Shaping Tomorrow’s Safe Cities Today
Seamless, scalable and sustainable solutions

Building a safer city in Singapore

Should we pay a high price for security?

Securing the future in Tigre

Tackling the new threat of online crime

About NEC Public Safety
The many disasters around us, natural or man-made, are vivid reminders of how complex and unpredictable the world has become. Yet, with improved technological capabilities, citizens today are better informed and more demanding. Governments are expected to not only pre-empt the potential occurrence of disaster or criminal activity, but also to respond efficiently and effectively.

The technology is already in place. Sprawling, city-wide sensor and communication networks already have the capacity to collect multiple types of data for public safety agencies to act upon. In the wake of September 11 and other terrorist attacks, New York City and London have deployed vast networks of surveillance cameras to detect suspicious activity. These initiatives have also begun to gather pace across the globe to key cities in Middle East, Latin America and Asia as crime and disaster prevention are brought into sharp focus.

A city can be equipped with the most cutting-edge crime and disaster prevention technologies, but that is only part of the answer in an age where split-second decisions form the fine line between public safety and unmitigated disaster. The bigger question lies not in whether we already have the technologies, but rather on how governments can effectively harness such power without undermining the autonomy of various agencies under their banner. The best technologies give actionable intelligence, but the capacity to follow up on that intelligence and make split-second decisions is in fact the most vital component of the public safety puzzle. The ability of multiple entities to work seamlessly towards a common goal will be pivotal in making a city as safe as it can be.

Ironically, this is also an area which is often overlooked when different entities make decisions on public safety solutions. Decades of isolated decision-making among agencies has resulted in a highly fragmented structure which makes collaboration a challenge for all involved. Multiply this across the countless cities that a country may have, and the odds are comprehensively stacked against a country being able to truly protect its lives and property.

This vision has led to the formation of NEC’s Inter-Agency Collaboration solutions, a concept which harnesses cutting-edge technologies like Big Data, Machine-to-Machine Communications and Internet of Everything to drive seamless cooperation within agencies everywhere. NEC’s latest breakthrough in smart pooling (pages 8-9), a concept of a futuristic platform which is able to host numerous analytic engines and drive accurate, actionable intelligence is just the tip of the iceberg when it comes to creating seamless, scalable and sustainable solutions for a safer tomorrow.

This supplement explores the various public safety solutions that NEC’s Global Safety Division has conceptualized and delivered since its formation. A key feature of the supplement is the Singapore Safe City Test Bed (pages 2-7), an ambitious large-scale safety initiative in which NEC plays a significant role. We also look back at other major projects won across the globe, putting the various solutions employed under a microscope to give you clarity on the technological depth and breadth that NEC brings to the table.

As you flip through the pages of this comprehensive yet easily digestible supplement, we hope that you will be enlightened by our public safety solutions which are global in scale, but ultimately human at heart.
Building a safer city in Singapore

Collecting and analyzing data from an array of sensors and cameras, Singapore recently rolled out a futuristic Test Bed for a safer city.

By Dr Woo Kang Wei and Koh See Kiat

When Singapore’s government planners first considered high-tech plans to make the city-state a safer and more secure place for its citizens in 2012, they were in a situation that many foreign counterparts could only envy.

Well-connected, efficient and highly urbanized, the country of 5.4 million people was as ready as any to embrace the timely information that an array of on-the-ground sensors and cameras could immediately feed decision makers.

The widespread use of social media also meant that users were tuned in to the latest news, sometimes becoming active participants or witnesses to developing incidents.

With a safe city system, police forces could react swiftly to a crowd that displayed unruly behavior. Emergency services could detect potentially unsafe locations where an increased number of people may make an evacuation difficult. Floods would be more easily detected with live monitoring of water levels.

Yet, despite Singapore’s renowned advancements, it faced a number of challenges not unlike many other cities. One key concern was optimizing the limited manpower available, while maintaining effective day-to-day city management activities such as ensuring smooth vehicular traffic, upholding law and order and managing emergencies.

With a fast-paced economy came an expectation for fast, efficient service as well. Should the public be first on the scene of an incident, for example, emergency responders were expected to be on the ground within a short period of time, rendering assistance or upholding public order.

