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WCO Technology and Innovation Forum: Background paper

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Abstract

Technologies used by Customs administrations in their daily operations can be categorized into two main parts, the first being Information and Communications Technology (ICT) and the second Inspection Enabling Technologies.

For practical purposes these technology groupings should be seen independently from each other, although in reality it is becoming increasingly common that these two forms of technology have interdependencies when applied at the front line of Customs operations. These two sets of technologies used in tandem with risk management and intelligence should be seen as complementary tools that enable Customs administrations to more efficiently manage their tasks and meet their organizational objectives.

This background paper provides an outline of different inspection technologies available and in use by WCO Members. The paper deals with WCO instruments which lay the foundation for the use of technology in Customs and the main WCO initiatives and instruments with specific regard to inspection technology. It also presents a short overview of the different inspection technologies used by Customs and/or other border control agencies. The original paper was produced as a background paper to the WCO Technology and Innovation Forum in November 2009.

Key words

Technology, WCO Databank on Advanced Technology, Container Scanning, Track and Trace

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1. Technology in a Customs context can in broad terms be divided into two parts. The first is Information and Communications Technology (ICT) and the second Inspection Enabling Technologies.

2. For practical purposes these technology groupings should be seen independently from each other, although in reality it is becoming increasingly common that these two forms of technology have interdependencies when applied at the front line of Customs operations. These two sets of technologies used in tandem with risk management and intelligence should be seen as complementary tools that enable Customs administrations to more efficiently manage their tasks and meet their organizational objectives.

3. The WCO has had a number of guidelines and initiatives regarding both types of technologies. In the field of ICT, the WCO has several guidelines associated with the establishment of ICT systems and in relation to data creation and management. In addition to the instruments and the work done in the different Committees, the annual ICT Conferences have become well established events that attract more than 500 participants from both the private and public sectors.

4. While working processes and procedures in relation to ICT are well established within the WCO, the rapidly emerging and developing area of inspection technology is also of great interest to Members. The WCO is increasingly active in support of Members wishing to procure and deploy inspection technologies. A Databank on Advanced Technology has been created and the WCO Scientific Subcommittee's remit broadened to draw up user requirements and technical specifications to assist Members in taking procurement decisions. Building on this work fully fledged' Guidelines for the purchase and deployment of scanning/imaging equipment' have been produced and endorsed by the SAFE working group The Secretariat is currently working with Regional Offices for Capacity Building (ROCBs) to organize a series of regional scanning workshops.

5. Research and Development associated with inspection technologies to deal with safety, security and anti smuggling concerns is moving capability forward at a rapid pace. When new technology is deployed by Customs as part of a layered risk management approach the pay-offs associated with implementation are increasing as technologies mature and develop and operator experience and competence increases. The routine use of inspection technologies in support of Customs activities is becoming strategically important to counter issues such as; increasing trade volumes, static resources, trade security and terrorism, accurate revenue collection, supply chain facilitation, piracy and counterfeiting, commercial fraud, false documents, money laundering and public health and safety.

6. The WCO has decided to organize and host the first WCO Technology and Innovation Forum given the tremendous importance now associated with the development of technologies that support customs front line operations. The event will assist Members to assess the merits of the technology products on offer, share Members' views and experiences and provide the opportunity to meet with industry representatives and vendors.

7. This background paper provides an outline of different inspection technologies available and in use by Members. The first two parts of the paper deal with WCO instruments which lay the foundation for the use of technology in Customs and the main WCO initiatives and instruments with specific regard to inspection technology. The third chapter presents a short overview of the different inspection technologies used by Customs and/or other border control agencies. The fourth chapter outlines potential future WCO work in the area.

2. WCO instruments and tools in the field of inspection technology

2.1 Main WCO instruments encouraging the use of inspection technology in the Customs context

8. The principles that define the use of technology in Customs can be found embedded in key WCO instruments. Documents like the *Customs in the 21st Century – Enhancing Growth and Development through Trade Facilitation and Border Security* (C21)[1], the *SAFE Framework of Standards* (SAFE Framework)[2], and the *Revised Kyoto Convention* (RKC)[3] all make references to the use of inspection technology.

