HTX (Home Team Science and Technology Agency)
INAUGURAL ANNUAL REPORT FY2020

PURPOSE
IMPACT
INSPIRATION

HTX

Contents

HTX is the world's first Science and Technology agency that integrates a diverse range of scientific and engineering capabilities to innovate and deliver transformative and operationally-ready solutions for homeland security. Part of the Ministry of Home Affairs and integral to the Home Team, HTX works at the forefront of science and technology to empower Singapore's frontline of security. Our shared mission is to amplify, augment and accelerate the Home Team's advantage and secure Singapore as the safest place on planet earth.

So, what's in a name?

'HT' stands for Home Team, and 'X' stands for force multiplier. In a nutshell, 'HTX' stands for the Home Team's force multiplier.

htx.gov.sg

Setting the Wheels in Motion

Delivering Impact

Building the Quintessential HTX Culture

Securing Singapore's Future

SETTING THE WHEELS IN MOTION...

OUR PURPOSE

VISION
*Exponentially Impacting
Singapore's Safety and Security*

MISSION
*Advance Science & Technology
Force Multiply our Home Team
Secure Singapore's Future*

KEY MILESTONES

HTX WAS OFFICIALLY LAUNCHED BY PM LEE HSIEN LOONG ON 2 DECEMBER 2019

Photo credits: Ministry of Communications and Information

1 December 2019

Formation of HTX and appointment of the HTX Board

"HTX has the important mission of providing science and technology support to the Home Team, so that the Home Team agencies are able to effectively keep Singapore safe and secure."

- Chew Hock Yong, Chairman of HTX

8 July 2019

First Reading of Home Team Science and Technology Agency Bill

2018

Cabinet gave its support for the establishment of a new Home Team Science & Technology (S&T) agency

6 August 2019

Second Reading of Home Team Science and Technology Agency Bill

"In establishing HTX, scientific and technological resources across the Home Team will be consolidated within a single agency... The formation of this agency will not only build mission-critical capabilities within the Home Team, but create important synergies within the larger S&T ecosystem."

- Mrs Josephine Teo, Second Minister for Home Affairs

*" ... I have great hopes for what HTX will achieve for the Home Team. I have very high expectations. Beyond Home Team, HTX can be a **centre of excellence** within the government, sharing your experiences and solutions with other agencies that have similar needs, for instance in enforcement or regulatory work. "*

- Singapore Prime Minister Lee Hsien Loong

" HTX shares the same DNA as all other Home Team Departments and we are fully committed to the Home Team mission of keeping Singapore safe and secure. "

- Chan Tsan, Chief Executive of HTX

Watch PM's Speech @ Launch:

HTX'S STATEMENT OF INTENT

Official Launch of
HTX

Guest of Honour
**Prime Minister
Lee Hsien Loong**

PM Lee officially
launched HTX

" *May HTX long be
as unconventional, and
indeed as X-ceptional,
as your acronym.* "

PM Lee Hsien Loong

Exponentially
Impacting
Singapore's Safety
and Security

PM Lee with VVIPs and
HTX Board of Directors

HTX's strong statement of intent was articulated in a 7-minute hologram show. The show featured technology that HTX was working on, or technology and solutions that HTX had already conceived and had begun research on, to give the audience a glimpse into what the Home Team can deliver. It encapsulated HTX's commitment to exponentially impact Singapore's safety and security.

**Watch the
hologram show:**

HTX FORENSIC LAB

ID:DFG/GST/5874

CODE:Z2900 TYPE: S
COE: OK

AERIAL SCAN

JOVI LOW
HTX CRIME SCENE SPECIALIST

// CHAN CHOR MING

TECHNOLOGIES EXHIBITED AT THE LAUNCH

The exhibition included technologies displayed in the hologram show. This allowed guests to have an up close and personal experience with HTX technologies in different stages of their development.

Saving Lives

Rover-X, a bio-inspired robot, is customised with technologies such as powerful thermal cameras and sensors, and capabilities to map its surroundings as well as navigate autonomously. Able to walk on different terrains, including the stairs, and to screen for signs of life near the surface of the debris, Rover-X can be used in urban search and rescue missions, and function as a first responder to save lives.

Securing Borders

The **Multi-Modal Biometrics System** uses iris and facial scans as the primary biometric identifiers, instead of fingerprints, allowing for safer, more secure and efficient immigration clearance at Singapore's air, land and sea checkpoints.

Solving Crimes

Latent fingerprint enhancement and analysis uses a novel nanopowder formulation and a method of analysis via mass spectrometry to uncover critical investigative leads such as residues of explosives, narcotics and drug metabolites, and even endogenous secretions that will determine the gender and ethnicity of a person. This will far surpass the capabilities of conventional latent fingerprint examination when it is ready for deployment.

Digital Forensic Kiosk is a self-service platform for non-technical Home Team officers to easily extract and analyse information from digital devices such as mobile phones and storage media. This way, frontline officers can conduct evidence review on their own and obtain the investigative leads in a shorter time.

Enhancing Public Safety and Security

XENTINEL is the first of its kind counter-drone vehicle with the ability to detect drones up to 1km, thus allowing officers to have more time for effective interdiction, if required. XENTINEL is designed to be ready within minutes and only requires one officer to operate.
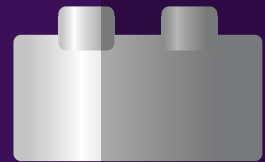
The **Drone Box** concept enables drones to operate autonomously and fly Beyond Visual Line of Sight (BVLOS). This way, the drones can be deployed for long-range complex operations and in the most hazardous and remote sites, and so expand the capabilities of the Home Team in the areas of public safety, search and rescue, and delivery of supplies.
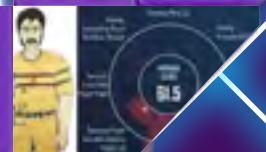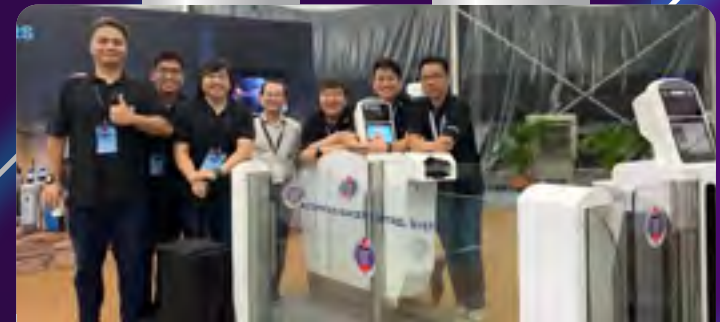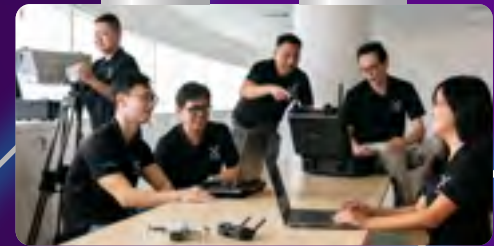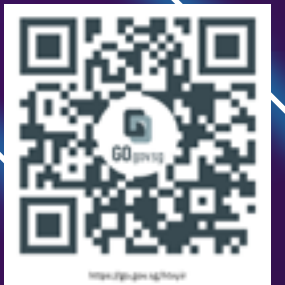
DELIVERING IMPACT

Watch our
Year-in-Review
video:

DELIVERING IMPACT IN THE TIME OF COVID-19

Covid-19 pandemic hit Singapore's shores in February 2020, just two months after HTX was established. It could be seen as a boon and a bane. On the one hand, bold and exciting plans that HTX dreamt up had to be shelved or adjusted. Yet, on the other, Covid-19 presented ripe opportunities for a young and untested agency like HTX to deliver timely technologies and solutions that force multiply the Home Team, and contribute impactfully to Singapore's safety and security.

Securing Borders

On the Frontline of a Viral War – COVID-19 Testing Operations

Since 5 March 2020, when Singapore reopened its borders to receive incoming travellers amid the Covid-19 pandemic, HTX scientists from CBRNE CoE (Chemical, Biological, Radiological, Nuclear, and Explosives Centre of Expertise) had been sucked deep into the Covid-19 operations to support a multi-agency effort.

Their job was to test the hundreds of swab samples of incoming travellers at six air, land and sea checkpoints everyday for Covid-19 virus. It was an unrelenting task and the stakes were high. Ms May Ong, Director of CBRNE CoE explained, "CBRNE's task was to run tests on swab samples to detect and identify travellers who had Covid-19 quickly, so that they could receive treatment. This also helped to curb the spread of the virus in the community."

For their task, the scientists used the test-kit developed based on the primers that they designed. Here is the backstory...

*CoE - Centre of Expertise

Securing Borders

When news of an unknown virus circulating in Wuhan, China, broke at the close of December 2019, CBRNE scientists immediately recognised the virus as posing a potential international threat. They monitored the situation closely and quickly designed the primers based on the full genome sequence of the virus once it was available on GISAID. They then partnered Veredus, a technology provider, to swiftly develop a Covid-19 test kit by February 2020.

Banding Together to Keep Singapore Safe – Wearable tech for persons on SHN

When Covid-19 cases continued to surge worldwide in mid-2020, it was imperative that Singapore acted swiftly and decisively to prevent imported Covid-19 cases from contributing to local transmission.

