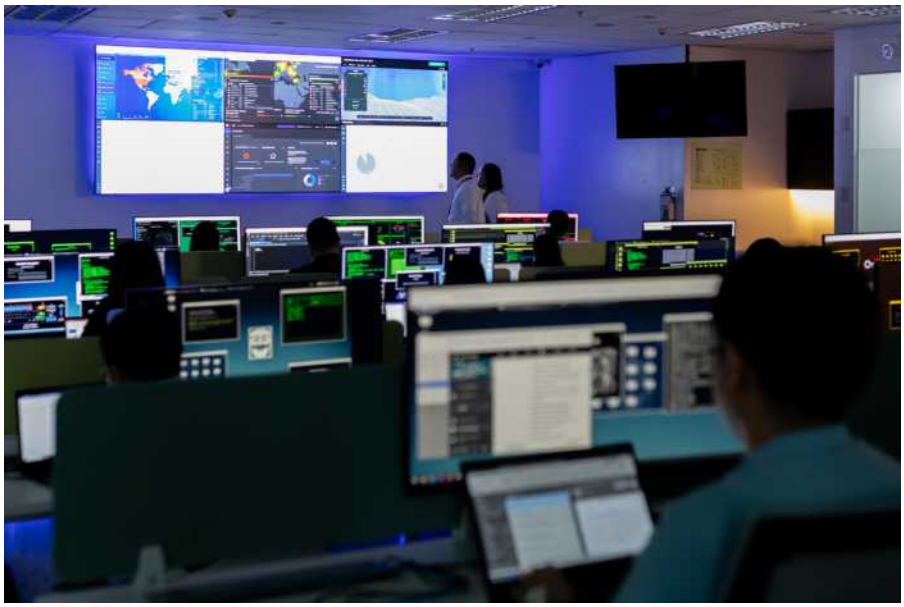
3. Create sustained growth and value for shareholders

4. Be the place that people want to work

ENHANCING DIGITALISATION THROUGH SPECIFIC INITIATIVES

Cloud Computing

Telstra accelerates digitalisation by maintaining data residency and governance at



its core. The company hosts data in secure data centres that are compliant with international data centre standards. Through Telstra Hybrid Cloud, customers get a fully managed service that combines the best of both worlds – amalgamating the visibility and management of both public and private cloud environments. Telstra's Public Cloud services help migrate, modernise, and build new cloud-native applications and data platforms for customers to solve business needs, accelerate growth, and enable data-driven organisations.

Cybersecurity

Telstra helps protect businesses from cyberattacks, whether they're introduced by people, through the network, or via external operating environments. It does this through four main avenues: posture, people, network, and environment.

1. Posture → Transforming security capabilities to respond to escalating threats

2. People → Protecting entry points to enable a secure, modern workplace, through identity management and endpoint protection

3. Network → Establishing the resiliency, connectivity and security of data transactions and communications

4. Environment → Building a strong layered defence to secure business operations

Cross-border data flows

Telstra's wholesale connectivity strategy is to accelerate its core and create new business. It will achieve this by uplifting its leading intra-Asian network with capacity investment, swaps and technological optimisation. The company also plans to accelerate its managed Submarine Cable Network Services and uplift its cable landing stations' footprint. In terms of new investment, Telstra is planning on investing in new strategic cables and routes, like from the Philippines to the USA, and to advance its investment in new growing markets. It also intends to diversify its offerings by investing into terrestrial cable infrastructure in Asia.

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TRADEFLOW CAPITAL MANAGEMENT

Generating Innovative Digital Trade Solutions

TradeFlow Capital Management (TradeFlow) is the world's first Fintech-powered commodities trade enabler focused on SMEs. TradeFlow consists of a diverse team of experts with the focused mission of addressing the increasing trade finance gap faced by global SMEs operating as producers, traders, or end-users in the bulk commodity trading space. By performing an enabling role in international trade and globalisation, TradeFlow creates growth opportunities for businesses and economies.

To date, TradeFlow has successfully invested in more than US$2.3 Bn of physical commodity trade through 2000+ transactions across 18+ countries and 30+ commodity types, and reviewed more than 1400 SME counterpart entities KYC reviewed. As part of its unique business model, The TradeFlow Funds, advised by TradeFlow, were conceived in 2016 and launched in 2018.

