

Not Just For Now, But For the Future
Not Just Advancing Connectivity, But
Creating Smarter, Safer Cities | **Not**
Just Transforming Digitally, But Making
Systems Sustainable and Reliable | **Not**
Just Outsourcing, But Mitigating Business
Risk | **Not Just Having Smart Data,**
But Augmenting the Advantage With AI
Not Just Satellite-driven Insights, But
True Business Intelligence | **Not Just**
Powerful, But Rugged Under Pressure
Not Just Orbiting Earth, But Pushing
Frontiers in Sensing and Imaging | **Not Just**
Autonomous, But Sailing Towards Greater
Safety and Efficiency | **Not Just Fending**
Off Attacks, But Building Cyber Resilience
Not Having to Imagine, But Building in
Limitless Possibilities

Not Just For Now, But For the Future

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Innovative Technology Meets Engineering Ingenuity

Here at ST Engineering, our rich heritage is one that is well-steeped in innovation.

Our earliest engineering breakthroughs were spurred by the urgent defence needs of Singapore's founding days. In the years that followed, the group's advanced solutions and equipment across air, land and sea have helped global governments and armed forces defend cities and keep their people safe.

Today, our diverse portfolio and multidisciplinary expertise enable our customers in more than 100 countries to be better prepared, protected and connected for a more sustainable future. And within ST Engineering Digital Systems and Cybersecurity, we harness technology and innovation to accelerate digitalisation transformation for organisations and shape new solutions that bridge critical gaps across industries.

We approach innovation by seeking value creation, our aspirations backed by engineering ingenuity and deep

understanding of exactly what customers need. This is why many of our solutions have not only made headlines, but also have made palpable impact in the ways we live and work.

Our research in artificial intelligence has helped hospitals optimise their capacities and improve patient care. Our cybersecurity and critical systems enhance public and homeland security in the digital world. And our satellite systems contribute geospatial insights that fuel business growth and facilitate rescue missions.

While our history inspires our efforts, tackling future challenges fuels our purpose. We work in service of the generations to come, putting out solutions that stand the test of time.

Journey with us in the coming pages as we provide a closer look at the capabilities of ST Engineering Digital Systems and Cybersecurity, and how they have shaped innovations that meet the aspirations of organisations around the world.



Thrive in the New Dynamic— Embracing Innovations

Disruption—there is not one industry that has not experienced it in this digital age.

Within a short span of 3 years, several major global disruptions such as the irreversible effects of COVID-19, invasion of Ukraine, bifurcation of technologies and economies, and climate change, have created a new world order that is still evolving.

Many business operations and strategies are severely impacted, forcing deep-seated adjustments and affecting hundreds of millions of livelihoods. However, there are also many organisations that are nimble, innovative and thriving in an ever more dynamic world.

Clearly, digital innovation has accelerated at an unprecedented pace, creating new possibilities, and providing solutions to many real-world challenges. Cloud, Artificial Intelligence (AI) and Cyber technologies are transforming businesses and organisations, changing the way we live, work and collaborate.

At ST Engineering, we see these digital innovations as important engines of growth for our businesses in the Commercial and Defence Public Security clusters. We are investing to build up capabilities, and establishing partnerships within the global eco-system, to deliver reliable and resilient end-to-end digital solutions to solve real-world problems.

Today, the breadth of ST Engineering Digital Systems' technological and engineering capabilities include

Cloud & Data Centres, Software & AI, Unmanned Autonomy, Advanced Communications Connectivity, Immersive Simulation and Digital Twin, Defence C4ISR Systems, Space Technologies, Advanced Electronics Manufacturing and Military Electronics Maintenance & Repairs Operations. These capabilities have been built off the back of our past 30 years of experience, co-developing IPs with Singapore's strategic partners and serving customers worldwide.

To stay ahead of the technological curve and to be market-relevant, we take a holistic approach to innovation. Ours is a culture of creativity, intrapreneurship, and continuous upskilling. We work with customers and partners to co-create digital systems and solutions to solve their pain points, transforming their operations and processes to yield higher efficiency and attain positive business outcomes. This can be achieved through expediting organisations' situation awareness, through our sensemaking capabilities that rapidly process myriad information and data. Decision making becomes informed and effective, response actions are timely, and there is less wastage of cost, manpower and environmental resources. Such solutions have allowed us to deliver value and make a meaningful impact in sectors as varied as agriculture and education, healthcare, public security, and defence.

Take the public safety and security domain for example—the Singapore Civil Defence Force (SCDF) employs our Emergency Response System, which performs AI natural language processing not just in English, but also Singlish

(colloquial Singaporean English), Chinese and Malay. At the SCDF call centres, the system's real-time transcribing, automated form filling and consolidating multiple calls about the same event have reduced both call processing times and the workload for call handlers by some 50%.

Then there is our Hospital Operations Centre solution, an intelligent operations centre controlling the flow of resources across both Tan Tock Seng Hospital and the National Centre for Infectious Diseases (NCID). It proved its mettle when COVID-19 brought a doubling of the patient load—instead of becoming overwhelmed by the situation, NCID was able to rapidly make available another hundred beds and safely managed the surge.

Indeed, what distinguishes Digital Systems is our proven track record and experience in implementing large-scale and complex systems.

What does a future-proof world look like?

At ST Engineering, we are making sustainable practices a priority; at the same time, we are ever learning and ever innovating; adopting and integrating new technologies for improved efficiency, connectivity and quality of life.

Our relentless innovation has resulted in much headway in the fast-moving realm of generative AI. After the astronomical success of ChatGPT, global tech giants swiftly followed up with their own Large Language Models and Chatbots, ushering in the era of generative AI.

A whole new world of possibilities for companies and individual users beckons. The technology potentially augments human creativity, improves customer experiences, and even saves lives by better predicting the need for emergency services, just to name a few examples.

AGIL[®] Vision, our latest brainchild, leverages generative AI to search for objects and people across video footage. From locating missing persons in real time to obtaining operational insights, AGIL[®] Vision boasts myriad use cases and is designed with security and data privacy in mind.

Today, AI is our muse. The next big disruption, however, is anyone's guess. No matter the nature of technology, all that we do, deep in our labs and out on the field with our customers, translate blue sky ideas into reality. This is where we truly shine.

In the coming pages, you will discover how our solutions have positively changed the ways our clients carry out their business. I hope you will enjoy these innovation stories and perhaps, be inspired to reimagine the future together with us, like we do every day.

Low Jin Phang
President, Digital Systems

Thrive in the New Dynamic— Unlocking Possibilities with Innovative Technology

In this fast-changing, interconnected world, businesses and governments face challenges that square off with growth opportunities.

Massive data sources, without intelligent management, cannot generate insights with value. Increasingly complex systems require cybersecurity measures robust enough to fend off sophisticated attacks. With growing populations, cities need to operate even more safely, smoothly and sustainably.

But from where we stand, challenges offer unprecedented opportunities for us and our customers—to make what's confounding, simple, and the improbable, possible. We do this through designing and delivering future-ready digital systems that uplift every aspect of an organisation, from operations and management to the customer experience.

ST Engineering Digital Systems and Cybersecurity meet the most pertinent needs of our customers today and tomorrow through our multidisciplinary capabilities. By applying engineering ingenuity and leveraging new technologies such as Artificial Intelligence, 5G, cloud and data analytics, we have been able to create a positive impact across industries, communities and the world at large.

The digital transformation journey for every industry is similar in sentiment, yet unique in its complexities—and our numerous innovations reflect this deep understanding. Whether it is enabling more data-based insights, fostering collaboration for organisational congruence, improving nimbleness, or enhancing cyber resilience, our solutions create outcomes that are immediately felt at all levels.

Our research in generative AI has resulted in a new era of video intelligence. Our unmanned vessels have reduced safety risks to marine workers. Our connectivity solutions enable public safety and security officers to work with speed in critical events. And many satisfied customers have reached new levels of scalability and agility with our cloud services.

These have been breakthrough possibilities where hurdles previously resided—with more to come. For now, read on for more insights on the innovations that have made a difference for our customers and those they serve.

Let's all thrive in the new dynamic.

OUR CAPABILITIES



TRAILBLAZING TECHNOLOGIES

Software & AI | Defence C4ISR Systems | Advanced Communications Connectivity | Immersive Simulation and Digital Twin



DIGITALISATION SOLUTIONS

Cloud & Data Centres | Cybersecurity | Business Process Outsourcing



FROM UNDERWATER TO SPACE

Unmanned Autonomy | Advanced Electronics Manufacturing | Military Electronics Maintenance & Repairs Operations | Space Technologies

Not Just Having Data, But Augmenting the Advantage With AI

In this modern era, organisations are often inundated by massive amounts of data. Sifting through disparate data sources and domains to make quick and informed decisions is usually a huge struggle.

But what if there was a way to automatically bring together facts and findings from different systems for a comprehensive bird's eye view of operations? To investigate and respond to incidents in a concerted way across functions? And use query analysis against data for greater visibility and insights?

These were the goals we sought to meet in developing our cloud-native sensemaking AGIL® Ops Hub. This real-time dynamic business analytics solution harnesses operational intelligence to help users understand their operations and improve situation awareness at a deeper level than before. Today, this sensemaking operations hub serves businesses in fields ranging from utilities and healthcare to aviation, maritime and emergency services.

With rules configured to each customer's needs, our system monitors incoming data and events, spotlighting the most relevant information to the current situation, predicts issues and facilitates seamless collaboration between different departments. Regularly, automatically triggered reminders alert users on missing items or to-do tasks.

Its uses are as varied as they are impactful. Airports can better manage passenger flow and minimise delays. Hospitals can deploy manpower more strategically and ensure critical supplies are in stock. Emergency services can respond to incidents faster—in fact, our solution has helped reduce the Singapore Civil Defence Force's call processing times and workload of call handlers by 50%.

At the end of the day, the AGIL® Ops Hub allows data influx to work for organisations without overwhelming staff, empowering teams to turbocharge their productivity, smoothen workflows and obtain actionable insights with little hassle.

Safeguarding Singapore's Water Infrastructure



The AGIL® Ops Hub reduces time spent on water demand planning by 75%.

Routine data logging meticulously done and circulated on excel sheets. Referencing multiple systems to gather information for daily tasks. Lengthy email threads to troubleshoot incidents. Time-lag between ground crew and command centre for incident updates. These were familiar woes to the staff of the Public Utilities Board (PUB); that was until the Intelligent Water Management System (IWMS) came along.