A comprehensive project

With these factors in mind, the Singapore government looked far into the future for a comprehensive safe city project in 2012. The country’s planners had often been known to be far-sighted, ready to adopt new ways of doing things. In developing a safer city, they were no different. They expected the project to run in multiple phases in three to four years, eventually leading to ready-to-market solutions.

In January 2013, the Singapore government issued a Safe City Test Bed Call for Collaboration that would kick start a year-long pilot project. It would involve the specially set-up Safety & Security Industry Programme Office (SSIPO), as well as a number of participating agencies, including police, civil defense, environment and water, land transport and homeland security, to develop a comprehensive system to address a wide spectrum of safety and security concerns.
The goals were clear. Police forces should be able to have better situational awareness that enabled them to better react to fast-developing incidents. With timely on-the-ground information, emergency services could better facilitate evacuation, for example, at a popular event where a fire may have broken out.

At the command level, a team coordinating to any home front crisis incident should have better global awareness, which would allow for improved decision making.

Singapore already had existing camera systems and various sensors providing data feeds back to government agencies. A new system making use of new sensor technologies and analytics on the fly would do more, by enabling decision makers to better comprehend a situation and make critical and timely decisions.

Key to this would be pulling all the data together in a way that made the information meaningful. In a crisis, decision makers had to see the big picture, literally, on a large screen to make sense of what was being fed from cameras and sensors.

The SSIPO identified four sites to test the technologies. In one of them, a consortium led by NEC Asia Pacific won a bid in May 2013 to develop a safe city Test Bed for the Ministry of Home Affairs and the Economic Development Board (EDB).

“Beyond improved urban management, the creation of new solutions and innovation capacity will generate new economic activities and create good jobs for Singaporeans in the technology-intensive Safety and Security industry,” said Mr Gian Yi-Hsen, co-director of the SSIPO at EDB, when announcing the Test Bed participants in May 2013.

With its experience developing safe city solutions, NEC would bring technology proven in markets around the world to Singapore.

A sophisticated Test Bed

Earlier, in the Argentinean city of Tigre, NEC had set up an urban surveillance proof-of-concept project to enable city authorities to better monitor activities at strategic locations (see separate story on pages 10-13).

In Singapore, the NEC team knew that it was preparing for an exciting Test Bed. Though similar in spirit, the SSIPO project would come with greater complexity and sophistication, something which the NEC team was well prepared for.

The police would want to be able to detect aggression or fighting easily, so that officers on patrol nearby can be alerted more swiftly.

Singapore agencies also wanted awareness of the traffic situation, through camera surveillance, and be able to better react to a traffic accident or the occasional congestion.

At the same time, the environment authorities concerned with the cleanliness of city streets wanted a way to detect if someone was littering. Also useful to them would be a surveillance system that indicated how clean a place was, so cleaners could be deployed more efficiently. For the nation’s security services, the safe city system from NEC had to pick up suspicious persons loitering at train stations.
Perhaps more importantly, the sensors and cameras had to provide information in a holistic way to help officers manage incidents. Armed with actionable intelligence, commanders could then better support officers on the ground with improved assessments of knock-on effects from an incident.

The system that NEC was building had to provide predictive analysis, to quickly explain how a situation would develop. Traffic flow, for example, would be severely hampered if there was a power outage in an area, and government agencies needed that insight.

Using the right technologies
This called for a number of technologies, which NEC pulled together with consortium members Esri Singapore, Force 21, G Element, Greenfossil, iOmniscient, Oracle and ZWEEC Analytics, as building blocks for a seamless safe city solution.

It would use a number of sensors – physical ones for acoustic, video and smell as well as online ones for social media reactions – to identify an incident of interest. In particular, a hemispheric camera (HemCam) would be able to capture images without the distortion usually associated with wide-angle fisheye lenses.

A machine-to-machine (M2M) network would have to be built to allow these sensors to communicate and ultimately connect back to a central system for live feeds of what was happening on the ground. Sensors would be dynamically added or dropped.

Separately, an appliance would have to be installed to provide various agencies with the information they required. This inter-agency information appliance would, however, authenticate and track the authorized accounts that access the data. Users would only receive information on a need-to-know basis.

In addition, a system that made use of semantic web-based risk models would attempt to make sense of cyber information. It would monitor postings based on predefined risk models and identify if a situation required the attention of various agencies.