But how was the Immigration and Checkpoints Authority (ICA) going to effectively monitor the thousands of returning Singapore Citizens, Permanent Residents, and Long-Term Pass holders for compliance with the Stay-Home Notice (SHN) regulations?

The answer came in the form of an electronic wristband that people entering Singapore would have to wear when they served out their SHN. Should they attempt to leave their places of residence before their SHN period was completed, or tamper with the devices, ICA would immediately be alerted.

This solution was thought up by a cross-departmental team made up of ICA officers and engineers from HTX's Sense-making and Surveillance CoE. "We wanted a solution that offers ease of use and also ensures users' compliance with the SHN rules. After weighing multiple technical and practical considerations for reliable, efficient and secure operations, we found this e-wristband, paired with an IoT gateway device, to be an effective, self-service solution," said Deputy Director Seah Swee Leng from HTX's Sense-making & Surveillance CoE.

DELIVERING IMPACT IN THE TIME OF COVID-19

Enhancing Public Safety and Security

M.A.T.A.R. on Patrol

Flying High and Propelling Forward
– a BVLOS drone story

The Safe-Distancing Enforcement App

What Lies Within the Wastewater
– testing for traces of COVID-19

In mid-2020, when a number of Government Quarantine Facilities and isolation facilities were being set up, and reinforcements in policing in these premises were much needed, Robotics, Automation & Unmanned Systems (RAUS) CoE offered a solution. Its engineers placed M.A.T.A.R. (Multi-purpose All-Terrain Autonomous Robots) on duty in the isolation facilities to ensure that residents adhered to safe distancing rules.

Moving with ease in the isolation facilities to sound out reminders to residents to keep a safe distance from one another, M.A.T.A.R. was able to augment police operations in foot patrol as well as project police presence there. With M.A.T.A.R. patrolling the premises, police officers would not need to enter these high-risk zones, and were able to remain in lower-risk zones to monitor the patrols instead. This greatly reduced the danger of police officers contracting Covid-19.

When asked what he thought was M.A.T.A.R.'s contributions to the Covid-19 effort, Goh Boon Kiat, one of the engineers in charge of M.A.T.A.R., said, "Although the role of the robot might sound mundane, the benefits it brought extended beyond ensuring safe-distancing among residents in the dormitories, to protecting our frontline officers and giving their loved ones peace of mind."

During the Covid-19 Circuit Breaker Period, autonomous drones were deployed to support Police ground operations in surveying the industrial estates to ensure security, and protect lives and properties.

Using a Drone Box concept, the drones were deployed to fly autonomously to survey the expanse of the industrial estates Beyond Visual Line of Sight (BVLOS) of the drone operator, who was stationed in a backend Command and Control Centre. These BVLOS drones facilitated the viewing of difficult-to-access areas and provided a safer and more cost-efficient way of gaining greater insights in times of critical operations.

According to Lead Engineer Low Hsien Meng from RAUS CoE's Aerial Systems, the drones could also pinpoint locations and zoom into certain areas which might not be clearly visible to police officers on foot patrol or in vehicles. Thus, they were able to augment SPF's operational resource and capability in ensuring safety and security.

When Singapore first introduced social distancing measures to curb the spread of Covid-19, more than 4000 officers from 53 public sector agencies were deployed to enforce safe distancing measures.

However, the newly-minted enforcement officers were unable to mete out appropriate actions to offenders on the spot because they had to first plough through records that were filed in all the 53 agencies to check if these people were first-time or repeat offenders.

What the enforcement officers needed urgently was an app that would allow them to create an "offence record" and search the offenders' past records in a centralised database on the spot.

HTX responded to the call for help. The team, made up of engineers from Policing Programme Management Centre (PPMC) and Corporate Digital Services, came together to develop a safe distancing enforcement app in seven days. They then worked with the Ministry of Health to roll out the app for enforcement officers to use with ease.

Ms Pauline Ng, Deputy Director in PPMC, who was in charge of the design and project management of this app, said, "It is great to see technology being used to help in this pandemic. The fight against Covid-19 is definitely a group effort and every contribution helps. I am glad that I can help to fight against Covid-19 in a digital way."

HTX supported National Environment Agency (NEA)'s surveillance programme to test wastewater samples for traces of Covid-19. This form of testing operations complements the Covid-19 nasal swabs and clinical testing in detecting Covid-19 transmission.

At the height of the Covid-19 pandemic in 2020, the wastewater surveillance team from CBRNE CoE collected wastewater samples from foreign worker dormitories to test and analyse the samples for Covid-19 viral fragments in their lab. The work was far from glamorous, but the team thought it meaningful.

Senior Lab Technologist Ms Jian Ciyue said, "These jobs are all part and parcel of helping Singapore in the fight against Covid-19". Her team-mate, Senior Lab Technologist Zhang Jinhua added, "Every day that we see a drop in the number of cases, including community cases, that's when we feel we have achieved something – maybe not in a big way, but at least to some small extent, we have contributed to the larger effort."

*CoE - Centre of Expertise

With our Science & Technology, we...

Solve Crimes

Save Lives

Enhance Public Safety and Security

Secure Borders

Force Multiply our Home Team

Senior Forensics Examiner Khairul Anwar Bin Ishak using the Digital Forensic Kiosk to extract and examine data from the mobile phone

Dr Lee Mian Rong, Forensic Scientist from Forensics CoE, demonstrating the use of latent fingerprinting.

SOLVING CRIMES

You Can Bet on This

In an age where illegal gambling sites proliferate the internet, HT enforcement officers will have to combat these sites by beating them at their own game.

This is where the Online Casino Hunter (OCH) comes in.

OCH, developed by Q Team CoE, is an AI bot that searches the web for online casino websites targeting Singaporeans. It uses text and image analytics, web-crawling, and search engine technologies to hunt down thousands of illegal casino websites along with their potentially affiliated syndicates.

"Using search engines alone give many false results, so we decided to train some in-house machine learning models and write some algorithms to identify casino websites targeting Singapore. We then extracted contact details from these casino sites and used machine learning techniques to cluster syndicates together," said Q Team engineer Ms Tan Wei Lin.

SPF and MHA's Gambling Regulatory Unit are currently using the OCH for their investigations, and Q Team has also used the OCH as a jumping board to develop similar web tools that hunt for phishing websites.

For helming the development of the online casino hunter, Wei Lin and her team were awarded the Minister for Home Affairs Operational Excellence Award (OE) 2020.

Getting More Out of Fingerprints

Scenes of detectives swooping down on a crime scene looking for evidence such as blood splatter, fingerprints, and shoe-prints to piece together how a crime was committed are what we see on regular crime and whodunit shows.

But do you know that a fingerprint can yield more information than we currently give it credit for?

Forensics CoE is developing a latent print enhancement and analysis tool to flesh out more information than merely the identity of suspects and victims. The new method, developed in collaboration with Nanyang Technological University, uses a novel nanopowder formulation and a method of analysis (via mass spectrometry) to obtain further investigative leads off fingerprints. And it works even for fingerprints that are badly smudged.

How it works is this: after a fingerprint is dusted and lifted, it is fed into a mass spectrometer to detect the residues of interest, meaning residues from explosives, narcotics and drug metabolites, and even endogenous secretions that could tell the gender and ethnicity of the fingerprint donor. In time, the capabilities of this tool could even extend to include lifestyle biomarkers, which will enhance the intelligence gathered.

This tool is being developed and is expected to be ready for use in one to two years' time. Currently, HTX is one of very few security agencies in the world pursuing this research.

Digital Detectives

Do you know what happens to the digital devices such as laptops and mobile phones that the Police seize from crime scenes?

They are handled by forensic examiners, who will retrieve information from them, such as photos, messages and emails, and analyse the data to aid the investigations.

The process is generally laborious and challenging. "New technologies are emerging all the time. With better encryption, everything is increasingly more secure, and it is a growing challenge to extract data," said Mohamad Ridzuan, Senior Forensic Examiner from Digital and Information Forensics CoE.

To enable investigators to access the evidence and get to leads faster, the engineers developed the Digital Forensic Kiosk. This self-service platform enables investigators (even those with no technical background) to easily retrieve and analyse information such as photos, messages, and emails from digital devices including mobile phone, storage media and even damaged devices.

The engineers also developed the Digital Evidence Search Tool (DIGEST) to complement the Digital Forensic Kiosk. DIGEST ingests the voluminous forensic data (we are speaking about terabytes of data) required for examination and automates the processing of the data. Once the data is processed, the investigating officer will be notified, and he/she can access DIGEST at any time to review the data via a user-friendly interface.

With the use of these transformative tools, investigating officers will be enabled to apprehend criminals more swiftly.

Ms Tan presenting the OCH to Home Affairs Ministers of State Dr Faishal Ibrahim and Mr Desmond Tan during their visit to HTX in October 2020

Mohamad Ridzuan, Senior Forensic Examiner from Digital and Information Forensics CoE, in action

*CoE - Centre of Expertise

(L to R) RAUS engineer Fabian Ang, Rover-X, and RAUS engineer Goh Boon Kiat

SAVING LIVES

Ms Chin Wan Ling from Swee Hong's Blast Engineering team doing a finite element simulation of a building column.