Dubbed the brain and backbone of water operations, the IWMS integrates various systems of PUB into one convenient platform. The goal is to ensure an unbroken supply of clean water to the public, optimise incident management and obtain an overview of the entire water supply network.

Equipped with data analytics and artificial intelligence capabilities, the smart platform is powered by ST Engineering's AGIL® Ops Hub. It is configured to solve long-standing challenges of PUB's workflow while helping the joint command centre staff to make sense of the entire water loop situation in real time.

By improving workflows, the IWMS speeds up incident response by 20%.

Seamless collaboration, increased productivity

Now in its third iteration, the IWMS:

- Informs water demand for the day

The system informs the operator of the amount of water required based on past and ongoing real-time data of water consumption. It also sends an alert when water sources need to be diverted if, for example, a desalination plant is closed for maintenance. Time spent on water demand planning is reduced by as much as 75%.

- Helps staff respond to incidents 20% faster

The IWMS detects if someone calls in for a pipe burst or other malfunctions and the operator dispatches the appropriate resources for rectification. Via their mobile devices, on-site officers can send incident updates to the IWMS without delays. Incidents can be easily tracked by all levels of staff from the moment they are reported to escalation and resolution.

- Fosters cross-functional work

The organisation can customise workflow tasks, with built-in approval processes, to suit different incident types. Plus, the built-in chat function compatible across desktop, iPad and iPhone allows for efficient communications between the Joint Operation Centre (JOC) and dispatch officers.

- Minimises human error

With all data captured within the IWMS, there is little room for slips attributed to shift handovers and staff turnover.

A scalable system

Data from other systems can also be fed into the IWMS. Social media posts, information from sensors and body cameras worn on field crew and data gathered from drones to detect algae bloom can be integrated with other operational data for end-to-end water management.

The capabilities of the IWMS are not limited to simply water management. The platform, when customised, can be applied to other critical infrastructures such as airports, seaports, healthcare institutions and emergency services.



Not Just Tech Hype, But Making Video Surveillance Simpler and Smarter

Long before the launch of large language model ChatGPT, Generative Artificial Intelligence (AI) has been a buzzword deep within the labs of ST Engineering. Our teams have been rigorously bolstering our wide-ranging domain expertise using Generative AI models, marked by their outstanding ability to identify patterns and structures without the need for labelled information.

This is a marked upgrade from conventional AI that needs to be trained using labelled data—and the cost implications for our customers are enormous.

By layering on the power of Generative AI to traditional video analytics (VA) engines, organisations can accelerate, scale and expand their capabilities, unlocking novel use cases and significantly increasing productivity. For instance, users can easily locate a specific suspect wearing a certain outfit across multiple video streams, even without any pre-training to the VA engine.

Our latest launch, AGIL[®] Vision demonstrates all these and more. It enables security and regulation enforcers in all industries to run real-time searches on multiple camera feeds using simple, natural language. The small, yet powerful form factor solution allows plug and play, easy deployment into any scenario, empowering users to manage unforeseen challenges with ease and speed, a departure from laborious scanning of video streams.

In the realm of video surveillance, Generative AI holds the promise of revolutionising security and monitoring systems, offering more sophisticated and adaptive capabilities for real-time threat detection, object recognition, and anomaly detection.



AGIL[®] Vision: Video Search Powered by Generative AI

This powerful yet compact and secure solution can retrieve insights during unanticipated scenarios on the spot.

All over the world, users have experienced how Generative AI can lend extreme ease to activities from debugging code to simplifying difficult concepts. But when applied to a video intelligence platform, generative AI extends immediate benefits to unanticipated incidents in our urban world.

This is unlike traditional video analytics (VA) solutions that are limited to dealing with specified and known use cases, such as identifying a person or vehicle of interest, or identification of specified objects.

Imagine an anxious family searching for a lost child in a shopping mall. The security team can perform an immediate search by providing the system with a general description such as, "a child in blue dress". The AGIL[®] Vision box then scans through multiple camera streams to detect the location of the person in real time, without the need for security personnel to manually comb through footages.

The deep learning model creates a semantic mapping between simple text—including colour, objects, actions and behaviours—and visual representations (even logos), enabling a more intuitive and quicker search for information. This leads to a huge range of search permutations previously not possible, making AGIL[®] Vision a powerful tool for all sectors or organisations that require video surveillance.

Plug and play with data security

AGIL® Vision operates efficiently on a single box with minimal set-up effort. It can also be deployed alongside existing camera infrastructure and video management systems.

The small form factor computer can be set up on-premise, avoiding the need to send data externally and hence enhancing data privacy.

On top of providing this frontier-pushing technology, ST Engineering's edge comes in our vast experience in deploying video analytics solutions within large, complex operations. This ensures we are well equipped to not just deploy AGIL® Vision successfully but to define new use cases built on this technology.



Training traditional VA systems to learn a specific scenario can take up to a year, but attributes on a watchlist can be configured on the fly with AGIL® Vision.

Not Just Advancing Connectivity, But Creating Smarter, Safer Cities

Keeping the lines of communication open in times of crisis. Helping factories make strides towards Industry 4.0. Bringing edge computing closer to customers. At ST Engineering, our Advanced Connectivity solutions are designed to provide companies with a strategic edge for growth by overcoming long-held challenges.

By piloting and pioneering new 5G-enabled solutions, we transform our approach to defence and public security, and even sectors as diverse as healthcare, logistics, and warehousing.

Take for example the issue of public network latency in crisis situations. We developed our AGIL[®] 5G-in-a-Box to turn any vehicle into a private high-bandwidth 5G network station. Officers can conduct critical communications without relying on overwhelmed public network infrastructure. First responders can reach those in need more quickly. Unmanned assets can be set into dangerous situations to capture and relay high-definition video information.

In the complex world of manufacturing, which calls for business intelligence, operational reliability and exceptional productivity, enabling factories with 5G brings about new possibilities. Businesses can deploy a variety of innovations from autonomous robots and intelligent sensors in the production line to AI-enabled inspection to obtain real-time actionable insights and reduce manpower costs.

And in mission-critical operations, where communication challenges abound for workers across different domains and agencies using disparate equipment, our Unified Communications System (UCS) provides seamless radio interoperability across different networks, channels, systems and devices.

Enhanced Situational Awareness with 5G

A milestone public-private trial has shown how the fifth-gen broadband cellular network can ensure dedicated bandwidth during network congestion and manage high-resolution camera payloads, feats not achievable over 4G.

For most people, having 5G connectivity means enjoying better-quality videos on their smartphones and swift downloads. For homeland security officers, the speed and reliability of 5G boast a more salient benefit: a safer country.

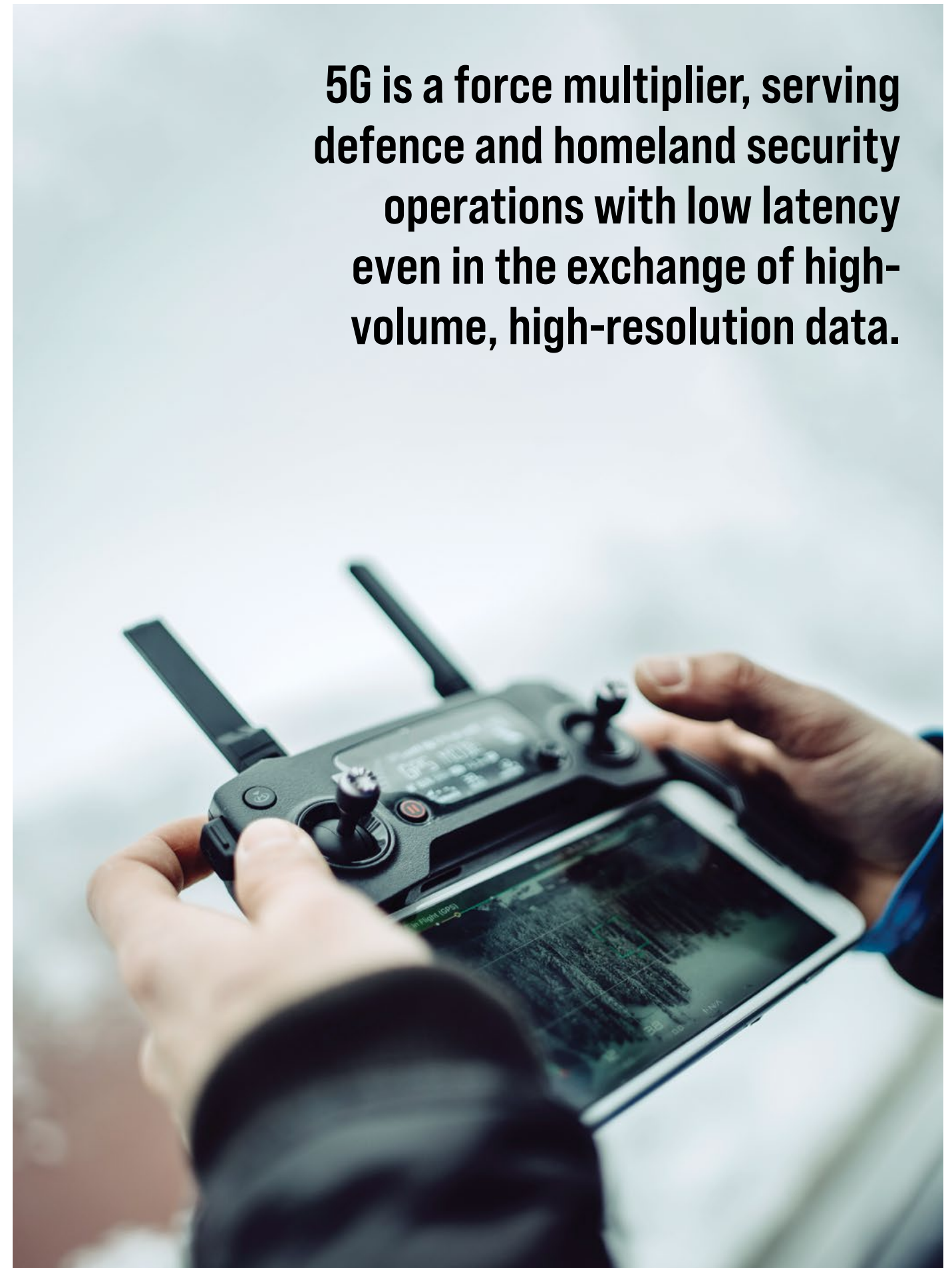
Defence Science and Technology Agency (DSTA) and Home Team Science and Technology Agency (HTX) engaged ST Engineering in their 5G@Sentosa Joint trial, which aimed to find out if 5G could improve operational effectiveness for citizen-centric services.

