



Risk Management for Cargo and Passengers

**A Knowledge and Capacity
Product**

External Author

**Inter-American
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Executive Summary

Border control agencies, including customs authorities, face major challenges balancing a country's need for controls with the benefits of facilitating cross-border traffic in people and goods. To better manage the growing volume of travelers and trade, a significant number of leading customs administrations has adopted risk management as the guiding principle for border management. Systematically implementing risk management at strategic, operational, and tactical levels ensures that customs administrations best deploy resources to protect their citizens from threats to health, safety, and security, while simultaneously supporting economic growth by maintaining efficient and predictable cross-border transit times.

The World Customs Organization (WCO), the principal body globally promoting cooperation between customs administrations and industry, strongly promotes using risk management for border control. The WCO's experience is that a risk-managed approach to border control best utilizes customs resources by enhancing trade facilitation while balancing it with security. The Inter-American Development Bank, the World Bank, and other multilateral organizations also promote risk management

“Risk assessment technology can both enhance security and facilitate global trade. Tax revenues along the entire import chain are increased by virtue of an increased velocity of trade.”

for border control through investment projects and through knowledge capacity products like this document.

Border risk management aligns with many international standards and principles. These include the following:

- Revised Kyoto Convention on the Simplification of Customs Procedures
- WCO SAFE Framework of Standards to Secure and Facilitate Global Trade
- European Union's Risk Management Framework
- WCO Risk Management Guide
- WCO Risk Management Compendium

This document is intended for any government bureau, directorate, or agency which plays a role in the movement of trade or travelers and has policy responsibilities with regard to trade or border control. Government agencies responsible for protection mandates involving the movement of people, goods, and conveyances include not only customs services, but also

transportation security agencies; health and safety administrations; police and law enforcement departments; revenue agencies; and various military, wildlife, agriculture, and food inspection organizations. Their mandates involve protecting their countries, citizens, and partners from a variety of threats including ones to health and safety stemming from events as diverse as contagion; terrorism; nuclear proliferation; narcotics; tax evasion; plant and animal health hazards; and illegal migration. By following the principles and implementing the recommendations contained in this document, governments can integrate border management processes across agencies within a single risk management framework supporting data collection, analysis, inspection, and admissibility decisions.

This document surveys the challenges of today's border environment, discusses the benefits of adopting risk management principles for all border decisions, and makes specific recommendations regarding each aspect of managing the transition to a risk management-enabled administration. The sections focused on cargo and passengers delineate the specifics of risk managing each aspect of customs processing across all modes of transportation.

Historically, many customs administrations have used risk adverse approaches requiring a full inspection of all shipments, conveyances, crews and passengers. While this "gatekeeper" approach was often legislated or regulated (i.e. 100 percent inspection required by law), it is clear in hindsight that this approach has the following shortcomings:

- Costly in resources as it applies the same degree of intensity to all threats
- Constrained in that it forces a lower degree of inspection intensity overall due to a uniform treatment of all cargo and passengers
- Creates a high incidence of officer errors due to higher workloads
- Realizes fewer enforcement results
- Encourages normally law-adhering entities to circumvent the system to hasten the cross-border transit of their goods
- Creates opportunities for criminals to circumvent and avoid interdiction by making customs reactions predictable
- Slows the supply chain
- Hinders economic growth
- Does not scale
- Fails ultimately to achieve efficient and secure border management

In moving away from such draconian risk-adverse approaches, many large customs administrations have demonstrated that technology is a key efficiency enabler. The WCO SAFE Framework of Standards to Secure and Facilitate Global Trade specifically mentions that customs administrations should develop or procure automated risk management systems. Based on international best practices, risk assessment systems use standard data sets and strategic intelligence to support identification of high-risk shipments and travelers. Adopting an automated risk assessment system is a significant step towards successfully adopting risk management practices strategically, operationally, and tactically. Border control processes that use risk assessment systems help ensure that customs resources are always focused on the highest-risk shipments and people in real time.

Automated targeting systems process electronic pre-arrival data in an analytical workflow to identify the shipments or passengers of most interest. Low-risk shipments and passengers are facilitated and high-risk ones are set aside for additional scrutiny, up to and including physical inspections or orders not to load cargo or fly passengers. When combined with random inspections, pre-arrival data can significantly augment threat identification and interdiction, thus improving an administration's effectiveness in meeting national economic and security mandates.

Successful implementation of risk assessment systems requires the mandated use of electronically submitted pre-arrival data. Many customs administrations use pre-arrival data for a variety of purposes, including:

- Increasing cargo control
- Recouping lost or evaded revenue
- Gathering intelligence
- Profiling risks
- Setting lookouts
- Identifying potential security threats
- Enhancing end-to-end supply chain or travel visibility in order to identify anomalous behaviour in relation to people, entities, commodities, and routings

Pre-arrival data provides customs administrations with the ability to “push the border out” virtually and decide whether to facilitate or intercept cargo or people before they reach the physical border.

This report recommends adopting risk management as the core foundation to any customs or border modernization activity, with due attention paid to the following specific tasks:

- 1) Update customs and trade legislation, regulations, standard operating procedures, and directives to provide authority to field personnel to adopt and use risk-based decisions for all travelers and trade entering or leaving the country
- 2) Adopt a simple, clear, and unified framework and approach to risk management at strategic, tactical, and operational levels
- 3) Perform a detailed analysis and ranking of threats
- 4) Acquire human and technical resources to enable:
 - a. Separation of duties to enhance integrity
 - b. Collection of pre-arrival data
 - c. Implementation of trusted trader and registered traveler programs
 - d. Expansion of available inspection types to allow for varying intensities of inspections
 - e. Establishment of control processes throughout the pre-arrival, arrival, and post-clearance stages of the customs process
 - f. Capture of all outcomes in automated systems
 - g. Establishment of a post-clearance audit and analysis unit to continually validate, monitor, and review the above.

Business transformation is a critical component of any change, including transitioning to a risk-managed border operation. Business transformation activities should include the following components:

- A stakeholder team:
 - Endorses a risk management framework and sets policies for the organization
 - Identifies and acquires “buy-in” from additional stakeholders (both within and outside of the organization) throughout the process.
- A transition team with the authority to drive change throughout the organization:
 - Aligns incentives for personnel and stakeholders with the program
 - Ensures that the infrastructure and organizations needed for the new program are in place

- Develops standard operating procedures (SOPs) to enhance existing risk management practices and support business transformation
- Produces training and communication materials.
- A risk management committee to oversee changes to and configurations in the risk assessment system to ensure its selectivity is aligned to the country's most significant threats.

Adopting border risk management at strategic levels within an administration is the first step. Transitioning to risk-managed decision making at all levels requires a multi-faceted organizational change involving new policy, clear and continuous communication, technology, and training. Above all, it requires persistence. Technology adoption is often the most significant catalyst for establishing a risk management framework within any customs or border organization. Acquiring technology provides momentum for change and allows an administration to modernize to the most current and leading-edge solutions while avoiding many development hurdles borne by other customs administrations. Using systems already adopted by other administrations can cut time and cost by leveraging best practices and benchmarks already incorporated in tested technology.

Business transformation takes time and requires the coordinated effort of all internal and external stakeholders, including customs, other government departments, travelers, and the trading community. This document advocates a systematic approach to adopting risk management to achieve an efficient and secure system to manage growing flows of people and goods across borders.

Glossary

The following terms encompassing risk are used in this document, with the definitions derived from preliminary documentation on the WCO Risk Management Compendium, due out in mid-2011.

Automated Risk Management	Using information technology (IT) software to guide decisions about identifying, evaluating, releasing or intervening, recording, and reporting of risks and risk activity
COTS	Software products (“Commercial Off-The-Shelf”) that are immediately available, offer significant functionality and complexity are self-contained, and the features of which are often determined by market needs.
Intelligence-driven Risk Management	Using information that has been collated, analyzed, and assessed to evaluate and identify risks.
Risk	Effect of uncertainty on objectives, including the potential for non-compliance with customs laws.
Risk analysis	Systematic use of available information to determine how often defined risks may occur and the magnitude of their likely consequences
Risk assessment	Overall process of determining risk identification, risk analysis, risk evaluation, and prioritization.
Risk evaluation	Process of comparing the results of risk analysis with risk criteria to determine whether the risk and/or its magnitude is acceptable or tolerable. Risk evaluation assists in decision making about risk treatment.
Risk indicators	Specific criteria which, when taken together, serve as a practical tool to select and target movements for the potential for non-compliance with customs law.
Risk management	The systematic application of management procedures and practices which provide customs with the necessary information to address risk.
Risk management framework	Set of components that provide a foundation and organizational arrangements ¹ for designing, implementing, monitoring reviewing and continually improving risk management throughout the organization.
Risk management plan	Scheme within the risk management framework specifying the approach, the management components ² and resources to be applied to the management of risk.
Risk management process	The systematic application of management policies, procedures, and practices to the activities of documenting, communicating, consulting, establishing the context, and identifying, analyzing, evaluating, treating, monitoring, and reviewing risk.

¹ The foundation includes the policy, objectives, mandate, and commitment to manage risk. The organizational arrangements include plans, relationships, accountabilities, resources, processes, and activities.

² Management components typically include procedures, practices, assignment of responsibilities, sequence, and timing of activities.

1. Risk Management

1.1 Benefits

Government and industry generally agree that requiring 100 percent physically intrusive inspection is not practical for either resource or economic reasons. A 100 percent inspection rate creates an unacceptable drag on economic activity and growth. Moreover, in a time of general economic constraints, most economies can ill afford to allocate significant resources to preventing or controlling low-impact threats. The “gatekeeper” style of inspection is becoming obsolete.

Recognizing this, many international trade agreements stress that administrations must modernize and implement risk management regimes using new technologies that support the flow of low-risk/pre-approved shipments. These include the following:

- Revised Kyoto Convention on the Simplification of Customs Procedures
- World Customs Framework of Standards to Secure and Facilitate Trade
- EU Risk Management Framework
- Canada/U.S. Smart Border Agreement
- North American Security and Prosperity Plan
- U.S. Safe Ports Act
- APEC Framework for the Security and Facilitation of Global Trade

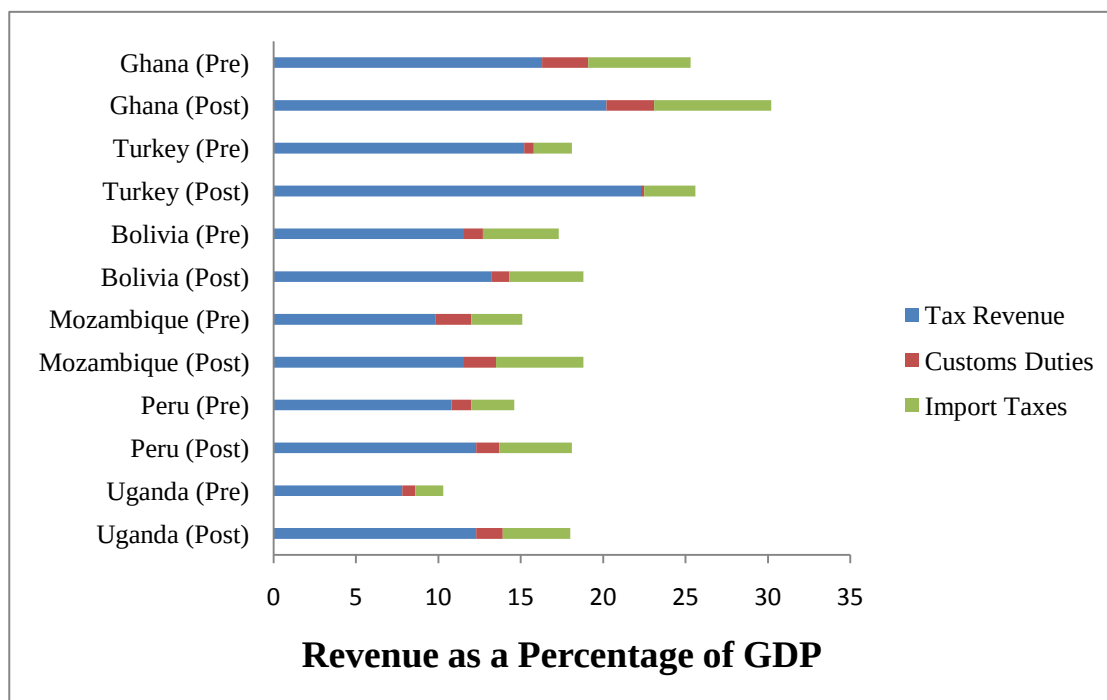
Risk assessment systems focus enforcement attention on high risk shipments and travelers which may be threats to a country’s health, safety, security, or economy. Without de-emphasizing control, tax revenues nevertheless increase along the entire import chain by virtue of an increased velocity of trade while the administration still addresses risks such as pandemics, commercial fraud, misclassification, trafficking, and terrorism. Moreover, since fewer shipments or passengers require human intervention, the same workforce can be more productive, processing greater volumes in less time.

