

## **Annex III**

# **BEST PRACTICES USING NII EQUIPMENT**

# AUSTRALIAN CUSTOMS & BORDER PROTECTION SERVICE AND HONG KONG CUSTOMS

*Regional Customs Good Practice Series Report: No. 7*

**Application of Non-intrusive Inspection (NII) Scanners for Better  
Security and Facilitation**



Australian Customs & Border Protection Service  
Hong Kong Customs  
WCO ROCB Asia Pacific  
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## Foreword

Modern technology supports Customs administrations to be more efficient and effective together with the application of modern procedures and practices laid down in the Revised Kyoto Convention (RKC). The international Customs community is confronted with the dual challenges of securing and facilitating international trade. To help member administrations address such challenges, in 2005, the WCO adopted the SAFE Framework and launched the Columbus Program to implement this key WCO instrument. Using non-intrusive inspection (NII) equipment has been incorporated as one of the four core elements in SAFE, aiming to enhance the inspection efficiency and effectiveness.

Within this context, many regional members in Asia Pacific have implemented or are planning to introduce NII equipments, especially scanners. In response to strong needs for capacity building, ROCB has organized two targeted workshops focusing on X-ray Scanner Image Analysis in Australia and Hong Kong respectively in 2008 and 2009. It is found that some members have installed sound facilities with well-established procurement, maintenance, training and operational systems. Nonetheless, the NII scanners are still new to some Customs administrations which may not have sufficient expertise. More experience sharing will be beneficial for our members.

With this spirit in mind, ROCB, in cooperation with the Australian Customs & Border Protection Service and Hong Kong Customs, has produced this report. It is believed that the report embrace rich, valuable, updated information on how to implement NII deployment project and follow-up application. Especially, the report is much meaningful for those members which are considering applying NII scanners in modernization program. While referring to this report, please keep in mind it is only for Customs officers use only.

I, on behalf of ROCB, would like to extend sincere appreciation to these two administrations. Especially, I would like to sincerely thank the concerned colleagues with Australian Customs & Border Protection Service and Mr. Hermes Tang as well as his team with Hong Kong Customs and Excise Department for their relentless efforts to bring forth this special report. I also thank my ROCB colleague Mr. Zhang Shujie, for his coordinating this project, also to Mr. Kelvin Wong, our new colleague from HK Customs for proofreading.

Yoshihiro Kosaka,  
Head of ROCB Asia Pacific



Australian Government  
Australian Customs and  
Border Protection Service

# USE OF NON- INTRUSIVE INSPECTION SCANNERS: EXPERIENCE OF AUSTRALIAN CUSTOMS & BORDER PROTECTION SERVICE

Technology and Enforcement Capability Branch  
Australian Customs and Border Protection Service



## 1.1 Background

### 1.1.1 Historical background of NII application

The Australian Customs and Border Protection Service first deployed non-intrusive inspection (NII) scanners in 1976 when fluoroscopes developed by a Customs Officer were deployed in Postal Operations to scan letters for narcotics and revenue items. In 1991 the first commercially built cabinet x-ray machines were deployed at international airports to scan passengers' baggage and then gradually introduced to other areas. In 1995 the first mobile x-ray vans were introduced to examine air cargo and passenger hand-carry luggage. In 2002 the first pallet x-ray machines were deployed to examine deconsolidated sea cargo and in 2002-03 the first container x-ray systems were deployed at key port locations.

### 1.1.2 Drivers to implement NII scanners

The Australian Customs and Border Protection Service uses NII scanners to provide an effective and efficient tool to screen large quantities of cargoes in a timely and cost-effective manner. They assist in identification of threats and also in commodity confirmation.

### 1.1.3 Legal basis and considerations

Section 186 of the Customs Act 1901 is the legislative basis for the Australian Customs and Border Protection Officers to operate NII scanners. The Customs Act has been regularly updated since its introduction in 1901. The most recent compilation was issued on 1 January 2011.

*186 General powers of examination of goods subject to Customs control*

*(1) Any officer may, subject to subsections (2) and (3), examine any goods subject to the control of the Customs, and the expense of the examination including the cost of removal to the place of examination shall be borne by the owner.*

*(2) In the exercise of the power to examine goods, the officer of Customs may do, or arrange for another officer of Customs or other person having the necessary experience to do, whatever is reasonably necessary to permit the examination of the goods concerned.*

*(3) Without limiting the generality of subsection (2), examples of what may be done in the examination of goods include the following:*

*(a) opening any package in which goods are or may be contained;*

*(b) using a device, such as an X-ray machine or ion scanning equipment, on the goods;*

*(c) testing or analysing the goods;*

*(d) measuring or counting the goods;*

*(e) if the goods are a document—reading the document either directly or with the use of an electronic device;*

*(f) using dogs to assist in examining the goods.*

The operation of x-ray equipment by Commonwealth organisations in Australia is regulated by the *Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)*, which issues operating licences for all x-ray equipment used by Federal Government agencies including the Australian Customs and Border Protection Service. The conditions of this licence outline requirements for use of equipment, training of operators and disposal of equipment.

#### 1.1.4 Organisational structure

The Australian Customs and Border Protection Service splits the responsibility for technology usage and policy/administrative issues. The Technology and Enforcement Capability Branch (TEC Branch), Enforcement and Investigations Division, Border Enforcement Program is responsible for policy issues related to NII scanners, procurement, training, maintenance contracts and regulatory licensing. In addition TEC Branch evaluates emerging NII technology and participates in liaison with international and domestic NII scanner forums.

Regarding the operational use of NII scanners by the Australian Customs and Border Protection staff, it is the responsibility of the operational divisions. Passengers Division, Cargo Division and Enforcement and Investigations Division are responsible for how the deployed NII scanners are utilised within their operational areas. These Divisions consist of the key user groups that use the NII scanners and whose inputs are incorporated into the user requirements for NII scanners.