As a trailblazer in piloting and pioneering 5G-enabled solutions, ST Engineering has been well versed in the benefits of 5G over the 4G LTE network.

With the latter, latency occurs in the transmission of high-resolution data like video footage. Officers must be deployed alongside unmanned systems and drones need to be flown within range of their pilot. There is little flexibility in the deployment of assets and manpower.

But would 5G be reliable enough to serve defence and homeland security operations with minimal transmission lag? After all, such operations require exchange of real-time, high-volume critical information, including videos, between ground and command centres.

5G is a force multiplier, serving defence and homeland security operations with low latency even in the exchange of high-volume, high-resolution data.



What we put to the test:

- Network Slicing, a 5G-specific capability that involves carving out a portion of the 5G network for dedicated use; and
- Multi-access Edge Computing (MEC) that facilitates the integration of multiple platforms like cameras, edge analytics (such as analysis of data at a sensor) and unmanned systems like drones.

At the same time, ST Engineering engineers worked closely with DSTA and HTX to develop robotic solutions that could improve situational awareness and response and enable inter-agency collaborations where needed.

The results spoke volumes.

- No discernible lag time

Live video feeds captured from drones and unmanned ground vehicles were transmitted in high resolution in almost real-time. The low latency, which improves situational awareness and responsiveness also helped officers in different locations collaborate more effectively.

- Better manpower and resource allocation

Officers can now monitor and survey areas from a virtual command post and make faster decisions from anywhere, so operations are effective and efficient.

- Every angle is covered

With 5G, real-time footage of any area can be obtained simultaneously from not just wired and fixed cameras—the current norm—but also wireless static cameras, drones, and body-worn cameras.

- Connected in chaos

Network slicing boasts reliable connectivity even in crowded areas or during times of crisis when network congestion due to a surge in users commonly occurs.

The 5G@Sentosa testbed did not just give commercially available 5G-enabled solutions a firm foray into homeland security; it showed once again that technology continues to be the force multiplier for ground force to remain effective and optimal in large areas.



Calling Mission Control

Our Unified Communications Suite has enabled seamless communications between mission-critical frontliners with disparate equipment in over 100 deployments around the world.

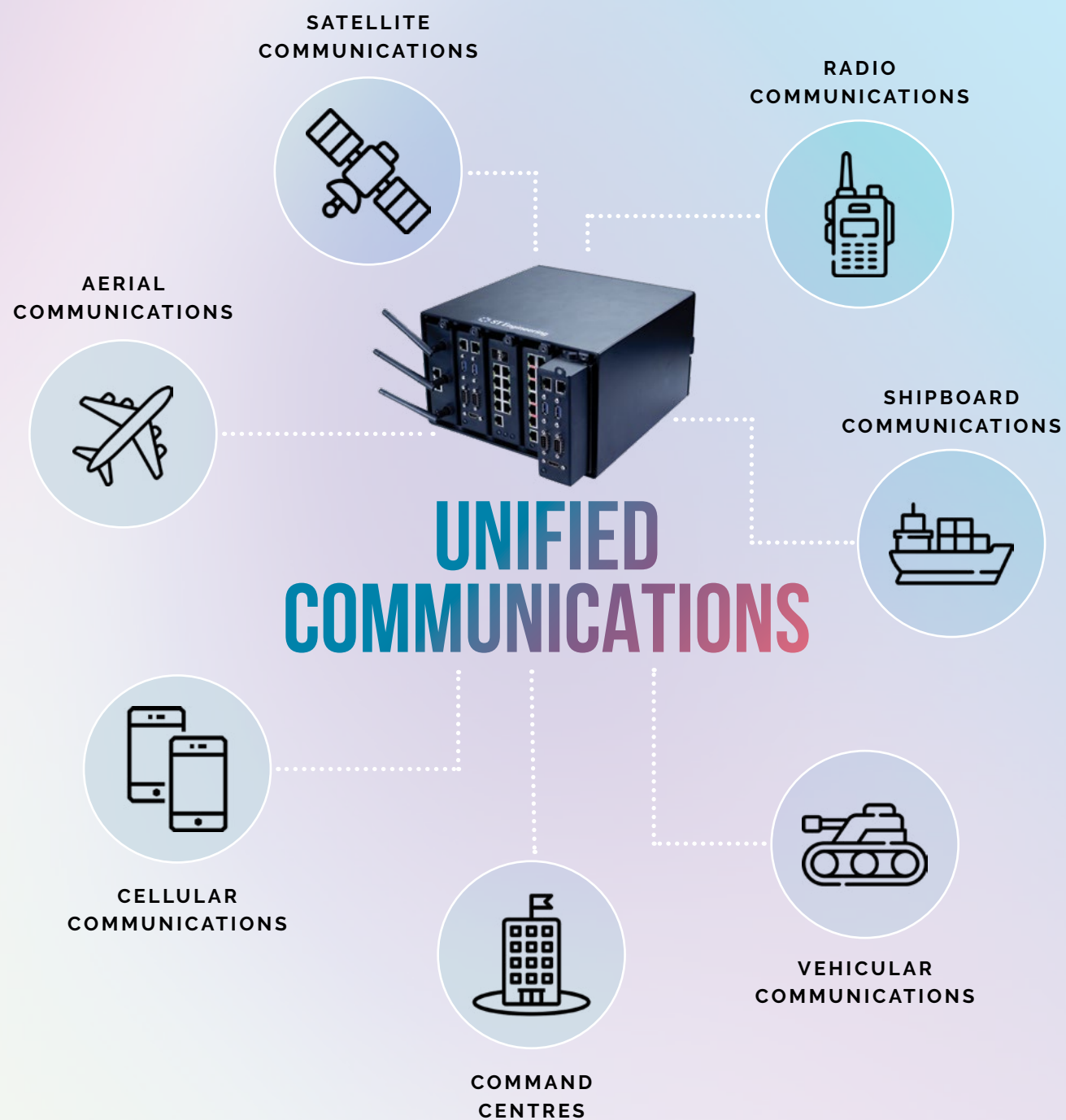
For decades, ST Engineering has been renowned for developing complex systems to optimise public safety, protect critical infrastructure and boost national defence.

One of the many ways we have added important values in these realms is via our Unified Communications Suite (UCS), which we have been continually developing for over 30 years. Buyers of our UCS have included organisations in defence and rail transport.

In a crisis, frontliners in defence, law enforcement, firefighting, rescue services and disaster relief teams face a time crunch to evacuate victims and contain damage.

But there's an issue: these workers are often using communication devices or systems of different radio frequencies, bands and networks. To collaborate and communicate across agencies and domains, users must know what the frequency or medium they need to communicate with, carry multiple radio equipment or install various systems.





>30
YEARS
of developing Unified
Communications Systems

>1000
USERS
currently relying
on this technology

>100
DEPLOYMENTS
in Singapore and
the rest of the world

Our scalable UCS allows the addition and connection of any device or network as needed, facilitating communication across mobilised teams and disparate platforms, including mobile command posts and command centres.

Addressing the urgent need for all parties to be able to connect with each other at great speed and efficiency, and coordinate efforts on a single platform is ST Engineering's UCS.

The UCS is a departure from hardwired legacy systems that rely on manual patching or message relays by an operator. The centralised IP-based platform is hardware agnostic, serving multiple user groups and terminals ranging from professional mobile radios to IP telephones and analogue phones—it also comes with a Smart Mobile Application enabling users to provide on-ground updates. Users will be able to share critical information more quickly, improving collaboration on the ground, and boosting operational efficiencies.

One of the best aspects of UCS is its incredible scalability, allowing the addition and connection of any device or network as needed, facilitating interoperable communication even across mobilised teams and multiple platforms, including mobile command posts and command centres.

There is no one-size-fits-all. Each UCS is commissioned and designed for an organisation's unique requirements. We also continually refresh its accompanying solutions and designs with technological advancements.

Radio interoperability across heterogenous networks will continue to be a priority across different agencies, some still saddled with the challenges of legacy systems. With the ability to be integrated with 5G, 6G and beyond, the UCS is poised to blaze a new trail in its category.

Not Having to Imagine, But Immersed in Limitless Possibilities

Whether it is training new hires or upskilling or reskilling existing personnel, organisations have a high bar to meet.

Staid presentations can no longer engage learners in the age of new technologies. Practical training using actual vehicles and equipment are bound by resource constraints, energy costs and risks to health and safety. And in dealing with complex security risks, military forces need to hone their skills with the most realistic and dynamic scenarios.

Understanding these needs, ST Engineering's Training and Simulation unit has spent the last 40 years designing and developing solutions and systems that enable companies to achieve mission success, enhance learning experiences, facilitate experimentation, and provide training realism in safe and controlled virtual environments.

Our suite of Learning Systems and Solutions engage and empower learners, enhancing overall learning experience and proficiency. Our Simulation and Training Systems run the gamut from procedural training to full platform networked simulators and Live-Virtual-Constructive training systems to refine the skills of individuals, teams, and leaders. Our Training Support and Consultancy Services further augment our customers' ongoing training and operation needs.

We are firm advocates of advanced technology to not just elevate training experiences, but also create measurable benefits. Our leading-edge simulation training reduces up to 30% of on-road training while saving on fuel and minimising damage to operational vehicles; and our crane simulation system trains operators at least 33% more quickly, just to name two examples.

Our wide network of resources and partners have helped us serve leading institutions in markets all over the world. We have a presence in America and Europe through our subsidiaries: MAK Technologies, a leading company in modelling and simulation software, and ST Engineering Antycip, a leading provider of Visual Systems and Virtual Reality solutions.

Meeting Tomorrow's Needs with MAK ONE

The software platform for modelling and simulation allows the Australian Army to add new capabilities over time, significantly stretching its lifespan.

Military training simulators are complex systems that are conventionally built to narrowly focus on specific training requirements. These bespoke training devices address the most pressing needs of a defence organisation in the present—and cease to be of use when training needs evolve.

Landing a training solution that could overcome such cost inefficiencies was of priority to the Australian Army, which needed to integrate a Common Simulation Software system within its Land Systems Core 2.0 (LS Core 2.0) training system in 2022.

In their search, the flexible, practical, and cost-effective MAK ONE training solution met their needs in more ways than one. The multi-domain simulation platform is designed to be extendable with new capabilities over time, rising to the demands of the future.

The MAK ONE suite of products provides the core components of LS Core 2.0 for desktop virtual training, constructive simulation, and networked simulators. LS Core 2.0 will become the base simulation architecture for all future Australian Army simulators and simulation-based training, and it will be a key enabler of the Army's Future Ready Training System.