Many studies have shown the tangible benefits of using a risk managed approach.³ The table below, extracted from the World Bank study “Customs Modernization Handbook 2005,” summarizes the results of applying customs modernization principles, including risk

³ Page 33 of the WCO News, Issue 62, June 2010 contains a recent example of the unprecedented seizures of counterfeit goods undertaken by Mexican authorities recently after enhancing their programs with risk assessment techniques.

management, to a series of countries over approximately 10 years. Tax revenues grew from increased trade facilitation as a result of economic expansion and decreased corruption.

Figure 1: Revenue Performance Before and After Customs Reforms



Source: Compiled by authors using data found in the World Bank, Customs Modernization Handbook 2005

World Bank studies on the subject demonstrate that countries with better trade facilitation measures in place benefit from more rapidly paced economic development than do those without such measures. Economies can be enhanced in any area where production is uneconomic due to long cross-border delays or transit time unpredictability.⁴

“Trade facilitation is not only about the physical infrastructure for trade. Indeed, only about a quarter of the delays are due to poor road or port infrastructure. Seventy five percent is due to administrative hurdles—numerous customs procedures, tax procedures, clearances and cargo inspections—often before the containers reach the port.”

These studies also demonstrate that improving border processing offers substantially higher returns than high-cost infrastructure projects. Similarly, even when compared to the benefits of trade liberalization through negotiated duty reduction, facilitation improvements

⁴ (2006) Simeon Djankov, Caroline Freund, Cong S. Pham. Jan. 2006. “Trading on Time” The World Bank. This reference particularly describes the benefits to agriculture of quicker and more predictable cross border transit.

resulting in smaller time delays are both easier to achieve and more economically advantageous in the long term.

The chart below shows the results from a survey⁵ of global freight forwarders regarding the average border control related time delays for importing a “standard” 40 ft. container that required no special handling.⁶ For consideration in the following table, the World Bank’s research suggests that the Latin American and Caribbean region is second only to Africa in terms of costs to import, with predominantly slow import processing times.

“...our estimates imply that improving trade facilitation can have relatively large effects on exports. For example, in sub Saharan Africa it takes 48 days on average to get a container from the factory gate loaded on to a ship. Reducing export time by 10 days is likely to have a bigger impact on exports (expanding them by about 10%) than any feasible [duty or tariff] liberalization in Europe or North America.”

Figure 2: Comparison of Container Import Times & Costs by World Region

	Mean Import Time (in days)	Mean Cost to Import (40' Container in USD)
OECD High-Income	3.2	663
Non-OECD High-Income	3.6	572
East Asia & Pacific	4.4	819
Europe & Central Asia	3.5	936
Latin American & Caribbean	4.8	1,000
Middle East & North Africa	6.0	609
South Asia	6.5	880
Sub-Saharan Africa	12.3	2,124

Source: J.F. Arvis, M. Mustra, J. Panzer, L. Djala, and T. Naula, 2007, “Connecting to Compete.” The World Bank.

1.2 Establishing a Risk Management Framework

A risk management framework provides the process components to address potential threats to a nation’s health, safety, and security. It centers stakeholders, executives, and operational personnel on common and uniform risk management objectives, playing a foundational role in implementing risk management within the organization. At a high level, all risk management frameworks provide for:

- Identifying threats

⁵ Ibid.

⁶ Special handling was not included since delays would increase if the additional complexities of special permits and handling were included.

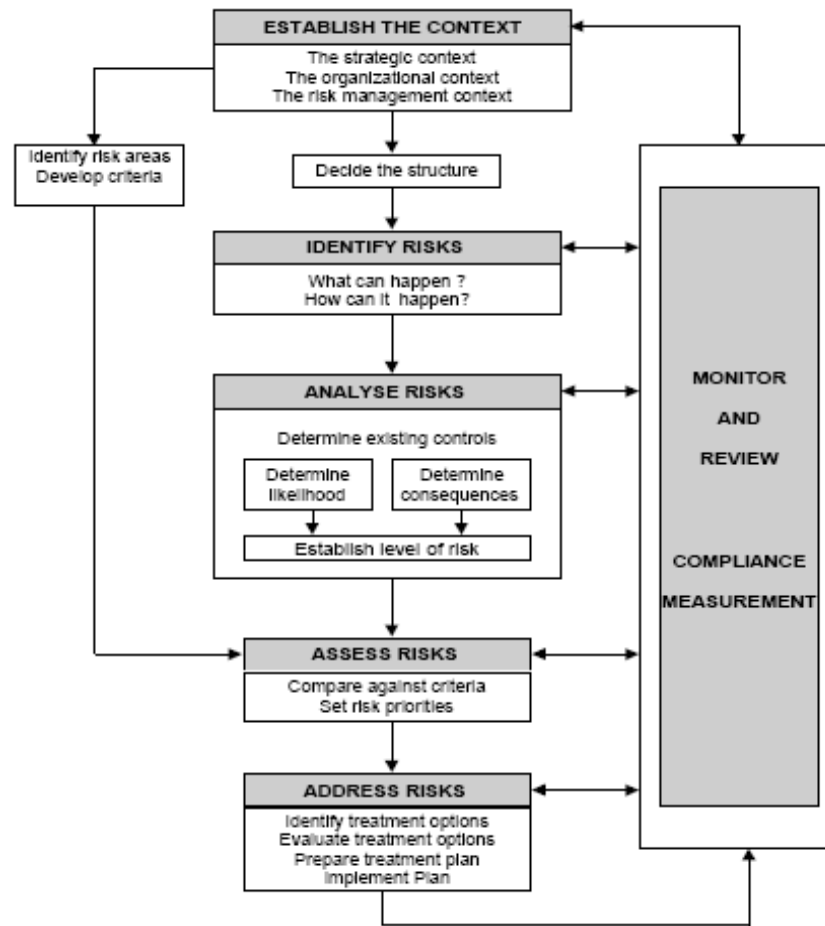
- Understanding the type of risk posed by the threat
- Identifying the potential impacts of those risks
- Ranking risks in significance
- Determining which risks to implement controls for
- Assigning implementation of controls
- Reviewing framework effectiveness

Most stress the importance of having one or more authorized bodies that are responsible for making periodic changes to priorities and operating procedures. Some frameworks will also specify how interaction with other agencies occurs and what role those agencies will play in the overall risk management process.

Several internationally accepted representations of frameworks exist today. They all follow a cyclical approach to risk-based decision making within a customs or border organization.

The WCO's approach to customs risk management is expressed in the following diagram:

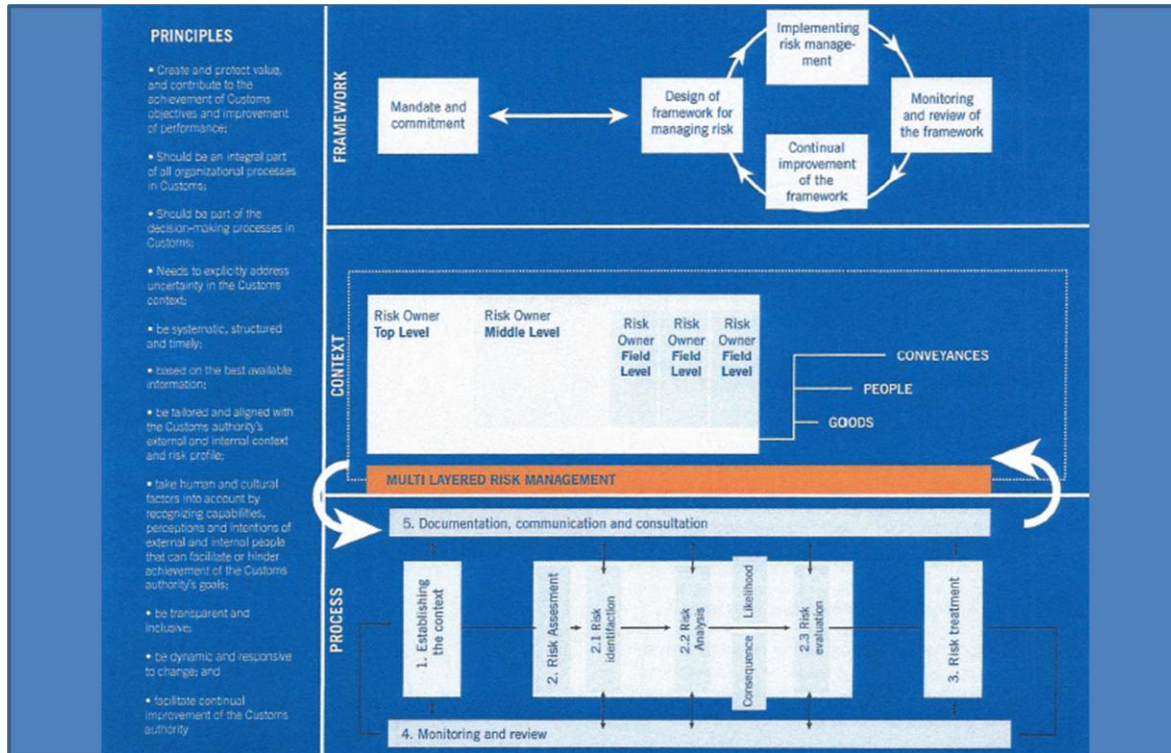
Figure 3: Original WCO Risk Management Framework



Source: World Customs Organization, 2003 "Risk Management Guide"

More recently, the WCO has expanded on its methodology with new detail provided for the various levels within a customs organization. The expanded methodology is expressed in the attached diagram taken from the WCO's Risk Management Compendium:

Figure 4: Latest WCO Risk Management Framework



Source: World Customs Organization, 2010, "Risk Management Compendium"

A second example, expressed in the following table, is the European Union's approach to customs risk management:

Figure 5: European Union Customs Risk Management Framework

5 Objectives		The risk management process should be based on a common framework in order to bring uniform treatment of risks and to ensure equal treatment of trade.
Identify	the risks	To identify the risks posed by illegal goods, all available information should be examined as potential sources of risk data, evaluated for accuracy and where appropriate, be made available to the operational service. In respect of operators, the EU and Member States have worked together to create a Catalogue of Risk Indicators which supports the identification and assessment of risks for economic operators.
Analyze	the risk	Using the risk data, and assessment of the risks in each aspect of the context should be undertaken. Proven risk is historical fact, an irregularity has occurred and the organization has a record of the incident and the facts surrounding the case. Lists of these risks can be analyzed against current data to see if conditions surrounding the risk currently exist. Potential risks are risks that have not yet been uncovered but are suspected.