## 1.2 Major Issues

### 1.2.1 Scope for implementing NII scanners (number, and location)

The total number of NII scanners deployed by the Australian Customs and Border Protection is outlined in the following table:

**Table 1.1: Types of NII Scanners**

Technology	Total
Mobile X-ray (X-ray only)	18
Cabinet X-ray (includes towable)	72
Pallet X-ray	5
Container X-ray	4

Container and pallet x-ray systems are deployed at Sea cargo Container Examination Facilities in Melbourne, Sydney, Brisbane and Fremantle with an additional pallet system in Port Adelaide. Mobile systems are usually used in air cargo environments across Australia and cabinet systems used at international airports, international mail centres and some freight providers.

### **1.2.2 Brief on procurement**

Procurement of NII scanners by the Australian Customs and Border Protection Service is conducted in accordance with government requirements under the *Commonwealth Procurement Guidelines*. Procurement is usually as a result of a competitive open tender process, or from a procurement panel that is developed using a competitive open tender process. Procurement is managed internally by TEC Branch.

In establishing performance standards for NII scanners used by the Australian Customs and Border Protection Service, advice was sought from other Australian government agencies including the Australian Nuclear Science and Technology Organisation; the Department of Infrastructure and Transport; and the Defence Science and Technology Organisation. Advice was also sought from independent scientific advisers contracted by the Customs and Border Protection Service, and from other Customs administrations.

### **1.2.3 Fees/charges on using scanners**

The Australian Customs and Border Protection Service purchases NII scanners under a capital funding process, which sets out the installment payments to be made at the time of contract signing, delivery/installation and acceptance testing. A separate maintenance contract is in place with each x-ray supplier that covers preventative maintenance and fault response. The cost of maintenance is generally about 10% per annum of the capital cost of the machine.

Currently, the Australian Customs and Border Protection does not charge the importer for the scanning of cargo consignments selected. Instead, a proportion of the Australian Import Processing Charge (IPC) is used to partly meet the cost of inspecting and examining sea containers. The IPC is charged on every import sea cargo container to help offset the costs associated with the NII scanning of sea containers as well as other administrative costs associated with processing sea cargo. The IPC is currently AUD\$50 per declaration for electronically lodged declarations.

### **1.2.4 Human and financial resources**

A team of five staff in TEC Branch conduct procurement of NII scanners, manage maintenance contracts, oversee training policy and certify NII trainers to deliver training. A larger group of operational staff are trained to deliver NII training and conduct assessments of staff.

## 1.2.5 Technology employed

### a. Container systems

The Australian Customs and Border Protection Service uses four Nuctech container x-ray units. These units are being upgraded in 2010-11 with dual energy 3 and 6 MeV switchable linear accelerators. This enhancement is improving penetration and image quality. In 2012 the software will be upgraded with a high energy materials discrimination capability. This NII scanner provides the ability to scan a high volume of sea containers. The unit has been successful in identifying several narcotic seizures as well as revenue items such as tobacco. The 6MeV energy level penetrates most commodities sufficiently to produce an image that can be used to decide whether to release or further examine a sea cargo container. A disadvantage of this system is that it is used in fixed locations near to major ports, rather than being incorporated closer into the logistics chain.



**Nuctech MB1215 Container X-ray**

b. Pallet

The L3 CX450P-DV pallet x-ray is used to scan primarily sea cargo in Sydney, Melbourne, Brisbane, Fremantle and Adelaide. The machine is at the 450 KeV power level and provides a dual view image, with materials discrimination. Each unit costs approximately AUD\$2,000,000. The size of the tunnel (2m by 2m) and energy level allow most deconsolidated sea cargo to be scanned. However, the system has limited penetration, particularly on the side view for denser materials.



**L3 CX450P-DV pallet x-ray**

c. Cabinet

A range of cabinet scanners are deployed consisting of machines with tunnel sizes of 60x40, 75x55 and 100x100cm. They are usually between 140 and 240 KeV in power. Some machines are single view while others are dual view. Some machines are in fixed locations while others can be manoeuvred around the location where they are deployed. These machines are located at international airports, mail centres and at warehouses. They cost AUD\$70,000 – \$180,000 per unit.



**Example of a Smiths 100x100 Cabinet X-ray**

d. Mobile

A fleet of custom-made mobile x-ray vans have been developed specifically for the Australian Customs and Border Protection Service. The latest generation of these vehicles features a Fiat chassis with a Smiths 85x85 tunnel x-ray. These vans are able to operate using a generator if mains power is not available. The van compartment can accommodate three staff and a variety of search equipment including trace and substance machines. Each van costs about AUD\$375,000.



**Interior of the Mobile X-ray with conveyor deployed**

**1.2.6 How the cargo/container to be scanned is identified and selected**

The Australian Customs and Border Protection Service uses a risk-based intelligence-led approach to identify cargoes to be scanned. This selection is conducted by the Intelligence and Targeting Division using analysis and profiling techniques. The number of cargo consignments to be inspected is set each year by the Australian Government. During 2010-11, the Australian Customs and Border Protection Service expects to inspect 101,500 sea cargo shipments (out of an expected 2.6 million shipments). It also expects to inspect 1.5 million air cargo consignments (out of an expected 12.2 million shipments).

**1.2.7 Database of scanned images**

Each NII scanner is capable of keeping a limited number of images. Images are kept from time to time for evidentiary, training or reporting purposes. A library with a variety of scanned images from

different environments is set up and can be accessed via a training network. In 2011, the Australian Customs and Border Protection Service is deploying a local area network for access to the x-ray image training system. This system will be used as a tool to aid in the training of image analysts and for the ongoing assessment of x-ray users.