9. The C21st policy document, adopted at the WCO Council Session in June 2008, forms the strategic basis of the WCO's forward thinking. This strategy rests on ten key building blocks. One specifically refers to the use of technology. It states that "*Customs must take advantage of new and emerging technologies to enhance, amongst others, processing, risk management, intelligence and non-intrusive detection"* and encourages Customs administrations to fully exploit the potential of emerging technologies to tackle the challenges of the rapidly changing 21st century operating environment.

10. The SAFE Framework, is a global supply chain security initiative, developed at the WCO by the international trade community and WCO Member Customs administrations to secure and facilitate the global supply chain, outlines the use of technology both in its "Customs-to-Customs" and "Customs-to-Business" pillars. Standard 3 of the Customs-to-Customs pillar states that *"non-intrusive inspection equipment and radiation detection should be available and used for conducting inspections, where available and in accordance with risk assessment. This equipment is necessary to inspect high-risk containers or cargo quickly, without disrupting the flow of legitimate goods."* Standard 3 focuses on the use of scanning and radiation detection, whereas Standard 4 of the Customs-to-Business pillar of the SAFE makes a broader reference to other kinds of inspection technologies. According to Standard 4 *"all parties will maintain cargo and container integrity by facilitating the use of modern technology*".

11. In addition to the C21 document and the SAFE Frameowrk, the Revised Kyoto Convention (RKC) touches on utilization of inspection technology. The RKC stipulates

[1] World Customs Organization, *Customs in the 21st century - Enhancing Growth and Development Through Trade Facilitation and Border Security*, June 2008, available at <http://www.wcoomd.org/files/1.%20Public%20files/PDFandDocuments/Annex%20II%20-%20Customs%20in%20the%2021st%20Century.pdf>

[2] World Customs Organization, *WCO SAFE Framework of Standards*, 2007, available at <http://www.wcoomd.org/files/1.%20Public%20files/PDFandDocuments/SAFE%20Framework_EN_2007_for_publication.pdf>

[3] World Customs Organization, *Revised Kyoto Convention*, June 1999, available at <http://www.wcoomd.org/Kyoto_New/Content/content.html>

"Customs control shall be limited to that necessary to ensure compliance with the Customs law"[4], and that modern inspection technologies are to be used together within a risk management system to make Customs controls more effective and efficient. While the RKC does not refer to any specific type of technology (with the exception of Customs seals), it recognizes the high value of using different types of inspection enabling equipment such as seals and scanning to enhance Customs control.

2.2 WCO tools related to the use of inspection technology

12. There have been four major WCO initiatives in the field of inspection technologies. The first was the establishment of the Databank on Advanced Technology, second, the production of Guidelines for the purchase and deployment of scanning/imaging equipment (produced and endorsed by the SAFE working group), third, a general survey on scanning expertise, and fourth – the organization of a series of regional scanning workshops in conjunction with the ROCBs.

2.2.1 WCO Databank on Advanced Technology

13. The acquisition of high tech inspection technology inevitably involves a substantial capital investment. In order to make a sound, informed purchasing decision, key information is needed on the various options that are available on the market. There is also a similar need for support at the post purchase phase. Information on potential support available for purchased equipment (especially relating to spare parts), consumables and trouble shooting, along with information on on-site support may be required.

14. In order to meet Members' needs, WCO Secretariat decided to develop a Databank on Advanced Technology. The Databank contains detailed information on products available with Customs application along with contact details of manufacturers/suppliers. The Databank has been structured in a way that allows viewers to search, filter, and identify products/manufacturers which match their specific needs.