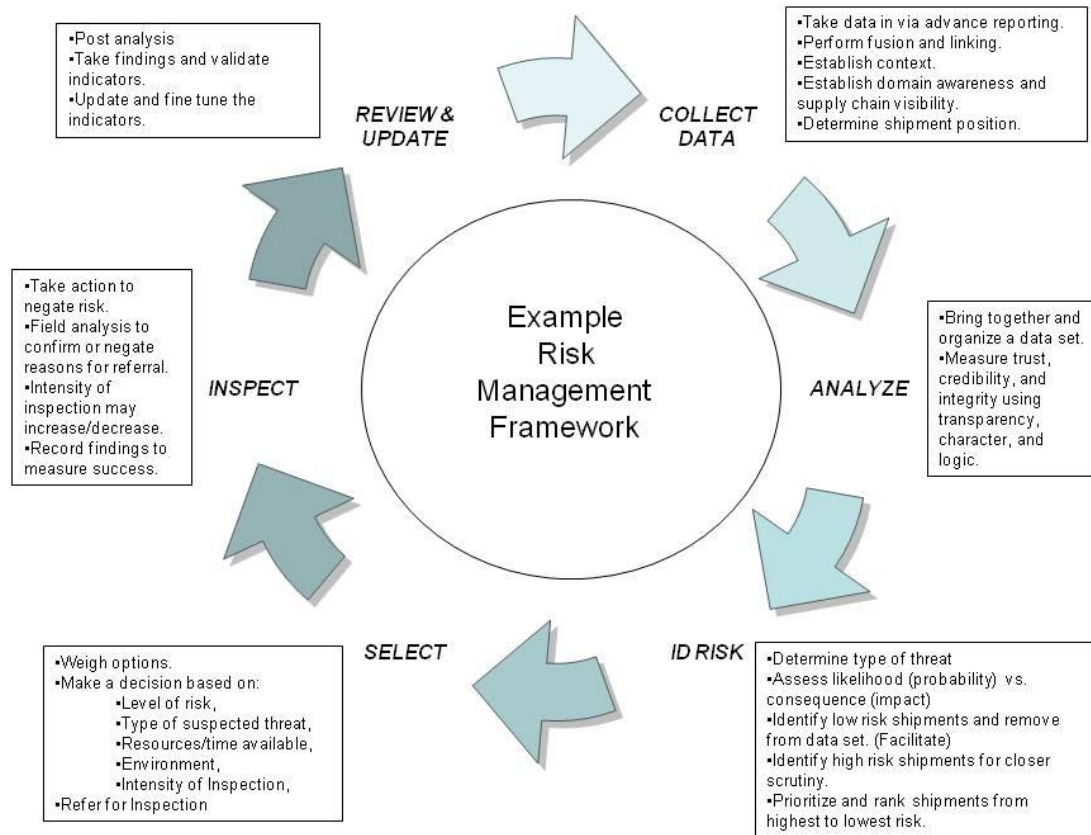
Assess and weigh the risk	There are different types of ranking systems. The assessment into HIGH, MEDIUM, and LOW is widespread. • <i>High risks</i> are generally likely to arise and have severe effects. Treatment actions for these risks should be highly visible to senior management and possibly agreed in control plans. • <i>Medium risks</i> may be less likely to arise, or have less severe effects, but not necessarily both. • <i>Low risks</i> are acceptable risks that can be assessed by standard or routine procedures or even where no action is necessary.
Address and treat the risk	When a customs control needs to be carried out, a decision must be made as to how to carry out the control. Together with the EU Member States, the Commission is developing a common approach on the type of control that is considered to be the most effective to meet a specific risk. This initiative outlines the methods and moments of control. The type of controls that customs carry out to address the risk range from customs supervision to documentary controls, physical controls, and audit based controls. It also describes the control areas requiring attention, including controls by customs to protect public health and safety and controls to protect the environment.
Monitor the system	It is necessary to monitor and review the performance in the use of risk management to assess the effectiveness and efficiency of the risk management system. Evaluation and review should be carried out on a regular basis by a regular mechanism. The review must use information feedback from the process and lead to updating the analysis and prioritization of control work which is carried out by customs.

Source: European Commission, Taxation & Customs Union, "Risk Management for Customs in the EU"⁷

The third example is a high-level framework providing additional detail around decision-making methodology. It demonstrates how large volumes of transactions are triaged to facilitate pre-approved and/or low risk travellers and trade while simultaneously focusing on higher-risk ones.

⁷http://ec.europa.eu/taxation_customs/customs/customs_controls/risk_management/customs_eu/index_en.htm

Figure 6: GreenLine Expanded Risk Management Framework



Source: C. Thibedeau, 2009, GreenLine Systems Inc.

1.2.1 Identifying Threats

Threats are often divided into fiscal and non-fiscal ones. Fiscal threats are typically related to the evasion of duties and taxes associated with the import or export of goods. Some examples of fiscal threats are listed below:

- Smuggling (declarant intentionally does not report the goods in order to evade duties and taxes)
- Non-report (declarant mistakenly does not report goods)
- Mis-description (declarant mis-describes goods or fails to provide a true commodity description in order to evade or lessen duties and taxes)
- Origin Determination (declarant fails to report the true origin of the goods with the intention of receiving a preferential or to evade or take advantage of quotas.)

- Undervaluation (declarant reports a lower value for goods in order to pay less duties and taxes)

Fiscal malfeasance is typically not final until shipment contents have to be legally declared. As a result, selectivity efforts are usually not undertaken until entry declaration is made, usually upon or after arrival.

The next table describes a variety of non-fiscal threats.

Figure 7: Sample Non-Fiscal Threats

Threat Category	Threat Examples
Terrorist	Bomb
	Anthrax
Contraband	Narcotics
	Prohibited Weapons
	Undeclared Goods
IPR/Counterfeiting	
Money Laundering	
Immigration	Stowaways
	Human Smuggling
	Irregular Migrants
Human Diseases	Ebola
	SARS
	Bubonic Plague
Dangerous Goods	Hazmat
	CBNRE
Strategic Export Concerns	Dual Use Goods
	Drug Precursors
	Chemical Precursors
Plant / Animal Health Threats	Avian Flu
	BSE
	Hoof & Mouth
	Plum Pox Virus
	Foreign Insects
	Soil
Endangered Species	CITES
Environmental Threats	Waste

	PCBs
Consumer Threats	Marking & Labeling
	Consumer Product Contaminants

Source: GreenLine Systems, 2010

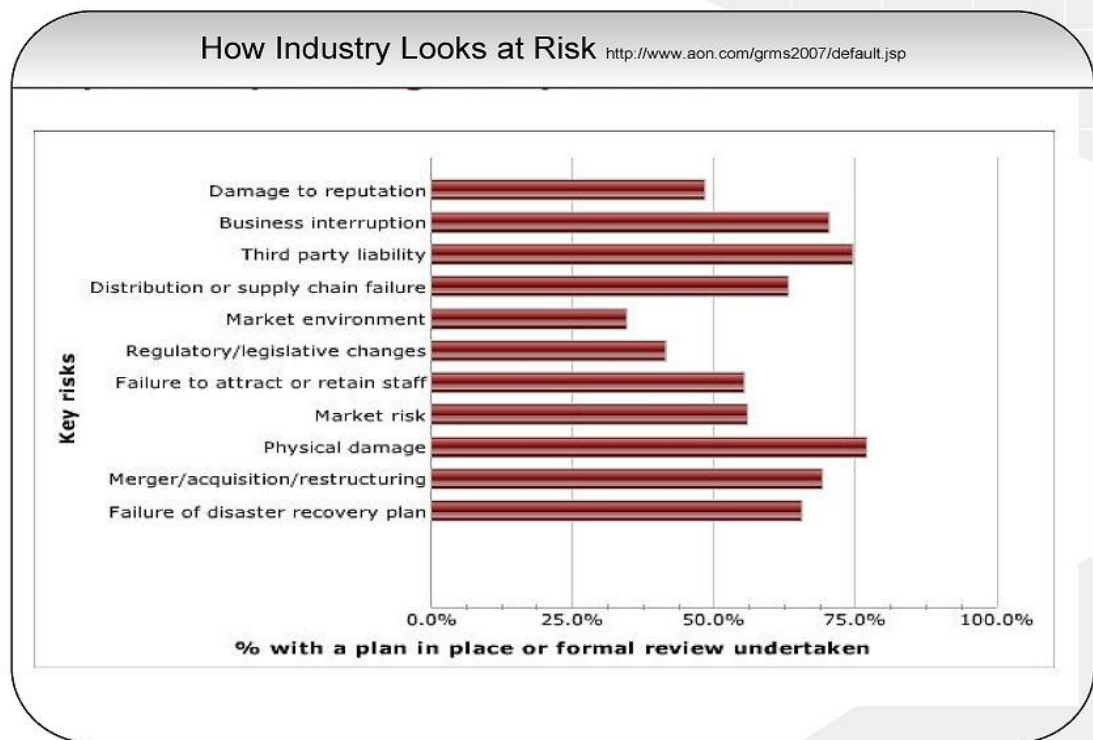
Unlike fiscal threats, non-fiscal threats can be identified based on data that precedes entry declarations, including cargo manifests, passenger reservation information, passenger manifests and importer regulatory filings. Non-entry data is often available at earlier stages of the import process and is optimal for analysis by automated risk assessment systems.

1.2.2 Defining Risk

Risk is defined as a function of a negative event probability and its impact, often, but not exclusively, expressed in monetary terms.⁸ Risks are of different types and must be considered in context. For example, in the private sector, companies often think of their risks in the following terms:

⁸ Although many events are not directly expressible in monetary terms, with sufficient assumptions and actuarial procedures approximations may be determined

Figure 8: Private Sector Risk Survey Results



Source: Aon Consulting, 2007

Governments look at a different risk typology than does the private sector. Public sector risks include:

- Political risk: risk to a country's political institutions or stability
- Operational risk: risk associated with various agencies of the country being unable to function and provide services, sometimes due to failure of automated systems.
- Compliance risk: risk associated with failure to obey law or regulation
- Economic risk: risk that increase costs or decrease revenues
- Health and safety risks: risk to the health and safety of a country's citizens
- International risk: risk in regard to international relations
- Infrastructure risk: risk to critical infrastructure

Placed within a public sector typology, risks must have their consequences calculated in terms of their capacity to cause damage to the socio-economic well-being of the sovereign state⁹ determined by their probability of occurrence and magnitude of impact.

Risk analysis is the systematic process of using available information to identify and determine the impact and probability of events and then ranking them.

The probability of an event is a function of the particular threat, the assessed competence of its cause, and the country's vulnerability to the threat. These three factors are often combined either through expert judgment or statistical analysis into a probability of occurrence. These two methods of determining the probability of an event are categorized as *qualitative* and *quantitative*.

Qualitative probability	Probability determined through expert judgment
Quantitative probability	Probability determined through statistical research

Qualitative approaches provide a more empirical basis for ranking the likelihoods of occurrence across threats. A quantitative analysis requires research showing frequency of occurrence or resulting impact. Due to time and resource constraints, previous studies by other countries or multilateral organizations are often used by extrapolating them to the current country's situation, particularly for common threats that transcend national boundaries. The underlying assumptions and adjustments made in adapting the study must be validated so that the conclusions drawn are relevant.

In the absence of reliable data regarding the probability of a threat, *qualitative* analysis uses the judgment of experienced professionals to rank the likelihood of a threat onto a common scale. A discussion of scales and different techniques for performing both qualitative and quantitative analysis is found in Appendix B: Qualitative & Quantitative Estimation of Probability.

The impact, or magnitude, of a risk event is usually measured in terms of economic impact. Most impacts, even those that transcend mere economic expression, for example, loss of

⁹ Depending on the social and economic priorities of a sovereign state, a narcotics interdiction may not be deemed as serious as a human smuggling attempt, a terrorist bomb, a disease that could eradicate agricultural crops, or tainted food stuffs that cause a portion of the population to become ill or die. It is these types of threats that have to be ranked in order of the damage that can possibly occur if not controlled or prevented from entering the country.

life or political instability, can be expressed in direct fiscal consequences for the purpose of risk management planning.¹⁰ Studies previously performed by an administration should be used wherever possible, as they will be the most pertinent, but it is often more cost-effective to acquire already performed international studies for well-known risks, particularly ones that either transcend national boundaries or discuss similar economies. See Appendix C: Estimating Risk Impacts for specific examples of impact studies that have been performed as part of previous risk analyses by other nations.

A common method for displaying the results of a risk analysis is to use a matrix to plot risks in terms of probability and impact. The example matrix below ranks risks about which a border control agency might be concerned. Performing this initial risk analysis on specific concerns for a given agency or set of agencies (and fine-tuning it over time) guides the overall risk strategy.