PROPRIETARY SYSTEMS AND APPLICATIONS

TradeFlow utilises a unique Digital Transaction and Risk Transformation Engine (DTRTE) to enable global physical commodity trade for SMEs via its innovative non-credit, non-lending model. TradeFlow's DTRTE architecture provides the added advantage of superior risk-adjusted returns and capital preservation for investors, and is highly complementary to traditional lending institutions like banks.

TradeFlow has automated and digitised most of the steps involved in their trade finance operations. The company is constantly improving their CTRM System (Commodity Trade Risk Management System), using API to connect different modules in real time. The company is currently working with AI for bots in the CTRM system. TradeFlow's CTRM also is integrated with DocuSign to enable the documentation and management of international cargo transitions. As such, TradeFlow is constantly improving their proprietary CTRM system to ultimately manage client relationships.

For increased efficiency in decision-making, TradeFlow uses their own proprietary Score Card System to generate initial assessments on trades. Using Big Data as a source, this system analyses multiple variables simultaneously and uses machine learning systems-powered data extraction techniques to produce relevant information.

DIGITALISATION TO MINIMISE ERROR AND MAXIMISE CAPITAL

Key to TradeFlow's operations is a culture of open communication where staff members are consistently made aware of new innovations so that they can test, improve and adopt the new initiatives effectively. The TradeFlow team benefits from the digitalisation process by enjoying real time access to trades information, automated tasks, and an integrated cloud system that is operational 24/7.

TradeFlow's constant efforts to digitalise every possible step in their business operations are driven by a need to be scalable and to offer an enhanced service to investors and customers. To that end, TradeFlow has automated 100% of the KYC and AML (anti-money laundering) process of potential customers, digitalised 100 % of their trade documents, and automated the invoicing process and tracking of cargoes and emissions footprints. The ultimate goal is a complete digital transformation that minimises time and human error while maximising the use of capital for enabling trade and making a stable investment grade return for their investors.

OVERCOMING BARRIERS

Trade Finance has traditionally been an industry that is highly reliant on paper. The

industry has often entailed the large-scale inefficient movement of papers with multiple copies, manual approvals, and redundant checks required. The primary barriers to digitalisation are the lack of common adoption principles to digitalise documentation and the absence of a single standard-setting authority. While there are different efforts led by private conglomerates and associations like the International Chamber of Commerce (ICC), these endeavours are slow and have yet to be broadly accepted. TradeFlow encourages their clients to use Electronic Bills of Lading (eBLs) as a first step to automate the process. The company also digitises clients' documentation for them and automates most of the trading process. This allows clients to overcome the heavy use of paper whilst reducing the terms of their payments.

DEMURRAGE PROJECT

In 2021, the Singapore Institute of Technology (SIT) and TradeFlow entered into a collaboration to enhance shipping industry efficiency with Artificial Intelligence (AI). The collaboration aimed to apply AI and machine learning to monitor, measure, analyse, predict, and eventually manage the risk that a company would incur demurrage on shipments of bulk commodities around the world. The demurrage project also worked to maximise routes with the goal of reducing fuel consumption. As such, once implemented, this AI-driven solution will be able to predict and reduce risk in International Shipping to increase operational efficiencies and reduce cost.

DIGITALISATION FOR SUSTAINABILITY

One of TradeFlow's key priorities is the monitoring and reduction of its operational carbon footprints whilst reducing risks and increasing profits for its stakeholders. To this end, the company has used several digital tools. For one, TradeFlow went paperless in 2020. By one estimate, DocuSign has reduced their carbon usage by more than 1000 Kgs of carbon and 200Ls of water annually. Similarly, the use of eBLS has reduced processing and approval times from days to minutes, saving tonnes of paper and cutting down vessels' fuel consumption. By using "Internet of Things" (IoT) devices to monitor variables like volume, temperature, humidity etc, TradeFlow generates precise information to better manage operations, and ensure that resources are not wasted. Digitalisation also allows for a tighter control of data and figures, allowing TradeFlow to extract the information necessary to assess their sustainability efforts. Furthermore, by persuading all the members of their value chain to go paperless, TradeFlow aspires to achieve a stronger collective difference to the carbon equation and contribute to NetZero goals by 2030.