Finally, the NEC-led team also had to develop a geo-spatial visualization platform that would put all the data in context. On a large screen, this fusion of information would have to make instant sense to operators at a command center.
“It is important not just to put together the various technology building blocks, but also to ensure they work well together to provide vital intelligence to users,” said Mr Tan Boon Chin, general manager of NEC Global Safety Division.

**Upgraded capabilities**
The results from the Test Beds were clear soon after the first deployments went online in late 2013, when the sensors on the ground started sending information to the relevant agencies.

In urban surveillance, the potential of early incident detection became clear. Video analytics could help detect a snatch thief thronging through a busy weekend crowd. Similarly, a fight occurring in view of cameras would be easily picked up.

Video analytics would detect the particular motions as symptomatic of a fight, along with aggressive action. Audio analysis then enabled the system to understand that someone was shouting or crying, whether in anger or distress.

This provided vital information to officers reacting to a situation. But that was not all. The system would automatically look for potential points of congestion or blockage in the area, where the traffic flow might be affected.

It would be able to alert relevant agencies and provide a visual map layout of the ground situation to both ambulance and security services. As they headed to the scene, they could be fed live information on the best route in and out of the area.

All in, the fusion of the various technologies gave an unprecedented amount of actionable intelligence and improved command and control. With this, officers and commanders did not end up overwhelmed with information. Instead, with the raw feeds analyzed and presented in a way that truly empowered them, their capabilities were upgraded to handle difficult situations.

The same technologies were used in other scenarios. Facial recognition and video analytics enabled officers to detect behavior such as loitering. If an officer alerted to this found it necessary, he could then check for similar, repeated occurrences. If a group of people were known to be lurking around a sensitive location, for a potential crime, they could be flagged by the system.

Besides suspicious persons, advanced video analytics could also detect suspicious objects being abandoned. For example, if a person left behind a suitcase in a train station, the system could look up a list of persons associated with it by analyzing previous video recordings.

Using a blend of facial recognition and clothes recognition, it would then display the last seen location of the persons of interest, as captured on video footage.

Apart from the country’s security services, the Singapore Test Bed also benefited other agencies immensely. The same technology used to detect an abandoned object could be used to monitor if an object was missing.

For example, the authorities could check if someone had stolen items such as rubbish bins.

Agencies also benefited from a system that could detect crowds in a specified area. More crowds usually meant there was more rubbish to be cleared. Once the threshold for a “geo-fenced” area was reached, an alert could be triggered to an officer, who would determine if a cleaning crew had to be dispatched.

At the same time, a slightly different system helped the transport authorities monitor cars on the roads, to see if congestion was building up. This was done with traffic volume monitoring as well as surveillance of the travelling speed of cars through important stretches of roads.

This was especially helpful because the system also took in information from real-time traffic reports already available. Together, the fusion of information provided situation awareness via a geographic information service (GIS).

Yet another agency that would benefit from the safe city project was Singapore’s water agency. With advanced video analytics, it could detect if water level had risen beyond a pre-defined level at many drains around the island. Once a certain level was reached, an alarm could be sent out to an officer, who would determine if a flood was imminent and send out appropriate alerts to people near to an affected area.

All in, 20 analytics capabilities were successfully tested. Some 370,000 faces were detected a day. Crowd behavior was correctly detected 75 per cent of the time and crowd counting was 80 to 90 per cent accurate.

**Understanding the information**
All that data, of course, would mean nothing if officers in charge were not able to make use of it in a timely fashion. This is where NEC’s team made a difference. It had analytics to make sense of the data and sophisticated governance to guard its access.
At the most basic level, remote sensor analytics picked up primary data such as fight detection, abandoned object detection and crowd detection. Using NEC’s MAG1C Bus system, this could also support analytics engines from other partners.

NEC’s MAG1C Sense semantic analysis helped make sense of the data even further, by adding users’ domain knowledge to the mix. Using ontology-based risk models, it analyzed patterns and inferences to predict potential incidents and likely follow-on effects.

In turn, that intelligence was presented on a city map or 3D building model that incorporated trends, real-time events, content and spatial analysis. These visual tools, based on Esri’s ArcGIS and G Element’s Nucleus, enabled swift and effective decision making.