Figure 9: Sample Risk Matrix

		IMPACT						
		EXTREME	VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW	NEGLIGIBLE
PROBABILITY	CERTAIN	EXTREME	VERY HIGH	VERY HIGH	HIGH	HIGH	MEDIUM	MEDIUM
	VERY HIGH	VERY HIGH	VERY HIGH	HIGH	HIGH	MEDIUM	MEDIUM	LOW
	HIGH	VERY HIGH	HIGH	HIGH	MEDIUM	MEDIUM	LOW	LOW
	MEDIUM	HIGH	HIGH	MEDIUM	MEDIUM	LOW	LOW	VERY LOW
	LOW	HIGH	MEDIUM	MEDIUM	LOW	LOW	VERY LOW	VERY LOW
	VERY LOW	MEDIUM	MEDIUM	LOW	LOW	VERY LOW	VERY LOW	NEGLIGIBLE
	NEGLIGIBLE	MEDIUM	LOW	LOW	VERY LOW	VERY LOW	NEGLIGIBLE	NEGLIGIBLE

Source: GreenLine Systems Inc, 2009

Not all risks can be successfully and continually prevented. People and organizations have different risk tolerances, and what is acceptable to one customs administration may be unacceptable to another administration, or even the same administration over time based on changing priorities. By having a well-considered risk management framework, administrations can better ensure that policy and field practices are aligned and make overall operations more predictable.

¹⁰ While most events can be reduced to a set of economic statements, a country will sometimes be required to consider political or perception impacts that go beyond their strictly economic aspects.

1.3 Determining Risk Responses

Risk management allocates resources and applies processes to address threats in a manner which is appropriate to a given organization's level of risk tolerance.

Risk management recognizes that risks can never be reduced to zero. Resources supporting a process or organization are necessarily finite, requiring that limited resources be intelligently allocated to achieve the greatest level of risk reduction possible while maximizing beneficial results. The four standard responses to risk are as follows:

- Avoid by ceasing the risky activity
- Mitigate by proactively eradicating threats, eliminating vulnerabilities, and reducing either the probability, the impact, or both of the risk
- Transfer by having a third party assume the risk for example through outsourcing certain functions or through indemnification
- Accept by recognizing that a particular risk will inevitably occur or is too expensive to mitigate compared to its potential impact, while monitoring ongoing costs of acceptance

Having identified threats and risks, the administration makes policy decisions deciding how to respond to each risk. It is critically important that each risk is addressed and tailored to each policy maker's priorities, in order to propagate a clear vision on risk management throughout an organization.

Avoiding risks in the customs realm is typically not an option. In most cases, risk management responses are centered on risk mitigation through the introduction of controls. In the context of border management, controls largely consist of document reviews, data analysis, and various types of education, inspections, and audits. As all controls have a cost, the effectiveness of a control should be closely monitored and processes adjusted to optimize their performance over time. The efficacy of a control can be measured by whether

- the control is successful in reducing exploits as measured against random inspections, and
- the cost of mitigation is too high compared to the impact associated with the threat

Increasingly, customs organizations are attempting to transfer operational and compliance risk to the exporter's government.¹¹ This approach is based upon the assumption that export governments are in the best position to understand the companies in their own countries and will assure the introduction of only legitimate goods into the stream of commerce. Although this is a good step to affect risk transfer, export screening by other governments cannot be relied upon as the sole source of domestic border protection.

- Countries have incentives to export goods
- Asking trading partner countries to screen exports destined for your country will require you to screen your exports headed to their country
- Export inspection quality standards are not uniform and difficult to control and enforce.

Risk acceptance is used by administrations for small-impact risks. For example, in many countries, 10 percent of importers are responsible for importing 80 percent of goods by value. Any lost tax revenue from the imports of the remaining 90 percent of (smaller) importers is economically immaterial compared to the cost of implementing controls to assure collection.

The same data and analysis that underpin creating a risk framework can also be used to develop contingency planning in the event a threat is not prevented. Agencies can quickly identify critical imports, exports, and impacted transportation means. The mathematical analysis performed on probability and impact can be used to determine and justify contingency funds being set aside for such occurrences. Since no border control process can ever eliminate risk completely, being able to quickly recover is an important part of any risk management planning.

1.4 Characteristics of an Effective Risk Management Program

Successful risk management programs have the following common characteristics:

- Supported organizationally from top to bottom
- Authorized by an appropriate legal authority
- Based on clearly identified threats
 - Identify the risk category(ies) of each threat

¹¹ This approach is championed by the World Customs Organization. For example, WCO, 3.4.6., "The Customs Administration will work cooperatively with businesses to maximize security and facilitation of the international trade supply chain originating in or moving through their Customs territory."

- Use a rigorous and well-defined process to determine the probability and impact of each threat
- Rank risks according to importance
- Explicitly determine which risk management response will be applied to each threat based on a cost/benefit analysis
- Determine what resources already exist to counter threats and how best to leverage them
- Focus resources on the most significant risks
- Managed by a standing risk management group that either continuously or at defined intervals re-evaluates the risk management program.
- Communicated clearly to the private sector and public
 - What is required of them
 - The tangible benefits for establishing low-risk status
- Supported in regular meetings with trading partner countries to share intelligence and approaches
- Supported through inter-agency communication and information sharing
- Implemented using computerized risk management systems to increase processing capacity and help drive objective determinations that can be supplemented by field observations and which
 - Improve their targeting determinations by implementing advanced statistical means and link and pattern analyses
 - Rigorously baseline their targeted inspections and their field initiated inspections against a program of random inspections
 - Consistently capture and analyze their findings
 - Maintain systems of separation of duties and audits in human processes and technical systems to assure quality in implementing the program
- Invested in human resources through training
- Engaged in constant improvement through programs implemented in conjunction with international funding sources to continually improve the economic climate for investment

Studies by the Inter-American Bank, the World Customs Organization, the World Bank, and other international organizations discuss some of the abovementioned characteristics in more detail. The following subsections will also explore some of them.

1.4.1 Support the Program with Laws

Regulation must provide field personnel with clear authority to make risk-based decisions, along with flexibility for middle management to optimize operations. The aspects of the legal system that should be reviewed are the following:

- Authority
 - Information collection as needed to support risk assessments during the import and export processes at determined time points.
 - Selective verification of cargo and passengers based upon risk management principles.
 - When multiple organizations are involved in risk assessment, delineation of their relative responsibilities to prevent multiple examinations on a single shipment
 - Flexibility to allow agencies to apply innovations and automation systems to better deliver on their mandates.
- Reducing Complexity
 - Complex duty classifications increase the likelihood of inspectors or trade entities making a mistake in classifications or assessments.¹² It is often more cost-effective to eliminate or combine duties to minimize classification errors. Lower, more general duties are simpler to apply, less prone to mistaken or delayed valuation, and may lead to more revenue overall by making the classification and collection process more efficient.¹³
 - Insufficient transparency or unnecessary or ambiguous discretionary powers can hamper predictability, delay clearances, and increase the likelihood of corruption.

¹² International lending institutions, such as the Inter-American Development Bank, can provide guidance in combining and refining duty systems.

¹³ UNCTAD Trust Fund for Trade Facilitation Negotiations, Technical Note 19, 2008, “Separating Release from Clearance Procedures”

- Alignment to International Standards
 - Provisions must exist for complying with international commitments. In some situations this is simply a matter of legislation not being updated to correspond to recent commitments.¹⁴
- Accountability
 - Appeals processes to allow customers an avenue to contest decisions they believe are in error. Care should be taken to ensure that this process is accountable and fair.
 - A post-clearance audit process that has the legal authority to monitor and report on both customs partners (e.g., trusted traders) and customs administration itself.
 - Penalties for offenses should be proportional to the severity of the offense and enforceable by the legal system, preferably in an expeditious manner.

1.4.2 Utilize Pre-Arrival Data

Information acquired from supply chain entities before the goods or people in question arrive at a border crossing is essential to an effective risk management program.

Electronically submitted pre-arrival data is a valuable support for risk assessment systems due to the timing of its acquisition. Since it comes in electronic form, it can be easily manipulated within an automated decision support system. Backed by appropriate legislation, pre-arrival data can allow the necessary time for risk processing to occur in advance of arrival. Sufficiently early pre-arrival data can also be used to prevent shipments or people from being transported in the first place, an important customs response when faced with certain high-impact threats.

¹⁴ For example, becoming a signatory to the Revised Kyoto Convention (1999), imposes the obligation (at a minimum) to the articles of the General Annex which include the right to lodge a Goods declaration at any Customs office. If a nation's laws currently only permit lodging of declarations at specific sites, they may require amendment to align with the General Annex.

Data can come from many sources and involve many individual elements, but is commonly grouped into the following categories:

In order to properly utilize pre-arrival data, a customs administration must do the following:

- Define what data is required.
- Define when the data is required.
- Require electronic data submission.
- Build or enhance a technical infrastructure that can accept, manage and respond to electronic data.
- Ensure consequences exist for failure to provide data in a timely fashion.
- Define and implement business processes that exploit the early data to triage down submissions in accordance with the previously-developed risk management framework.
- Use the results of the early triages to determine whether and at what intensity a person or shipment should be subjected to inspection upon their arrival at a port of entry.

- Regulated Data
 - Encompasses all information submitted as a required part of a regulatory process.
 - Examples include cargo declarations, conveyance reports, phytosanitary certifications and passenger declarations.
- Trade Data
 - Used in the commercial course of a transaction between a vendor and a customer.
 - Examples include purchase orders, truck pickup or delivery orders, container call notices, carrier or forwarder bookings, shipment or vessel status messages, transfer or delivery notices, and financial settlement documents such as a letter of credit or commercial invoice.
- Contextual Data
 - Pertains to the entities, locations and other environmental factors related to a transaction as it advances through a supply chain.

- Examples include information about foreign port operations and staffing; political disturbances; local or regional profiles of industries, businesses, or products; entity level financial profiles; and management or staffing profiles.

From an automated risk management perspective, of these three groups, the most important is regulated data. A customs administration controls the content, organization, and timing of this data. Regulated data yields consistent, specific, and more easily analyzed results than do other types of data that do not provide a consistent level of detail or coverage across all entities and transactions. Contextual or trade data is largely useful during a secondary triage, when a target is performing a deeper investigation of a person or shipment.

Trade data has value, particularly to validate regulatory submissions suspected of being false, but the complexities of acquiring and correlating it make it difficult to use in an automated system.

1.4.3 Automate Risk Assessment

Automated risk assessment systems use multiple data sources that automatically review, score, and triage the underlying data. These systems are a powerful component of an effective risk management program. Global economies use these systems to focus their efforts on the highest-risk people and goods while facilitating entry of low-risk persons and shipments. Facilitating trade creates a virtuous cycle for customs authorities: traders that see their competitors enjoy the economic advantages of low-risk status will themselves be encouraged to follow suit and increasingly larger volumes of trade will be handled by trusted trade entities. This frees up customs resources to focus on high-risk entities.¹⁵

Pre-arrival data can provide valuable insights to the risk assessment process and augment contingency plans

With sufficient tools and skilled resources, the rigid practices found in fixed-percentage inspections are replaced with intelligent selection based on comprehensive and objective data analysis. Bias in the inspection process is minimized, as are resources needed for such inspections.