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NATIONAL BUSINESS GROUPS (NBGs) ENGAGEMENT IN THE DIGITAL ECONOMY

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BELGIUM & LUXEMBOURG AT THE NEXUS OF DIGITAL INNOVATION

Belgium, the home of 4 digital economy unicorns, Collibra (data intelligence cloud), Deliverect (e-commerce & food delivery), Odoo (open-source business app suite) and Team.Blue (digital business services), has a long and successful history of private and governmental focus on innovation and technology. From the "Flanders Technology and Innovation" initiative to the "Digital-Wallonia4.be '' platform launched in 2015, digital transformation has always been a priority. Belgium's "digital appropriation plan" aims to raise awareness, federate, equip and support citizens. Last but not least, with IMEC, Belgium boasts one of the world's most renowned chip design and development labs.

Initially developed to support Luxembourg's flourishing financial, broadcasting and space sectors in the late 70s, the ICT industry has enabled Luxembourg to evolve into a global centre of excellence in cybersecurity and data protection. Luxembourg is home to outstanding digital infrastructure – including smart electricity grids, the highest density of Tier IV certified data centres in the world, top-notch connectivity, and cross-border digital connectivity. Simultaneously, Luxembourg's pedigree as a leading global financial centre is bolstered by digital fintech, spearheaded by the LHoFT and LuxTrust.

There are many cross-border digital transformation services and initiatives launched between Belgium,Luxembourg and Singapore. Solvay Singapore's activities include regional sales of sustainable specialty solutions, R&D, supply chain, digital technology implementation, and business continuity management. They interface with customers and logistics companies' systems from group HQ to Singapore and the region. Katoen Natie, an industrial service group with a global network of 180 logistics terminals, is innovating digital data management and automation.

VYNCKE in Singapore is embracing IoT, AI and data analytics to revolutionise the energy and industrial sectors to optimise energy production processes and enhance sustainability practices. Victor Buck Services creates and distributes digital documents and offers digitisation services to support its clients with their digital transition. As one of the strongest communications networks in the world, BICS drives the ecosystem, bridging telecommunications services with the needs of enterprises. Their solutions – from global voice services, seamless roaming, IoT enablement, to global messaging – are essential for supporting today's data-hungry consumers and digitally driven enterprises.

The Chamber also has organisations that provide digital transformation services such as Delaware Singapore, a company that helps businesses transform their operations by using tools like AI, cloud computing, and advanced analytics. NxtPort International provides neutral and secure data exchange capabilities to enable the digitalisation and decarbonisation of maritime and port industries across the Asia Pacific region. Unifiedpost Group is a major service provider for Singapore's nationwide e-invoicing initiative InvoiceNow. SettleMint is the leading high-performance, low-code platform for blockchain transformation that empowers engineering teams to build, integrate and launch applications on web3 infrastructure. Nalian enables air cargo communities to digitise their operations. Additionally, other organisations like AI Club Asia, Clearstream, Ebury, LuxProvide, SES, Talkwalker are all driving digital transformation across different industries to optimise operations and bring about disruptive changes in the industries.

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THE NETHERLANDS LEADING ICT TRANSFORMATION

The Netherlands is a global leader in ICT, with a focus on basic research in areas such as AI, cryptology, quantum and photonics, and the application of digitalisation within government for health, agrifood, urban planning and mobility. The Netherlands has been and still is a frontrunner on many technological developments, like Fintech and Agritech. This creates a myriad of opportunities for Singapore and the Netherlands to collaborate on.

The Dutch government embraces digital transformation by investing in businesses, research and innovation, reforming data protection, empowering people with the skills necessary for a new generation of technologies and designing rules to match. The Netherlands supports the newly developed "Digital Economy Partnership Agreement" between Singapore and the EU and aims to continue and expand bilateral projects.