### **1.2.8 Training and integrity issues**

All staff operating NII scanners shall attend the training in radiation safety. This course provides an introduction to x-ray theory and meets the ARPANSA radiation safety training requirements. Currently this course is delivered in a face-to-face manner but later in 2011 it will be replaced by an online learning module.

An image analysis course equip staff with the knowledge and skill to interpret images and use the imaging software to enhance images. This course currently is delivered via PowerPoint but is to be upgraded in 2011 with access to a new online image training database.

In addition to this training, staff are also trained in the operation of the specific type of machine that they are yet to be operated. This training includes start-up, shut-down and fault procedures; how to use the tools on the machine; how to position cargo to the beam to get the best image; and more advanced image analyst training on the specific machine.

The Australian Customs and Border Protection Service has commissioned or conducted a number of studies over the past few years looking at how the image analyst function can be improved. This has included looking at environmental factors that may have impacts on image analysis; the skills and cognitive requirements to be an effective image analyst; and reviewing the training delivery model.

### **1.2.9 Safety issues**

The ARPANSA dictates the standards in the operation of x-ray equipment that must be adhered to by the Australian Customs and Border Protection Service under its operator licence conditions. All operators of x-ray equipment must be trained in radiation safety and in the use of the machine that they are using. Radiation surveys of the equipment need to be conducted on a regular basis and the equipment must display warning signs to alert to the radiation hazard. The ARPANSA regularly audits the safety procedures at the Australian Customs and Border Protection NII scanner sites to ensure that the requirements are met.

In line with the ARPANSA guidelines, staff in the Australian Customs and Border Protection Service are not to be exposed to radiation above 5 microsieverts per hour. All NII scanners used by the Australian Customs and Border Protection Service conform to this safety standard by not allowing

radiation levels to exceed 5 microsieverts per hour in areas where staff would be exposed. This is achieved by shielding, the use of lead curtains or exclusion zones.

There have been no significant safety issues with the procedures currently in place for the Australian Customs and Border Protection's NII scanning equipment.

## **1.3 Benefits**

### **1.3.1 Benefits to Customs**

The use of NII scanners has provided the Australian Customs and Border Protection Service an effective and efficient tool to inspect a greater volume of items in a timely and cost-effective manner. This use of NII scanners has improved the revenue collection and detection of prohibited items, facilitating legitimate trade and interdicting smuggling activities.

### **1.3.2 Benefits to trade**

NII scanners are integrated into the logistics chain in Australia and internationally. With the use of NII scanners, less physical inspection on cargoes is necessary and therefore shortens the time for cargo clearance. Some of the Australian Customs and Border Protection's NII scanners are used by freight forwarders to screen export cargoes to meet international security screening requirements, providing an additional benefit to trade.

### **1.3.3 Benefits to government**

The Australian Customs and Border Protection Service has reported to Government in its 2009-10 annual report that intervention in the inspection and examination of air and sea cargoes had been lessened by focusing on an intelligence-led and risk based deployment of resources. This was resulted from a continued reliance on NII scanners to efficiently screen baggage and cargoes. Despite this reduction in intervention, comparable detection rates were maintained. This has also helped the Australian Customs and Border Protection Service meet government expectations of providing protection to the community at the border.

**Table 1.2: 2009-10 Annual Report Government Performance Targets**

Deliverable	Target	Actual
(1) Sea cargo		
– number of TEUs inspected<	101 500	101 822
– number of TEUs examined<<	14 000	14 175
(2) Air cargo		
– number of consignments inspected<	1 500 000	1 492 762
– number of consignments examined<<	**	66 821
(3) Mail		
– number of parcels/express mail system/registered items inspected<	18 000 000	20 696 957
– number of letter class mail items inspected<	40 000 000	41 512 725
– number of mail items examined<<	**	202 858

< Inspection may include the use of X-ray technology, detector dogs or physical examination.

<< Examination means physically opened by Customs and Border Protection.

## 1.4 Challenges and Way Forward

### 1.4.1 Main challenges/problems

One external challenge is getting NII scanners that meet the requirements of Customs administrations rather than the air security industry. The Australian Customs and Border Protection NII scanner users are after the best possible quality image and resolution. There is a need to be able to look for complex concealments, interpret the differences between organic and inorganic materials as well as be able to identify the commodity. Unfortunately some NII scanner vendors struggle to meet this varied requirements concentrating on the needs of the air security industry.

One internal challenge is trying to improve the cognitive abilities of image analysts to interpret NII scanner images and make correct decisions. This has resulted from improvements on training delivered to staff and the introduction of image library software.

### 1.4.2 Lessons for other regional members

The Australian Customs and Border Protection Service believes that the most important consideration in using NII scanners (particularly larger container and pallet systems) is to focus on having good quality intelligence and targeting arrangements in place, to ensure that the highest risk items are the ones that are selected for NII scanning.

No significant problems have been identified by the Australian Customs and Border Protection Service for further action.

### 1.4.3 Future plans for improvement

Given the current tight financial resources, the Australian Customs and Border Protection Service is focusing on upgrading or replacing existing NII scanner capability, rather than introducing new or expanded systems. There are, however, areas where future work to improve the use of NII scanners is being considered. This work includes:

- deploying internal body scanners at airports;
- developing a container x-ray test piece to assess the performance of container x-ray systems;
- improving the image analyst training given to staff;
- introducing a quality assurance regime regarding use of NII scanners; and
- introducing materials discrimination software for container x-ray systems.