15. The main features of the Databank include online registration request for interested companies, management of their own company and product details by registered companies (including images of products to their records), and a product search utility using free text and/or product classification search. Products in the Databank are classified under the following headings:

    - Communication Equipment;
    - Document Readers/Verifiers;
    - Tools/Safety Equipment;
    - Software and Services;
    - Surveillance Equipment;
    - Test & Detection Equipment;
    - X-ray Equipment;

16. The application can be reached via the WCO Public Website and includes details on manufacturers; products; location where each product can be installed/used and its applications; costs (if provided); needs for training; Customs and/or other law enforce-

[4] World Customs Organization, *Revised Kyoto Convention*, General Annex, Chapter 6, Standard 6.2

ment agencies having already purchased that single product; and Companies' representatives. The Members of the WCO can access the Databank via the Members website and have access to some additional features. The Databank includes the possibility for Members/public to submit their own comments and experiences with different inspection technologies and to update and contribute to the Databank itself.

2.2.2 Guidelines for the purchase and deployment of container scanning/imaging equipment

17. Many Members have already purchased or are looking at the potential of purchasing technical inspection equipment, particularly X-ray or gamma ray equipment for scanning containers, to assist their operational objectives by increasing efficiency through NII examinations rather than time consuming physical inspections. The WCO Secretariat has produced Guidelines[5] to assist Member Administrations in purchasing and deploying container scanning/imaging equipment by giving an overview of the relevant administrative issues.

18. The Guidelines cover issues such as; the planning process for purchasing equipment, user requirements and technical specifications, purchasing process, factory acceptance test, deployment of the equipment, field validation tests, acceptance of the purchase contract, and post-implementation review. An Annex to the document includes sample bidding documents. The scope of these particular Guidelines is limited to X-ray and Gamma-ray imaging type equipment and does not include nuclear and other radioactive material detection equipment including radiation portal monitors (nonetheless, radioactive and special nuclear material detectors may be considered as optional extras when purchasing container scanners).

2.2.3 Survey on scanning expertise

19. The Secretariat is trying to harness the experience of Members who have already acquired, installed and are using scanning equipment. For this purpose, a general questionnaire was sent out for Members at the end of 2008 to identify their level of expertise and whether there was a willingness to share that knowledge with others.

20. Based on the replies to the study, the Secretariat is now working on obtaining assistance from Regional Vice-Chair's and Regional Offices for Capacity Building (ROCB) in order to establish regional pools of expertise able to assist with capacity building requests and demands.

21. Additionally the Secretariat is compiling a list of consultants or experts who have worked with Customs in the acquisition of this equipment. The aim is to enable an administration that wishes to purchase and install inspection equipment to be able to contact another administration that has already used a consultancy service in order to learn from that administration's experience.

[5] World Customs Organization, "Guidelines for the Purchase and Deployment of Scanning/Imaging Equipment", LF0031E1a, 12 August 2009, Brussels

2.2.4 Regional scanning seminars

22. The WCO Secretariat is organizing a series of regional scanning seminars together with the ROCBs. The first seminar was organized in Buenos Aires in October 2009, and the next seminars are planned for late 2009 and early 2010. The goal of the seminars is to discuss both benefits and challenges associated with purchasing and deployment of scanning equipment and to share best practices and lessons learnt in the use of the equipment.

3. Overview of some of the inspection technologies used by Customs

3.1 General

23. Markets for a diverse range of inspection technologies have grown rapidly. During the last decade the use of advanced inspection technologies have become more frequent in all Customs regions. Even though modern inspection technologies can assist Customs administrations tremendously in their tasks, they are by no means the sole key to success. At a time of economic prudence almost all Customs administrations face severe resource constraints. It is therefore of utmost importance that the decisions to purchase inspection technology are thoroughly assessed and the scarce resources are allocated in equipment which can bring about the biggest return-on-investment (ROI) and deliver efficiently towards the wider strategic goals of the organization. It is important never the less to underline that the role of inspection technology in the customs business and control processes is supportive. The mere purchase of technology in itself is not a unique key to success. Continuous HR training is needed to develop and maintain skillful front-line officers, who thoroughly understand risk analysis and how to operate this often highly complex equipment to achieve peak performance.