Singapore is home to 1,800 registered Dutch businesses (including start-ups and scaleups). The Dutch Chamber of Commerce in Singapore (DutchCham) is proud to have many of them as corporate members, as they are important trading and innovation partners in the Singapore industry. By collaborating with startups and scale-ups, the Netherlands and Singapore share knowledge and expertise, and work together to develop new solutions that can benefit both countries. In Singapore, the Dutch Embassy is focused on bolstering specific industries that converge with the following digitalisation efforts:

- Digitalisation (a.o. AI and trust technology)
- Agritech
- Advanced manufacturing and electronics (a.o. semiconductors)
- Circular economy
- Life sciences & health
- Key enabling technologies (quantum and photonics)

The DutchCham "Tech Committee" started a close collaboration with representatives of the Dutch Embassy to focus on the above topics. The committee's goal is to form an established platform where DutchCham is the facilitator of various network opportunities and events. DutchCham aims to provide their corporate and professional members various opportunities to expand their network, share knowledge, grow business opportunities and collaborate more effectively within the Singapore market. Corporate members of DutchCham who are active in these fields are for example VDL and ASM (semicon), Adyen and ChannelEngine (digitalisation and e-commerce), and a growing number of professional members involved in Agrifood (like Meatable and the NTU "Singapore Agri-Food Innovation Lab").

Given the impactful role Dutch companies play in the digital economy of Singapore, DutchCham is very motivated to foster the existing and emerging collaborations between the companies involved.

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FRANCE & SINGAPORE DRIVING DIGITAL & GREEN EXCELLENCE

The France-Singapore Digital and Green Partnership (DGP) was signed on 14 March 2022 which aims to provide a structured platform for France and Singapore to cooperate on a wide range of digital and green issues in various sectors such as AI, cybersecurity, smart cities, smart transport, cyber, financial innovation, the energy transition and more.

The intent is to support public-private partnerships and private sector-led approaches that harness digital and green technologies to enhance the competitiveness of both economies and seize growth opportunities in the fast-growing digital and green economies.

A joint workplan has been defined by the French and Singaporean authorities to implement this partnership. As such, the French Chamber of Commerce in Singapore plays a pivotal role in implementing this partnership, building on its position as a leader within the French business community and its extensive experience in facilitating collaborations between French and Singaporean companies.

France has witnessed significant digital transformation efforts across various industries. The manufacturing sector has been at the forefront, leveraging technologies like the Internet of Things (IoT) and automation to optimise production processes and enhance operational efficiency. The financial services sector has also embraced digitalisation, adopting FinTech solutions, online payment systems, and blockchain technology to revolutionise financial operations and deliver innovative services to customers. Additionally, cybersecurity has emerged as a critical focus area, ensuring the protection of digital assets, and fostering trust in the digital economy.

Members of the French Chamber of Commerce in Singapore are actively driving digital transformation initiatives within the country. Several French technology companies, part of the dynamic French Tech ecosystem, have established a strong presence in Singapore. These companies specialise in cybersecurity, AI, blockchain, and digital identities solutions that offer advanced technologies to protect digital assets, safeguard data, and mitigate cyber threats. Their expertise contributes to enhancing digital capabilities in Singapore, reinforcing the partnership's commitment to securing a digital infrastructure.

Moreover, the French business and member community is actively engaged in shaping Singapore's digital landscape contributing to the development of smart cities and smart mobility through their expertise in urban planning, transportation, and sustainable infrastructure. Additionally, they participate in Singapore's energy transition initiatives, promoting renewable energy adoption and sustainable practices in Singapore.

Finally, the French Chamber organises numerous committees' meetings, events in Tech & Innovation, Smart-cities, and Sustainability, as well as the annual flagship Asia Startup Summit. These platforms provide opportunities to highlight the role of members and French technologies in driving digital excellence in Singapore and creating a significant impact in the wider region.

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IRELAND'S DIGITAL TRANSFORMATION IS ENABLING CRITICAL SOLUTIONS WORLDWIDE

The Government of Ireland is committed to being the best place in the world to start and scale ambitious technological companies. Accordingly, the Government is focused on ensuring Ireland's position as a digital leader. Enterprise Ireland's mandate is to identify and support entrepreneurs by developing the optimal digital ecosystem for SMEs, therefore increasing Ireland's digital competitiveness.