Finally, NEC’s Information Governance Suite (IGS) enabled various agencies to access information they required, while protecting it using access rights. This meant various agencies collaborating on a situation could have access to a set of data – on a “need to know” basis.

**A committed partner**

Many lessons were learnt from the Singapore Test Bed. One was the importance of having all relevant agencies onboard a platform that would benefit from as much information as possible. At the same time, the trials also validated that a safe city solution would help address many of the challenges facing Singapore.

Perhaps most important in a project like Singapore’s was the readiness and experience of technology vendors to meet the requirements of government agencies involved in the crucial job of ensuring safety and security in a city.

Throughout the Test Bed project, NEC spared no effort in refining small details in the system. It also ensured that it would work well with existing systems that were in place previously.

With decades of working with governments the world over, NEC was well-positioned in this area. Backed by cutting edge innovations such as advanced biometrics and inter-agency collaboration tools, the company integrated the technologies of its consortium members to deliver a Test Bed that showed how a future city could keep safe and secure with the latest advancements.

“Key to the success of safe city solutions is understanding the changing requirements of city authorities as well as the experience involved in making the most of technologies that are still emerging,” said NEC’s Mr Tan.

“In both aspects, we believe we have proven that seemingly futuristic safe city technologies are not something that are years away, but practical and deployable right now,” he added.
The technologies
Each member of the NEC-led consortium brought to the table a number of important technologies that made the Singapore Safe City Test Bed a success in 2013. The fusion of information provided the Singapore government with timely and accurate intelligence to make important decisions.

In January 2013, the Singapore government invited companies to develop its Safe City Test Bed project, which would span a year and a half. A number of government agencies participated in this wide-ranging endeavor aimed at producing systems to make the country safer and more secure.

They would assist key decision makers through more timely and accurate intelligence, while providing officers on the ground important information to react to fast-developing situations.

In 2013, a consortium led by NEC won a deal to develop such a system, backed by its breakthrough innovations. Making use of an array of sensors and a unique fusion of information from the ground and on cyberspace, the consortium developed a system that validated Singapore’s belief in innovative safe city solutions.

Among the solutions that NEC delivered were:

- Urban surveillance for security, land transport and environment agencies
- Geo-spatial analytics to present the information in a useful, actionable format
- Information governance to enable sharing and security of information across agencies

In a Nutshell
In January 2013, the Singapore government invited companies to develop its Safe City Test Bed project, which would span a year and a half. A number of government agencies participated in this wide-ranging endeavor aimed at producing systems to make the country safer and more secure.

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- Information governance to enable sharing and security of information across agencies
Should we pay a high price for security?

Cities can enhance security and safety by pooling resources smartly, and making sure their technologies are scalable and sustainable in a time of limited resources.

By Dr Paul Wang

With safety and security on top of their minds, city planners today have begun deploying some of the most sophisticated technologies around, such as advanced video analytics, for tasks ranging from police surveillance to flood detection.

In the years ahead, there is no question major cities worldwide will be “smart” or connected in more ways than imaginable today. Yet, the enduring question many might continue to ask is whether the technologies they have rolled out have been fully made use of to create a safe environment for citizens.

When new technologies, such as cameras and sensors, are rolled out throughout an urban environment, will different government agencies be able to gain access to such resources and make sense of the big picture together? Must there be a hefty price tag for the security and safety that cities desire?

Making sense of raw information

Through tighter inter-agency collaboration, there may be a way to achieve the same goals through a more sustainable, scalable manner. This begins by adopting the right technologies from start, an open platform that is future-proof.

As cities wire up, planners will have to face up to a new reality. Raw information may be abundant but it has to be shared with the right people so they can pool together the limited physical resources to better the lives of citizens.

For starters, with so much raw data flooding in, how can the authorities make use of their own analytic engines to better make sense of it, to turn it into practical information? When it comes to selecting safe city platforms or technologies, city planners will have to ask if they allow for easy sharing and analysis of the raw data that are captured and fed into the system.

After all, not every government agency may be using the same type of analytic engine, particularly when their areas of focus are so different. The big challenge then is for safe city solutions to provide an open, seamless way to let agencies plug in their own analytic engines for their specific uses.

The ideal is to have a “bring your own engine” concept, where the raw data is available on an open platform and can be easily picked up by analytic engines to be turned into actionable information, to improve city operations.