24. The next sub-sections provide an outline on some of the inspection technologies in the different panels of the Forum. The aim of this part of the paper is to give a general overview to facilitate discussion in the Forum itself. More detailed information on the individual technologies can be received from the speakers and exhibitors during the Forum.

3.2 Container scanning

25. Container scanning equipment is perhaps emerging as the single most important inspection technology desired and used by Customs administrations. There are two principal types of technology (X-ray and Gamma-ray imaging technologies), and three different types of systems (stationary, re-locatable, mobile) that are mainly used. The following is a brief summary of these technologies and systems without going into detail on different individual products and manufacturers.

26. In simple terms, the essential differences between systems based on X-ray and Gamma ray are:

- An X-ray is an electromagnetic wave of very short wavelength. X-rays are polychromatic and have a larger spectrum than Gamma rays. The power source for X-ray systems is electrical. This means it can be turned on and off. It also means that in a site where the electricity supply is not certain, it is essential to have a

back-up generator. The energy level of X-ray systems is measured in mega-electron volts (MeV). The MeV rating varies in fixed, mobile and re-locatable systems, discussed in detail below. Currently X-ray systems give better image quality but are more expensive and are larger than Gamma ray systems.

- Gamma rays are monochromatic electromagnetic waves of shorter wavelength than X-rays. Gamma rays are produced from natural isotopes such as Cesium-137 or Cobalt-60. These are radioactive sources and the energy emission is continuous. Because of this, the isotopes must be always kept in a shielded cabinet. Over time, the radioactive isotope's emission decreases. Accordingly, some Members that operate these systems have included within their contracts a provision for periodic testing to ensure that levels remain sufficiently high. Gamma ray systems are cheaper to purchase and to operate but the images produced can be more difficult to interpret. A gamma ray unit is, in general, smaller than an X-ray unit which gives these systems a higher degree of mobility. Gamma ray units are far more likely to be mobile or re-locatable than fixed. Live source needs to be disposed of and replaced approximately every 5 years.

27. The usual comparative method for these systems is to refer to the penetration ability through different thicknesses of steel. A gamma based system using a Cobalt-60 radioisotope, which has greater penetration than one based on Cesium-137, should penetrate up to 165mm of steel. Manufacturers of X-ray equipment show 180mm penetration of steel for a 2.5 MeV mobile X-ray system, over 200 mm for a 3.0 MeV mobile unit and more than 300mm for a 6.0MeV relocatable unit. Fixed X-ray systems of 9 MeV are able to penetrate around 400 mm of steel. Some currently deployed mobile systems have energy levels as low as 450kV and would have trouble surveying a large portion of container traffic. Members who currently use X-ray systems are of the view that 2.5 MeV is the minimum level for cargo penetration.

28. There are three mobility types of imaging systems available. Fixed (stationary) units are the most expensive and the most powerful, typically with energy levels around 9MeV. This high energy level provides a clearer image and deeper penetration of containers and their cargo than systems of lower energy. However, due to high energy of the system there is a possibility that X-rays may "blow through" the cargo without forming a proper image. Some fixed units have a capability to use "half power" for the consignments that are empty or when the goods are fairly transparent. As a result the quality of the image is considerably better. Most fixed unit systems tend to be X-ray imaging units. A fixed unit may permit a "dual view", when both horizontal and vertical profiles of the cargo can be taken.

29. A fixed unit consists of more than just the scanner. Due to the high energy of the systems and possible scatter of X-rays the entire system must be housed in a purpose-built building with walls up to two meters or deeper. The building must also contain safety doors for the entrance and exit and can weigh 40 tons each. The entire construction of this unit must also include the facility for the computer equipment and image interpretation and may also include ancillary office accommodation. Fixed systems are expensive given the cost of equipment, the specialized facility that must be constructed to house it and the need for an operating zone of a minimum of 3000 m^2. Due to safety regulations in some countries a total footprint of 5,000–8,000 m^2 for an operating zone may be necessary.