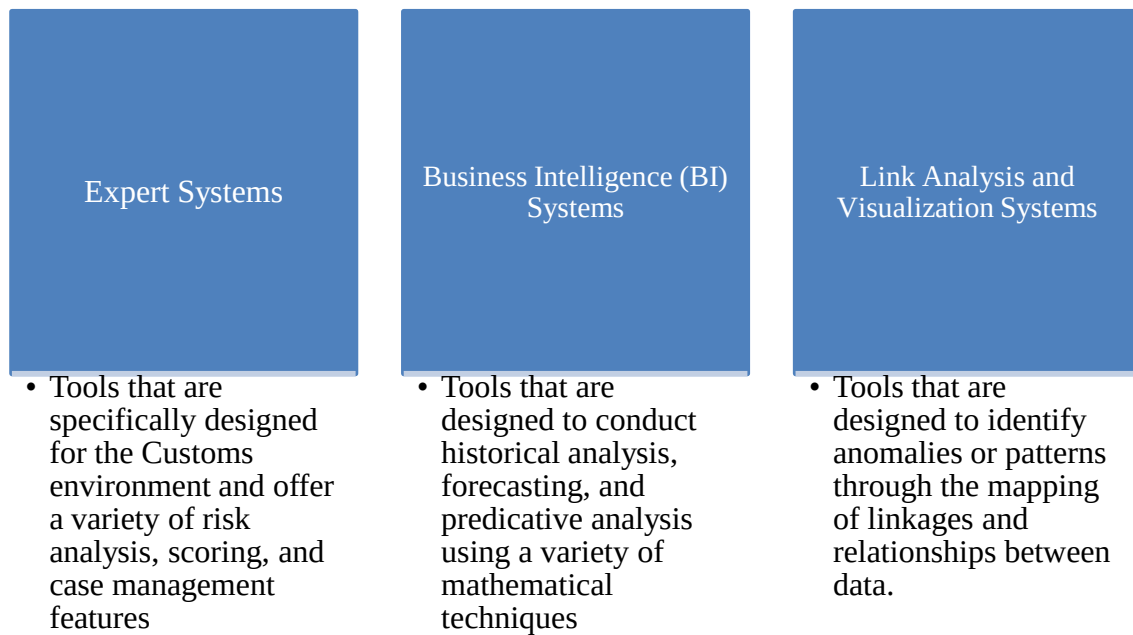
¹⁵ For example, in Canada, most goods are cleared within seconds, although the 'standard' clearance time is 45 minutes (WTO CTG, 2000). This reflects the huge difference in clearance times between high-risk and low-risk goods based on their risk management regime. Similarly, in Australia, over 98 percent of electronically lodged declarations were processed within 15 minutes (Australian Customs Service, 2002)

Automated risk assessment systems have the following features:

- Visibility, that is, the fusing of all entities and documents involved in a given shipment or transit to permit a holistic view of the context and history of that submission
- Electronic acceptance of documents
- Interfaces that permit the integration and fusion of other data as determined by an administration
- Interfaces for creating user-defined risk rules
- Pre-developed rules based on international standards
- Grouping of rules based on certain threat types
- User interfaces to display relevant data and rule hits
- Case management
- Archiving
- Entity-based statistics
- Exam findings capture
- Lookouts and watch lists for intelligence-driven operations
- Query functionality for tactical identification of shipments
- Dynamic rule tuning to aid in timely updates to the system and the ability to create and update qualitative (officer intuition) and quantitative (statistical analysis) rule sets
- The ability to adapt to new methodologies, approaches, and new trade data to augment the ability to identify risk

These features enable a customs administration to quickly identify and categorize shipments and passengers into various categories of risk for either facilitation or inspection as desired by policy makers. The system must also have some capacity to adapt its indicators over time and mesh with other sources of information, whether by using case management to record feedback from examinations or augmenting automated risk detection with watch lists from intelligence agencies.

The private sector offers various types of COTS products to support the assessment of risk, which for simplification can be categorized into the following three types:



Of these three, expert systems provide the best value for a developing customs administration due to optimized process control, data integration, and ease of use in tactical and operational environments. A more detailed discussion of the important components and examples can be found in Appendix G: Expert Automated Risk Assessment System Components.

Both BI and data mining systems provide greater value for strategic analysis or in-depth investigations of large case files. These tools often require their users to have additional expertise in order to exploit passenger or commercial data in a real-time dynamic environment such as a targeting center or port of entry. While widely used in policing and the intelligence community, many customs risk professionals find BI and link analysis systems cumbersome in practice when employed on large customs or immigration data sets.

In general, commercial products tend to require less initial capital investment, more effectively leverage modern technologies, and more easily communicate with other computer systems (particularly ones external to customs control). In contrast, custom-built “in-house” risk assessment systems often suffer from under-estimation of the actual difficulties involved in developing the software for a complex operating environment like customs. This can lead to cost

overruns, scheduling slips, or elimination of features in order to meet either time or budget constraints, negatively impacting commitments made to other stakeholders.¹⁶

A recommended balanced approach is to involve local IT departments in the COTS selection process, procurement, and deployment. Once installed, suitable knowledge transfer programs develop local expertise over time. This helps alleviate product acceptance resistance while strongly positioning in-house resources to own and maintain the new system.

1.4.4 Share Data among Agencies

Risk management reform, in addition to involving customs, also involves other government agencies with a stake in border traffic as well as the trading community.

A recent study¹⁷ commissioned by the World Bank demonstrated that governments involving more agencies in border management reform experienced greater benefits in terms of trade facilitation. Transportation security agencies; health and safety administrations; police and law enforcement departments; revenue agencies; and various military, wildlife, agriculture, and food inspection organizations can all provide valuable data to benefit a customs administration's risk management efforts. The mere process of providing data across agencies can lead to greater cooperation, coordination, and ultimately benefit to the public.

The table below lists some examples of intra-agency data that is available in many administrations and could be useful to a customs risk management program.

¹⁶ Yasui Tadashi and Michael Engman. 2005. "The Role of Automation in Trade Facilitation," OECD.

¹⁷ J.F. Arvis, M. Mustra, J. Panzer, L. Djala, and T. Naula, 2007. "Connecting to Compete." World Bank.

Figure 10: Data Available from Other Government Agencies

Agency	Potential Data Available
Transportation Agency	Vessel description
	Vessel registration
	Vessel ownership
Immigration Agency	Corporate immigration claims
	Passenger manifest
	Crew list
Taxation / Revenue Agency	Corporate registration
	Corporate tax filings
	Duty exemption holders
	Duty payment history
Law Enforcement Agency	Warrant history / outstanding warrants
	Criminal organization affiliations
	Watch lists
Legal	Civil legal actions
Health & Safety	Alien flora/fauna permit
	Hazardous goods transport certificate
	Pollution emissions history / certificate
	Vessel safety record
	Vessel casualty record
	Load list
Defense	Conveyance tracking
	Watch lists
	Dual-use goods permits

Similarly, those other agencies can also benefit from customs data submissions and risk assessments in managing their own programs.

Involving non-customs agencies in a joint initiative exposes them to the benefits of risk management as well. This can lead to synergistic and complementary cross-agency reforms, which reduce the burden of implementing a wide set of policies and yield a greater benefit for trade facilitation than customs changes alone achieve.¹⁸

¹⁸ (2004) UN/CEFACT, Recommendation 33, “Recommendations and Guidelines on establishing a Single Window”

Internationally, data sharing is focused more on leveraging law enforcement and intelligence information. Frequent contact on the working level between border control agencies in different nations also encourages trade facilitation between the two, which can lead to a strengthening and extending of existing trade partnerships in the political arena.

There are significant hurdles to implementing data-sharing initiatives either on a domestic or international basis. In particular, security concerns and sensitivities regarding the data being shared are significant and should be carefully addressed with adequate controls put into place.

When embarking on a data-sharing program to support customs risk management, it is recommended to perform the following activities:

- Domestically
 - Clarify each agency's current role and proposed future role with regard to integrated inspections.
 - Establish either reciprocal inspection procedures between agencies, or outright joint inspections.
 - Establish a Trade Outreach Program with Account Managers to inform and acquire "buy-in" from traders for any submission or border process changes.
 - Consider "single windows" for filing. These initiatives generally seek to perform the following:
 - Encourage electronic advance submission of data by offering additional compliance incentives such as expedited permit processing
 - Provide trade with a single electronic format and point of submission
 - Perform joint assessments of pre-arrival data on a combined, more accurate picture
 - Perform joint inspections where appropriate
 - Execute clearance processes by different agencies in parallel
- Internationally
 - Communicate with trading partner nations and international agencies that can provide data useful for risk assessments. International law enforcement or customs agencies maintain useful databases of suspicious individuals or

entities. Many customs administrations have entered into memoranda of understanding to share lookout information on cargo and passengers.

- Make international data sharing policies consistent with the administration's privacy and security goals and regulation.
- Construct business processes within customs for sharing data with a foreign agency and integrating with a risk management program.
- Determine technical solutions required for integration.

The WCO's Customs Enforcement Network (CEN) is a database designed to share critical enforcement-related information between partnering customs administrations. Used largely for strategic analysis in creating smuggling profiles and spotting trends, this information can be operationally leveraged to correlate and corroborate real time information for arriving passengers and cargo. International data sharing promotes collaboration between customs administrations and aligns with the WCO's future direction to promote "Globally Networked Customs."

1.4.5 Establish a Trusted Trader/Traveler Program

Establishing an Authorized Economic Operator (AEO), "trusted trader" or "trusted traveler" program provides an avenue for trading partners to promote the facilitation of their own traffic or travel. Supply chain entities provide information and subject themselves to audits by customs, which approves them as low-risk trading entities after they have complied with a program of security improvements and controls. Travelers submit to a pre-travel background investigation which the customs authority updates on a regular basis.

Once approved, the entity (e.g., shipper, consignee, carrier, freight forwarder) will receive the benefits of trade facilitation when their cargo or personnel cross a border. These benefits are extended for as long as the entity continues to engage in periodic verification processes with customs.

The advantage to a customs administration is the opportunity to effectively outsource the risk controls for certain threats. Private sector trading partners have supply chains and networks that extend beyond the reach of a single nation's government. By utilizing their network and resources to control risks at origin and along the supply chain, the country in essence pushes back its borders.

The advantages to a trader of this program can be many, including: faster clearance lanes, lower risk determination, dedicated customs personnel, preferential inspections or even self-selection of an inspection facility. By constructing a system of tangible rewards, a customs administration can convince trade partners to use their time and resources to assist in controlling threats they would not normally address.

Trusted trader and traveler programs also offer synergistic benefits when combined with the use of pre-arrival data (see section 4.4.2). Typically trusted trader programs require a given supply chain entity to expose information about its relationships with other partners. Data submitted as part of the AEO verification process can be cross-referenced with other (non-trusted trader) cargo and personnel advance trade data. More data to cross-reference increases transparency throughout the supply chain and aids overall risk analysis.

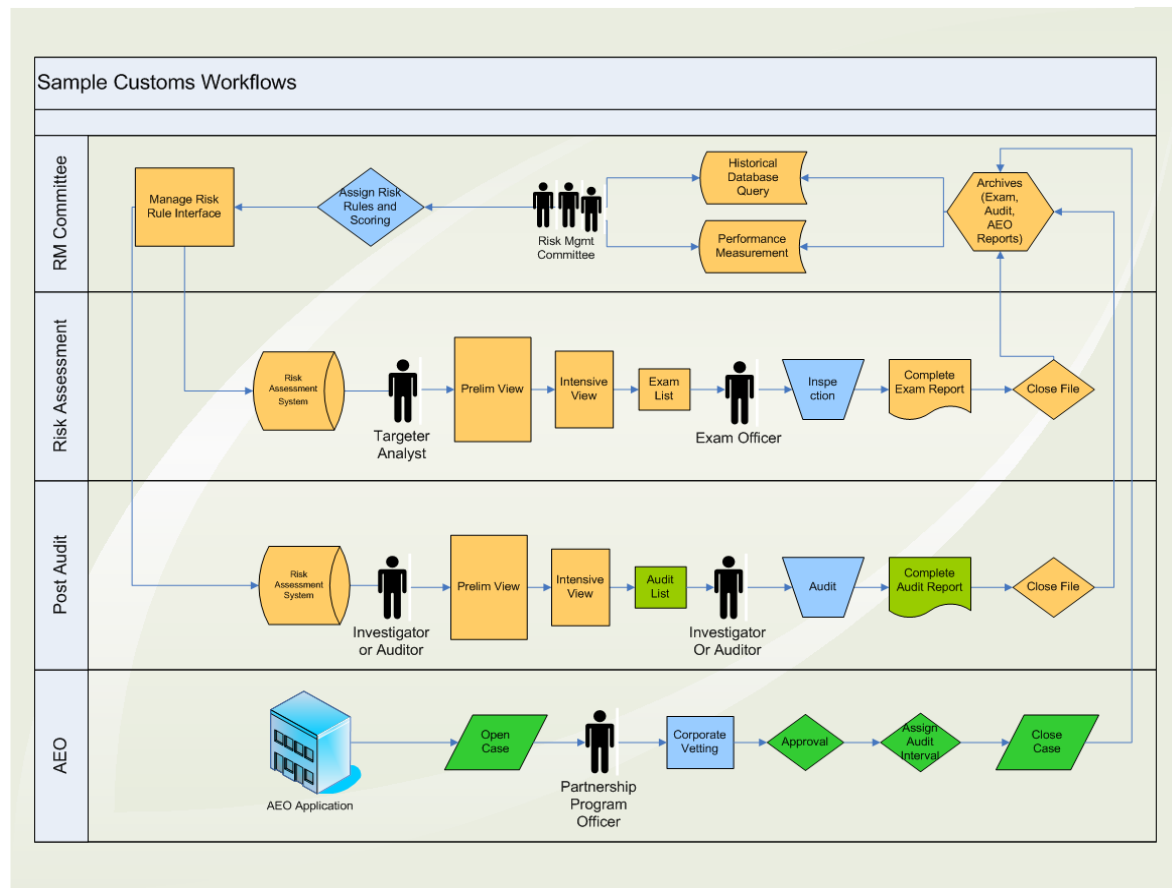
Ultimately, by replacing expected, frequent inspections with occasional inspections for trusted traders that compose the bulk of traffic across a border, trade facilitation in general is increased.