Making Buildings Safer and More Secure

Man's Mechanical Best Friend

If a building were to collapse and people trapped in the debris are waiting to be rescued, we know instinctively that first responders will be dispatched on a search and rescue mission at the first instance. But, what if the area is too unsafe for first responders to venture into? What will happen to the rescue work or the rescuers?

In steps Rover-X, the robotic dog, 'trained' as a first responder to support search and rescue missions.

Rover-X is well-suited for search-and-rescue operations, especially in Singapore's challenging urban terrain. It is equipped with sensors and thermal heat cameras as well as capabilities to map its surroundings. So, it can navigate itself autonomously through rubble and uneven terrains, climb stairs, and skillfully avoid obstacles in its mission. Once Rover-X detects heat and chemicals produced by a human body, it will issue an alert to human rescuers, so that they can rush to its location and extricate the victim from under the debris in the shortest time possible.

Ong Ka Hing, Deputy Director of Ground Systems, RAUS CoE, said, "In industry, there is a rule-of-thumb called the 3Ds (Dull, Dirty & Dangerous) when considering the application of robotics. We embarked on the development of Rover-X for search and rescue operations, especially for missions where the environment is hazardous or too dangerous for SCDF officers to perform. Rover-X is particularly advantageous for such tasks that can alleviate the workload of humans and more importantly, to keep them safe and out of harm's way. It is one of the key ways to augment our officers' ability to perform his/her missions safely and effectively."

Commenting on the current stage of development, Cheng Wee Kiang, Director of RAUS CoE, said, "The team completed the development of a new autonomous navigation stack that was adapted from our earlier wheeled robot, M.A.T.A.R. We are testing this new capability on Rover-X."

Rover-X is a collaboration between HTX, Ghost Robotics, and Klass Engineering and Solutions.
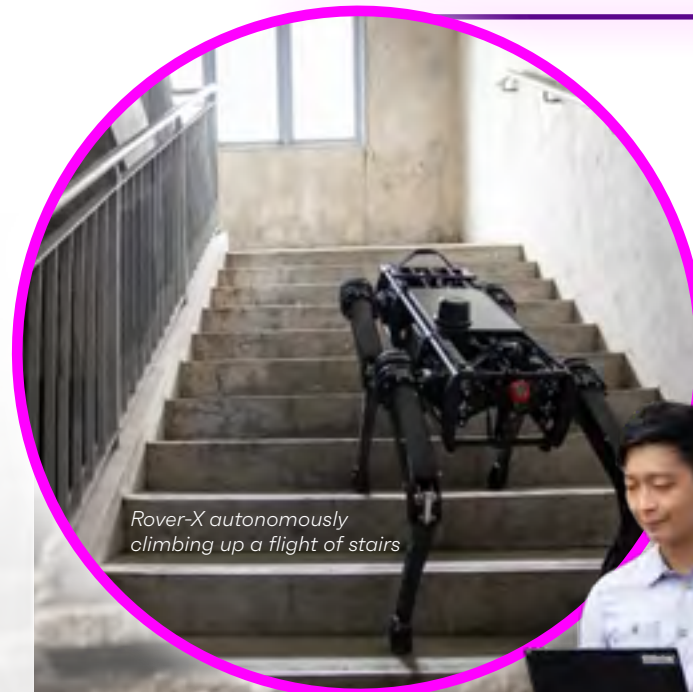
Rover-X autonomously climbing up a flight of stairs
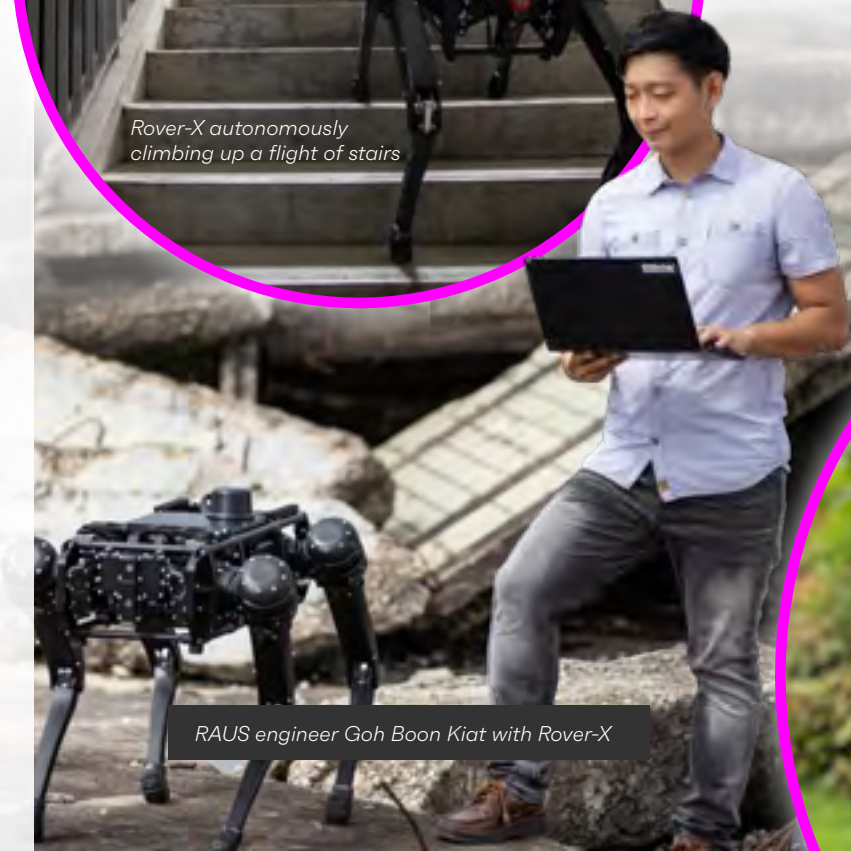
RAUS engineer Goh Boon Kiat with Rover-X

No building in Singapore has been threatened by a bomb attack since the terrorists planted bombs in the McDonald House in 1965, which killed three people.

But this does not mean that it will not occur again.

Engineers in Protective Security and Safety (PSS) CoE are working hard to mitigate the possible harm and damage to lives and properties should an explosion happen in a building.

One of the ways according to Er. Dr Tan Swee Hong, who heads the Blast Engineering Branch and specialises in designing mitigation measures, is to have the columns in the buildings encased in steel jackets. This is to improve the resilience so that the buildings could continue to stand erect in the event of an explosion, and be less likely to collapse. This way, the number of casualties can be minimised.

To test if a building column will survive a bomb blast, Swee Hong's team relies on digital means. They will do a finite element simulation of a column being subjected to blast effects to evaluate if the residual capacity of the column could support the weight of the building.

Ng Shu Herng, the Deputy Director said, "By leveraging on science and technology, PSS CoE engineers help save lives by making our buildings safer and more secure."

Swee Hong added, "It is important that HTX, as the leading agency in protective security, maintains a high level of technical competency to stay at the very forefront."

Er. Dr Tan Swee Hong, Head of Blast Engineering Division, PSS CoE

°CoE - Centre of Expertise

ENHANCING PUBLIC SAFETY AND SECURITY

The Sky's The Limit

"The first time we saw the drone take off from the drone box, I was like – 'Oh yes! We've done it!'" recalled Ms Vanessia Choo, an engineer in RAUS CoE. She was referring to the maiden flight undertaken by the Unmanned Aerial Vehicle (UAV) which flew Beyond Visual Line of Sight (BVLOS).

These autonomous flights can fly over long distances but require only a very lean team to operate remotely. Her team-mate, Lead Engineer of Aerial Systems Low Hsien Meng explained, "Unlike a conventional drone, where you need a pilot on site to insert the battery and prepare the aircraft, with a drone box concept, all these preparatory activities are actually automated by the system inside the drone box."

Since then, the team has carried out several hundred hours of flight time over vast distances, including the patrolling operations around industrial areas during the height of Covid-19 Circuit Breaker Period.

BVLOS UAVs will be particularly useful to the Home Team in that officers would be able to carry out patrols and security operations in areas which may be inaccessible or where situations are too risky for manual operations. BVLOS UAVs can also be used as a first responder to provide a situational picture

of an incident site, such as a big-scale or high-security event with large crowds, and for sustained and routine patrols. As videos from the UAVs can be streamed to the Police Operations Command Centre, the Police can rapidly view and assess the situation before deciding on the appropriate resources to send to the ground.

Currently, HTX is working with ST Engineering Aerospace as well as Airobotics to further design and customise effective BVLOS UAV solutions to meet the specific needs and requirements of the Home Team Departments.

*CoE - Centre of Expertise

RAUS team involved in the development of this advanced drone capability: (from left) Vanessia Choo, Low Hsien Meng, Cheng Wee Kiang, Chua Song Heng, Looi Xinglun

HTX's BVLOS hexacopter drone and the Drone Box

On Ground Patrol

M.A.T.A.R. or Multi-purpose All-Terrain Autonomous Robots is the closest thing to R2-D2 for the Home Team. Like R2-D2, it is a friendly presence.

Developed by RAUS CoE in collaboration with A*STAR and ST Engineering, M.A.T.A.R. is a familiar face with Singaporeans, having been deployed for active duty by the SPF to help with patrols and crowd control in past National Day events, Marina Bay Countdown, and Chingay, as well as in isolation facilities during the early days of the Covid-19 pandemic.