30. A major consideration when evaluating fixed units is that, by definition, they have to be located close to containers generally within a port environment. This means there must be sufficient space to accommodate the facility itself and for vehicles waiting to enter the facility to park and to maneuver. Further, there must be satisfactory access roads to and from the unit that must accommodate both import and export traffic. Due to these constraints it has been found that fixed units are better suited to areas such as container ports where there is sufficient land or inland ports where a constant flow of traffic which can be directed along a single channel or choke point.

31. Due to the fact that the purchase of a fixed unit may require purchase of land for the site and will involve substantial buildings to be erected, the process may take several years from initial conception to final installation.

32. Re-locatable imaging/scanning units are designed as a compromise between fixed and mobile systems by providing better performance than mobile units while overcoming the expense and land requirements of a fixed unit. Re-locatable scanners typically operate at levels of approximately 6MeV and require a lighter infrastructure and shielding structure than fixed units. They are less expensive to purchase and operate than fixed units but should, as with a fixed unit, have some office and ICT equipment support, suitable access roads and parking facilities. All re-locatable X-ray and Gamma ray scanning systems require a clear area surrounding them during operation for health and safety reasons. This area is known as an 'exclusion zone'. The space required for this zone increases in proportion with the increase in equipment energy levels. It is important to establish the land requirements of the exclusion zone for these re-locatable units. If the necessary land is not available within the port or close to the Customs station, the scanning unit will have to be installed at a remote location.

33. While re-locatable units may be dismantled and moved to a new location, they should not be considered as mobile units. The process of dismantling, transporting and reassembling them can be time-consuming and labour intensive. Although some low-energy Gamma ray units may be re-locatable in one day, the move of a portable office could take longer. Higher energy X-ray units, with more permanent support facilities require several days for the process. A re-locatable unit might be the preferred choice if trade patterns indicate that traffic might move significantly from one port or border location to another in the foreseeable future. Due to cost and size advantages some administrations have opted to deploy re-locatable units in the same manner as a fixed unit with some modifications involving an upgrade of energy and penetration levels.

34. Mobile units are less expensive than fixed units but operate at lower energy levels, typically around 2.5-4.0 MeV, although some models may be available up to 6 MeV. The reduced penetration levels of these units are partially offset by the mobility which allows a quicker response to address fast emerging risks at varied locations. Prior to purchase a full review of business requirements and expectations must be performed to ensure that this type of unit can fore fill the requirements of the business model.. For example, they are particularly useful for land borders where traffic may cross at a number of points and smugglers are searching for the weak points in the border examination sites. The fact that they can move to different locations at a reasonably short notice makes it more difficult for the smugglers to avoid scanning controls by shifting border entry points. They also can allow for the possibility of shared costs by neighbouring

administrations that could jointly purchase and operate a mobile unit. Arguably mobile systems are subject to greater downtime and require more frequent maintenance.

35. Unlike fixed and re-locatable units mobile scanners do not require a network of access roads to be constructed because they are able to move to the traffic flow. However, like re-locatable scanners, they do, require an 'exclusion zone' dependant upon the energy level and amount of shielding of the unit. Exclusion zones on the various models vary and must be specifically measured on a unit by unit basis. A rough estimate would be to assume that 500 m^2 (1500 m^2 required for 4 MeV systems) will be needed as an exclusion zone for these units. The tarmac these machines operate on is a critical consideration as it will have an impact on the quality of images produced. Strict specifications for concrete or asphalt to be even-tempered and strong enough for scanner operations must be considered when addressing deployment options. It is also necessary to consider that the driver of a mobile scanning unit may also need a special license to move hazardous material on public roads and a special license to drive heavy weight vehicles.

3.3 Radiation detection

36. Another key technology to aid border monitoring is radiation detection equipment used to detect illicit trafficking of nuclear and dangerous radioactive materials in cargo and carried by passengers. More specifically, the focus is on detecting components of nuclear weapons and radioactive materials outside of normal regulatory controls that could potentially be used for Radiological Dispersal Devices (RDD) – the highest concern for nuclear security.