A recently published National Digital Strategy by the Irish Government presents a consolidated and robust approach to maximising the economic and societal benefits from digitalisation and ensuring that everyone can enjoy these benefits.[1] Ireland also continues to be among the most attractive locations in Europe for Foreign Direct Investment, giving firms an extremely business-friendly environment to establish a base in. The country also provides access to a highly-educated workforce and world-class infrastructure.

Companies supporting digital transformation are enabling problem-solving across various domains. As the cybersecurity threat landscape increases, companies must be acutely aware of what and where sensitive customer data is held. GetVisibility is an Irish AI-powered Data Discovery and Classification tool which allows companies to pinpoint crucial data such as phone-numbers, names, and bank accounts. To ameliorate the physician shortage in healthcare, technologies are quickly being adopted to support improved patient care. Leading companies like xWave, T-Pro and MEG Support Tools are being integrated into hospitals and healthcare facilities to support the sector's rapid growth.

INDUSTRY EXPERTISE

Financial Services

In the SME sector, Irish companies like Enterpryze have partnered with leading banking institutions to provide a suite of "Go Digital" tools for small and micro businesses in Singapore, providing a seamless way to bring finance, operations, sales and purchasing online through a simple ERP platform.

Irish companies continue to strengthen and support the thriving Financial Services industry in Singapore, helping to address the challenges of digital transformation. Companies like Fenergo are providing 1st tier banks with a comprehensive client life-cycle management solution that enables them to meet increasingly complex compliance obligations. RegTech providers are working with home-grown Singaporean FinTech companies to do the same.

PM Group

PM Group, is a corporate member of the Irish Chamber of Commerce Singapore and is an employee-owned Irish company, which specialises in managing the design, construction, and commissioning of high-tech manufacturing facilities for leading pharmaceutical, food, and medical technology companies. With 50 years in business and 3800 employees across 17 offices, PM Group is committed to a digital transformation journey that has already yielded benefits.

A key pillar of PM Group's digital strategy is the utilisation of digital tools, technology, and data capture to unlock richer insights and drive enhanced project delivery results. By digitising workflows and enabling real-time collaboration, PM Group empowers seamless information flow within its teams, leading to improved project delivery for their people, their clients, and the industry at large. With a strong commitment to innovation, the organisation is well poised to meet evolving client needs.

1 "Department of the Taoiseach, "Harnessing Digital - The Digital Ireland Framework," February 1, 2022, https://www.gov.ie/en/publication/adf42-harnessing-digital-the-digital-ireland-framework/."

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ITALY ON FACILITATING DIGITAL INNOVATION FROM A HOLISTIC PERSPECTIVE

As the third largest EU economy, Italy's progress in the digital transformation over the coming years is crucial to enabling the EU as a whole to reach the 2030 Digital Decade targets. Italy is pursuing digitalisation initiatives for both public services and industries. Furthermore, Italy is specifically focusing on digital transformation among SMEs, as they are the backbone of the Italian economy. Generally, the digitalisation efforts are aimed at modernizing and streamlining processes, enhancing connectivity, and promoting digital innovation.

During 2020 and 2021, there was a sharp acceleration in the adoption of major enabling platforms for digital public services by public administrations. New reforms under the national Recovery and Resilience Plan are expected to give a further boost to the digitalisation of services and modernisation of public administrations across the country. In 2020, Italy launched its first National Strategy for Digital Skills and a related operational plan that lists more than 100 specific actions and sets ambitious targets for 2025.[1]

Some key areas of digitalisation in Italy include:

E-government: Italy is working on expanding online government services, making it easier for citizens and businesses to access public services and interact with government entities electronically.

Digital Infrastructure: Investments are being made to improve digital infrastructure, including broadband and mobile networks, to support faster and more reliable internet connectivity.

Digital Healthcare: Italy is exploring ways to leverage digital technologies in the healthcare sector, such as electronic health records and telemedicine services, to improve patient care and accessibility.