The development journey for M.A.T.A.R. started as early as 2016, with little support and many naysayers.

"We have to design the interaction between the human and machine to be as user-friendly and as seamless as possible, so that minimal or no training is required to handle it. This is made possible by leveraging motion tracking sensors and head mounted displays commonly used in virtual reality applications," said Lee Guoming, Deputy Director of Aerial Systems (RAUS CoE), who worked on the project together with Ong Ka Hing, Deputy Director of Ground Systems (RAUS CoE), from the very beginning.

But, when M.A.T.A.R. was launched in 2018, the responses were so favourable that the engineers continued to improve its capabilities, applying it to more Home Team operations.

Today, M.A.T.A.R. boasts of 360° cameras for eyes, sensors for ears, and speakers for its mouth, and the ability to relay information to and from Police Command Centres, while patrolling autonomously.

"It's very meaningful to see how our efforts can support officers on the ground. This spurs us on to develop innovative technologies that enhance the Home Team's operations," said Ka Hing.

RAUS Deputy Director Ong Ka Hing (middle, in red) with his colleagues and two M.A.T.A.R. robots

M.A.T.A.R. helps SPF in their patrols and crowd control

The Drone Catcher

In a time where rogue drones pose a real threat to lives and properties, XENTINEL is the first-of-its-kind mobile counter-drone vehicle that can rapidly take down illegal drones.

Able to be deployed within minutes, the sensor-packed XENTINEL can detect drones at further distances and jam their signals for takedown – all with only a single operator.

"Using a combination of cutting-edge technologies, we developed a mobile and rapid deployable system that is capable of countering rogue drones effectively. The systems on board the vehicle can detect and interdict drones at far greater range than a human operator," explained Eric Chua, Director of Land Systems CoE and co-Project Team Leader for XENTINEL.

Developed by HTX's Land Systems CoE and RAUS CoE, with SPF and DSO, the XENTINEL project team won the Minister for Home Affairs National Day Award 2020 for rapidly developing the powerful anti-drone solution in a mere 14 months.

"The development of the XENTINEL sets a new benchmark for delivering full spectrum counter drone capabilities to the Home Team," said Director of RAUS CoE and Co-Project Team Leader, Cheng Wee Kiang. "This original capability has proven to be superior in application, as the development and deployment is meticulously customised and optimised for Singapore's unique operating landscape."

Only one officer is needed to operate XENTINEL

XENTINEL has a "smart" jammer that disables drones without affecting electronic signals used by other devices such as smartphones

Beacon of Hope

When we take a walk in Punggol Waterway Park Connector or Sengkang Riverside Park Connector, we will invariably be greeted by a handsome structure bearing the Police chevron markings.

That is the Police Beacon for you – tall and stately, standing sentry to offer assurance to the public of police presence and ready assistance should the need arise. It was conceptualised and developed jointly by HTX's Policing Programme Management Centre (PPMC) and SPF.

The Police Beacon is equipped with motion detection lights, CCTVs, a Police warning system, an electronic screen as well as AED, or Automated External Defibrillator. These features are designed to aid the public, deter crime, and enhance public safety and security.

Lim Guan Choon, the Lead Engineer of Operations Systems at PPMC, explained, "We were thinking about the various scenarios where the members of the public would be using the Police Beacon. One is at night when it is quieter, and the surroundings may not be as brightly lit. So we included motion detection lights that will turn on when a person approaches the Police Beacon."

The Police Beacon would be on trial for a year from December 2020. If successful, more Police Beacons could be expected in other park connectors and other public spaces in the future.

The PPMC team that worked on the Police Beacon: (left to right) Victor Yuen, Lim Guan Choon, Bernard Phang, Darren Pek and Wong Chee Mun

Two Police Beacons are being trialled at Punggol Waterway Park Connector and Sengkang Riverside Park Connector for two years

Pawandeep Singh Shahi (right) with the NGFRC project teammates, Chan Li Wei (middle) from S&S CoE and Samuel Seah (left) from Land Systems CoE

NGFRCs, Roll Out!

In August 2020, the newest batch of Next Generation Fast Response Cars (NGFRCs) revved their engines and plied Singapore's streets. These would gradually replace the older fleet of police cars by 2024.

The NGFRC integrated technology and functional design to enhance the overall safety and operational effectiveness of the Police.

For instance, it has an integrated vehicular dashboard which provides the driver with a seamless use and control of the technological functions in the car. It has an automated number plate recognition system, that allows police officers to identify vehicles of interest while on the move, thus ensuring that the officers' attention can focus on their tasks at hand. In addition, there are also the customised compartment for person-in-custody, as well as ergonomically cut-out seats for officers.

The NGFRC is the result of the collaboration between the SPF and HTX's Land Systems CoE, Human Factors and Simulation CoE, Sense-making and Surveillance (S&S) CoE, and Joint Capabilities Programme Management Centre (JCPMC).

One of the team members, Pawandeep Singh Shahi, Lead Engineer in JCPMC, said, "It is really exciting to see something evolving from paper design to an integrated and technologically superior solution with a state-of-the-art capability. The NGFRC will be a game-changer for SPF in keeping Singapore safe."

*CoE - Centre of Expertise

SECURING BORDERS

The Eyes Don't Lie

Move over fingerprints! Travellers can now breeze through immigration clearance at our air, land and sea checkpoints without having to slow down or lift a single finger.

Instead of the fingerprints, travellers' iris patterns and facial features will be used as primary biometric identifiers for immigration clearance. Fingerprints will be used as a secondary biometric identifier for travellers who are unsuccessful in their iris and facial scans. This new way of immigration clearance (Multi-Module Biometrics System aka MMBS) ensures that efficiency is achieved without compromising security.

This system is developed jointly by ICA and HTX's Biometrics and Profiling (B&P) CoE and the Immigration and Checkpoints Programme Management Centre (ICPMC).

Some members of the MMBS project team

MMBS at Tanah Merah Ferry Terminal

The Test of our Times

During the pre-Covid-19 days, the scientists in CBRNE CoE's lab in the Protective Analytical Assessment Facility (PAAF) focused their energies on R&D as well as the work of detecting pathogens and security-sensitive materials at the borders.

But when Covid-19 struck, the scientists had to assume a new role of testing the nasal swab samples of incoming travellers to augment the work of the National Centre for Infectious Diseases (NCID). By identifying persons infected with Covid-19 soon after their entry into Singapore, the scientists were able to help limit the spread of the virus in the community.

The lab work was intense and relentless. Ms Chin Zan Xin, one of the young scientists on the team, said, "At the peak of the crisis, waves of lab samples kept coming in for analysis, and the work seemed never-ending. My family and friends were initially concerned about our exposure to the virus. However, the team pressed on because we knew that the results of the testing would help assure many affected individuals and their families."

The hard work of the scientists paid off. In August 2020, the CBRNE lab was awarded the Ministry of Health Private Health Medical Clinic license and ranked at the top tier for its excellent performance.

"I am happy I could play a part and the team could play a part. HTX staff would come up to me and talk about how proud they were that HTX could contribute to Covid-19 efforts in this way," said Ms May Ong, the Director of CBRNE CoE.

The CBRNE team testing swab samples for Covid-19

CoE - Centre of Expertise

FORCE MULTIPLYING OUR HOME TEAM

Ahoy! To the Sea!

After a hair-raising high-speed chase over choppy waters where they had to execute high-risk manoeuvres to interdict a suspicious ship, the trainee Police Coast Guard (PCG) officers disembarked their vessel with nary a scratch or cut.

This is no ordinary vessel. This is the Tactical Boat Handling and Firing Simulator (TBHFS) – the first of its kind in Singapore – developed by Policing Programme Management Centre (PPMC) and PCG.

The TBHFS can simulate how high-speed vessels behave in the real world under different conditions, environments and in a range of scenarios at sea. Using the TBHFS, the PCG officers can undergo the rigorous training as well as tactical boat handling skills, and hone their skills in watch-keeping, navigation, berthing and maritime interdiction in a safe environment before their actual sea phase training.

The TBHFS is also integrated with an advanced eye-tracking system that detects the eye movement of the trainees to allow Trainers to analyse the trainees' visual focus during stressful scenarios such as high-speed pursuit. This will allow the Trainers to provide targeted feedback to the individual trainees so that they are aware of the areas they can improve on.

Bernard Phang, Director of PPMC explained, "The multiple sensors allow the trainer to analyse each trainee's performance and help them to improve. We have been able to enhance the training of police officers exponentially in different areas without having to be subjected to the climate and currents of any given day of training."

The TBHFS trains the steering competencies of Police Coast Guard officers to steer marine vessels by simulating a variety of scenarios

Blood on the (Virtual) Walls

To be able to glean critical insights from the shape, size and distribution of bloodstains, forensic specialists must be proficient in Blood Pattern Analysis (BPA) by practising with a variety of scenarios, using synthetic blood.

However, creating each new training scenario is a laborious task for instructors as the synthetic bloodstains on the furniture, walls and floor from the previous scenario must be removed before setting up a new scenario with a fresh set of bloodstains. On some occasions, an instructor might have to redo bloodstain splatters multiple times in order to enact the right patterns.