1.4.6 Define Workflows and Related Controls

Constructing customs business processes that utilize risk management while still segregating duties to minimize corruption and maximize scalability is a significant challenge to any nation.

The following diagram describes a simplified, breakdown of customs processing into workflows that are used in countries which have implemented risk management regimes. For any given implementation, modifications may be required to accommodate existing processes and resources, particularly in a staged implementation.

Figure 11: Sample Customs Workflows



1.4.7 Continual Review and Refinement

A risk management framework must be continuously reviewed and refined. Agencies should re-evaluate assumptions as well as accumulate and correlate findings from inspections with the initial analysis that lead to selection. These results should be compared to random inspections and findings should be fed back into the risk identification analysis to fine-tune selectivity. International trends, current events, and changing administrative priorities should be reflected in changes to the risk management framework as well. Doing so will result in targeting becoming increasingly more effective while reflecting a government's priorities in the face of new threats and trends.

Planning for continual risk management maintenance should include defining the processes and responsible bodies to accomplish it. At a minimum, this includes designating an

administrative body for reviewing risks with a reporting chain to whatever administrative authority is required to enact any necessary changes to customs business processes.

2. Managing Cargo Risk

2.1 General Discussion

In order to make informed decisions on commercial shipments arriving at the border, one must have a good working knowledge and understanding of the supply chain and the business relationships between trading entities. While supply chain transactions may be discussed in great depth and detail, this document can only provide an overview to help establish a general understanding.

The buyer purchases the goods and typically contracts for their movement from one location to another. It is generally the initiator of a supply chain transaction. Within this transaction many carriers may be involved to effect the actual movement of the goods, along with facilitators (agents, brokers) for crossing political boundaries and coordinators (shippers, freight forwarders) to manage the overall process. While most customs administrations require a cargo declaration (or manifest) from the carrier and an import declaration from the importer, several modern administrations have sought to require by regulation additional supply chain data to augment their ability to track goods throughout the supply chain from origin to destination. Examples of additional data include container status messages which can assist in tracking the equipment throughout the supply chain, and bay plans or stow plans which can assist in providing the exact location of containers aboard vessels.

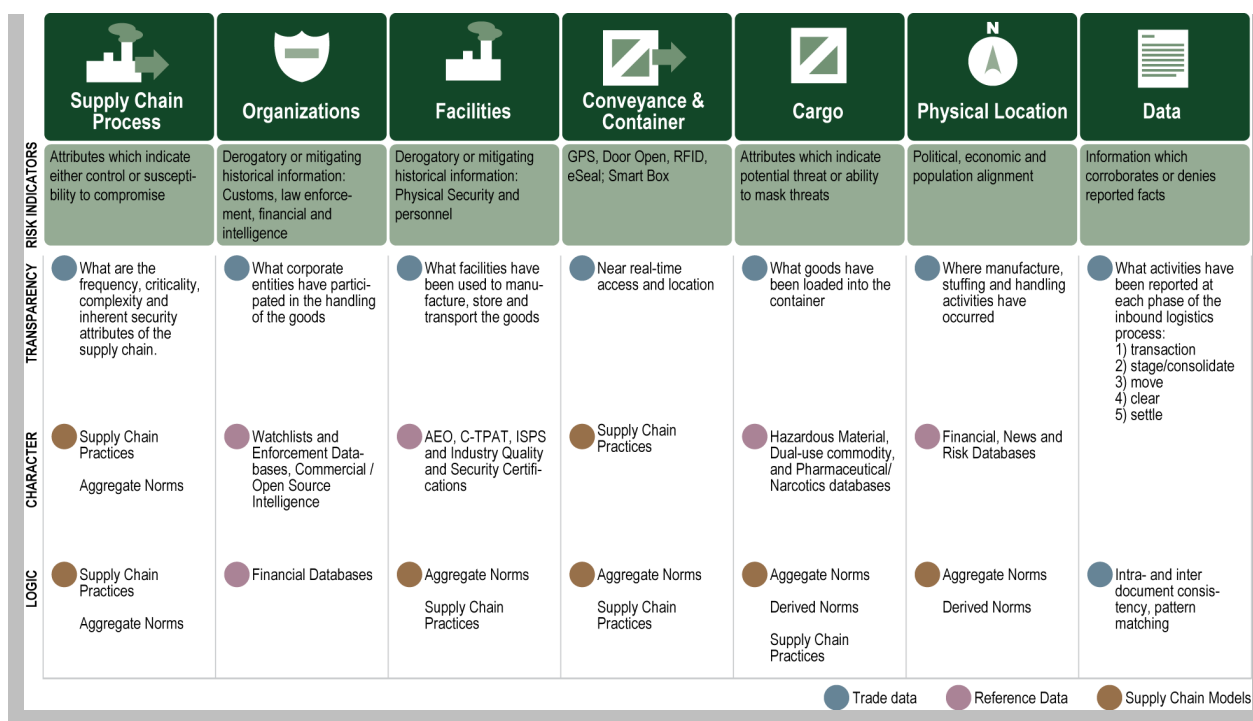
Having sufficient time and resources to perform adequate risk assessment on the volume of traffic experienced by a nation can be a challenge, albeit a lesser one than manually inspecting every cargo shipment. In order to ease this time burden, nations with highly developed risk management processes perform the following tasks:

- Require and enforce that multiple regulatory submissions be filed well before actual arrival of the goods
- Require electronic submission mechanisms where possible
- Use computerized risk assessment systems to increase the accuracy and speed of pre-arrival targeting
- Acquire and fuse additional contextual data to put each transaction into perspective

- Corroborate regulatory submissions across entities in the supply chain to validate accuracy and discover anomalies

Obtaining data in advance supports addressing threats well before arrival. This maximizes the use of resources and significantly improves outcomes. The following diagram represents how and where information can be obtained and used towards creating better supply chain visibility as well as addressing the associated risk for each shipment.

Figure 12: Sources of Different Types of Supply Chain Data



Source: GreenLine Systems Inc, 2009

2.1.1 Supply Chain Analysis

Automated commercial cargo risk assessment capabilities provide administrations with new means to identify high-risk shipments earlier in the trade chain. New technologies that support this approach will also reduce corruption by eliminating opportunities for tampering that exist in paper processing environments. They ensure that modernizing administrations begin to focus their efforts on security-based threats and assist in establishing a common and strategic risk management regime among security partners.

Depending on the threat involved, pre-arrival data can be reviewed and scrutinized in advance of loading and before departure in order to identify high-risk shipments and potentially interdict threats at the appropriate stage of the supply chain. The more security and safety-oriented the threat, the more important it is to interdict the threat as early as possible in the supply chain. This prompts efforts to obtain data as early as possible within the supply chain timeline. While responses to interdict a security threat (e.g., bomb) must start as soon as possible (i.e., before loading/departure), other less physical threats (e.g., smuggled tobacco/evasion of duties and taxes) are normally interdicted after arrival, as a formal declaration is required which will prove *actus rea* (the act) and *mens rea* (intent). This “point of finality” is legally required by most regulatory agencies with a border or supply chain mandate outside of the security realm.

Supply chains are often complex and multi-faceted, involving manufacturers, sellers, buyers, consolidators, shippers, consignees, and freight forwarders, among others. In many cases, a single shipment may be moved using multiple modes of transportation between origin and destination. The data flow can also be complex and include both electronic and paper-based documents.¹⁹ As shipments traverse their supply chains, a variety of data elements are generated. These elements are used both to control and coordinate shipment movement among private sector participants, and for entities to submit to regulatory authorities.²⁰

While customs, industry, and the trading community have traditionally focused on “transactions” to monitor supply chain movements, many transport security administrations are moving towards an approach that focuses risk assessment on entities (shipper, freight forwarder, importer, carrier, consignee, notify party, etc.). While this is an important piece in building a clear picture of “who” is moving goods through the supply chain, entities often mask the true nature of the goods or the actual person or entity who will be taking physical possession of the goods upon arrival. As one example, the use of freight forwarders has emerged to become very problematic in the customs domain in determining true importers, shippers, or consignees and negates the ability to cross-reference company names in historical databases or lookout systems for previous enforcement actions or suspect behavior.

Supply chain data such as cargo reports and importer declarations can contain data that can be used to reveal the following interest factors:

¹⁹ Refer to Appendix D: *Sample Air Cargo Supply Chain Dataflow* for a visual description of an example data flow.

²⁰ Refer to Appendix E: *Sample Air Waybill* for an example of data elements contained on an air waybill that would be shared amongst logistic partners and regulatory authorities.

- Entity relationships
 - First-time relationships between shipper and consignee/importer
 - New or low-volume importers and carriers
- Commodities
 - First-time importer has imported a commodity
 - Valuation that is inconsistent with the commodity type (e.g., by HTS Code or description)
 - Origin inconsistent with the commodity type (e.g., by HTS Code and country or region)
- Geography
 - Cargo routing is inconsistent based on historical ports stops and transits
 - Goods have been exported from a high risk country
- Mode of transport
 - First time an importer has used an air or marine port of entry to import goods
 - Maximum payload weight is inconsistent with the commodity type

For consideration, supplementary data²¹ is often required when the detailed goods description, ultimate consignee, and shipper information is unknown by the primary carrier. This data can be obtained from house bill level information by freight forwarders.

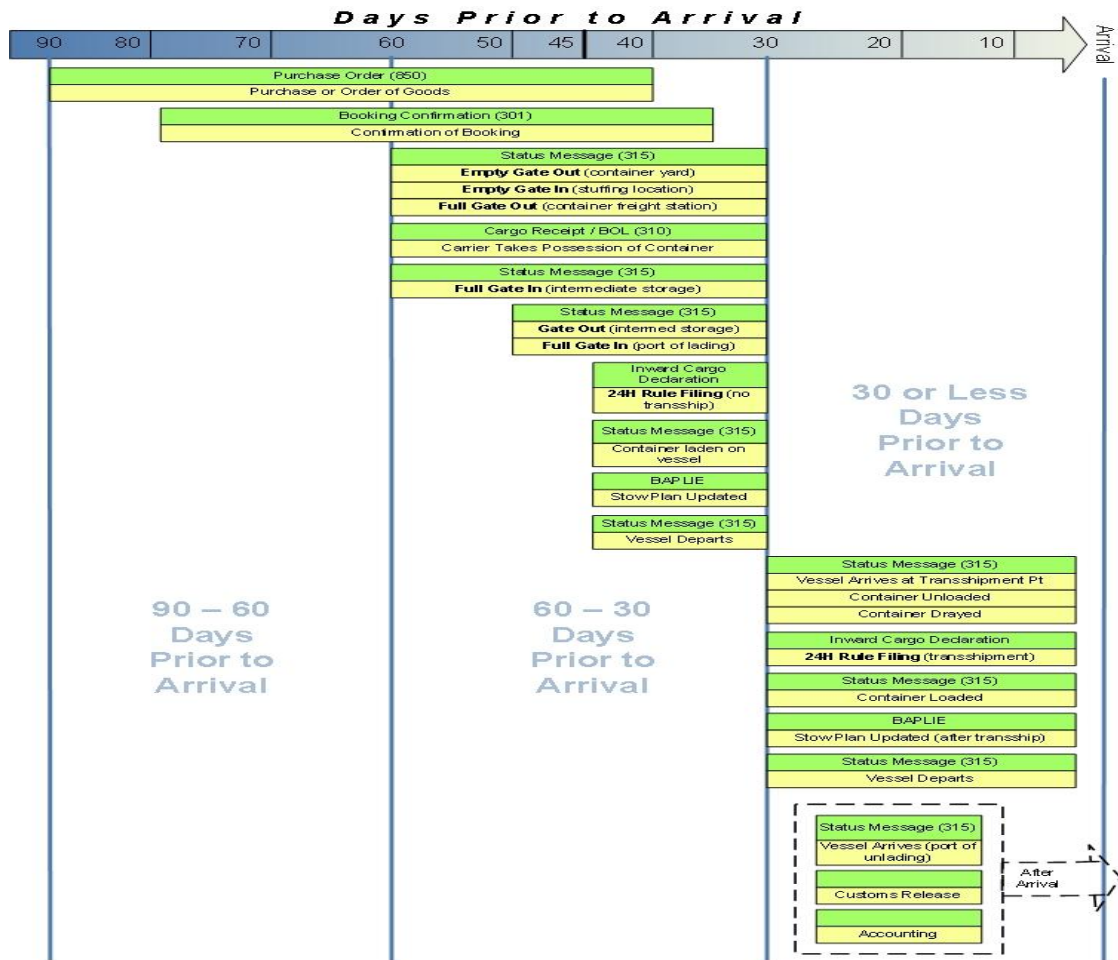
Risk assessment becomes more effective when end-to-end supply chain visibility (origin to destination) is created. To do so, it is necessary to draw information from as many sources as possible, whether supply chain entities via regulated filings, other government departments, or independent third-party contextual data sources.