In the five years from 2016 to 2020, the entire e-commerce and digital retail network in Italy accounted for 40.6% of the growth in total revenue of private Italian economic activities, and generated more than €70 billion in revenue.[2]

The Italian Chamber of Commerce in Singapore (ICCS) strongly supports the digital collaboration between Italy and Singapore. In this view in 2022 ICCS has launched its ICCS Digital Innovation Committee, led by Fabrizio Caruso ICCS Board Member, and co-chaired by Alessandro Puccio from Accenture.

1 Mara Jakobsone, "Italy - National Strategy for Digital Skills | Digital Skills and Jobs Platform," Digital Skills and Jobs Platform, July 14, 2022, https://digital-skills-jobs.europa.eu/en/actions/national-initiatives/national-strategies/italy-national-strategy-digital-skills.
2 "E-Commerce Is the Main Growth Driver of the Italian Economy," EU About Amazon, January 23, 2023, https://www.aboutamazon.eu/news/empowering-small-business/e-commerce-is-the-main-growth-driver-of-the-italian-economy.

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SINGAPORE-GERMAN CHAMBER OF COMMERCE AS A PLATFORM FOR COLLABORATION AND INNOVATION

The Singaporean-German Chamber of Industry and Commerce (SGC) is part of a global network consisting of 150 offices representing German bilateral Chambers of Industry and Commerce in 93 countries. With a membership of over 600 companies from various industries in Germany and Singapore, the SGC stands as one of the largest national business chambers in Singapore.

German industries at the forefront of digitalisation efforts are, among others, Automotive and Manufacturing, Finance and Banking, Healthcare, IT and Software, and Transport and Logistics.

Singapore and the ASEAN region present attractive business environments and opportunities for German companies in various sectors. Embracing digitalisation and innovation is imperative to capitalising on the region's potential. Accordingly, Singapore is witnessing a surge in local startups and businesses leveraging digital innovation to disrupt traditional industries. To remain competitive in such an environment, German companies must innovate and adapt to changing market demands.

The Singaporean-German Chamber of Industry and Commerce strives to support its member companies in these processes by providing platforms and networks for exchange, such as the SGC Innovation & Digitalisation Committee, the Innovation Circle International (ICI), as well as several other active committees. Guest speakers and VIPs such as the Bavarian Minister for Digitalisation Judith Gerlach, the CIO of Siemens Hanna Hennig, as well as government organisations such as EDB, discuss topics and explore initiatives with SGC members on diverse aspects of digitalisation and innovation.

SGC members actively explore a range of topics, including best practices for digital transformation (corporate) and digital administration (government), how government and industry can work together to build innovation ecosystems, and how companies can leverage generative AI technologies.

However, innovation and digital transformation are not solely about adopting new or existing technologies but also about nurturing a culture of innovation within organisations. The German-Singaporean Industry Forum on Sustainability and Innovation, to be held at the SAP Experience Center on 9 October 2023, will, among other topics, explore the "human factor" of digitalisation, i.e. what governments and corporations can and must do to engage and motivate citizens and employees to actively take part in digital transformation.

As a well-established business and networking platform, SGC maintains strong connections with authorities in both Singapore and Germany. It actively advocates for businesses through its industry committees, giving them a voice in relevant discussions.

AHK Singaporean-German Chamber of Industry and Commerce
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IN PURSUIT OF A DIGITALISED SPAIN

In recent years, the digitalisation of economies has become a central focus for countries around the world. Spain, in particular, has made significant strides in embracing digital transformation and harnessing its potential for economic growth.

The digital economy in Spain has experienced steady growth in recent years. From 2020 to 2022, it witnessed a cumulative growth of 19%, reaching a total value of 140 billion euros.[1] This growth can be attributed to two significant factors. First, the acceptance of digital technologies by businesses and users. Secondly, the recovery of Spain's GDP after the pandemic-induced downturn has also contributed to the expansion of the digital economy.

It is important to note that while the growth rate of the digital economy in Spain has slowed down, it still remains significant. This indicates the maturity of the digital ecosystem and its potential for further development.

Small and Medium Enterprises (SMEs) play a crucial role in accelerating and increasing the contribution of the digital economy to Spain's GDP. These companies constitute 99.8% of the country's business fabric. Nevertheless, scale-ups as well as young companies with strong technological foundations and innovative digital processes have emerged as key players in the Spanish economy. These companies exhibit an annual growth rate of over 20% in terms of revenue or employee count. Their rapid growth and innovative business models have a significant impact on the digital economy and act as catalysts for other sectors.