Silos no more

With that in place from the start, a safe city solution becomes much more useful to a bigger group of authorized users. It also catalyzes a smart pooling of resources, which will help break down silos and empower a more efficient, sustainable way for city planners to solve complex urban problems.

With information shared by the various security agencies, for example, persons or vehicles of interest can be tracked across various parts of a city, using different technologies that were separately available in the past but not shared among agencies.
Dr Paul Wang is currently the Chief Technology Officer and Head, Strategy & Management for NEC Global Safety Division. During his tenure as CTO, he spearheaded NEC Consortium’s participation in the Singapore Safety and Security Industry Programme Office (SSIPO) Safe City Test Bed. Under his leadership, he brought along 7 industry partners, representing technology contributions from both MNC and local SME, to demonstrate NEC’s safer city framework to achieve a scalable, sustainable and smart pooling strategy to address cities’ operational challenges.

Prior to joining NEC, Paul was active in Singapore’s healthcare industry where he contributed various technological innovations to enhance the patient experience in Singapore’s healthcare system. Under the hassle-free hospital programme spearheaded by the then Alexandra Hospital (now known as the Kheas Teck Puat Hospital), he was awarded two innovation awards from The Enterprise Challenge which is administered by the Singapore Prime Minister’s Office.

Paul also served in various industry-level committees: steering committee member for National Infocomm Competency Framework (NICF), as well as technical chairman for the NICF Healthcare track. Giving back to his alma mater he now serves as Honorary Assistant Secretary and Chairman, Membership, in the National University of Singapore Society (NUSS). Paul obtained his BSc (Comp Science & Information System), MSc (Management of Technology) & PhD from the National University of Singapore and participated in the Advanced Management Programme from MIT Sloan School of Management.

The call to break down the walls within governments is not new. What has changed is that technologies are now available to solve these problems. More importantly, there is an urgent need to maximize benefits for more citizens with a limited amount of resources. The fusion of sensor data can now enhance situational awareness and help city planners avoid unintentional blindness in many situations.

On a need-to-know basis

Undoubtedly, this was on the minds of Singapore’s forward-looking leaders last year, when they started planning for a safe city solution (read story on page 2).

The ambitious project involved several agencies within the government, including police and emergency services and authorities for land transport, environment and water. From urban surveillance to the monitoring of possible floods, the safe city project provided crucial situation awareness to better respond and even pre-empt incidents requiring action.

The project also highlighted the importance of pooling resources in such an effort. With sensors and cameras connected to a broad Internet of Things, it was important to ensure that the surveillance infrastructure was used efficiently by the various agencies.

Could a camera be used by both a security agency as well as an environmental agency? Who could access the video footage and who could view an analysis of suspicious persons in an area, such as a train station?

The answer to this is in Information Governance, a key component in future safe city solutions. A central server controlling access can enable users who are authorized to access more sensitive information to have it instantly, while keeping it away from users who are not allowed to see it.

On a live city map, for example, only those with access can track certain persons or vehicles of interest, while others who don’t have access are not even shown any content that is out of bounds. Again, the key is in giving access to those who need it, and only those who need it.

In this Test Bed for Singapore’s Safety and Security Industry Programme Office (SSIPO), an NEC-led consortium rolled out a “magic box” that enabled systems-wide access control. More than just a simple authentication server, this mapped out the access policy for a safe city system, empowering authorized government users while safeguarding the privacy of citizens.

Lessons from Singapore

Several lessons can be learnt from the Singapore experience. An important one for cities worldwide is the need for improved efficiency and control, as they roll out safe city infrastructure. Besides blanketing a city with sensors, it is just as important to reduce wastage.

As the world’s urban population grows from 3.4 billion in 2009 to 6.3 billion in 2050, as the United Nations predicts, technology will prove critical in raising the quality of life through the innovative use of finite resources.

The biggest change, one that brings more lasting benefits to citizens, could come from a smarter pooling of resources, to achieve safety and security while being sustainable and scalable. To do this, an open safety city platform is crucial in the years ahead.
As it experienced strong growth in recent years, Argentina’s Tigre City looked to an advanced surveillance platform to bring improved security and safety to residents and visitors.