2.1.2 Document Submission Timelines

Supply chain data is used by the trading industry today and shared among partners as part of many different types of business transactions. The following diagram displays several types of supply chain data, and highlights when this information is used (and potentially available to customs) before arrival of the goods at the border.

²¹ Supplementary data, when used in the pre-arrival data context, refers to additional regulatory filings required by logistics entities beyond the basic importer filing in certain customs jurisdictions. "Prime" or carrier level bills of lading are often used to populate cargo reporting requirements. This data contains vague entity and commodity information. Supplementary data can be obtained from house bill level information which is essentially provided by the next freight forwarder in the supply chain. This next level of data can provide a better commodity description as well as the ultimate consignee or entity who will be taking physical possession of the goods upon arrival.

Figure 13: Sample Document Submission Timeline



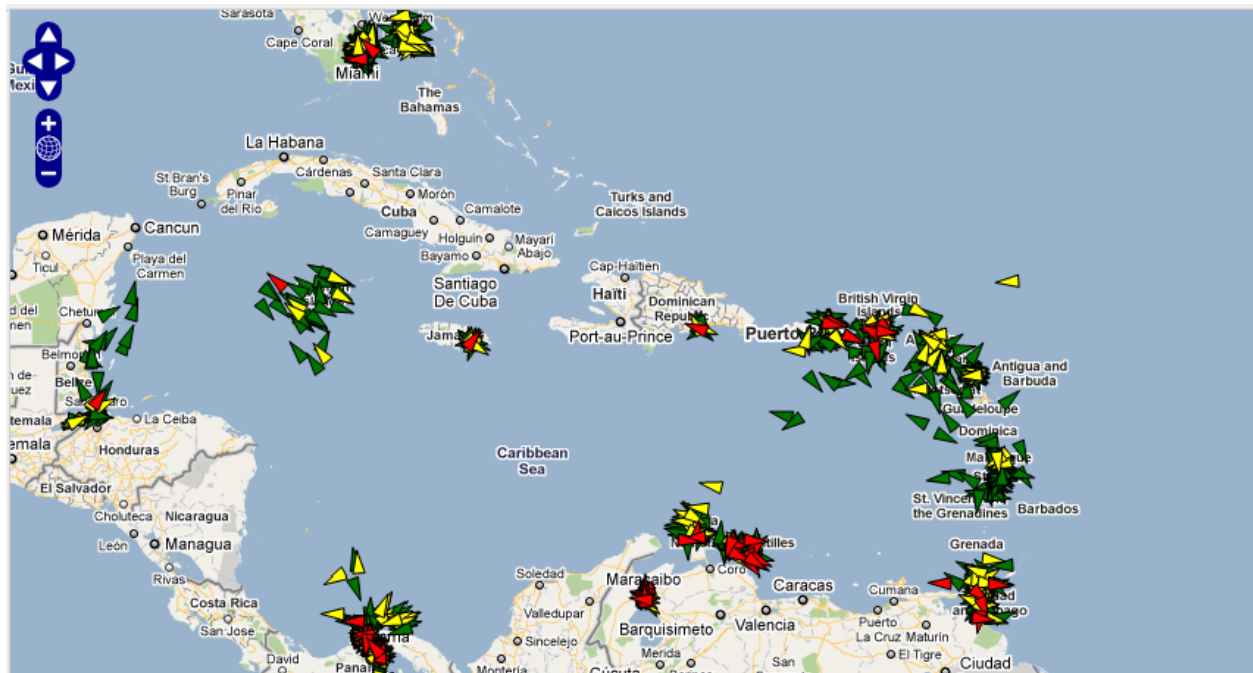
Source: GreenLine Systems Inc, 2009

2.2 Marine Cargo and Conveyance Considerations

Marine transport is the slowest, yet most cost-effective, mode of transportation for large quantities of goods. The advent of containerization has led to the standardization of many business processes involved in the logistics management of these vessels. These two facts can be leveraged by security administrations to (a) easily acquire data well in advance of arrival and (b) provide an excellent opportunity for quality risk assessment to be performed. Many customs administrations now require pre-arrival data for cargo 24 hours *pre-lading*, that is, 24 hours before loading of the vessel in the last foreign port before departure. It is also possible to arrange for foreign container examinations, issuances to foreign ports to not load containers (“do-not-load” or DNL orders), or even prohibitions to a vessel from entering an exclusive economic zone (“do-not-sail” or DNS orders). Enacting these responses will require delicate negotiations with both carriers and foreign governments, however, and are recommended for a later phase in development of a customs risk management program.

In addition, some customs administrations also require vessel conveyance information to be reported in advance of arrival. For several administrations in North America and Europe, the timeline for filing this report is 96 hours pre-arrival. As an additional consideration, international sea-safety regulations (SOLAS) regulations require larger vessels (100 gross tons or more) to continually operate a radio transponder on-board as part of an Automatic Identification System (AIS). These transmissions can also be received by a customs administration for border control purposes. Combined with published carrier schedules, regulatory submissions, and information from carrier agents at local ports, this can create a powerful, interconnected network to monitor and control maritime traffic. Suspicious vessel activities can be compared to historical situations and other entity behavior in this network to validate or dismiss border control threats. Appropriate responses can then be organized well before the vessel arrives at a domestic port.

Figure 14: Example of AIS Vessel Indicators in Eastern Caribbean



Source: MDA WatchKeeper, GreenLine Systems, 2010

Containerized cargo offers an additional advantage that many developed countries are only now beginning to take advantage of. Private logistics networks already transmit standardized messages called container status messages regarding container movements.

With all the advantages of the marine mode, there are still significant challenges to security administrations. Small unregistered vessels that do not carry transponders can be especially particularly challenging, particularly with regard to the smuggling of small, high-value cargoes. Due to the autonomous nature of maritime vessels, the authority to board, acquisition of proof, and enforcement of infractions can be difficult. Care must be taken that the legal foundation (see section 4.4.1) of a nation takes into account the unique characteristics of a maritime vessel's ownership structure and provides enforcement authorities with the tools they need to implement all components of a risk management framework.

It is recommended that customs administrations implement a 24-hour pre-lading requirement for pre-arrival data of marine cargo. If changes occur en route, carriers and shippers should also be required to submit amendments and/or additional filings to provide the essential data for proper risk assessment to be performed.

2.2.1 Vessel Identification Concerns

Maritime vessels can become problematic to identify if less than 99 gross tons as registry related information is often not available. Vessels of 99 gross registered tons (GRT) and above are required to register with the International Maritime Organization (IMO) and the official Lloyd's Registry of Ships. This database is available to consumers²² and contains valuable information related to ownership, movement history, vessel schematics, casualties, and detentions. Originally kept for underwriting and insurance purposes, this database is now widely used in the global security, customs, and intelligence communities to enhance visibility into the movement of maritime conveyances.

It is often important to link cargo and crew to maritime vessels to provide a more holistic view of risk and discern anomalous behavior and linkages between people, cargo, and conveyances. Linking is made possible by assuring that certain key data elements, especially the "Lloyds Number," are included on all documents.²³

If the Lloyd's Number is included on cargo and crew reports, then these reports are easily fused with the correct vessel data and reducing errors in linking. Other secondary elements can be used to help in the linking process including vessel name, carrier codes, and domestic conveyance reference numbers, but the Lloyd's Number is the most reliable element.

2.3 Air Cargo Considerations

The air cargo environment is becoming an increasingly popular option for global freight transportation. Though more costly than shipping by sea, the air cargo environment allows for shorter shipping times which are convenient in today's world of "*just-in-time manufacturing*." Business and consumer demand for fast, efficient shipment of goods has fueled the rapid growth of the air cargo industry over the past 25 years.

One of the unique characteristics of air cargo is that it is frequently carried on passenger aircraft, making this environment more vulnerable to security threats than other modes. This mix of cargo and passengers on a single conveyance requires that risk assessment be performed on both to clear the same vessel. According to statistics provided by the U.S. Office of Aviation and International Affairs, on average, 39 percent of freight is carried on board passenger aircraft,

²² http://www.ihsfairplay.com/Maritime_Data/Ships.html

²³ The Lloyds Number is unique to every vessel over 99GRT and remains static during the vessel's lifespan, like the VIN on an automobile. Vessels may undergo many name changes over the course of their lifespan yet the Lloyd's number remains unchanged as the vessel's key identifier.

32 percent on board express carriers, 24 percent by scheduled all-cargo aircraft, and 5 percent by charters.²⁴

Current North American customs administrations mandate a four-hour pre-arrival submission deadline for pre-arrival information to allow sufficient time for risk assessment of cargo and passengers. To accommodate the flexibility and requirements of JIT manufacturing, carriers engaging in shorter flights (less than four hours) are permitted to transmit the final notification upon wheels-up.

2.4 Rail Cargo Considerations

While this report describes rail and land cargo in separate sections, one should consider that the supply chain is multi-modal. With cargo often originating overseas, many ports and terminal operators are marketing themselves as “ship to rail” operations. As containers are discharged from vessels, they are often loaded directly onto trains with intent of introducing the minimal number of moves (between ship, gantry crane, pier, bomb cart, yard crane, forklift, rail car, etc.) as possible. Due to competitive pressures, logistics firms have optimized their supply chains to minimize these movements and the costs associated with them. Savings can be, and have been, found in gas and labor to increase profitability margins. As “ship to rail” operations increase, (and when customs cargo controls permit) many rail carriers have chosen to move the rail cargo inland or even in-transit to another country across one or more borders on the original ocean bill of lading. Those that do not will often report a rail bill of lading, and these documents resemble similar data elements normally seen in marine cargo reporting. As such, selectivity efforts and risk assessment systems can operate normally on this data with minimal effort to adapt.

Rail traffic is dealt with differently from country to country and sometimes between different ports of entry. Some borders will ensure the train is stopped before being permitted to cross (e.g., Laredo, Texas) while others (Windsor/Detroit on the Canada /U.S. border) allow trains to cross at full speed with inspections taking place further inland at dedicated rail yards and sidings.²⁵ As a result, both customs administrations cooperate to share data for risk assessment purposes and also assist with inspections before the train departs for the other

²⁴ United States Government Accountability Office, Report to Congressional Requesters: “*Aviation Security, Vulnerabilities and Potential Improvements for the Air Cargo System.*” GAO-03-344.