The digitalisation of the Spanish economy has become an imperative for businesses of all sizes. To further realise the digital transformation and the government's commitment to achieving a digital economy representing 40% of the GDP by 2030, the Spanish government has launched "Digital Spain 2025", a strategy that positions Spain at the forefront of the digital revolution by investing in connectivity, skills, cybersecurity, and digitalisation across various sectors.

Several industries have been leading in digital transformation efforts in Spain, from banking and financial services, telecommunications, tourism, and energy to retail through ecommerce.

Spanish companies present in Singapore have reached several milestones in the pursuit of digitalisation. Arquimea has created Volinga, the first professional suite using advanced machine learning (NeRF) to easily generate the 3D background for Virtual Production, VFX, TV & Entertainment. Volinga has been showcased and used in Singapore; in specifically being deployed by local studios and innovative tech media platforms such as OMG or Disguise. Caixabank and Santander bank have launched their own robo-advisor, investing in digital channels, mobile banking apps, and online payment systems to provide convenient and secure banking services to customers. In the travel industry, Amadeus as an IT company is leading digital transformation for travel and expenses, balancing process efficiencies, compliance and employee experience.

Spain aims to create a more inclusive, sustainable, and prosperous society. As the country accelerates its digital transformation, it is poised to seize upon the opportunities presented by the digital economy and emerge as a leading digital nation in Europe and beyond.

1 Boston Consulting Group, "Economía Digital en España 2023," Adigital (blog), accessed August 7, 2023, https://www.adigital.org/economia-digital-en-espana-2023/.

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SWEDEN – HERALDING COOPERATIVE DIGITALISATION EFFORTS

"Launch of Green Innovation Center in Bukit Batok © Bukit Batok GROs"

Sweden has long been a frontrunner in digital development. With 67% of the population already possessing basic digital competencies, Sweden is well on its way to reach its goal of 80% basic competence among its population by 2030.[1] On the business side, Sweden is also forging ahead: together with Finland and Denmark, Sweden ranks highest in the digital transformation of enterprises.[2]

Today, Singapore hosts over 250 Swedish companies. Due to the focus on digital transformation shared by many of the Swedish Chamber's (SwedCham) member companies, the topic has long been a priority area for the organisation. Alongside partners in Team Sweden – the Embassy of Sweden to Singapore and Sweden's trade & investment agency Business Sweden – there are a number of collaborative bilateral engagements.

BUSINESS COLLABORATIONS

Singtel has partnered with Ericsson to build 5G in Singapore. Ericsson, Singtel and Singapore Polytechnic (SP) opened Singapore's first live 5G facility at SP's Dover Road campus in 2019. This "5G Garage" serves as a training centre, test bed and ideation lab in an effort to develop the country's 5G ecosystem and accelerate the enterprise adoption of 5G. Additionally, in 2020, NTU and Volvo Buses collaborated in launching the world's first full size, autonomous electric bus. The Volvo 7900 electric bus is equipped with numerous sensors and navigation controls managed by a comprehensive AI system.

FACILITATING RESEARCH AND EDUCATION EXCHANGES

Saab and NTU established a partnership in 2018 to undertake research and development in the area of high-end digital technologies. The Digital Air Traffic Management (ATM) project aims to augment Airport Management and Tower Control Systems using AI/ML. The Autonomous Underwater Robotic Deployment (UWRD) project focuses on Autonomous Navigation in GPS-denied and turbid waters.

The Wallenberg – NTU Presidential Postdoctoral Fellowship was set up in 2018 by The Knut and Alice Wallenberg Foundation, one of the largest private financiers of research in Europe, and NTU. It is awarded to young scientists driving research in the areas of AI, machine learning, big data/data analytics, software & security and mobility/autonomy.

BILATERAL INNOVATION EFFORTS

In 2022, Enterprise SG launched the first Global Innovation Alliance acceleration program to support the access of Singapore start-ups and tech SMEs into Sweden and to connect the countries' digitalisation ecosystems. Enterprise SG partnered with Swedish digital accelerator Epicenter to run the programme, with support from Swedish government agencies.