By Jorge Vargas
On weekends, the city of Tigre in Argentina sees its population swell as much as three times. With its popular museums, game parks and casinos, it has been steadily attracting visitors from in-country and overseas while enjoying a housing boom since the 1990s.

Thus when Tigre planners recently strategized to improve security and safety to both residents and visitors, it banked on a long-term plan. A sophisticated, effective urban monitoring system was needed to provide advanced capabilities to security forces while strengthening the bond with residents.

Using a series of cameras and NEC’s intelligence video analysis tools, the system could enable public safety officers to effectively monitor the city’s key areas and improve public safety for residents.

Located 32 km from the Argentinean capital Buenos Aires, Tigre had unique challenges. One was the high volume of traffic through the city, which occupies an area of 148 km² on the mainland and 220 km² on nearby islands.

The huge housing boom in the past two decades has also increased the number of large private neighborhoods, while the resident population stood at about 380,000 residents in 2010. Providing adequate security and safety was a top priority for Sergio Massa, national deputy and former mayor of Tigre.

Eyes in the city
Among the first items to be installed was a network of cameras that provided the raw footage for advanced analysis. This yielded practical intelligence for security agencies seeking to more effectively react to emerging situations.

The system involved 640 pan-tilt-zoom dome cameras, and integrated an existing 200 cameras from closed neighborhoods that were already in place.

Another 12 fixed cameras were set up to recognize license plates on cars entering and leaving Tigre City’s boundaries, while a number of other cameras were set up to recognize faces. All in, the video technology was run on a hybrid fiber optic and wireless network.

It was with this in mind that NEC and Tigre City signed a memorandum of understanding in early 2013 to evaluate a number of NEC’s safe city technologies. These included advanced CCTV cameras, intelligent video analysis, a command and control center and a data center to host the systems.

Topmost on the agenda was a closely integrated platform that could link up all the various components in a holistic manner.

At the heart of things was the Tigre City Operations Center, a purpose-built system that brings together various aspects of public safety, such as street surveillance, vehicle tracking and force coordination.

“As the city experiences exciting developments in the years ahead, it is important that we provide the security and safety that residents and visitors demand and expect. Technology is no longer deemed a luxury — it is in fact, an essential in providing this security and safety. We have been able to take advantage of the latest innovations in urban surveillance, such as behavior detection by integrating technologies. This has raised the capabilities of our security and emergency agencies, while building a stronger bond with residents.”

Sergio Massa
National Deputy and former Mayor of Tigre
Intelligent video analysis

With that amount of raw video data, the next step would be to make sense of it for both real-time analysis and forensic analysis. Using NEC innovations, such as the award-winning NeoFace facial recognition technology, Tigre City could gather critical information for its public safety and security agencies.

Three items were provided by the groundbreaking, real-time analysis of surveillance data.

- **License plate recognition**
  The city installed 12 cameras at six places in the city to have a complete record of cars entering and exiting from Tigre, so it could have a real-time comparison against a watch list of wanted cars.

- **Facial recognition**
  Using NEC’s NeoFace facial recognition technology at train stations and business terminals, Tigre City officers could monitor and compare faces in real time and compare with a watch list of individuals.

- **Behavior detection**
  All in, cameras installed at train stations, open places, streets and banks looked out for suspicious behavior by analyzing the footage captured in real time. For example, spaces near banks were monitored for loitering. On the streets, cameras could automatically detect street racers exceeding speed limits.

Separately, city officials could also rely on forensic analysis for more in-depth but non-real-time intelligence. For example, a “scene hunter” feature of recorded video footage could provide valuable frame-by-frame analysis.

The NEC system also enabled video meta search for things such as the color of clothing, age or gender. These tools empowered security agencies to track down important details in an investigation.
A city just 32 km from the Argentinean capital Buenos Aires, Tigre had experienced strong growth since the 1990s. To improve on public safety and security, the city’s planners rolled out a sophisticated video surveillance system and command and control center in 2013, which included:

- **CCTV cameras**
  As many as 640 pan-tilt-zoom dome cameras were set up city-wide, with integration of 200 cameras from closed neighborhoods. These were complemented by cameras that could help recognize license plates and faces.

- **Intelligent video analysis**
  The images were analyzed by advanced NEC technologies that could detect human behavior, such as a sudden change of pace and direction or trespassing into sensitive areas. Vehicles can be analyzed as well.