Apart from the onerous process of creating training scenarios, trainees practising the 'stringing' technique to gauge points of impact also find the process time-consuming.

That is why Human Factors and Simulation (HFS) CoE and the Criminal Investigation Department (CID) have jointly developed a Mixed Reality (MR) technology to train forensic specialists in BPA.

The MR training system allows trainee investigators to interact with a computer-generated environment. The bloodstains, strings, and furniture can be computer-generated, so instructors can quickly create a large variety of accurate scenarios for their trainees without having to set up and tear down physical props.

Meanwhile, the trainee can draw holographic lines in real-time to visually track the angles of impact of the computer-generated bloodstains. The MR headset also gives instantaneous feedback to the trainee, removing the need for one-to-one supervision.

"This system is designed to introduce a fresh instructional approach, to enhance the learning experience of our crime scene specialists," Ms Leong Hin Fong, Senior Scientist in HFS CoE.

Both HFS CoE and CID are aiming for full-scale deployment of the new system and are conducting user trials to make further improvements to this technology.

*CoE - Centre of Expertise

A half-virtual Bloodstain Pattern Analysis training scenario made using Mixed Reality technology

Targets that Teach

Picture yourself in the live firing range. How would it feel to have a target that not only scores your accuracy but also gives you immediate feedback on how to improve your aim and technique?

This is exactly what Enhanced Live Firing Range System (ELFRAS), a training system jointly developed by Human Factors and Simulation (HFS) CoE and SPF, does. It senses the way the officer handles his/her weapon, the breathing, shooting posture, gaze fixation, and visual alignment so as to give real-time recommendations to improve his/her shots.

Dr Saravana Kumar, Deputy Director of HFS CoE, said, "We want it to simulate a realistic environment for the officer. Once it is realistic, then the outcome that we achieved through training can be transferred to real operational environment as well".

ELFRAS has undergone trials since Oct 2020 and is expected to be deployed in late 2021.

An officer testing out the ELFRAS during firearm training

ELFRAS' scorecard that gives trainees specific recommendations on how to improve their firearm technique

ADVANCING S&T IN KEY DOMAINS

HTX advances Science and Technology in three broad pillars – engineering, digital and sciences. Our Centres of Expertise are as follows:

ENGINEERING

- Robotics, Automation and Unmanned Systems
- Sense-making & Surveillance
- Q Team
- Land Systems
- Marine Systems
- C4I (Command, Control, Communications, Computers and Intelligence)

DIGITAL

- Cybersecurity
- Data Science & AI
- Digital & Information Forensics
- Disruptive Technologies Office

SCIENCES

- Biometrics & Profiling
- CBRNE
- Forensics
- Human Factors & Simulation
- Protective Security & Safety

More details can be found at: go.gov.sg/htxexpertise

ENABLING 24/7 OPERATIONS IN HOMELAND SECURITY

HTX manages properties, vehicles and vessels, systems and networks across the different Home Team Departments.

NUMBERS AT A GLANCE...

270 properties

3,000 vehicles

90,000 PolCam

300 ICT systems

>35,000 computing devices

COLLABORATING WITH PARTNERS TO ADVANCE S&T

We **work with partners** to leverage each other's expertise and co-create together

LOCAL GOVERNMENT AGENCIES

DSTA — Defence Science & Technology Agency

GOVTECH SINGAPORE

DSO National Laboratories

SMART NATION & DIGITAL GOVERNMENT OFFICE

CSA SINGAPORE

HSA

RESEARCH INSTITUTES & UNIVERSITIES

SUTD — SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

A*STAR — Agency for Science, Technology and Research SINGAPORE

NUS — National University of Singapore

SMU — SINGAPORE MANAGEMENT UNIVERSITY

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

SIT — SINGAPORE INSTITUTE OF TECHNOLOGY

INDUSTRY

Strategic Partnerships for Innovation

PCS SECURITY

Singtel

NCS

THALES

HOPE technik

KLASS

ST Engineering

motorola

NEC

Cellebrite

Innovation Ecosystem Partners

vertex

INNOSPARKS — AN ST ENGINEERING OPEN LAB

sosa

TEMBUSU PARTNERS

Singtel innov8

STARBURST

Public Ventures

edbi

SMU — Institute of Innovation & Entrepreneurship

SGINNOVATE

CAPVISTA

IMDA — INFOCOMM MEDIA DEVELOPMENT AUTHORITY

a*startcentral

YEAR IN REVIEW:
December 2019 – July 2020

December 2019

On 1 Dec 2019, when **HTX officially came into being** as a statutory board under the Ministry of Home Affairs (MHA), 13 leaders in industry, academia and the Home Team were appointed as directors to the HTX Board chaired by Mr Chew Hock Yong, Permanent Secretary (Development) of MHA and Permanent Secretary of the Ministry of Social & Family Development.

Prime Minister Lee Hsien Loong officially launched HTX on 2 Dec 2019 and charged the young agency to "make its mark as a key member of the Home Team, as a leading science & technology agency for homeland security, and as a force multiplier for Singapore".

More than 1,000 newly-minted HTX officers gathered together for the first time on 4 Dec 2019 to **celebrate their new status as members of HTX.**

January 2020

CBRNE scientists led by Ms May Ong **designed the primers for Covid-19 testing** based on the full genome sequence of the virus that became available on GISAID, and partnered Veredus, a technology provider, to swiftly develop a Covid-19 test kit.

April 2020

During the Covid-19 Circuit Breaker Period, Senior Management sent a special breakfast delivery to HTX officers who were on duty on-site on Good Friday, and also "dropped in" for a **Zoom Breakfast** with them.
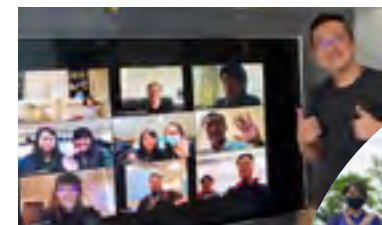
As staff had to "work from home" by default, the most pressing issue was their emotional and psychological well-being. Small gestures to connect staff were rolled out including **care packs,** agency-wide virtual fun activities like "View from My Desk", and other bracing eDMs.

June 2020

HTX supported the pilot **wastewater surveillance programme** initiated by the National Environment Agency to screen wastewater for Covid-19 virus fragments in the nationwide fight against the pandemic.
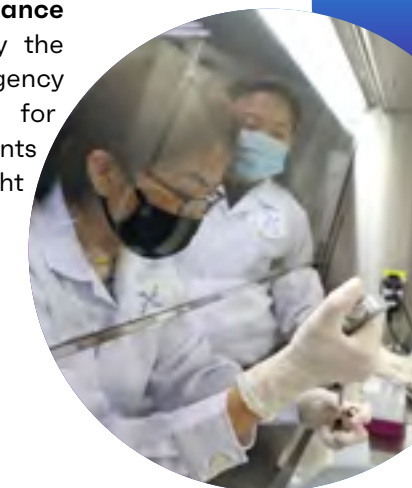
March 2020

From 5 Mar 2020, CBRNE scientists, in full PPE gear, began **testing the nasal swab samples** of incoming travellers for Covid-19 virus. With each detection, infected travellers could be quickly identified and quarantined so as to contain the spread to the community. To aid the lean team on non-lab work, HTX officers volunteered to collect the samples from the checkpoints, and manage the testing operations.

On his first visit to HTX, Minister for Home Affairs K. Shanmugam stopped by three stations showcasing HTX's **cutting-edge technologies that were developed in-house.** Some highlights included CBRNE's Covid-19 test kit; Sense-making & Surveillance's facial recognition engine; and Q Team's AI Bot. The session ended on a high note for HTX Associates who had the chance to interact with the Minister.

HTX's Sense-making & Surveillance CoE conducted a trial of the **Thermal Monitoring Solution with Facial Recognition System** at the MHA headquarters. The system was able to detect the temperature of a person automatically and identify the person against a database of facial images. This would be useful for contact tracing and border biosurveillance operations.

Mr Frederick Chew (CE of A*STAR) and his colleagues visited the CBRNE lab in PAAF to understand how the scientists ran the Covid-19 testing operations and border biosurveillance operations.
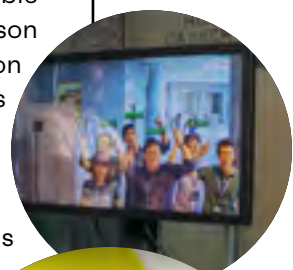
May 2020

During the Covid-19 Circuit Breaker period, HTX collaborated with SPF to **use drones to augment Police ground operations** in tracking anomalies within the industrial areas to ensure that safe-distancing was observed.

M.A.T.A.R. was deployed at the Government Quarantine Facilities and foreign worker dormitories to **augment foot patrol and project police presence** and ensure that residents abided by safe-distancing rules.

The inaugural Town Hall was held virtually and attended by more than 900 officers. Meant for Senior Management to encourage officers during the Circuit Breaker Period, the Town Hall sessions soon morphed into a monthly affair, and even acquired a name – eXpresso!

July 2020

The **Enterprise Geographic Information System (eGIS)**, developed jointly by HTX and SPF, received the Esri Special Achievement in GIS Award for its innovative application of mapping and analytics technology.