In June 2023, SwedCham launched the Green Innovation Centre together with South West District, a local garden community in Bukit Batok, and a number of local SMEs. With a focus on supporting the implementation of the Singapore Green Plan on a grassroot level, an important component of this initiative was also to create a showcase of smart digital solutions.

"Launch of Global Innovation Alliance acceleration program with Enterprise SG. © Epicenter"

1 Lidija Kralj, "Sweden: A Snapshot of Digital Skills," Digital Skills and Jobs Platform, June 6, 2023, https://digital-skills-jobs.europa.eu/en/latest/briefs/sweden-snapshot-digital-skills.
2 Ibid.

SWEDCHAM
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SWITZERLAND'S THRIVING DIGITAL ECONOMY: PIONEERING AI DEVELOPMENT AND INNOVATION

Switzerland has long been recognised as a global leader in innovation. With a worldwide impetus to achieve groundbreaking advancements in the field of digital economy, the country is leading the way through the emergence of numerous fintech startups and blockchain companies. Many of SwissCham Singapore's member companies are leading and enhancing efficiency in business models with their active involvement in AI development, digital connectivity, and transformation. For instance, companies like Sygnum have gained prominence as licensed digital asset banks, providing services in areas such as cryptocurrency custody, trading, and investment. Many Swiss-based companies are led by innovation – For example, Netcetera has established an international presence in e-commerce payment and Buhler employs digital twin technology to create virtual replicas of physical systems and processes.

SWISS INGENUITY SHAPING THE FUTURE WITH AI RESEARCH

With a big number of research institutions and universities, Switzerland has a rich tradition of investing in R&D and technology. Several institutions in Switzerland are actively involved in AI research. The Swiss Federal Institute of Technology in Zurich (ETH Zurich) is renowned for its breakthrough work in AI, robotics, and machine learning, with projects spanning various domains such as healthcare, autonomous systems, and data analysis.

SWITZERLAND'S ADVANCED INFRASTRUCTURE FOR REINFORCING THE DIGITAL BACKBONE

Switzerland has invested in building advanced digital infrastructure, including high-speed internet connectivity, data centres and cyber security capabilities. The Swiss company Acronis is a global leader in cyber protection solutions that helps organisations to safeguard their critical data by offering advanced backup and recovery solutions. Acronis also enables businesses to leverage the benefits of both on -premises infrastructure and cloud technology by providing hybrid cloud solutions.

DATA PRIVACY AT THE CORE

With a robust legal framework for intellectual property protection, Switzerland has a strong commitment and history of enforcing data protection and privacy. As an example, companies like ABB provide multi-layered approaches to security to ensure user privacy and data security in industrial applications which are critical to its customers.

SWITZERLAND'S RISE AS A GLOBAL HUB FOR BLOCKCHAIN AND ICOS

The Swiss city, Zug, is recognised as Crypto Valley, becoming known for its concentration of blockchain and cryptocurrency startups and companies. Switzerland has established itself as a preferred destination for a maturing global crypto scene due to its clear regulatory framework and guidelines. The regulatory environment in Switzerland provides legal certainty for ICOs and other digital ledger technologies. In that respect, The Swiss Financial Market Supervisory Authority (FINMA) has taken a proactive approach in offering clear guidelines for regulatory compliance.

REVOLUTIONISING SWISS INDUSTRIES

Swiss banks like UBS have embraced digital transformation by investing in mobile banking apps, online platforms, and robo-advisory services to enhance customer experiences and streamline financial operations. Swiss multinational healthcare company, Roche, has implemented digital health solutions and data analytics to drive personalised medicine and improve patient outcomes. And on the industrial side, ABB has been at the forefront of Industry 4.0 initiatives, specifically, integrating IoT and automation technologies to optimise manufacturing processes and enhance productivity.

The SwissCham and the Digital subcommittee aims to provide a platform for organisations to discuss, showcase and increase their knowledge and efforts in digitalisation. The Swisscham is well recognised as part of the ecosystem and collaborates with partners, the government, and other chambers to support digital transformation efforts in Singapore and beyond.

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