- **Command and control center**
  A 22-seat operations center, this sophisticated command center had dedicated large screens and integration with safety-related agencies.

- **Datacenter**
  The video management system, NEC analytic engines and safety management suite are run on a dedicated data center that provides reliability for the mission-critical tasks.

**Bringing the information together**

All the capabilities were brought together in a command and control center and crisis room purpose-built in Tigre City. Here, in a 22-seat operation room, officers could view the incoming information in dedicated large screens that provided easy integration with all related agencies.

The mission-critical systems required for the project is hosted in a data center that provides 30 days of storage for the CCTV footage. The video management system and NEC’s core analytic engines and safety management suite are operated here as well.

Another interesting part of the Tigre City project is the way it was rolled out. Rather than invest heavily on one technology, the surveillance technology has been deployed as a service, as part of a 36-month contract. This has enabled the city to build up capabilities over time, and plug in new innovations as they become available.

**IN A NUTSHELL**

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Tackling the new threat of online crime

NEC is working with Interpol to develop new capabilities to fight cyber crimes, as they become increasingly sophisticated.

By Douglas Tang

As cyber crime becomes more prevalent in recent years, one thing that has struck law enforcement agencies is how sophisticated criminals have become. Using the information highway as a fast track to illegal activities, they have learnt to harness technology at a tremendous pace.

In the same way that police officers know their neighborhoods inside out, crime fighters today have to be familiar with the corners of the Internet where illegal activities are carried out. Whether it comes to online tools used by perpetrators or the way they operate, law enforcement agencies are tasked with uncovering the modus operandi of these criminal networks.

Developing such capabilities – to effectively look up intelligence and act on it – requires a long-term approach, one that draws on expertise from private-public partnerships.

This was the belief of NEC and Interpol, when both parties signed a three-year agreement in December 2012 to develop the Digital Crime Centre at the Global Complex for Innovation in Singapore.

NEC’s vast experience with infocomm technologies for public safety will help bring cutting-edge expertise and know-how to new, enhanced cyber security and law enforcement efforts.

Mindful of the fast-changing online landscape, NEC is concerned about the increasingly serious damage that online attacks can inflict, which is often made possible by the global reach and anonymity afforded by the Internet.

Through this partnership with Interpol, NEC has been contributing its skills to combat crime and raise social awareness at the same time.
NEC is backed by the latest breakthroughs in facial recognition, biometric identification and other technologies in public safety to fight crime. Decades of working with governments worldwide also gives NEC unrivalled experience.

Both physical and cyber security technologies are important in tackling new crimes of the future. Having developed and deployed both types of technologies in real-life rollouts, NEC is in a unique position to fuse the two to contribute to the global effort against cyber crime.

Through this partnership with Interpol, NEC is providing technical expertise and human resources to assist in establishing a Digital Forensic Lab and Cyber-Fusion Centre within the Digital Crime Centre.

The Digital Forensic Lab focuses on identifying and testing digital forensic technology and methodologies to help investigators in digital crime investigations. Its activities include trend analysis, testing of forensic tools, development of best practices, and capacity building and training.

The Cyber-Fusion Centre provides a platform for law enforcement to collaborate with the Internet security industry to combat digital crime. It will turn intelligence-led analysis into solid, intelligence-driven identification of criminals and operational action.

It will also provide expertise to national cybercrime units during enquiries, coordinate cross-border investigations and deploy investigative support teams to assist national law enforcement agencies during investigations following a serious cyber crime incident.

Public infrastructure may be more frequently targeted in the future, as cyber criminals look to more advanced targets in increasingly ambitious attacks. This is where partnerships such as the NEC-Interpol collaboration can play a crucial role in combating the threat, whether this is the work of individuals or organized groups.

The global effort to tackle new cyber crimes is not an easy task, but NEC is confident that our solutions in public safety can contribute positively in the years ahead.

NEC President Nobujiro Endo (left) and Interpol Secretary General Ronald K. Noble sealing the agreement in Tokyo, December 2012.
At NEC, we have the solutions to help create a better, safer city. We have decades of experience working with governments, city planners and other public agencies in projects as varied as identification to public transport. Our solutions include national identification, law enforcement, immigration, protection of critical installations, safeguarding of cyber infrastructure and emergency and disaster response.