The multi-domain MAK ONE supports whole-world modelling, including space, so there's no geographic limits on the size of operations.

Unique beyond an enduring lifespan

With MAK ONE, simulators that are developed for land operations can be easily integrated with air, naval and space assets; they can also model non-kinetic effects such as those arising from cyber operations.

The platform supports whole-world modelling, including space, so there's no geographic limits on the size of operations. Simulation models are available for platforms of all types—from submarines, ships and amphibious craft to ground vehicles, airplanes, satellites, human characters and each of their weapons systems.

MAK ONE boasts multiple applications from providing multi-domain threats to networked desktop training and sensor visualisation. Modules are perfect standalone and amplified when combined as a suite.

To meet the requirements of the Australian Army, the following applications were deployed: VR-Forces for computer generated forces and constructure simulation; VR-Engage for multi-role virtual simulators; and VR-vantage for generating images and battlefield visualisation for developing situational awareness. Various other infrastructure tools were also included to stream terrestrial and other domains, record and replay simulations and facilitate interoperability.

A common set of simulation modules can be used across all future Australian Army training systems for everyone from commanders and their staff at the brigade to crew members of armoured vehicles and individual war fighters, making the process streamlined and effective.



Driving Success Through Immersive Collaboration

ST Engineering Antycip led the customisation and installation of an immersive virtual reality suite at Renault's facilities in three countries, allowing teams to collaborate on a global scale.

A dramatic floor-to-ceiling 4K screen. Premium Christie laser projector. A 5.1 surround sound system and a range of related gizmos.

No, this is not a cinematic installation. Rather, it is the setup for Renault's 4K powerwall system, installed at the car manufacturer's facilities in India, South Korea and Brazil.

Powerwalls are powerful large-screen visualisation tools, and one of the most immersive ways for teams in remote locations to work together, fulfilling Renault's desire to break down silos and make global collaboration efficient and effective.

For the automotive giant, many aspects of the development process from product design and review to assessing vehicle aesthetics, ergonomics and performance can now be conducted virtually between the three countries and Renault's headquarters in Paris.

Whether it is 2D or 3D content, a presentation or virtual prototyping, designers, engineers and executives alike can experience and analyse their plans at close quarters, refine them in concert, maximise clarity and minimise risk or errors.

Anticipative and globally connected

The prowess behind ST Engineering Antycip's powerwall comes from over 20 years of experience in the field of virtual reality and mastery of features integration. Antycip—a play on the word "anticipate"—also proactively embraces innovation, adapts to changing landscapes and stays ahead of the curve to provide cutting-edge forward-thinking solutions for clients.

Beyond the technical know-hows, the team's intricate understanding of behind-the-scenes aspects of installations have led to the success of the multi-location installation for Renault, a gargantuan undertaking that came with unique demands.

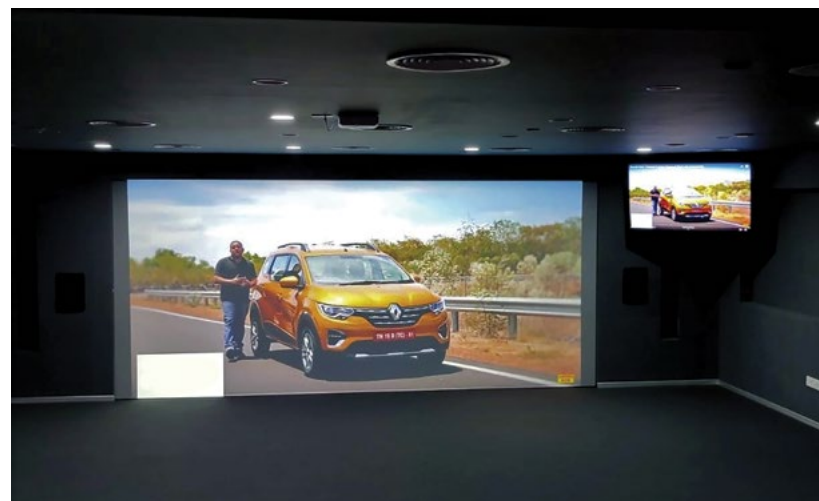
Having to deploy the same solution—a highly integrated system with massive amounts of hardware—in three countries was a complex undertaking. By leveraging local partners who supplied various parts and services, what could have been a lengthy and extremely expensive endeavour became more time- and cost-efficient for the customer.

Versatile and imaginative

Powerwalls are not just used in the automotive industry; they can add profound value to a wide range of organisations.

Aerospace engineers can use the powerwall for simulations, prototyping and design; schools can enhance learning experiences through VR simulations and interactive presentations across disciplines; architects can present 3D renderings and walk-throughs of building designs; and film makers can visualise movie scenes to plan for production.

The possibilities are endless, limited only by the human imagination.



By leveraging the strengths of local partners, what could have been a lengthy and extremely expensive endeavour became more time- and cost-efficient for Renault.

Not Just Transforming Digitally, But Making Systems Sustainable and Reliable

||||| CLOUD AND DATA CENTRE

Moving data and processes to the cloud comes with complexities as much as it allows businesses to scale, stay agile and operate with reliability and insights. While the COVID-19 pandemic has brought home the importance of digital transformation and a departure from outdated legacy systems, navigating the intricacies of cloud migration and optimising it for long-term benefit can be a challenge.

Organisations have to grapple with common issues like lack of inter-operability in a multi-cloud environment, hampered visibility and security risk governance. Third-party vendors that may be adept in specialised cloud services are often unable to help customers unify siloed applications or gain true visibility over cloud use.

This is where ST Engineering Cloud and Data Centre comes in to create value. Our end-to-end cloud infrastructure, applications, data and AI/ML solutions and services extend from software refactoring and rearchitecting, to rebuilding and repurposing applications and infrastructure and data migration and management. This approach provides the crucial links that empower customers to work smoothly and securely in a new operating environment.

To date, we have completed over 1,000 workload migrations. Our team of more than 2,000 tech experts in the region serve clients in all sectors, including government agencies.

Driving Automation for JERA Global Markets

Leveraging ST Engineering Cloud & Data Centre's Automation-by-Design and DevOps continuous integration/continuous delivery (CI/CD) solution, the energy trading firm enjoys productivity gains of up to 30% and a 50% drop in manpower costs.

It had been a long-standing pain point. JERA Global Markets' (JERA GM) old brand website had been hardcoded, with little flexibility for code changes. Its service provider manually implemented content changes, web updates and delivery of applications. No matter how big or small the task, it incurred monetary costs and precious hours.

Surely there was a way to automate processes? A more flexible way of working with less cost, more ease? And seamlessly transit into an improved workflow from the start?

JERA GM found what they needed in ST Engineering Cloud and Data Centre's cloud migration and managed services. With our customer centricity and expertise in implementing enterprise solutions for various industries, ST Engineering Cloud and Data Centre was chosen to design, build, automate and operate an Azure cloud platform to host JERA GM's website content management system (CMS) and handle their cloud usage subscription.



Operational ease and cost savings

ST Engineering Cloud & Data Centre conducted discovery and assessment workshops with JERA GM's technical team based out of UK. These workshops provided data-driven insights and set the right tone for the project. Armed with clear insights, JERA GM's team could take their next steps with clarity and confidence.

On our part, we are then able to design a 100% cloud native DevOps framework with Infrastructure-as-Code (IaC) to drive automation and operational efficiency for JERA GM. This translated to:

- Automated website version updates and patching
- Automated delivery of applications using CI/CD
- A more secure system by adopting industry best practices and minimising human intervention
- A highly scalable and available cloud-native platform that can grow with the business with minimal or no downtime

The seven-week process included development and migration, user acceptance testing, vulnerability assessment and penetration testing.

Without the need for a third-party provider to manually implement updates, productivity increased by 30%.

In addition, by outsourcing their Day 2 cloud operations to ST Engineering, the customer enjoyed a 50% savings in manpower costs.

On top of web management, IaC and DevOps CI/CD can similarly be applied to other workloads, from training to human resources, to streamline workflows and improve performance enterprise-wide.



Our Automated DevOps solution has simplified Day 2 Managed Services Operations, improved operational efficiency, and empowered JERA GM's team to be more responsive in their customer communication and engagement.

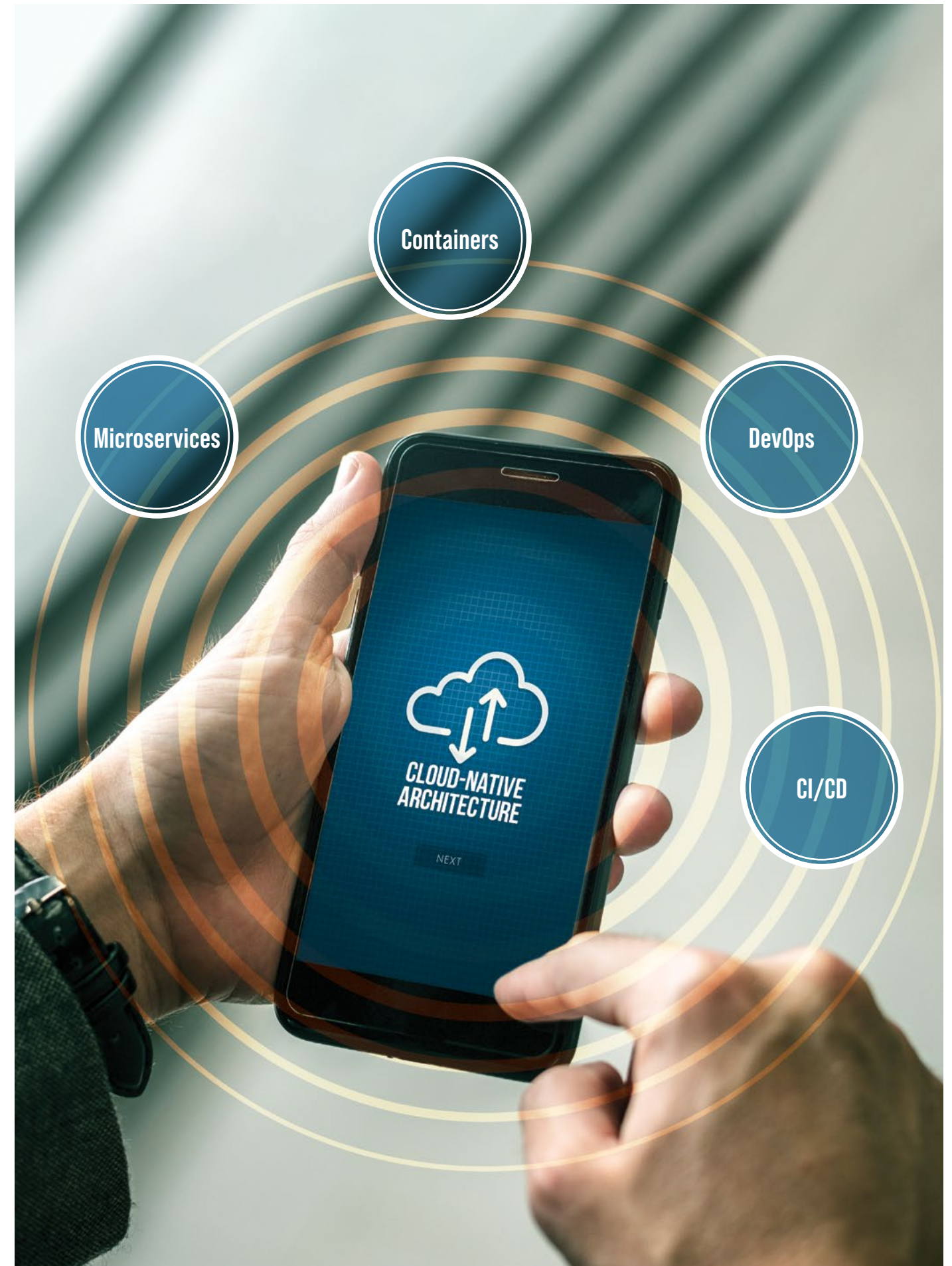
Using the Cloud to Meet Singapore's Business Demands