\*

\*       \*



## **Procurement and Management of Non-Intrusive Inspection Scanners for Containers in Hong Kong**

### **Hong Kong Customs**



## 2.1 Executive summary

This report outlines the use of Non-Intrusive Inspection (NII) scanners for customs clearance of containerized cargoes and vehicles in Hong Kong and the management process, which includes procurement, maintenance and training. The purpose is to share Hong Kong's experience on the effective application and management of inspection equipment to cope with the evolving challenges in the 21<sup>st</sup> century.

As an international transport, supply chain and logistics hub, Hong Kong handled over 23 million TEUs<sup>2</sup> in its container port, processed some 15.7 million vehicles and 240 million passengers passing through its entry/exit points in 2010. Manual mode of Customs clearance alone was not sufficiently efficient and effective in stopping illicit goods/contraband from entering/leaving the territory under such voluminous traffic. With the NII scanners, Customs officers are able to perform thorough and speedy examinations of vehicles and containerized cargoes, without having to resort to the costly, time consuming process of unloading cargo for manual searches, or intrusive examinations.

International trade is an essential driver for economic prosperity. Customs administrations are obliged to increase its contribution to the economic well-being of countries by expediting the clearance and release of goods. Hong Kong Customs has been using NII scanners for cargo and vehicle inspection since 2001 and finds the equipment enhance efficiency and effectiveness of inspection.

To effectively manage the procurement, maintenance and training of the equipment, Hong Kong Customs adopts a Three-tier Management System to formulate, implement, monitor and evaluate the procurement, training and maintenance of inspection equipment. Dedicated departments of Hong Kong Government will assist in the procurement and maintenance of NII scanners by offering professional consultancy services such as market research, tendering, contract management, testing and commissioning and acceptance inspection.

By actively engaged in overseas exhibitions/forums/meetings/workshops on NII scanners, Hong Kong Customs has fostered and will continue to maintain strategic partnership with vendors and counterparts to research advanced equipment and benchmark best practices for enhancing cargo security while facilitating international movement of goods.

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<sup>2</sup>TEU refers to twenty-foot equivalent unit, i.e. the volume of a 20-foot long shipping container. The unit is used to define the capacity in container transportation.

## 2.2 Background

With the rapid development of economic globalization and regional economic integration, the scale, volume and efficiency of international trade have been on the rise in the past few decades. There is increasingly strong demand for higher efficiency of logistics industry. Trade facilitation has become a major agenda amid growing concern on cargo security in face of the terrorist threat. Being government organizations responsible for controlling and administering international movement of goods, Customs administrations are expected to provide efficient customs clearance services to facilitate the development of global trade and safeguard the international supply chain security.

In 2005, the World Customs Organization (WCO) adopted the SAFE Framework of Standards (SAFE Framework) which sets out 4 core elements and 17 standards to enhance security of international trade and improve ability of customs authorities in detecting high-risk consignments for inspection. One of the key standards is the application of NII equipment to examine high-risk containers or cargo speedily, without disrupting the legitimate trade.

The application of NII scanners does not only increase the efficiency and effectiveness of customs inspection, but also benefits the trade (especially the logistics industry) by enhancing their competitive edge on providing efficient delivery service. The benefits brought about by the NII scanners further authenticated their wide application in Customs inspection. Today, the NII scanner has become an essential equipment of Customs administrations to reinforce their operation in the seaports and land border control points.

## 2.3 Overview of the Application of NII Scanners in Hong Kong

### 2.3.1 Major drivers for application of NII scanners

Strategically located at the doorway of the Mainland China, Hong Kong has long been serving as an important logistics hub for international trade that bridges the time gap between Asia and Europe. Entering the 1990s, the volume and scale of import and export trade expanded significantly and Hong Kong Customs was confronted with the consequential drastic increase in vehicle and cargo inspections.

Manual mode of examination alone was not sufficiently efficient and effective in detecting contraband from voluminous vehicles and containers, not to mention the sophisticated and diversified methods in concealing the smuggled goods. Hong Kong Customs introduced the first two NII scanners in 2001 and deployed the equipment to the land border control points between Hong Kong and the Mainland China to enhance work efficiency and enforcement capabilities.

The fast-changing global environment in the 21<sup>st</sup> century triggers greater demand for international supply chain security and logistics efficiency. Hong Kong Customs bears a stronger than ever obligation in countering terrorism and safeguarding Hong Kong's status as one of the leading logistics hubs in South-east Asia<sup>3</sup>. Application of advanced NII scanners becomes more instrumental in safeguarding cargo security and facilitating movement of commercial goods.

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<sup>3</sup> In 2010, Hong Kong is the world's third busiest container port and the sea container throughput reached 23.6 million TEUs which is more than 4 folds as compared with that in 1990. The annual vehicular throughput was 15 737 274 for land border crossings, which has been raised by 5.8% as compared with 2009.

### 2.3.2 Types and technology of NII scanners

Fixed type and mobile type X-ray scanners are two major types of NII scanners available in market. They have their own distinctive functions, characteristics and neither one has absolute advantage over the other. The main technologies currently used by X-ray scanners are transmission technology and backscatter technology. Transmission technology can project images of objects loaded inside containers/vehicles through beaming X-ray to them. The backscatter technology will collect X-ray reflected from the objects under scanning and highlight the images of organic items (such as drugs, explosives and plastic weapons) in eye-catching colour for easy identification. Optional radiation threat detection feature can be integrated into the X-ray system to detect both gamma ray and neutron radiation, which is capable of indicating the presence of a potential dirty bomb or fissionable materials inside the scanned vehicles.