37. Experience has shown that a high percentage of radiation alarms registered at radiation detection equipped border crossing points is due to naturally occurring radioactive material in goods consignments, or from persons who have had medical or diagnostic treatments using radiopharmaceuticals. While such radiation alarms are of no enforcement significance they nevertheless require a response. In order to detect radiation but minimize false positive activations equipment manufacturers and suppliers are working closely with law enforcement authorities including Customs to make equipment increasingly adaptable to meet front line conditions. As a starting point instruments used by front line law enforcement officers and supporting experts should be able to detect, verify, assess, localize, identify and attribute the source of radiation.

38. A single instrument — simultaneously sensitive enough to detect small amounts of hazardous material in cargo, light and easy in operation and featuring radionuclide identification does not exist. Therefore, various types of radiation detection instruments should be deployed in order to accommodate all contingencies. They can be divided into the following categories:

- Fixed radiation portal monitors (RPM);
- Personal radiation detectors (PRD);
- Hand-held radionuclide identification devices (RID);
- Hand-held neutron search detectors (NSD);
- Portable radiation scanners (PRS);
- Field gamma ray spectrometers.

39. Functional and technical specifications for the border monitoring equipment are described in detail in the IAEA Technical Guidance Document[6]. The abovementioned document, prepared in extensive consultation with IAEA Member States, is being used:

- as a recommendation for implementation;
- by designers and developers of radiation detection equipment;
- as development guidance to meet essential end-user requirements,
- by end-users such as Customs, police and border guards;
- as deployment guidance;
- and by the IAEA as a basis for development of procurement and technical specifications.

3.4 Fumigants

40. Fumigation is a long standing method for pest control that completely fills an area like containers with gaseous pesticides - or fumigants - to suffocate or poison the pests within. Fumigation is utilized for control of pests in buildings (structural fumigation), soil, grain, and produce, and is also used during processing of goods to be imported or exported to prevent transfer of exotic organisms.

41. Fumigation usually involves the following phases: firstly, the area to be fumigated is usually covered to create a sealed environment; next the fumigant is released into the space to be fumigated; then, the space is held for a set period while the fumigant gas percolates through the space killing any infestation in the product, lastly the space is ventilated to diffuse the poisonous gases making the area safe for humans to enter.

42. The importance of Customs having proper equipment for detection of fumigants (down to the threshold limits) cannot be overemphasized as exposure to fumigants is a significant health and safety issue. According to the FAO, many needless accidents have occurred where personnel have been exposed to fumigants as they were unaware of the presence of a fumigant in the atmosphere. Several fumigants have little or no odor and even for those having a characteristic odor the sense of smell may not always be reliable as a means of detection.

43. For safety purposes it is considered essential to have detection equipment that will give reliable and immediate indication of toxic concentrations of fumigants.[7] A number of instruments or methods are available for the detection of fumigants such as detector tubes, halide leak detectors, infra-red analyzers, gas chromatographs. In cases when personnel are exposed to fumigation, it is important to take care of the exposed persons and to provide them with respiratory protective equipment including the possibility to use external oxygen etc.

[6] International Atomic Energy Agency, "The International Basic Safety Standards against Ionizing Radiation and for the Safety of Radiation Sources", *Safety Series* 115, 1996, available at <http://www-pub.iaea.org/MTCD/publications/PDF/Pub996_EN.pdf>

[7] E.J. Bond, "Factors Affecting Residue Accumulation", *Manual of Fumigation for Insect Control*, FAO Plant Production and Protection Paper 54, FAO, 1984, available at <http://www.fao.org/docrep/X5042E/x5042E07.HTM#Factors affecting residue accumulation>

3.5 Drug and explosives detection

44. Explosive and drug detection are two of the major areas non-intrusive/destructive inspection processes are used by Customs to detect illicit drugs, weapons and explosives crossing national borders..