100% cloud-native and scalable cloud infrastructure can support more than 1 million Internet domains while speeding up application updates by 40%.

A subsidiary of the Infocomm Media Development Authority (IMDA), the Singapore Network Information Centre (SGNIC) has the unique and massive task of providing internet registry and information services for the country. Essentially, the agency is responsible for authorising and regulating the registration, administration and management of domain names ending with .SG.

As entrepreneurship and the gig economy continue to grow, so does the number of domains that SGNIC needs to support. To get ready for the future, the agency needed to replace its ageing on-premises system which incurred high operational and maintenance costs and was not able to keep up with increasing business demands.

At the same time, a systems overhaul was needed to comply with the government's security-by-design framework and cater for business continuity without lag when unavoidable failures occur. Moving to a cloud-based infrastructure was the most viable option.





With automation, SGNIC has experienced a 100% increase in productivity, and cost savings of up to 50%.

End-to-end support from ST Engineering Cloud and Data Centre

The 18-month-long project fully demonstrated our multidisciplinary capabilities including software development and cloud migration to cybersecurity. Our comprehensive support and tailored solution for SGNIC helped them leverage the full potential of cloud computing to improve operations, reduce costs and grow sustainably.

First up was providing a tailored Registry-Registrar Domain Name Registration software, hosted on Amazon Web Services' (AWS) commercial cloud. We were also asked to provide 24/7 managed security and operations support to enhance SGNIC's cybersecurity posture while reducing their operational load.

Now SGNIC boasts a 100% cloud-native, scalable and modernised system that can support more than 1 million domains to keep up with growing business needs. The system is estimated to provide 50% cost savings across its life cycle as compared to retaining their previous system.

Also, with CI/CD pipelines and IaC, new versions of software can be automatically delivered—this is about 40% faster than manual updates and patching. With automation built in, SGNIC now enjoys a 100% increase in productivity.

Last but not least, ST Engineering Cloud and Data Centre is able to meet SGNIC's need for the highest level of IT security with best practices on the cloud and managed services.

Our ability to propose and deploy cost-effective and operationally efficient solutions is a result of both the team's technical knowhow and deep understanding of our customers' requirements and challenges. Their success is a firm nod to our rigorous processes and intelligent innovations.

Not Just Fending Off Attacks, But Building Cyber Resilience

In an increasingly connected world, cyber threats have become constant and pervasive. Organisations and critical sectors need to proactively predict, pre-empt, and defend networks and systems from being compromised.

ST Engineering's end-to-end cybersecurity solutions—ranging from cybersecurity engineering and digital authentication to SCADA protection and audit and compliance—work to outpace malicious attacks through a holistic approach.

Our multi-disciplinary expertise in cryptography, secure hardware and firmware development, network and data security ensures the incorporation of best practices and the most up-to-date technology in our products and solutions.

For instance, our robust encryption products such as NetCrypt, DiskCrypt and WiZ-Knight™ fit seamlessly into any enterprise. And our high-performance and compact data diode allows organisations to transfer massive data securely across physically separated networks.

On a larger scale, we specialise in the design and build of security operations centres (SOC) to protect Operation Technology (OT) and IT networks of critical information infrastructures (CII) such as banks, power plants and emergency services.

Additionally, as a centre of excellence for cybersecurity in Singapore and the Asia Pacific region, the ST Engineering Cybersecurity Academy (STECA) has successfully trained over 2000 professionals from more than 150 organisations.

One-way Ticket to Secure Operations



Essential for critical infrastructure networks, ST Engineering's data diode facilitates unidirectional data transmission with zero file loss.

In a highly interconnected world, businesses, critical infrastructures, governments, public safety and security teams and defence agencies become increasingly vulnerable to cyber attacks. From loss of personal data and stolen money to even tampering with the power grid and life loss, the ramifications are grave.

How do public departments monitor the workings of power stations and water plants without fear of threat to critical infrastructure? How can intelligence agencies collaborate with whitelisted partners with zero data leakage?

A big part of the answer lies in a crucial hardware called the data diode. It is a unidirectional communication and data transfer gateway that enables organisations to transfer data securely across physically separated networks. In short, data only moves one way and never the other.

In addition to its high-performing design, our data diode is Common Criteria certified (CC EAL 4+), a rigorous globally recognised security standard.



Years of technology refinement

ST Engineering's data diode is the result of dogged research and development and continuous improvement starting from 2014. The team sought to solve a key problem that early data diodes developed overseas posed—a high percentage of file loss during data transfer, leading to corrupted files on the receiving end.

With growing demand for data diodes, there was an urgent need to provide local customers a high-performing product that also came with swift support in the same country. After achieving successful proof of concept, ST Engineering's first data diode delivery was made to a government agency in Singapore in early 2017, and its popularity has grown ever since.

Our data diode comes in a compact design that allows all functions to be encapsulated in less space and is easily integrated with an array of networking protocols. It greatly reduces the possibility of data loss during transmission due to its direct connection between source and destination without additional nodes like proxy servers. In addition, ST Engineering's data diode reconstructs files at each stage of transfer to ensure almost zero file loss.

As a nod to its security robustness, ST Engineering's data diode is Common Criteria certified (CC EAL 4+), a standard recognised by many developed nations. In 2016, it was also certified under the National IT Evaluation Scheme (NITES), making it onto the Singapore Government Evaluated Security Product List.

In addition, ST Engineering is the only provider to bundle the data diode hardware appliance with a web management portal so protocol configurations and monitoring services can be easily managed with a web-based client interface.

With cyberattacks increasing at an exponential rate, data diodes will continue to play a huge role in helping mission-critical or sensitive networks to counteract against external threats.

WiZ-Knight™: Fortifying Connectivity in the Mobile Workforce

The world's first and smallest wireless encryptor allows users to work with peace of mind from any location.

Even as COVID-19 fades from the rear view mirror, remote work has become a permanent reality. Professionals, including many who handle sensitive data, retrieve and send files from any location—a boon for convenience, bane for security.

Connecting to public or untrusted networks at hotels, cafes at airports opens users up to risks including malware, packet sniffers, rogue WiFi and other threats. While many organisations rely on VPN software to secure their remote workforce, this can be compromised by sophisticated tactics such as evil twin attacks or exploit unpatched systems.

Enter the solution: WiZ-Knight™, a palm-sized portable USB encryptor that is designed for today's hybrid workforce.

Launched in 2022, WiZ-Knight™ arose from a vision to re-engineer the conventional encryptor—bulky and only deployed at the backend of the server room—into a lightweight, portable device for employees.

Our multi-disciplinary team with over 20 years of experience and knowledge in secure hardware development, firmware development, cryptography, network and data security achieved WiZ-Knight™'s friendly ergonomic design through rigorous testing of new innovative security architecture.



Secure by design

The VPN hardware provides a secure wireless connection and prevents malicious entry as users go about their work. The dongle's secure connection cannot be disabled, bypassed or diverted even when the user's computer is compromised, eliminating the risks faced by a VPN software.

In addition to providing secure VPN connection, WiZ-Knight™ boasts a separate physical component that serves as an advanced encryptor—companies can implement customised coding to further protect sensitive data.

The physical separation of the encryption and Wi-Fi modules are key in blocking malicious actors from accessing the protected corporate network.

WiZ-Knight™ is easy enough for anyone to use. Simply plug it in and key in your user information and connect to any Wi-Fi or LAN network to work securely from anywhere.