Major features of the two types of NII scanners are summarized below:

#### Comparison of Mobile and Fixed X-ray Scanners

Mobile X-ray Vehicle Scanning System	Fixed X-ray Inspection System
<ul style="list-style-type: none"> <li>• X-ray scanner installed in a large truck fixed with a stretchable robotic arm swing out sideways from the truck</li> <li>• Scanning is conducted within a designated operating zone</li> <li>• High mobility</li> <li>• Relatively lower energy and penetration power</li> <li>• Mobility inevitably undermines system stability</li> </ul>	<ul style="list-style-type: none"> <li>• X-ray scanner installed in a fixed purpose-built building with walls up to two meters or even thicker and safety doors of 40 tonnes</li> <li>• Scanning is conducted within the building</li> <li>• Zero mobility</li> <li>• Relatively high energy and penetration power</li> <li>• Involve land acquisition for setting up the whole system</li> </ul>



A Mobile X-ray Vehicle Scanning System scanned a container truck at Kwai Chung Customhouse, Hong Kong



X-ray scanning on a container truck by the Fixed X-ray Vehicle Inspection System at Lok Ma Chau Land Border Control Point, Hong Kong

### **2.3.3 Safety issues**

The safe operation of X-ray-based NII scanners is of paramount importance to system operators and the public. All the equipment procured are complied with the statutory requirements of Hong Kong Laws as well as the World Health Organization's safety standard in governing the X- ray emission. In addition, only trained officers are allowed to operate the equipment for the sake of safety and security.

### **2.3.4 Workflow of NII inspection**

The WCO's SAFE Framework encourages the use of NII scanners as a component of risk- based processing system. However, pivotal to its success is the ability of Customs to target high-risk vehicles and containers for NII inspection. Risk assessment is implemented with the compliment of intelligence system to assist Customs in risk profiling to select goods and vehicles for inspection.

Customs officers in Hong Kong are vested with power under the Import and Export Ordinance, Cap. 60, Laws of Hong Kong to stop, board and search any vessel, aircraft or vehicle and examine the cargo on board when they are entering or leaving the territory. Nevertheless, traders are not required to pay any fee regarding X-ray scanning or other forms of cargo examination.

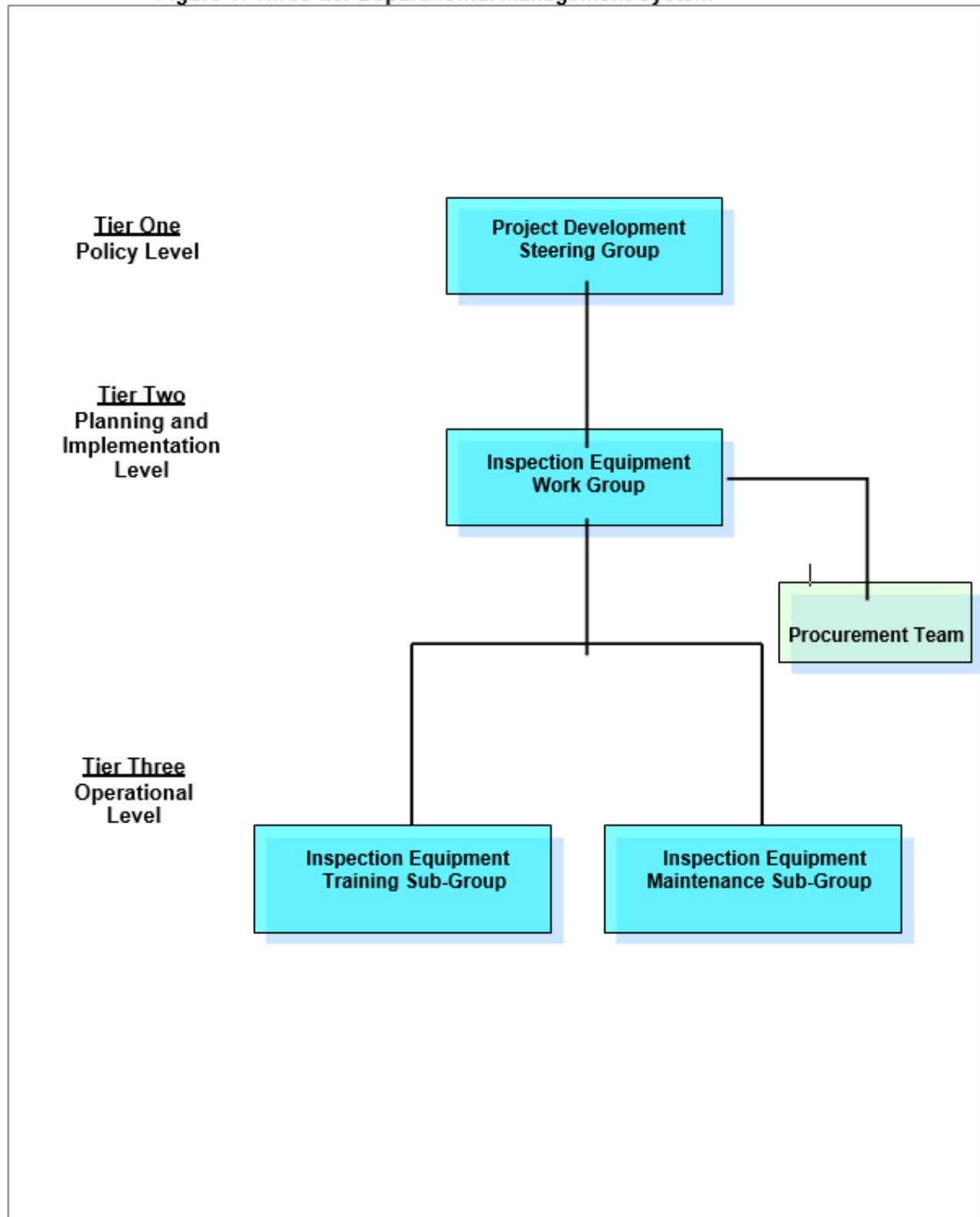
Under the automated system of Customs in processing the electronic advance cargo information submitted by traders, the majority of vehicles and cargoes can enjoy seamless customs clearance. Only vehicles selected for X-ray scanning will be directed to a designated compound for inspection. If suspicious images are detected during a NII scanning, Customs officers will conduct intensive examination.