*CoE - Centre of Expertise

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35

YEAR IN REVIEW:
August 2020 – March 2021

August 2020

Immigration & Checkpoints Programme Management Centre (ICPMC) Director **Ms Tan Sor Hoon, was presented with the Public Administration Medal (Silver)** for her outstanding efficiency, competence, and industry at the National Day Awards. Along with her, 18 other HTX officers also received the National Day Awards 2020.
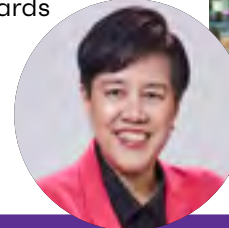
The **wearable tech,** developed jointly by ICA and HTX, was rolled out to more effectively monitor all returning Singapore citizens and residents, as well as Long-Term Pass holders, for their compliance with the Stay-Home Notice.

The XENTINEL project team won the **Minister for Home Affairs National Day Award** for its excellent teamwork, dedication to duty, operational efficiency, and integration of innovative technologies.

300 Next Generation Fast Response Cars (NGFRCs) hit the streets and would replace SPF's older fleet of cars by 2024. The NGFRCs, designed and developed jointly by SPF and HTX, contain a myriad of technological advancements.

September 2020

Mr Tham Kok Leong, Partner (Head of Technology & Corporate Intellectual Property Practice) at Allen & Gledhill LLP; Ms Chew Seow-Chien, Partner (Head of Southeast Asia Financial Services Practice) at Bain & Company; and Ms Shie Yong Lee, Commissioner of Prisons Prisons were appointed to the HTX Board. HTX bade farewell to Mr Desmond Chin who stepped down from the Board when he retired from the Singapore Prison Service.
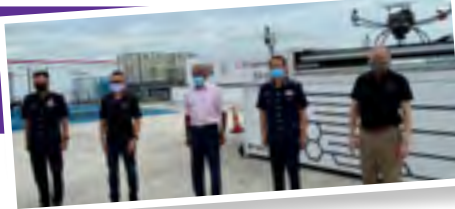
During Minister K. Shanmugam's visit to Tuas View Fire Station to observe the BVLOS drone flight, he commended the project saying, "This development is a **key milestone in the Home Team's use of cutting-edge technologies** to transform the way we operate. HTX and the Home Team Departments must continue to innovate and find ways to harness technology to enhance the Home Team's effectiveness in keeping Singapore safe and secure."

The **Tactical Boat Handling and Firing Simulator** by HTX and SPF's Police Coast Guard (PCG) division was launched to train PCG officers for different scenarios at sea in a safe environment.

Ministers of State for Home Affairs Prof Muhammad Faishal Ibrahim and Mr Desmond Tan visited HTX for the first time to understand the various projects that HTX was developing.
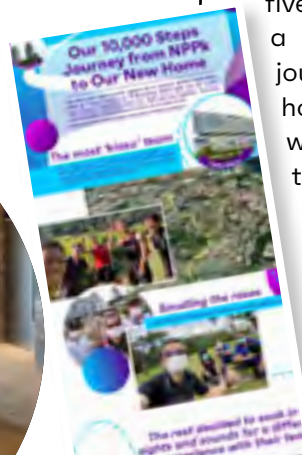
October 2020

At the announcement of the **Enhanced Live Firing Range System** (ELFRAS), SPF and HTX showed how the use of multiple sensors and analytics could improve the shooting performance of officers undergoing firearm training.

The Multi-Modal Biometrics System (MMBS) was introduced to the air, land and sea, checkpoints to allow **both the iris and facial biometrics** to be used in place of fingerprint scans for immigrations clearance.
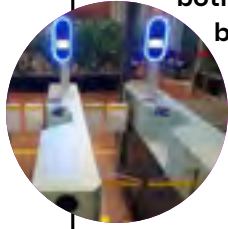
November 2020

To commemorate HTX's move into its new headquarters, 140 HTX officers walked **10,000 steps** each from the old office at New Phoenix Park to the new premises in Mediacorp Campus. Split into teams of five, each team explored a different route for the journey to get to the new home. Safe distancing was observed throughout the event.

December 2020

HTX turned ONE in the thick of the Covid-19 pandemic. At the virtual ceremony, HTX Chairman Mr Chew Hock Yong charged HTX officers to "be bold, dare to try, and constantly push the boundaries."

The HTX Virtual Run organised to **promote healthy living** saw 500 participants running over a seven-day period. Each participant ran a total of 14.6km on average, and as an agency, HTX clocked 7030km in total.

The **Police Beacon** developed by SPF and HTX was unveiled for trials in two park connectors in Punggol and Sengkang respectively to project police presence and enhance the public's access to emergency services.

January 2021

Minister K. Shanmugam and Second Minister for Home Affairs Josephine Teo **visited HTX's new premises** where they viewed a showcase of projects the scientists and engineers were engaged in.

At the **inaugural TechXchange**, world-renowned forensic scientist Dr Henry Lee spoke on the history and future of forensic science. He said, "HTX is way ahead of the curve in forensics because when it comes to the future of forensics, you guys already know about it."
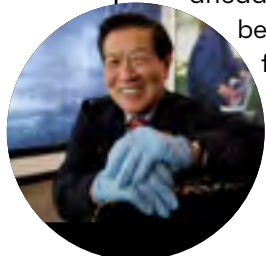
February 2021

During the Chinese New Year holiday, Minister of State Muhammad Faishal Ibrahim visited CBRNE scientists, who were hard at work carrying out Covid-19 testing operations in their lab in PAAF, to wish them a happy Chinese New Year.

Permanent Secretaries for Home Affairs Mr Pang Kin Keong and Mr Chew Hock Yong along with 400 officers from HTX and Home Team Departments attended **HTX's first TechXplore** to view a showcase of 20 of the current projects across four S&T themes.

March 2021

At the Committee of Supply Debate, Minister K. Shanmugam emphasised the importance of technology transforming Home Team's operations and made special mention of HTX's flagship and key projects. He reiterated **HTX's critical role in developing customised technology solutions** to exponentially impact Home Team capabilities.

BUILDING THE QUINTESSENTIAL HTX CULTURE

WHO WE ARE...

Xponents
the name HTX officers call themselves

1,500
Total Strength

15
Centres of Expertise

7
Programme Management Centres

4
Capability Sustainment Teams

8
Capability Planning Teams

We are the Xponents...
Hear us

ROAR

What is the quintessentially HTX culture?

Xponents give their take on what drives them, what binds them, and what it is about HTX that sets them apart.

"We need to have integrity and a strong sense of service towards the public. What motivates us to give our best is the trust and confidence that the public has in us."

Ms Eng Wan Ying
Senior Forensic Scientist, HT Investigations Lab, Forensics CoE

Wan Ying (seated), with her colleagues

"Knowing that what we design will lead to a more secure environment for our nation, including my loved ones, motivates me to push on in my work."

Chandrasehar S/O Rajaseharan
Lead Engineer, Sensors and Sense-making, Sense-making & Surveillance CoE

"When my work creates a direct and positive impact on the Home Team's operations, I feel really gratified. It gives meaning to what I do."

Goh Yong Wee
Engineer, Q1, Q Team CoE

"As an Armament-trained engineer, I am honoured to be able to contribute to the weapon capability development for our homeland security community."

Teo Tiong Ngee
Deputy Director (Weapons & Armament Systems), Land Systems CoE

"When I witness my inputs evolving into solutions, it hits me that the work I'm doing is truly meaningful and will eventually leave a positive impact."

Ms Daphne Goh
Engineer, Cybersecurity CoE

"I feel proud that I have helped to keep Singapore safe and it makes me even more passionate about my work!"

Ms Goh Siew Lee
Deputy Director, Sense-making and Surveillance, Joint Capabilities Programme Management Centre

"I derive energy from all the different things I am doing and learning about."

Ahalid Hasumi
Deputy Director, Maintenance, Marine Systems, Platform Systems Sustainment Centre

"I have always been excited by the plethora of options and opportunities that S&T offers... I like it that what I do can have a direct impact on the ground, be it operationally or in shaping the organisation."

Ms Ong Si Ci
Engineer, Sensors and Sense-making, Sense-making & Surveillance CoE

"I really love my job. Not only because I get to look at new technology which is very cool, but also because I get involved in actual operations to see how the technology is used on the ground. It's exciting and meaningful."

Ms Vanessia Choo
Engineer, Aerial Systems, RAUS CoE

"My favourite part of the job is to be part of the team where I get to learn about the challenges in the Home Team Departments, work hand-in-hand with them and operationalise our research on the grounds. It's very heartening when fellow officers tell us that our results helped them in their investigations."

Ms Anna Lim
Deputy Director (Research) of Forensics CoE

"I feel privileged to be able to propose or enhance the policies and processes that will help our colleagues in their course of work while ensuring HTX is still able to fulfil its various obligations in terms of governance and accountability to the public."

Pang Chia Chiat
Deputy Director (Financial Accounting), Corporate & Finance

"No two days are ever alike. This is both a blessing and a challenge as the nature of the work is so varied. Every day seems to bring something new and unexpected."

Muhamad Amir Bin Muhamad Hassim
Deputy Director (Immigration & Checkpoints Border Security), Ops Systems Sustainment Centre

"I truly appreciate the guidance from my colleagues and supervisors as I learn on the job. At HTX, no question is ever too small or invalid."