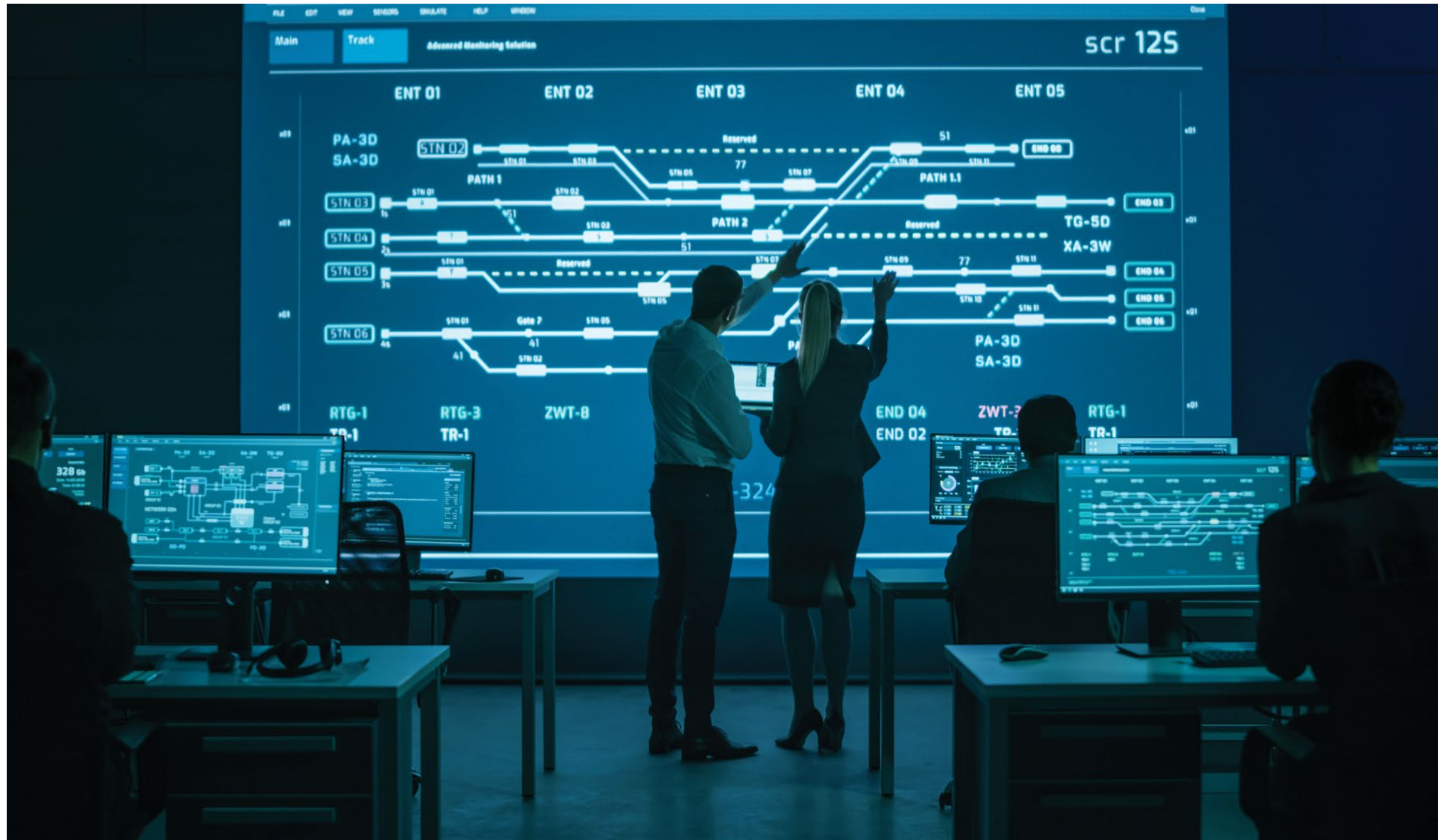
To date, the product has been deployed by multiple defence and government agencies around the world. It also received the prestigious CES Innovation Award in 2022.

With advancing technologies, the scalable solution can be further enhanced. In the pipeline is the development of a complementary WiZ-Knight™ cloud service. As remote work and business travel continue to proliferate, WiZ-Knight™ will, in tandem, grow in relevance and importance.



Encapsulating the security functions of a bulky backend encryptor within a palm-sized device, WiZ-Knight™ won the 2022 CES Innovation Award.

Deciphering Cyber Threats with Intelligence




Our cyber threat intelligence platform helps our customers increase operational efficiency by up to 20 times.

For over a decade, ST Engineering has designed, built, operated and maintained over 20 security operation centres (SOCs) for nations, critical information infrastructures and enterprises.

Our deep expertise in cybersecurity has allowed us to put together unified solutions for customers, combining machine-based analytics, threat intelligence and security orchestration, automation and response (SOAR). Through our systems, security teams have been able to uncover unknown threats in IT and operational technology environments.

However, complex security operations often encounter a common pain point: processing threat intelligence is labour-intensive, inconsistent and unscalable. A threat analyst reads threat reports, extracts key information for downstream analysis and manually creates a knowledge graph. It is a time-consuming translation process, time that customers may not be able to afford to protect key assets.

With the increasing speed and smarts of malicious hackers, there is a need to translate and act on cyber threat intelligence more quickly than ever before. Our newly introduced cyber threat intelligence platform can help our customers do just that.



Our AI-powered threat intelligence platform safeguards the most sensitive operations and is trained in multiple languages.

Elevating the way security teams work

By leveraging the powers of AI today, we eliminate the need for analysts to process unstructured threat reports manually. Trained in multiple languages, the AI engine parses the report, extracts key STIX data (a programming language for communicating cyber threats) and generates STIX-formatted reports that can be easily processed by Threat Intelligence Platforms.

This technology, launched in 2022, is now being used in the aviation sector. By incorporating our AI engine, the operational efficiency of security teams increases by up to 20 times.

ST Engineering's AI engine is unique in its on-site deployment. Most commercial solutions are hosted on the cloud—a non-option for highly sensitive operations. Also, our model can be re-trained using operational data from each customer, making the platform highly customised, quick and accurate.

Not Just Outsourcing, But Mitigating Business Risk

||| BUSINESS PROCESS OUTSOURCING

All around the world, business and government agencies are in flux. There is a growing need to digitalise operations and improve organisational performance, all amidst an uncertain macro landscape and rising costs.

At ST Engineering e-Services, one of Singapore's largest business process outsourcing (BPO) and shared services providers, we understand the challenges behind enterprise transformation and nuances that drive sustainable change.

This is why we customise our suite of services to suit your business needs and optimise IT infrastructure, storage, network and business functions from Finance and Accounting to Human Resources and Customer Care.

In a fast-paced world where effective communication and elimination of human errors are essential rather than aspirational, we tap on advanced technologies for the benefit of our customers. Innovations such as Live Chat and robotics process automation (RPA) have enabled us to maintain consistently outstanding service levels in all our projects.

ST Engineering e-Services was named one of the Top 10 BPO Companies in Singapore in 2023 by business journal Asia Business Outlook. We also won Best Outsourced Contact Centre (Silver) at the International Contact Centre Awards 2022, which celebrates the best contact centres and professionals in the region.

And in a nation that has embraced a culture of continuous learning, we have bridged industry gaps with our Training and Development Services (TDS). Training centres and businesses seeking faster and smarter workflows and more immersive content have relied on our end-to-end solutions using advanced pedagogy, tech-enabled features and performance analytics.

Since 2009, we have successfully designed, developed and deployed over 3,000 e-learning content hours in diverse domain areas including finance, cybersecurity, workplace safety and more.

In addition, our sub-division COMAT provides certified IT training courses that have served over 50,000 professionals to date. Our programmes, a combination of classroom-based, online and blended lessons, are created to accommodate the different needs of the modern workforce.



Learning Made More Engaging and Reliable

Our Learning Management System deployed by the Science Centre Singapore has ended the era of system downtimes and now supports a user base more than twice as large as before.

The Science Centre Singapore is fondly known among adults and children alike for its engaging exhibitions, learning content and workshops.

While its former cPanel learning management system (LMS) served the institution well for a time, increased demands have led to frequent disruptions in learning experiences. With a growing user base, the Science Centre needed a more robust and dynamic platform that could serve a broader audience without technical limitations.

As a recognised cloud-based LMS specialist, ST Engineering e-Services was well-placed to help.

Learning remains uninterrupted even during peak periods due to our system's auto-scaling capability.

Making learning seamless

Our LMS distinguishes itself through its holistic benefits for learners and administrators alike.

First, its auto-scaling capability allows resources to be dynamically adjusted to match user demand. Even during peak periods, learning remains uninterrupted and enjoyable, thanks to the system's user-friendly interface and customisation options.

Also, the system's exceptional scalability allows it to accommodate the centre's growing database from 180,000 to 400,000 without added infrastructure investments and maintenance.

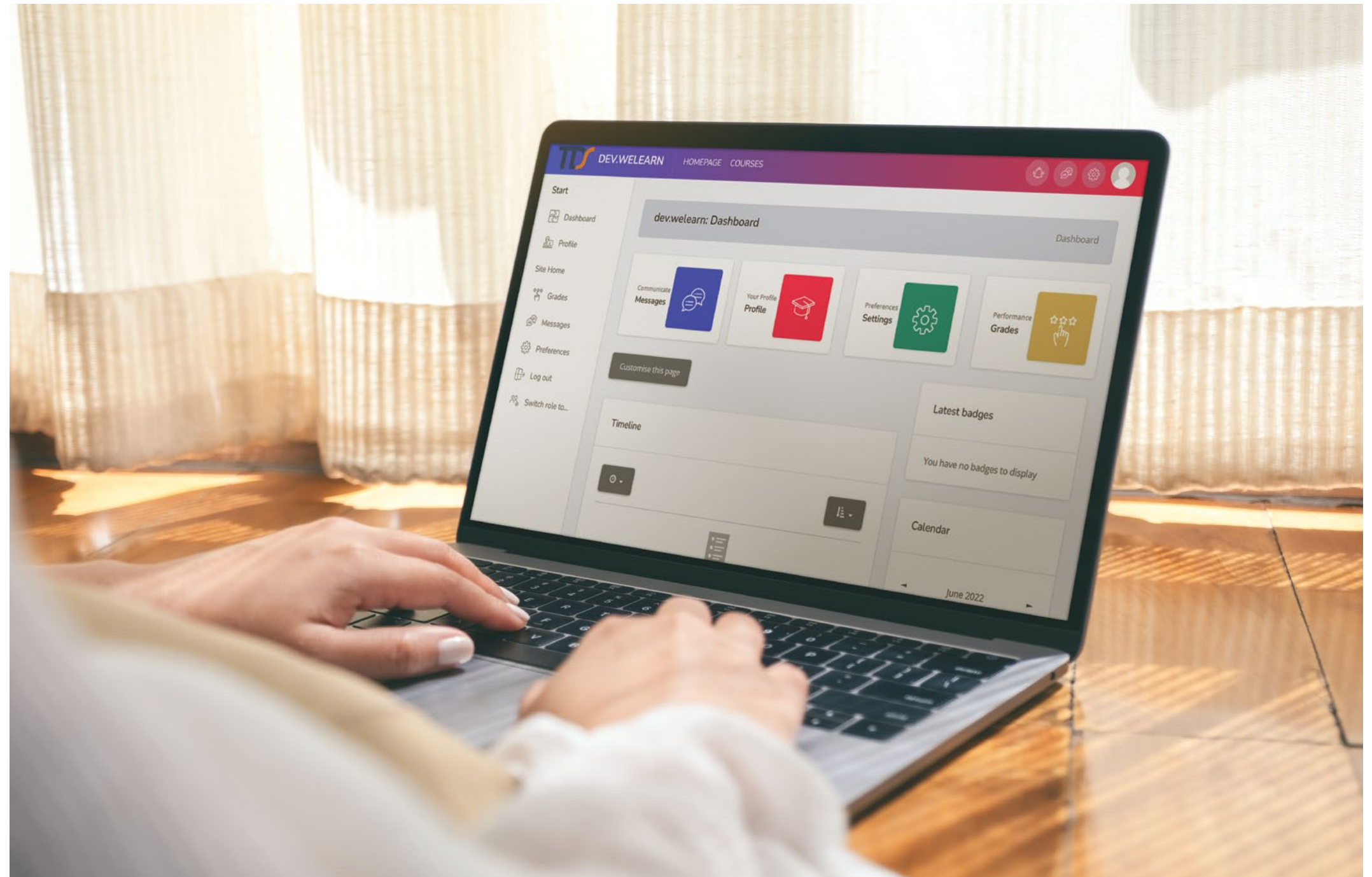
Man-hours that were previously spent on troubleshooting system issues can now be directed towards more productive tasks. With downtime minimised, productivity and visitor satisfaction become enhanced.