## **2.4 Strategic Management of Inspection Equipment**

### **2.4.1 Evolvement of management system**

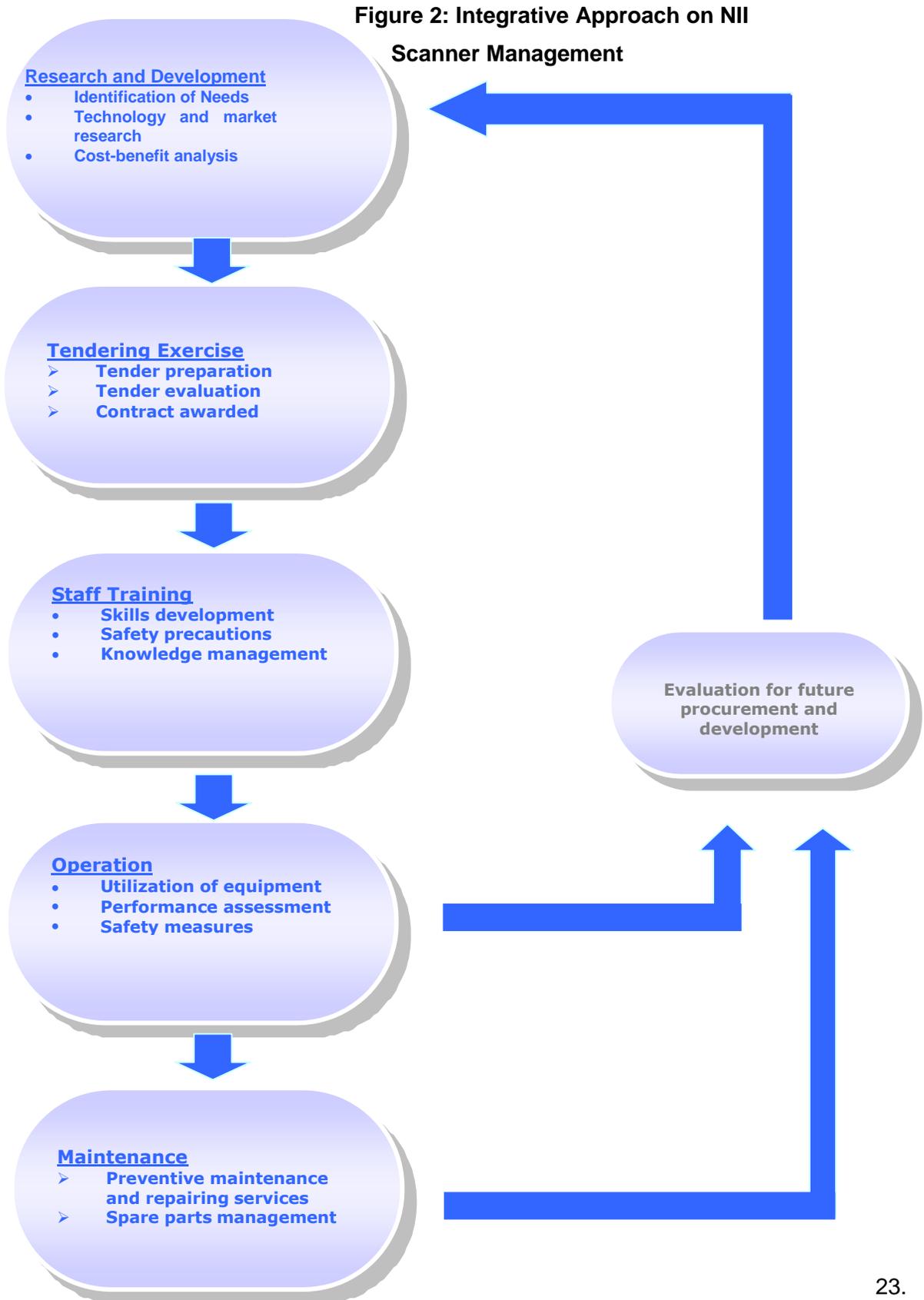
As a pilot run, the use of NII scanners in Hong Kong in 2001 was only confined to two land border control points. When the use of NII scanners has been gradually extended to other control points and sea ports, Hong Kong Customs took the opportunity to review the management mechanism and finally adopted a Three-tier Departmental Management System (Figure 1) on NII scanners in 2009 to enable the department to move towards a knowledge based and more customer-oriented model.

Figure 1: Three-tier Departmental Management System



### 2.4.2 Integrative approach on NII scanner management

Under the Three-tier Management system, Hong Kong Customs follows the process below (Figure 2) in the procurement and management of NII scanners:



### 2.4.3 Research and development

Members of the Inspection Equipment Work Group meet regularly to review and identify evolving needs of each entry/exit point. The Work Group will arrange to conduct technology and market research to help identify appropriate and effective equipment to cope with the changing environment. A full cost-benefit analysis is conducted to determine whether procurement of NII scanners is justified and cost-effective.

Overseen by the Inspection Equipment Work Group, the Procurement Team conducts worldwide technology and market research via the following means to keep abreast of the latest technology:

- **WCO Databank on Advanced Technology**, which provides detailed and updated technology information on advanced inspection equipment for Customs administrations;
- **Overseas Enforcement Equipment Exhibitions**, such as the WCO Technology and Innovation Forum, Global Security Asia Exhibition and Security and Policing Exhibition (formerly named as Home Office Scientific Development Branch Exhibition), which demonstrate new and emerging technologies for customs inspection in order to advocate efficient use of advanced technology at border;
- **Benchmarking with Overseas Counterparts** facilitates Customs administrations to exchange best practices as well as operational difficulties in the application of advanced technology and innovations; and
- **Equipment demonstrations by suppliers** showcase the latest inspection technologies and equipment that are readily available to suit Customs needs.