45. A large majority of Customs administrations deploy detector dogs as the primary detection tool. However a large and increasing sophisticated range of technologies are being developed to support these activities, particularly for 'human-screening'. These range from 'trace' technologies that detect microscopic quantities of explosives and drugs on clothing and/or the body, millimeter wave cameras to detect packages concealed beneath clothing (body-packing) and low-dose transmission X-rays to detect packages concealed internally.

46. With the exception of 'trace' equipment, all technologies used to screen non-human traffic crossing the border for drugs and explosives do not offer material identification. For the most part X-ray equipment is used and interpretation of images is required. Successful identification of drugs and explosives concealed within freight, vehicles and baggage is resource intensive and relies heavily on the experience of the officers.

47. The volume of traffic crossing borders increases every year whilst the level of resource employed to screen such traffic remains static at best. Until automated-alarm, material specific technology has been developed and introduced into the screening process the proportion of traffic examined will continue to diminish. If/when such technology becomes available, it will work as the primary screening tool, it will improve significantly the business processes without having an impact on the legitimate movement of people and goods, and inform and direct secondary examination activity. Ultimately this will provide assurance to law enforcement organizations and governments that border security has been enhanced, and as a by-product detection yield will improve, particularly in the field of drug detection.

3.6 Container security devices

48. Many different types of container security devices are currently in use. The scope of different container security tools ranges from very basic mechanical seals to sophisticated smart boxes which can be used not only for ensuring the integrity of a container but also to manage data on the movement of the container. There have been notable developments in seal technology during the past decade. Mechanical seals are giving a way to more sophisticated electronic seals which when backed by proper system protocols, technology providers and system integrators, can become powerful tools in a comprehensive security program.

49. The simplest types of devices are indicative seals. These are usually produced from a low cost plastic or metal band to indicate whether an unauthorized person has compromised an item or conveyance. Indicative seals are not designed for, nor do they provide, a strong physical barrier. They only provide tamper detection and are relied upon to provide limited information regarding whether or not a sealed item has been compromised.

50. The second type of widely used container seals is the barrier seal. These seals are designed to prevent unauthorized entry by barring or delaying access to a sealed container. Barrier seals are most often made of steel or other strong materials that make it difficult to break or open it. The objective of this type of seal is to slow down the access to a sealed area, provide tamper evidence and prevent unauthorized entry entirely. Sometimes barrier seals can also take the form of larger devices such as bar seals or bar locks.

51. Electronic seals are mechanical seals combined with specific electronic components. The result is a hybrid electronic seal that provides tamper evidence, physical security, and data management. This device can indicate electronically whether a conveyance has been opened and tampered with. These kinds of electronic devices use RFID or similar technologies as well as fiber optics. These devices are often compatible with GPS (Global Positioning System) and even cell phone technologies for a given application enabling tracking of the container at the same time.

52. An evolving application of these technologies is the ‘smart box’. Whilst no widely accepted definition of a smart box exists, the trend is towards combining the above technologies (RFID, GPS and cell phone technologies) with sensors that may detect, for example, light and temperature, to create a flexible system that may identify the container’s location, provide notification of any tamper alerts or change in status events and record these.

53. Even though container security devices increase tremendously container integrity and make unauthorized entry more difficult, they can not guarantee full integrity. Nearly all devices are vulnerable and with the right amount of time, tools, and opportunity, devices can be tampered with allowing undetected entry. However, the latest technologies on the market including high-tech features with data management abilities make unauthorized entry into a container or a sealed area much more difficult and detectable than indicative seals.

3.7 Track and trace

54. In distribution and logistics tracking and tracing is widely used. It incorporates processes for determining the current and past locations (and other information) of a unique item or property. This concept can be supported by means such as GPS reckoning for identifying the position of vehicles and containers that may be of interest.