What's also worth noting is ST Engineering's focus on data security and compliance to safeguard sensitive information. And our commitment to continuous innovation and customer support ensures that our cutting-edge solutions are tailored to an organisation's specific needs, giving them an edge in the competitive e-learning landscape.

Versatile and transformative

The benefits of a cloud-based LMS cuts across industries and functions, and are immediately felt by users. Schools can efficiently manage curriculum delivery reliably and seamlessly; businesses can enhance employee training and development; healthcare institutions can keep employees up to date with compliance standards.

This technology will enable our customers to adapt to evolving educational paradigms. In time, the integration of AI and machine learning to our LMS will provide personalised learning pathways, maximise engagement and improve knowledge retention. Enhanced data analytics will yield insights for continuous improvement in education content and delivery; our LMS will evolve not just to accommodate emerging trends but keep educators and learners at the forefront of their field.



Not Just Autonomous, But, Sailing Towards Greater Safety and Efficiency

At ST Engineering, we want to make maritime missions safer, smarter and more effective—and autonomous technology plays a big part.

Over the years, we have developed a rich experience in designing and developing uncrewed vessels that ease manpower constraints, improve operational efficiencies, defend our seas and protect crew operators from harm.

Our wide range of autonomous vessels run the gamut from the Smart Maritime Autonomous Vessel (SMAV)—converted from a crewed tugboat—to the MERCURY Autonomous Underwater Vehicle (AUV) and JUPITER Autonomous Solar-Powered Vessel (ASPV). Quick fact: the JUPITER is also equipped with a 2KW solar roof that charges onboard batteries to power its entire system.

Many of these vessels are integrated with AUTONOMAST™, an all-in-one system that converts a crewed vessel into an uncrewed one. Beyond enabling autonomous missions, the system exemplifies the engineering capabilities that ST Engineering is renowned for.

Multiple perception sensors (including 360-degree panoramic vision) lend to safe autonomous navigation; the Collision Detection Collision Avoidance (CDCA) has been rigorously tested in the congested and high-traffic waters of the Singapore Straits; and end-to-end cybersecurity applications facilitate secure communications.

The AUTONOMAST™ serves a wide range of functions including defence, maritime security, firefighting and more.



Designed to Tackle Danger

Uncrewed surface vessels enhance capabilities to manage fires more safely and reduce human effort by at least 50%.

It is an emergency like no other when a blaze erupts at sea. A small fire can spread in seconds across fuel and flammable objects. Weather conditions and smoke obscuration can accelerate the crisis without warning.

Not too long ago, numerous firefighting officers would have had to be dispatched to the scene in a mission that could endanger their lives at each turn, from blaze assessment to extinguishing the flames.

With robotics however, the story has turned to one of less risk to human lives, operational efficiency and intelligence.

Infrared cameras that provide a 360-degree view pinpoint the hot spot, provide visibility in low-light conditions and facilitate the direction of the water monitors for more effective firefighting.



VENUS Uncrewed Surface Vehicle a crucial aide to firefighters

The Singapore Civil Defence Force (SCDF) is among customers who have found ST Engineering's VENUS Uncrewed Surface Vehicle to be a force multiplier. Its autonomous nature comes by way of AUTONOMAST™, an all-in-one system that converts a crewed vessel to an uncrewed one.

The USV's ability to perform vessel manoeuvre functions like station keeping reduces the cognitive load on human operators so crew members can focus on firefighting—this cuts down human effort by half or more. Not only is firefighting capabilities enhanced, but there is also less risk to lives.

Think of the remotely controlled USV as a first responder into the danger zone, sending critical intelligence to the control station at shore to determine the best course of action.

Infrared cameras that provide a 360-degree view do several things: pinpoint the hot spot, provide visibility in low-light conditions and facilitate the direction of the water monitors for more effective firefighting. Augmented reality overlays help support decision-making.

At the same time, a robust perception suite with radar and optical trackers, multi-sensor fusion and navigation charts detect obstacles as small as barrels and sailing yachts that can be overlooked by standard navigation radars. This allows firefighters to avoid debris, improving safety and efficiency.

The AUTONOMAST™ autopilot system considers the weight and thrust of water monitors—canons that eject large amounts of water (or foam) to put out a blaze—so the vessel maintains its position amidst dynamic conditions.

The USV works together with other crewed vessels to achieve a better result, with less personnel. This means fewer officers are put at risk in a mission.

Another highlight of AUTONOMAST™ is its automatic collision detection and avoidance feature, which has been tested in the congested waters of the Singapore Straits since 2008. The USV can hence navigate its way to the danger zone at speed even amidst heavy sea traffic, at the same time prioritising course change when safety calls for it.

With reliable communications a critical need in incidents management, AUTONOMAST™ system allows for secure connections between the Operator Control station and USV through mesh Wi-Fi, LTE and satellite communications.

As technology continues to evolve, the use of autonomous vessels to improve safety and improve crisis operations will only proliferate and reach even higher bars of excellence in the future.

AUTONOMAST™

Beyond Singapore Waters

Australia's Defence Science and Technology Group has deployed the all-in-one system for maritime navigation and mission manoeuvres, reducing manpower demands.

The tiny island state of Singapore is renowned for embracing emerging technologies, including the emerging field of defence maritime robotics. This is where ST Engineering has blazed a trail with the AUTONOMAST™, a modular kit that converts crewed vessels into uncrewed ones to replace humans in dull, dirty and dangerous missions.

It was an exciting proposition for Australia's Defence Science and Technology Group (DSTG), an organisation that brings together interdisciplinary expertise from around the world to address Australia's defence and national security challenges.

The DSTG was on the lookout for a maritime robotics solution that could improve efficiencies in maritime navigation and mission manoeuvres—tasks that used to require many crew members with specialised skills.

The AUTONOMAST™ became a leading choice due to its proven capabilities in the high-traffic Singapore Straits. In particular, the system's fused radar and panoramic vision—and near zero-miss obstacle detection—provide excellent situational awareness for navigation purposes. Pan-tilt zoom optics and a powerful searchlight enhance object recognition in low light.

The compact solution, which takes up the space of just one seat, was integrated onto a 12m vessel and has since been deployed in Australian waters. AUTONOMAST's advanced control algorithms were calibrated to suit DSTG's vessel for quick and accurate control, freeing crew members up for higher value tasks.

Even as the AUTONOMAST™ is being lauded for its versatility and high performance, the team is not resting on their laurels. A variant suited for rigid-hulled inflatable boats is now being developed so the upstanding advantages of maritime robotics can reach even more global users in defence, public safety and the commercial space.



Accurate autonomous waypoint navigation frees crew members up to undertake higher value tasks.

Not Just Powerful, But Rugged Under Pressure

Rugged computers and systems are integral to planning and executing critical missions. Military operations require their field equipment to withstand the most demanding and challenging land, sea and airborne environments.

Meeting these unique needs is Miltope, a leading U.S. manufacturer of rugged computers and computer peripherals for tactical and aviation applications. This subsidiary of ST Engineering has been a prominent purveyor of battle-tested products since 1975.

Miltope's product lines stand out for their multi-mission functionality, easy deployment and most importantly, genuine ruggedness, maintaining high performance even under impact, in rainstorms and at high altitudes. And with varied tactical needs that call for adaptations, the Miltope team adds value with innovative, customised systems built upon the brand's renowned qualities.

Today, Miltope serves not just the military, but also industrial and commercial sectors. Its stellar reputation extends to wireless networking solutions that provide clear and fast bandwidth throughout commercial airline cabins; and cybersecurity solutions to proactively predict, pre-empt and defend networks and systems from attacks.

Rugged and Versatile

Miltope turned its famed ultra-tough tablet into a vehicle-based console, using modular components to shorten the development cycle and reduce costs.

For close to five decades, Miltope's Rugged Mobile Computing products have been trusted by defence agencies and warfighters to hold up under the most demanding conditions, where speed and precision are paramount.

However, cookie-cutter products are not what has brought Miltope this far. Where the team has shone most brightly is the ability to create non-standard custom and complex electronic systems and solutions through an intimate understanding of customers' needs and out-of-the-box thinking.

As such, when a defense prime needed a tough yet compact and compatible control station within a vehicle with space constraints, the team was quickly able to tailor a solution that was time- and cost-efficient.

Conventionally, such a task would require designing the solution from scratch, a lengthy and expensive process for all stakeholders. However, the ability of Miltope's Rugged Mobile Computing (RMC) system to layer on modular tech components reduced the design process down by more than a half and brought about cost savings at the same time.

The resulting solution was the Rugged Tablet, a vehicle-based compact console adapted from the existing RMC family of products. In addition to being a perfect physical fit, the Rugged Tablet came with all the qualities that the RMC products are beloved for—multi-functional, powerful, lightweight and built to work in any condition.

In time, Miltope's portfolio of modulars can be harnessed to tackle even more challenging requests including AI and machine learning and autonomous systems—all to guarantee performance day after day.



Miltope shines in creating non-standard custom and complex electronic systems and solutions in less time.

Not Just Satellite- driven Insights, But True Business Intelligence

As a developer of geospatial solutions, ST Engineering Geo-Insights transforms data into insights to support informed decision-making for customers all over the world.

Our data comes from some of the most advanced satellites within the world's first and only Near Equatorial Orbit (NEqO) constellation by ST Engineering. Our high-resolution images, captured in any weather and lighting condition, have enabled more optimal ways of working in agriculture, maritime, insurance, finance and smart city planning.

Oil and gas explorations or infrastructure monitoring can be carried out remotely. Farmers can monitor plant health and yield better harvests. Information from remote sensing aid in disaster management.

Our library of analytics tools, ranging from detecting change in land use and objects of interest to land cover classification, work together to help businesses optimise land use, stretch their budget through minimising physical site surveillance and making insights-driven decisions more quickly.