Hong Kong Customs attaches great importance on devising long-term development plan on the application of inspection equipment to enhance enforcement capability while facilitating trade. We have actively engaged in overseas exhibitions/forums/meetings on the application of NII scanners, and established strategic partnership with vendors and overseas counterparts for researching advanced equipment and benchmarking the best practices. Hereunder are some episodes :



Senior officers of Hong Kong Customs (Assistant Commissioner Mr Yu Koon-hing (centre) and Chief Superintendent Mr Liu Cheung-shing (left)) visited Home Office Scientific Development Branch Exhibition in the United Kingdom in March 2011



Representative of the Emerging Technologies Team of the UK Border Agency delivered seminars on advanced technologies for Customs inspection in Hong Kong in September 2010

To ensure that the procurement of high value equipment is fully justified, cost-benefit analysis will be conducted with reference to the following factors:

### **Cost**

- Non-recurrent cost - one-off cost for equipment, X-ray building and associated builder's works, delivery, installation and consultancy fee for engineering experts; and
- Recurrent cost - regular preventative and corrective maintenance cost, fuel and electricity cost, labour cost, operating cost for the X-ray building.

### **Benefits**

- Increased operational efficiency at borders and seaports;
- Enhancement of contraband detection capability;
- Reduction of revenue loss due to smuggling of dutiable goods;
- Anticipated manpower and cost saving; and
- Improvement on supply chain security.

#### **2.4.4 Tendering**

A fundamental principle on the procurement policy is to obtain goods and services at the best value for money. Equal opportunities should be given to local and overseas suppliers to participate or competing in the procurement process. Hong Kong is a signatory to the World Trade Organization Agreement on Government Procurement and global tendering exercise is required for purchase of goods and related services at a value over HK\$1.4 million (EURO €122,500). The whole tendering process will undergo a set of open, fair, competitive and transparent procedures. The Procurement Team of Hong Kong Customs works closely with the government departments concerned to monitor the tendering process to ensure the NII scanners are timely procured, delivered and commissioned.

Due to the time gap between market research and tender preparation, administrations should maintain close dialogue with potential suppliers to ensure that the information previously acquired, e.g. technology, specifications, constraints are still valid to avoid possible tender failure, or any delay of project caused by non-compliance of tender terms.

#### **2.4.5 Staff training**

##### Skill Development

The principles of operation and application of NII scanners in cargo and vehicle inspection are included as a part of induction training for all new recruits of Hong Kong Customs. On the job training will be provided to every officer for skill development when he/she is posted to the NII Scanning Team of different work places e.g. airport, seaports or land border control points. The scope of training covers a wide spectrum, including system operation, image interpretation and safety precautions.

Training courses for operators, maintenance team and trainers to be provided by the system supplier are included in the terms of tendering document as mandatory requirement. The Inspection Equipment Training Sub-Group under the Three-tier Departmental Management System is responsible for overseeing the training strategy by monitoring the training progress and reviewing the training requirements regularly.

#### **2.4.6 Operation**

##### Performance Assessment

NII scanners can help facilitate Customs inspection if they are properly deployed and utilized. In order to ascertain whether the NII scanners are used efficiently and effectively, users are required to submit returns regularly comprising the utilization rate, breakdown records, etc. for assessment.

The performance assessment of the equipment provides standardized, reliable and objective information to identify areas of improvement. For instance, frequent breakdown records may indicate underperformance of certain models of NII scanners. Manufacturers providing efficient technical support should be praised for their efforts in enhancing their products and assist Customs administrations to deliver uninterrupted services to public. Such information shall be taken into account when Customs administrations evaluate the operational efficiency of the existing scanners, which will also serve as a good reference in the prospective procurement exercises. With the timely assessment, Customs administrations will be in a more advantageous position to identify areas for improvement and direct the responsible parties to take follow-up actions.

## **2.4.7 Maintenance**

Regular preventive maintenance and corrective repair services are crucial to the uninterrupted operations of NII scanners. To standardize and enhance the maintenance/support services of inspection equipment, the Inspection Equipment Maintenance Sub-Group will examine the returns submitted by users to identify scanners with maintenance problems for case study, e.g. components with unusually short lifespan, prolonged down time due to belated delivery of spare parts. The Sub-Group will report the findings to the Inspection Equipment Work Group and make recommendations for improvement.

As the overseas suppliers will usually take longer period to deliver spare parts for repairing of NII systems, the maintenance agent shall keep sufficient stock of spare parts, such as X-ray generation tubes, X-ray detector modules and hydraulic system parts, etc. to ensure timely replacement. This requirement has to be clearly stated on the tender document during procurement stage.

## **2.4.8 Evaluation and monitoring mechanism**

The Three-tier Departmental Management System establishes a holistic framework for management of NII scanners. Regular returns from frontline users will help provide valuable information regarding utilization and performance of NII scanners and build up feedback learning loops that allow the Work Groups to take remedial actions to improve the performance of equipment. The Project Development Steering Group will examine the recommendations made by the Work Group members and give policy steer on the departmental strategy for procurement, replacement and management of NII scanners.

## **2.5 Benefits in Using NII Scanners**

The use of NII scanners has generated huge benefits from the perspectives of supply chain security, Customs inspection and trade facilitation. These benefits are well received by Customs administrations, traders and the society.