Ms Ng Hui Lian
Engineer, Profiling, Biometrics & Profiling CoE

"Science and Technology can only be useful when it is deployed effectively in real-life applications. Our role must go beyond the boundaries of S&T by meeting the operational needs of SPF."

Victor Yuen
Head, Operations Systems, Policing Programme Management Centre

"I find it meaningful to use my skills to develop ICT systems that can be deployed across Home Team Departments, and HTX allows me to do that."

Tan Teck Huat
Deputy Director, Enterprise Systems, Joint Capabilities Programme Management Centre

"The open, friendly culture at HTX gives me the autonomy to do my work. It allows me to determine my own pace for development and sharpening of skills."

Ms Clara Ho
Data Scientist, Data Science & AI CoE

"To me, 'HTX' also stands for Hyper Technology eXperience as it represents the satisfaction that you gain when working here!"

Ms Irene Tan
Engineer, Cybersecurity CoE

"HTX has many opportunities for professional growth. Not only can I acquire specialist knowledge, but I can also develop skills and understanding of the organisation's business structure."

Yeo Hwee Kiat
Engineer, Protective Security & Safety CoE

"I am looking forward to witness robotic guardians patrolling our streets and play a small role in shaping the safety of our nation by bringing robots beyond 'factory cages' to serve our citizens as trusty labourers."

Dr Daniel Teo
Head, Ground Systems, RAUS CoE

"Despite coming from a different field of engineering, I am grateful that my Director Dr Ng Gee Wah, and my supervisor, Dr Terence Tan, were confident I could rise to the challenge and deliver. They were very supportive and mentored me closely to help me learn and overcome the difficulties I encountered during the project."

Ms Tan Wei Lin
Engineer, Q1, Q Team CoE

The HTX family get-together on 4 Dec 2019

CONNECTING MINDS

The inaugural TechXplore, themed "Exponentially Impacting Singapore's Safety and Security", took place on 8 – 9 February. The event showcased 20 new tech projects spanning four zones – securing our homeland; solving crimes; enhancing our public safety; force multiplying the Home Team.

"This is the very first Home Team TechXplore, so it's very important to share technology with Home Team officers who are running the operations," said Dr Ng Gee Wah, Director, Q Team CoE, and co-chair of the organising committee.

His co-chair, Dr Portia Gloria Loh, Director, Forensics CoE, added, "TechXplore provides a really great platform for us to engage our Home Team Department counterparts, at the same time seek feedback on some of the concepts, the new technological boundaries that we are trying to push."

The 400 guests from the Home Team Departments who attended the event enjoyed the experience and were effusive in their praise for it.

Anecdotal feedback from guests indicated that they found the event useful because they were able to see innovative technology by HTX on display, and how the tech can be applied in Home team operations.

Ms Stephanie Chan, Senior Psychologist, Home Team Behavioural Science Centre, HTA, said, "The booths showcased a lot of cutting edge technologies, very applicable for Home Team operations and officers in the work that we do."

Another attendee, Justin Wong, Assistant Director (Major Crime), CID, SPF, said, "One of the exhibits that really can be useful for us is the GEVAS system. It will actually be very helpful for our first responders to be able to process the crime scenes quickly."
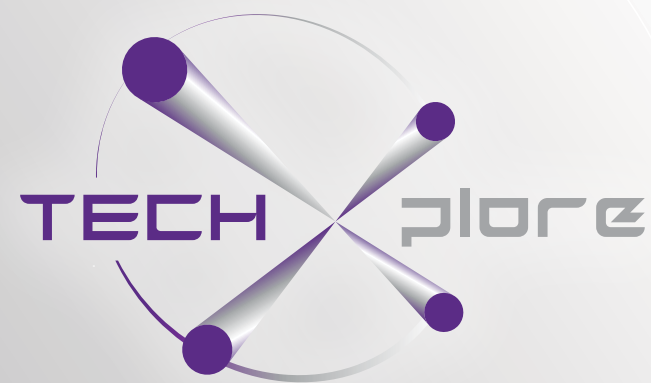
Other feedback included…

"Great to find out tech efforts in the Home Team, and happy to be able to connect with an HTX officer doing RPA for future assistance :)"

"I have a deeper understanding of HTX work and potential application opportunities back at work. Thank you for organising!"

"Very interesting showcase that gives us insight to future technology and trends in the Home Team."

"Good exposure to projects undertaken by HTX across Home Team Departments."

"The young engineers are promising!"

Go to: go.gov.sg/techxplorevideo for a taste of the event.

*CoE - Centre of Expertise

TOUCHING HEARTS

eXpresso!

In FY2020, 11 eXpresso! sessions or Town Halls, were organised which attracted an average attendance of 700 participants per session. eXpressos! aim to foster organisational culture and enhance engagement especially during this time of Covid-19 pandemic. They were conducted virtually during the circuit breaker period and heightened alert phases, and in the blended mode (hybrid) when work-from-home was not the default work arrangement.

"eXpresso! is a great form of engagement with our Senior Management, that I've never experienced in my past organisations. I'm grateful that our leaders set aside time to engage us despite their busy schedules. During the Ask Management Anything (AMA) segment, they also take each feedback seriously, no matter how trivial, and follow up on them. I am assured knowing that our leaders take interest in our feedback for the organisation."

Elfeiz Fadhil Md Amin
Engineer, Platforms Systems
Sustainment Centre

"Thankful for eXpresso! where Xponents are able to hear directly from Senior Management on organisational-wide initiatives and the exciting plans for HTX, and especially the Ask Management Anything (AMA) segment. Being an S&T organisation, leveraging on such tech platforms, i.e. Microsoft Teams, allows every Xponent to attend this virtual townhall at one's convenience. This initiative sends a strong and positive signal on the culture that HTX is trying to build as a young organisation and this is just one of the many comms initiatives that HTX had rolled out since the Covid-19 pandemic. Kudos to my fellow colleagues behind-the-scenes for eXpresso!"

Ms Deena Lau
Manager, Plans & Strategy Division

"eXpresso! is a good and exciting platform serving its intended purpose to hear latest updates by Senior Management and responses to feedback raised by HTX colleagues."

Pawandeep Singh Shahi
Lead Engineer,
Joint Capabilities Programme
Management Centre

"eXpresso!, like the name implies, is a small yet strong boost of "caffeine" where staff can get in touch with the latest happenings in the organisation and seek clarification directly from senior management. It is an eXcellent platform to keep staff engaged."

Lee Guo Ming
Deputy Director,
Robotics, Automation and
Unmanned Systems CoE

Thanks-a-Latte!

Every week, three Xponents who have made special contributions above and beyond their call of duty would receive "Thanks a Latte" from CE and DCEs. This HTX initiative consists of a personalised email of appreciation plus a latte to sweeten the special Xponents' day.

Notes from Xponents to CE and DCEs

"Thanks very much to Senior Management for the encouragement and treat. It was a great mid-week boost, and very nice cake and Lavazza!"

Wong Weiyang
Lead Engineer
Biometrics & Profiling CoE

"This is a morale booster for the forward deployed staff to know that our efforts are being recognised."

Ms Amanda Lee
Ag Head
Building &
Infrastructure
Sustainment
Centre

"Thank you so much for the words of appreciation and the latte. The support and understanding that you, DCEs Yeow Boon and Yeang Tat, ACE and Dir ICPMC provided has made it easier to overcome the challenges."

Kamal Raja Mat
Principal Engineer
Immigration & Checkpoints
Programme Management
Centre

"This gesture was indeed a surprise and whatever the reason for my nomination may be, I am extremely grateful and humbled by the recognition."

Fadzilah Salim
CBRNE Scientist
CBRNE CoE

"Thanks for the very encouraging note, latte & pastry! Must say it occurred in a surprising and out-of-the-blue way in office!"