Customers may choose to subscribe to our extensive geospatial warehouse filled with best-in-class images, or tap on GEOEARTH, our cloud-based analytics platform that provides immediate streaming access to images and analytics tools. Applications that benefit from GEOEARTH include airport operations, business intelligence, maritime monitoring, land-use survey and change detection analysis.

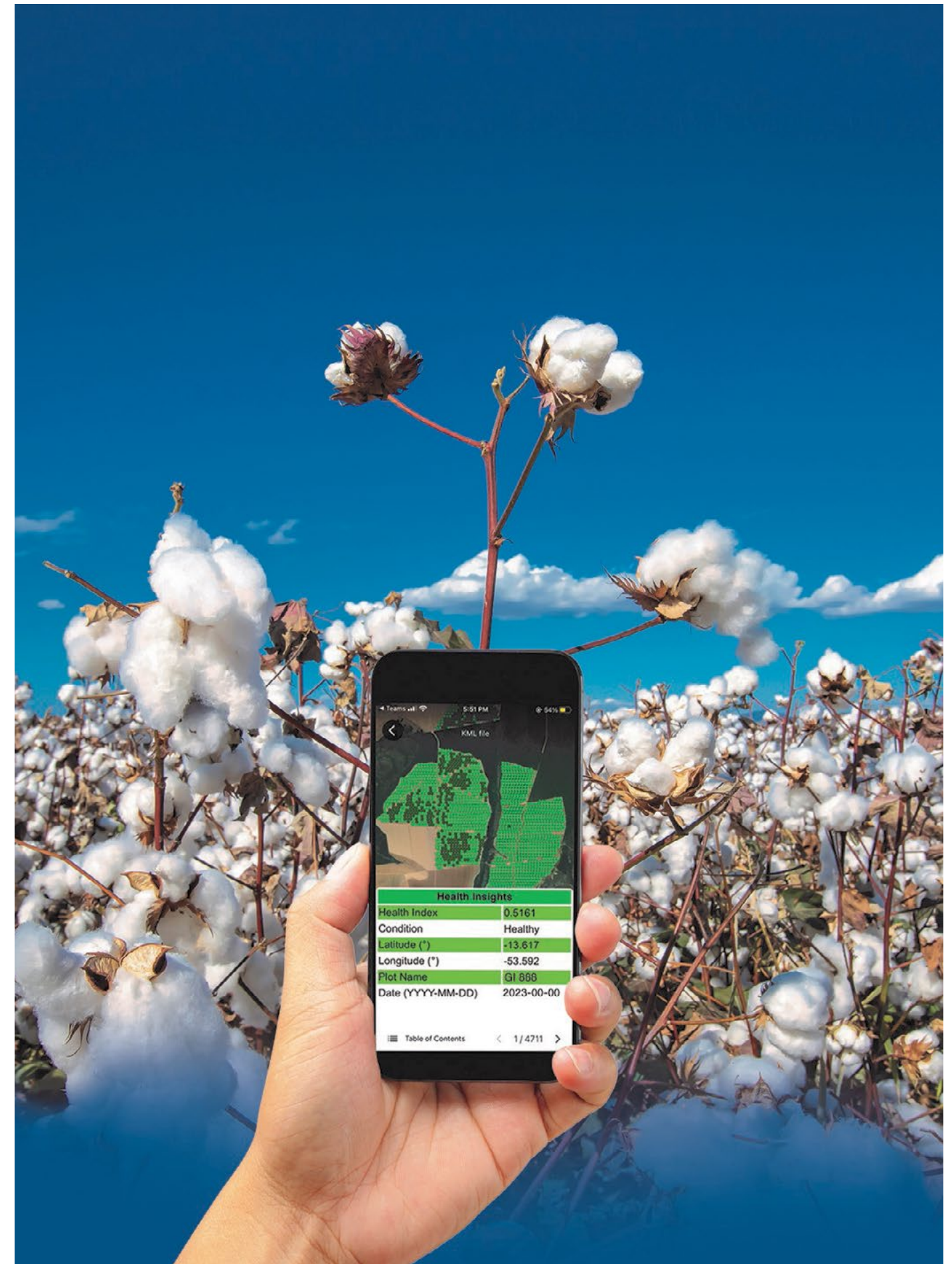
Practicing Precision Agriculture with AgXellence

By enabling macronutrient analysis of cotton crops using satellite technology, farmers can now assess and improve crop health up to four times as quickly.

In the agriculture industry, plantation managers often rely on traditional crop inspection methods. Farmers schedule visits to their plots, visually monitoring their crops that spread over hundreds of acres. Leaf samples are collected and sent to nearby laboratories for nutrient measurements. The results come back—almost three weeks later.

By this time, it is too late to nurse under-fertilised crops back to health. It's going to be a sub-optimal harvest.

Now however, farmers can refine their agriculture practices and optimise their harvests more reliably with AgXellence, a plantation health monitoring service powered by our advanced satellite-based estimations. Assessment of crop health and performance can be done remotely and as frequently as every five days.



Getting to the heart of what farmers need

AgXellence stemmed from Geo-Insights' deep engagement with cotton plantation owners in Latin America and Asia. Farmers don't want cookie-cutter tools and services; what they need instead are tailored solutions that meet their specific needs. A critical pain point that we sought to address was the inefficient distribution of fertiliser causing uneven yield across large swathes of land.

In developing AgXellence, we worked with a cotton farmer in Brazil to generate a macronutrient analysis map using satellite technology, showing levels of nitrogen (N), phosphorous (P), Potassium (K) and moisture levels. The goal was to use satellite-based crop health monitoring to quickly visualise the overall health of the entire plantation and identify areas of underperformance to deploy resources based on need.

The journey has led to the inclusion of these salient features:

- Wide area coverage

The technology provides wide aerial coverage, thanks to our remote sensing satellites. A single image provides a comprehensive view of a plantation's health and macronutrient status, without the need for farmers to spend weeks on manual inspection.

- Improves water resource management

With visibility of moisture distribution, farmers can make data-driven decisions for efficient and sustainable irrigation.

- Guides optimal nutrient distribution

There is precise location data to pinpoint where macronutrients are in abundance or deficiency, so corrective action can be taken. AgXellence can also facilitate precise fertilisation for even distribution of nutrients in a plantation.

With AgXellence, Geo-Insights actively monitors 15,000 hectares of plantations and continuously uses artificial intelligence and machine learning techniques on over six years of collected data to refine the technology.

Plus, the team has fostered strong partnerships with global operators, agronomists and advisors across Asia, Africa and the Americas. We marry new scientific knowledge with operational expertise to deliver actionable insights for farmers everywhere.

In the pipeline is a cloud-based platform as we continue to evolve the capabilities of AgXellence. The platform allows users to access valuable information from current and past crop cycles, helping farmers make informed comparisons and decisions to optimise inspections, streamline operations and improve yield.



AgXellence solves salient farming challenges from manual inspections of large land plots to inefficient nutrient distribution.

Not Just Orbiting Earth, But Pushing Frontiers in Sensing and Imaging

||||| SATELLITE SYSTEMS

ST Engineering Satellite Systems is a one-stop space solutions provider, providing customers end-to-end solutions through engineering, design, development and manufacturing of space avionics, system integration and testing.

In 2023, we launched TeLEOS-2, our first polarimetric Synthetic Aperture Radar (SAR) earth observation satellite. Our earlier launch in 2015, TeLEOS-1 was Singapore's first Optical earth observation satellite.

While most satellite constellations make polar orbits, both TeLEOS-1 and TeLEOS-2 satellites form part of our Near Equatorial Orbit (NEqO) constellation, the first of such constellations in the world to provide customers with high re-visit and high-resolution imagery over the equatorial region.

As a leading satellite manufacturer in Asia, we operate a comprehensive suite of satellite engineering and testing facilities, including a high-ceiling advanced Assembly, Integration and Test (AIT) area, anechoic chamber and failure analysis facility. Our services also include the conduct of in-orbit tests, operations and maintenance support for satellites and ground stations, testing of space applications and mission studies.

In 2016, we obtained the AS9100 certification, a widely adopted global standard for effective participation in aviation, space and defence businesses. We apply best practices in the space industry, complying with the standards of the European Cooperation for Space Standardisation and IPC.

Eye in the Sky Breaks New Ground

Developed jointly between the Defence Science and Technology Agency (DSTA) and ST Engineering Satellite Systems, TeLEOS-2 is Singapore's first polarimetric synthetic aperture radar (PolSAR) satellite capturing imagery under all light and weather conditions.

Pitched almost right above the equator at a 10-degree inclination, TeLEOS-2 orbits the earth every 90 to 100 minutes. The 750kg mass is almost twice as heavy as TeLEOs-1 and packs a huge punch in its features.

Launched on 22 April 2023, TeLEOS-2 is ST Engineering's first polarimetric Synthetic Aperture radar (PolSAR) satellite. The made-in-Singapore PolSAR payload enables TeLEOS-2 to penetrate cloud and rain, and capture both day and night images in any weather at 1-meter resolution—one pixel on a generated image is equivalent to a 1m² area. These features lend to improved monitoring, mapping and quantification of parameters of different surfaces; the satellite's orbital route and speed fill an important gap in geospatial insights gathering.

The launch of TeLEOS-2 was a highly anticipated follow-up to TeLEOS-1, ST Engineering's Electro-Optical (EO) satellite that has been in orbit since 2015.



Covering critical needs

TeLEOS-2's orbital route near the equator makes it a unique and invaluable deployment; most other global satellites are placed in the polar orbits.

TeLEOS-2 averages 14 imaging opportunities each day over many shipping routes, and disaster-prone and forest-fire regions near the equator. In comparison, satellites in the polar orbits typically provide up to four imaging opportunities daily over the same regions.

The unique abilities of the satellites in our NEqO constellation to gather geospatial insights swiftly have allowed us to extend our services to a wide range of commercial businesses.

TeLEOS-2 provides 7 times as many imaging opportunities compared to satellites in near-polar orbits.



Disruption is the only constant

The spirit of innovation drives our actions in every line of business.

As we dive into the intricacies of our technologies and deepen our multidisciplinary expertise, we do so with our lens also on the bigger picture. How does the work we do benefit businesses, communities and individuals? How do we do it better?

Questioning the status quo is how we continually push ourselves to advance our mission of enabling a more secure, smart and sustainable world. As the landscape in which we operate rapidly evolves, we are ready to meet new challenges with purpose and intelligence.

Find out more on how ST Engineering can contribute to your organisation's transformation needs at: <https://www.stengg.com>.

For more innovation stories and insights, visit: <https://innovd.stengg.com>.