55. Typical Customs application of track & trace is to identify where a product was "diverted" from its intended course, or where a fake product was introduced. Sometimes sensitive food or pharmaceutical products need to be recalled if a safety issue is discovered or suspected and the track & trace system will help to locate the consignments. Identification by shipment documentation (delivery order, bill of lading, etc), package labeling, bar codes, and RFID tags is commonly used.

56. Some of the benefits of a track & trace system include:

- improved time management;
- reduced delivery times;
- shortened intervention system response times in the event of an accident;

- speed up processing times for releasing guarantees and cut bank charges;
- reduced number of roadside checks and certification disputes when goods reach their destination;
- controlled trade flows and transit statistics;
- and protection of the national economic area.

3.8 Tax and document security

57. With the growth of international trade, a corresponding growth in the amount of illicit activity is also occurring. One area of growth has been document related fraud. For many developing countries trade taxes are central to the national economy and tax and document fraud have become major national concerns. In addition to the developing countries, many advanced countries argue that they lose vast amounts of customs duties and taxes due to such phenomenon as double invoicing.

58. Therefore, the prevention of tax and document fraud has become a higher priority for Customs administrations. Electronic procedures have been introduced by an increasing number of administrations to reduce the opportunity to tamper with paper documents. Such procedures make the forging and lodging of documents more difficult, but paper remains the main document of transaction in many parts of the world. Therefore there remains an insatiable need to develop techniques and technologies that can be deployed to detect fraudulent documents.

59. In addition to the commercial and fiscal considerations, fraudulent documents also raise different security concerns with regard to both goods and passengers. Passengers with false travel documents such as passports and visas are becoming a growing problem for Customs administrations as many of them are also dealing with immigration and wider national security concerns. The increasing amount of certificate fraud also poses a threat to flora and fauna making document security also an issue from environmental, quarantine and public health perspectives.

60. The market for technical equipment designed to enhance document security and enabling the detection of fraudulent documents is advanced and well-developed. New innovations constantly enter the market to suppress the forging of documents. At the same time these same products facilitate the work of frontline officers in detecting fraudulent documents. These new innovations include, for example, new signature and verification technologies that can be used in cargo validation and counterfeit detection as well as different human feature scanners to be used for passenger verification.

61. Even though some of the latest high-tech equipments in the field of document security still require substantial capital investment, there are plenty of inspection technologies that are not necessarily expensive and can bring about substantial economic gains in recovered revenue and enhanced security. Besides technical equipment, many administrations are increasingly investing in training with regard to document control. More skilled officers with enhanced knowledge of the latest trends are better able to detect anomalies and fraud.

4. Conclusion

62. Building on the success of the annual WCO ICT Conferences and the demand from Members, the WCO Secretariat has decided to organize its first Technology and Innovation Forum on 5 – 6 November 2009. The rapid growth of different inspection technologies has created a need for this kind of event to enable the Members to have a platform to discuss questions relating to the "hardware" side of technology.

63. The Forum brings together the latest know-how of inspection technologies from the Customs as well as from the Technology sector. The Conference part of the Forum addresses some of the emerging challenges Customs administrations face at the border and how technology and innovation can be used to tackle these challenges. It is also set to address some of the existing challenges the WCO Members face with the use of the technical equipment and inspection technologies as well as to enable them to share best practices.

64. The Exhibition running simultaneously with the Conference gives Customs representatives a chance to meet a wide spectrum of public and private sector technology vendors and suppliers and enable them to learn more about the latest product innovations on the market. For technology vendors the Conference provides an excellent chance to display their latest products and converse with Customs administrations who may wish to procure their products or discuss new and emerging areas of risk for which they may be seeking technology solutions.

65. The aim of the WCO Secretariat is make the Technology and Innovation Forum into an event where Customs administrations and technology vendors gather together on a regular basis to exchange views and best practices. Even though inspection technologies do not necessarily change as rapidly as ICT systems, the wide variety of different technologies together with dynamic research and development efforts have created a need to turn the Forum into an annual event. As in case of the ICT Conferences, the aim is to enlarge the scope of the event and to have different administrations host it.

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