### **2.5.1 Benefits for Customs Administration**

1. Improve inspection efficiency

Using NII scanners for container scanning significantly shortens the inspection time. Enhanced operational efficiency enables Customs administrations to select more high-risk containers for X-ray scanning while ensuring a rapid movement of goods at entry/exit points.

2. Enhance enforcement capability

NII scanners are proven to be effective in detecting contraband, in particular those hidden inside concealed compartments of vehicles/containers and mixed with other general cargo. Clear X-ray images with highlight of organic substances (such as illicit drugs, explosives and plastic weapons) in eye-catching colour help frontline officers identify concealed contraband or unmanifested cargo easily, therefore enhancing detection capability.

3. Save manpower

Physical inspection of a full-loaded 45-foot container normally takes two to three hours with the engagement of intensive manpower resource. By using NII scanners, the inspection time can be largely reduced to within 30 minutes.

4. Reduce revenue loss

NII scanner is an effective tool to detect smuggling of dutiable commodities in bulk quantity, which help protect revenue of the Government.

### **2.5.2 Benefits for traders**

5. Reduce operating cost

The use of NII scanners significantly shortens the Customs inspection time at entry/exit points and hence benefits the traders, especially those in logistics industry. Their competitive edge will thus be enhanced by reducing the operating cost and providing speedy delivery service to their customers.

6. Enhance cargo security

Not only Customs administrations but also traders and their overseas trading partners have grave concern on supply chain security. The use of NII scanners can help safeguard cargo security without impeding the free movement of bona fide cargoes.

### **2.5.3 Benefits for society**

7. Reduce risk of terrorism

NII scanners can help detect weapons of mass destruction and explosives, and hence protect the society from terrorism and maintain the integrity of internal security.

8. Assure social order

9. NII scanners can detect organic substances such as narcotics and precursor chemicals. Obviation of drug trafficking will help safeguard the local community by suppressing the drug supply and associated crimes.

## 2.6 Partnership between Government and Equipment Supplier

Customs administrations and NII scanner suppliers are both customers and partners. While Customs administrations count on the suppliers to gain access to the latest commercially available technologies for identification of suitable equipment to assist their operations, the suppliers also have keen interest to understand the users' operational need so as to better steer their resources on research and development programs. If an attractive business case can be made, there will be high incentive for suppliers to take a more Customer-focused and needs-oriented approach in product design and development of business plan. In return, Customs administrations can receive continuous technical support from the suppliers through firmware upgrade and modifications of equipment. Though there may be a perception that the public sector and private sector are entities with distinct cultures, the pro-active and robust communication can bridge the gap and bring about greater clarity to mutual interests.

## 2.7 Challenges

NII scanners for container/vehicle inspection are made-to-order equipment and the procurement exercise usually includes: market research, tendering, production, assembly, inspection and delivery. Despite the variation of procurement procedures in different Customs administrations, the whole procurement process is generally lengthy and usually takes more than two years in the case of Hong Kong. In order to ensure timely procurement and replacement of NII scanners, Customs administrations are recommended to form dedicated office to centralize the management of inspection equipment for establishing and retaining of knowledge and expertise.

The technology of NII scanner is ever-changing and manufacturers will keep on refining and modifying their products to meet the customers' needs. The long procurement process will inevitably hinder Customs administrations to acquire the latest technology from the market. In this regard, regular and comprehensive technology research, in particular on emerging technology is indispensable for effective procurement.

Application of NII scanner involves huge capital investment on equipment and maintenance which imposes significant financial burden on the Customs administrations, in particular those countries with scattered entry/exit points. Support from the policy level and financial bureaus of the government is essential for sustainable development in the procurement and subsequent replacement of the equipment.

Although NII scanner is proved to be efficient and effective equipment in container/vehicle inspection, Customs administrations should be fully aware of its inherent and operational constraints. Customs administrations are still required to resort to other means of inspection, such as open examination and sniffing by Customs detector dog, etc. to supplement the inadequacy. Site constraint is also another concern that needs to be well considered and meticulously planned before procurement.

The efficacy of NII scanner is heavily relied on the competency of the operators in image interpretation. While NII scanners are capable of generating high quality X-ray images, the operators should possess ample knowledge in identifying irregularities on the images so as to detect the contraband. In this regard, continuous training plan and knowledge management have to be drawn up to enhance the overall value and effectiveness of the system.

## 2.8 Way Forward

Entering the 21<sup>st</sup> Century, Customs administrations are facing with immense challenges derived from the fast changing landscape in global trade. Clearance service aside, Customs today is obliged to strengthen our value proposition to support the global logistics development, facilitate international trade and enhance safety and security at the border. The use of NII scanners will improve Customs ability to detect high-risk consignments and enhance the overall efficiencies in the administration of goods.

In 2008, WCO introduced ten building blocks under the New Strategic Direction for Customs in the 21<sup>st</sup> Century. WCO encourages the Customs administrations to take advantage of new and emerging technologies to enhance, amongst others, intelligence processing, risk management, and non-intrusive detection. Extensive application of NII scanners in Customs inspection is an indispensable trend for Customs administrations. In the case of Hong Kong Customs, we have not only applied NII scanners in the existing work areas, but also categorized them as standard operational equipment in the resource planning for new infrastructural projects such as the construction of new land border control points.

Notwithstanding that NII scanners have been deployed in daily operation for a decade, Hong Kong Customs will continue to explore and take forward measures to further enhance its capability and application. Advanced training programmes, in particular on image interpretation and knowledge management, are being implemented to enhance frontline officers' capabilities to discern anomaly in vehicle/container scanning. On the other hand, Hong Kong Customs will strive to strengthen the risk assessment and intelligence system to sustain the momentum of pursuing global supply chain security while promoting the seamless movement of legitimate goods.

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