Mok Shao Hong
Deputy Director
Partnerships

CoE - Centre of Expertise

STAYING HEALTHY

17 Nov 2020
10,000 Steps
from NPPK to 1 Stars Ave

140 Xponents signed up to journey 10,000 steps from NPPk to 1 Stars Avenue on 17 November 2020. Split into 30 teams, they explored different routes for their journey together. Everyone completed the 10,000 steps to arrive at their new home.
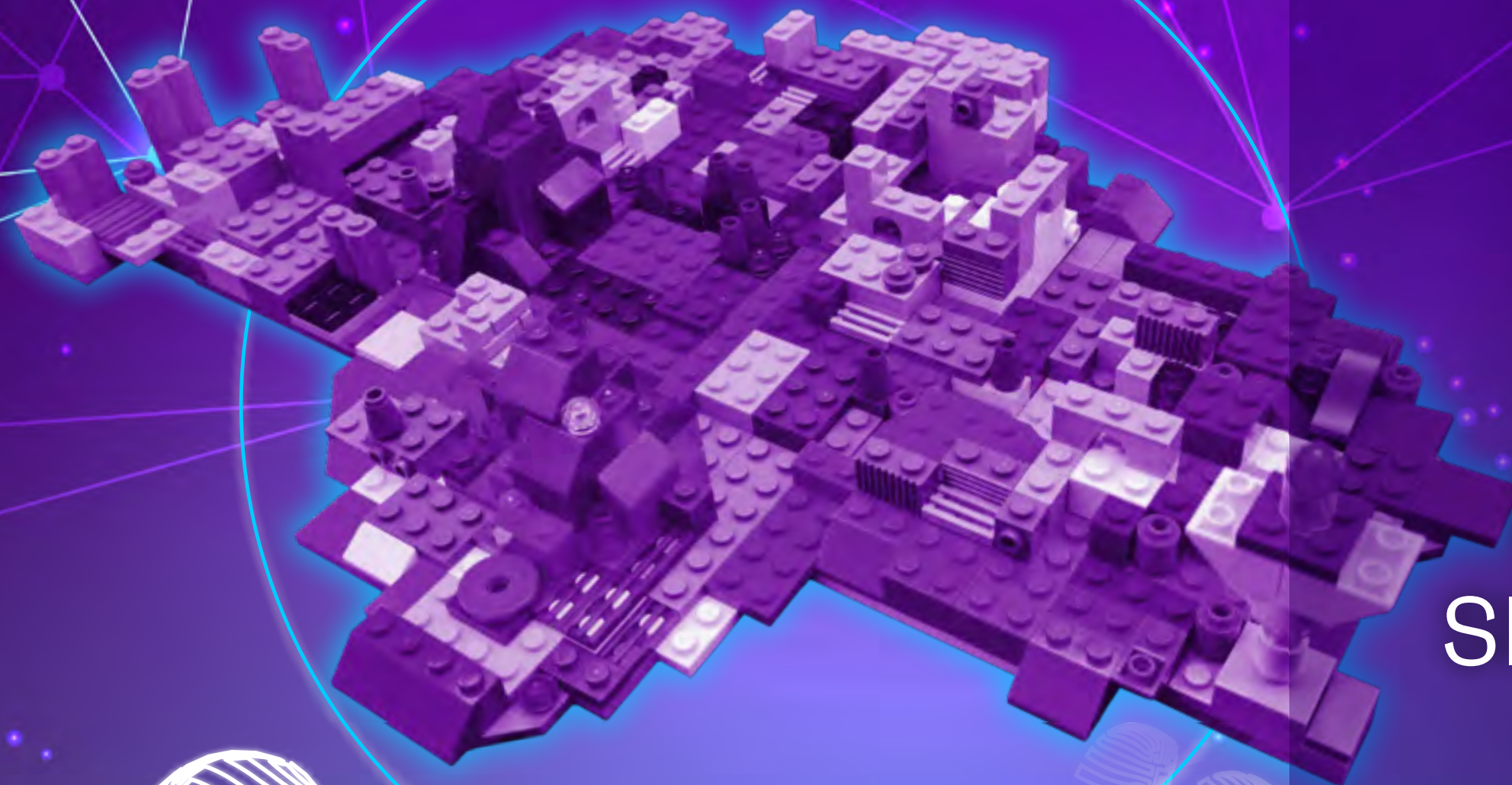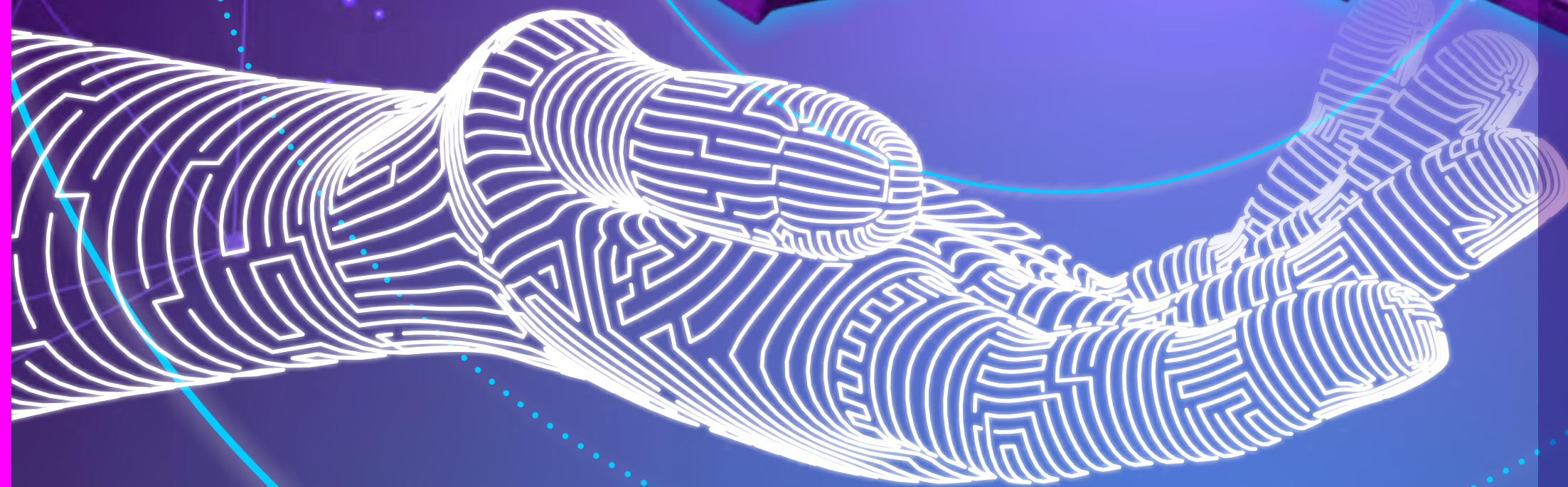
21-27 Dec 2020
HTX Virtual Run

7 days

500 participants

7,030 km in total

SECURING
SINGAPORE'S
FUTURE

" *HTX is to the Home Team what Q is to 007 in the James Bond movies. HTX must build and sustain an innovative culture where new ideas are explored, trialled, implemented and celebrated, without fear of failure. This will enable us to transform operational capabilities and effectively force multiply the Home Team.* "

Mr Chew Hock Yong, Chairman of HTX

" *At HTX, we are driven by our mission to be the Home Team's Force Multiplier. We will push the boundaries of S&T and go places where no one has been before. We will keep innovating and developing cutting-edge S&T capabilities so that the 28,000-strong Home Team will work like a much larger force and be ready for tomorrow's challenges. Our will to succeed is unshakeable because our cause is to keep Singapore safe for all Singaporeans.* "

Mr Chan Tsan, CE of HTX

BOARD OF DIRECTORS

Mr CHEW Hock Yong
CHAIRMAN
Permanent Secretary (Development),
Ministry of Home Affairs; Permanent Secretary,
Ministry of Social & Family Development

Mr CHAN Tsan
CHIEF EXECUTIVE
Deputy Secretary (Development),
Ministry of Home Affairs

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Singapore Police Force

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Civil Defence Force

Mr SIM Wai Meng Marvin
Commissioner, Immigration &
Checkpoints Authority

Ms SHIE Yong Lee
Commissioner,
Singapore Prison Service

Mr NG Ser Song
Director,
Central Narcotics Bureau

Mr ONG Pang Thye
Managing Director, KPMG

Ms Janet ANG Guat Har
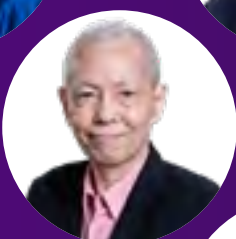Chairman, Institute of Systems Science
of NUS, Former IBM Vice President

Prof CHONG Tow Chong
President, Singapore University
of Technology and Design

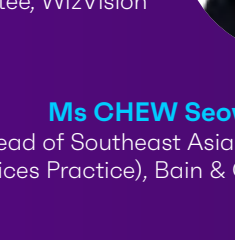**Ms Carmen WEE Yik Cheng**
C Suite Advisor

Mr Richard KOH Chin Kiong
Chief Technology Officer,
Microsoft Singapore

Mr CHANG Yew Kong
Independent Director, ZWEEC; Chairman,
Management Committee, WizVision

Mr THAM Kok Leong
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Services Practice), Bain & Company

SENIOR MANAGEMENT

Mr CHAN Tsan
CHIEF EXECUTIVE

Mr NG Yeow Boon
DEPUTY CHIEF
EXECUTIVE
(DEVELOPMENT)

Mr CHEN Yeang Tat
DEPUTY CHIEF
EXECUTIVE
(OPERATIONS)

Mr TAY Yeow Koon
ASSISTANT CHIEF
EXECUTIVE
(PROGRAMMES)

What HTX is about...

eXceptional minds collaborating

eXtraordinary thinking applied

eXperimentation . Innovation . Co-creation

eXceeding expectations

eXciting missions accomplished

*eXponentially impacting
Singapore's safety and security*

The stylised X is a starburst with a pattern of divergent rays radiating from a source signifying motion, energy and vitality. It represents the HTX community that is bonded together by the common mission to exponentially impact the safety and security of Singapore through science and technology, and be the Home Team's force multiplier.

The rays with the gradient colours connote "innovation in motion" as the HTX community experiments, invents and co-creates to ensure that exciting missions are accomplished. The dots attached to the end of the rays convey how ideas, like dots, connect when exceptional minds collaborate and when extraordinary thinking is applied.

The choice of blue and purple is deliberate. Blue represents trust, truth and stability, and is the colour of the Home Team. This is a constant reminder that HTX is an integral member of the Home Team. Purple represents creativity, innovation and independence – qualities essential in science and technology that propel the HTX community to keep exceeding expectations.

htx.gov.sg