While bringing together the latest cutting-edge technology, NEC’s team also possesses the experience and expertise to deal with projects – both private and government – on municipal and international levels. Indeed, many of the technologies required to build a safer city are created from NEC’s R&D facilities in Japan, Britain, China, Germany, Singapore and the United States.

Internationally, they have been proven as well. NEC is the most accurate for both fingerprint recognition and still-face recognition, according to tests run by the National Institute of Standards and Technology (NIST) in the US.

What’s also unique about NEC is our expertise in both infrastructure and identity management. We have been working on natural or non-human infrastructure issues, as well as identifying incidents triggered by individuals, to better develop a secure and safe city.

In terms of protecting critical infrastructure, NEC has solutions to enhance the security in sensitive installations such as a city’s water supply, power grid and telecommunications network. For example, NEC has high sensitivity cameras to capture video images, even in low light. NEC’s behavior detection systems can analyze the data and automatically detect suspicious behavior.

As for incidents triggered by individuals, we are experienced in the areas of enforcement and identity resolution. To-date, there are some 500 customers in more than 30 countries around the world who are using NEC’s biometrics solutions. They have allowed countries to safeguard their border checkpoints, airports, seaports and other entry points.

Most importantly, our success stories around the world speak for themselves.

**United States:** In 2013, NEC modernized the multi-state criminal identification system run by the Western Identification Network (WIN) in the United States, which provides identification services to the law enforcement agencies and citizens of its member states.

Together, the states of Alaska, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming, and California (as an interface member), have a database of about 28 million fingerprint records.

The updated system includes advanced identification capabilities such as high-resolution palm and fingerprint matching and other emerging biometric functions, disaster recovery facilities, and enhanced system performance. It also incorporates key elements of NEC’s cloud-based offerings – such as FBI-compliant data centers, Network Operations Centre, remote managed services, and server virtualization – that will be used to increase system security, reliability, and maintainability.
**Australia:** In 2014, NEC worked with South Australia Police to put the country’s criminal database at an officer’s fingertips, wherever there is access to a 3G or 4G mobile data network. Equipped with a custom-built NEC app, an Android smartphone and a lightweight fingerprint capture unit, officers could independently verify a person’s identity on the spot.

The technology also enables police officers to cross-reference captured fingerprints against a database from Australia police authorities. If a match is found, additional information such as any bail conditions, outstanding warrants and current photo are shown to the officer. The technology is being deployed across 150 units. The deployment came after an extensive trial of biometric scanners and smartphones in late 2013.

**Bolivia:** In just 75 days, NEC helped to create an electoral voter roll for Bolivia using biometric data that enfranchised Bolivians and enabled them to vote in the presidential elections of 2009. Working with the National Electoral Court of Bolivia, NEC managed to create an electoral roll registering the voters living in Bolivia and abroad that was both accurate and reliable.

The solution consisted of NEC’s AFIS (automated fingerprint identification system) and facial recognition technology, hardware, software, and staff training and support. As a result of their efforts, Bolivians living overseas were able to vote for the first time, and the voter list swelled from 3.5 to 5.2 million voters, allowing truly democratic elections for the first time in many years. Duplicate voters were also purged from the list.

**South Africa:** In 2001, NEC worked with South Africa to create a digital database of existing and new fingerprints that could be processed, verified and authenticated in real time. The Home Affairs National Identification System leveraged on NEC’s AFIS to handle more than 30 million digital records.

Today, the system can handle as many as 70,000 searches in a single day. With the new system replacing a previous paper-based system, citizens can easily access public services and transactions. Queues are shorter, delays have been reduced, and the accuracy of the system has dramatically reduced the possibility of fraud and identity theft.

Our solutions can make cities safer and better.

To find out how they can benefit your city, contact us at safety@gsd.jp.nec.com
Safe and sound
With NEC’s public safety solutions

Savouring the simple joys of life is no longer a breeze. Cities are growing in size and complexity, their challenges and threats are increasing, and expectations are rising on governments to handle them with capability and confidence.

NEC is dedicated to making cities safer, protecting people from natural disasters and man-made catastrophes, crimes in the real and cyber worlds, and the evolving security risks of the present and the future.

Sleep better and live happier in safer cities. Talk to us about our public safety solutions.