²⁵ These trains are over 10,000 feet in length and require a number of locomotives to pull the large number of containers attached via spine cars. The Windsor tunnel crosses the Canada /US border and is shaped like a belly under the St Clair River with steep inclines on both sides exiting the tunnel. These 10,000 foot trains exit the tunnel in excess of 60km/h to ensure the train can fully exit. Stopping these trains after exiting the tunnel can take more than 5-10 additional kilometers inland on both sides of the border due to the massive inertial forces involved.

country. This collaborative effort allows both customs administrations to push the border out and interdict serious threats before arrival in the country of destination.

Many customs administrations receive rail cargo reports from the rail carriers and these can be used to identify threats using risk assessment systems in virtually the same manner as marine cargo. Additional considerations are involved, however, to ensure that the data is provided electronically and far enough in advance to perform an adequate risk analysis.²⁶ For consideration, rail cargo reports reveal much the same information as marine cargo reports and can be risk assessed in a very similar manner. Customs also needs to determine where the cargo can be inspected, which can depend upon the geography of the port of entry, as noted above. While rail cargo needs to be handled on a case by case basis in many instances, inspections should be taken at the first point of arrival where possible and when not, at the first point of operational intervention. New technologies can assist in this process by providing additional inspection intensity options, such as rail VACIS (Vehicle and Cargo Inspection Systems) which uses gamma ray technology to image the contents of the container. This imaging when matched with the cargo data can help to identify anomalies and ensure the highest-risk containers are set aside for close scrutiny or physical inspection.

In general, rail cargo and containers can be very difficult to inspect adequately. As few rail offloads can normally be achieved due to logistical constraints, limited resources, and available inspection technologies, risk assessment systems are a critical piece in the determination to inspect or facilitate. It is imperative that sufficient time be provided to allow for this risk assessment to occur, which is why many modern customs administrations recommend adopting a one-hour minimum requirement for transmission of pre-arrival data in the rail mode.

2.5 Land Mode Considerations

Like rail cargo noted in the previous section, land cargo can also be difficult to adequately inspect due to infrastructure constraints at highway/land border crossings. Like other modes, land border operations should seek to legally acquire pre-arrival data for decision support. However, in many countries, data and reporting are often not provided until arrival or at best shortly before arrival. In some customs administrations, cargo information is filed by the carrier

²⁶ As one example, North American rail cargo filing requirements have established rail carriers to file 1 hour in advance of arrival

one hour before the truck arrives at the border. Importers are further encouraged to file declarations in advance to assist in facilitating customs processing. Promoting an advance reporting regime for land border can greatly assist in facilitation and prevent congestion.

Highway cargo documents are similar in nature to rail and marine and if provided electronically and in advance of arrival, can be used to assess risk on all shipments due to arrive at the border. In some instances, importer declarations will be presented at the border and can also be used to assess risk. Importer declarations have more detailed information particularly in relation to the commodity (HS code) and importer name and address. Bills of lading often contain less precise information regarding entities and commodities. Land cargo can arrive via container but is often shipped consolidated in trailers. Like FCL and LCL (Full Container Load or Less than Container Load) shipments in marine cargo, trailer loads can be reported as FTL and LTL (Full Trailer Load and Less than Trailer Load) for consolidated shipments.

As mentioned in rail cargo, the supply chain is intermodal, and the methodologies and approaches to risk management frameworks can be applied mode by mode with only subtle differences. The largest discrepancies are in regards to “when” the data is reported to customs in the supply chain timeline. For a risk management framework to be effective in the land mode, it is critical to obtain electronic pre-arrival data. Allowing reporting to take place at arrival provides little to no opportunity to assess risk and forces customs to adopt a regime that places the same degree of inspection intensity on all shipments. As discussed earlier in the document, this “gatekeeper” approach to border management is not conducive to trade facilitation and modern customs operating principles.

To provide adequate time to risk assess commercial shipments at the land border, current North American standards recommend regulating at least one hour pre-arrival notification for commercial cargo traversing a land border port.

3. Managing People Risk

3.1 General Discussion

One of an administration’s most difficult challenges is mitigating the risks associated with the movement of people across its borders. The difficulty stems from the administration having only a short time to make a decision and being unable to discern a person’s true intent or purpose while being required to process a large volume of travelers. The task is further complicated by

the large number of means of transportation that are used, including commercial aviation, general aviation, commercial vessels, pleasure boats, trucks, automobiles, train, and on foot.²⁷

Although applicable to varying degrees depending upon the mode of travel, the administration's basic tasks are the following:

- Associate the person with an officially issued tamper-proof identity document
- Physically screen the person prior to embarkation to discover threats to the means of transportation
- Analytically vet the person to the extent possible prior to boarding to prevent threats to the means of transportation
- Continue vetting until or at arrival to determine whether the person should be allowed to enter or leave the country, referred for further investigation, or arrested.

Successfully accomplishing these tasks requires the following:

- Understanding clearly the threats to be mitigated
- Sharing information among border control, police, intelligence, and international agencies
- Obtaining pre-arrival information whenever possible
- Implementing automated systems to support vetting
- Training personnel
- Establishing well-understood processes
- Capturing findings
- Continually analyzing data and findings to discover links and associations

Each of these points is discussed below.

3.2 Threats

The following are categories of threats that administrations typically consider when making boarding or admissibility decisions in regard to people:

- Criminals or other persons of interest
- Smugglers
 - Weapons

²⁷ This paper purposely confines itself to discussing entry at a recognized port of entry and does not consider the risk management of travel by way of unauthorized points of ingress or egress. Risk management principles can be successfully used to allocate resources to policing a border between ports of entry, but that discussion is beyond the scope of this paper.

- Narcotics
- Intellectual property
- People, particularly women or children
- Cash or equivalents
- Prohibited goods
- Terrorists
 - Attacking the means of transportation
 - Transiting to other destinations
 - Infiltrating the host country
- Illegal immigrants

3.3 Information Sharing

One of the most important tools for combating threats associated with people is sharing information among various government agencies and between governments. Border control agencies, police agencies, and intelligence components should regularly cooperate in developing watch-lists of people and rule criteria to be used in automated systems. Administrations can also leverage denied person lists from other countries and multilateral organizations to the extent such use is consistent with domestic policy. Administrations should also share information with other countries in the region, within the bounds of existing privacy protections.

Due to a number of factors, including the similarity or identicalness of people's names; their variability in spellings, nicknames, diminutives, and titles; and the difficulty of consistently translating names from disparate written character types, administrations should obtain as much identifying information as possible including country of origin, gender, date of birth, official document type, corresponding document number, country of domicile, address, and any available biometric information.

3.4 Passenger Data

Both pre-arrival and arrival data is available for potential consumption by a customs administration. The following subsections will describe, in bullet-point form, the benefits, drawbacks, and some technical details of each type of data.

3.4.1 Pre-Arrival Data

3.4.1.1 Advance Passenger Information

This is data taken from the machine-readable zone of the passenger's passport at check-in or boarding.

- Available for air passengers (and ferries in some instances)
- Not available until close to departure
 - Possibly included in the Passenger Name Record which is available as soon as the booking is made
 - Otherwise only available as commercial air passengers check in at the gate
 - Final passenger list is available at wheels-up
- Particularly valuable for running against watch lists
- As personally identifiable information, its handling, storage, and sharing may be impacted by privacy regulations
- Can be obtained as a “push” directly from airlines or through a value-added network provider such as SITA or ARINC
- Structured data conforming to EDIFACT PAXLST standards
- When linking the API record to its corresponding PNR record, it is important to use multiple keys, e.g., record locator number and name.

3.4.1.2 Passenger Name Record

This is data obtained by the airline or a travel agent when a passenger makes a reservation.

- Available for air and, in some countries, rail passengers
- May contain destination addresses, the passenger's itinerary, contact phone numbers, traveling companions, credit card numbers, and email addresses, among other things (refer to Figure 15 below)
- Data is available as soon as passengers make reservations; some countries start to pull 72 hours prior to departure and then later at defined intervals
- Particularly valuable for running against rules looking for travel patterns

- Particularly valuable for link analysis based on traveling companions, phone numbers, email addresses, contact address, etc.
- As personally identifiable information, its handling, storage, and sharing may be impacted by privacy regulations
- Usually, but not always, obtained as a “pull” from a PNR system such as Sabre, Galileo, Worldspan, or Amadeus or directly from the airline
- Some interesting data is “free text” field and not formatted so filters have to be developed to harvest information out of those fields. “Natural language” techniques are available to significantly increase the quality of data extracted from free text fields.
- Identified by a record locator number, which, however, is not unique over time thus when linking the PNR record to its corresponding API record it is important to use multiple keys, e.g., record locator number and name.

Figure 15: Common PNR Data Elements

Data Elements Entered Into the PNR System By All Carriers		
Received from information	All historical changes to the PNR	Other Supplementary Information
Special Services Info (SSI)	Special Services Request (SSR)	Voluntary/involuntary upgrades
PNR record locator code	All travel itinerary for specific PNR	General remarks
Date of reservation	Frequent Flyer Information	Ticket number
Date(s) of intended travel	Travel agency	Seat number
Name	Code share PNR information	Date of ticket issuance
Other names on PNR	Travel status of passenger	Any collected APIS info
Number of Travelers on PNR	Split/Divided PNR information	No show history
Seat information	Identifiers for free tickets	Number of bags
Address	One-way tickets	Bag tag numbers
All forms of payment information	E-mail address	Go show information
Billing address	Ticketing field information	Number of bags on each segment
Contact telephone numbers	ATFQ fields	

3.4.1.3 Visa

This data includes student or immigration visas and is composed of information submitted in advance by foreigners wishing to travel to a country where a visa is required.

- To the extent legally required, available for any foreigner coming to the host country regardless of mode of transport
- Particularly valuable for running against watch lists or intelligence reports
- As personally identifiable information, its handling, storage, and sharing may implicate privacy regulations
- Formatted per host-country requirements but often submitted as a paper document

3.4.1.4 Travel Authority

This information has been submitted by a traveler to the destination country in advance of travel, often in lieu of obtaining a visa.

- If legally required, available for any visa waiver foreigner coming to the host country regardless of mode of transport
- Particularly valuable for running against watch lists or intelligence reports
- As personally identifiable information, its handling, storage, and sharing may be impacted by privacy regulations
- Formatted per host-country requirements but often submitted as an electronic document

3.4.2 Arrival Data

3.4.2.1 Passport

This is the information contained on a passport that is generally available from all persons legally crossing an international border.

- The information that is usually included is:
 - Name
 - Passport number
 - Nationality
 - Date of birth
 - Sex
 - Passport expiration date
 - Personal identity number
- Most modern passports have a standard format machine readable zone where the above information can be captured electronically
- Passport information is the standard for ensuring identity by using a number of characteristics including name, date of birth, sex and nationality and tying them to a single unique number
- Useful for matching to watch lists
- Useful to discover travel patterns by physically investigating immigration stamps in the passport

- As personally identifiable information, its handling, storage, and sharing may be impacted by privacy regulations

3.4.2.2 Landing / Arrival Card

This is data which a passenger provides to the customs authorities upon arrival, generally by populating a form, or card.

- The U.S. version requires that the following information be provided:
 - Family Name
 - First Name
 - Date of Birth
 - Country of Citizenship
 - Sex (Male or Female)
 - Passport Number
 - Airline and Flight Number (if applicable)
 - Country Where You Live – Lawful Permanent Residence
 - City Where You Boarded (if applicable)
 - City Where Visa was Issued (if applicable)
 - Date Issued (Day/Mo/Yr) (if applicable)
 - Address While in the United States (Number and Street)
 - City and State
- Foreign passengers are required to keep a portion of the document and return that portion upon departure
- Difficult to analyze the information as it is a handwritten paper document

3.4.2.3 Biometrics

Biometrics are human data characteristics captured at the border and can include fingerprints, iris or retina scans, DNA samples, facial recognition, or voice prints.

- As personally identifiable information, its handling, storage, and sharing may implicate privacy regulations
- Associates a difficult-to-forge or spoof unique personal characteristic with an officially issued identifier such as a passport number

- Used for making positive identifications of the same biometric obtained at a different time
- As personally identifiable information, its handling, storage, and sharing may be impacted by privacy regulations

3.5 Contextual Data

In passenger vetting, the administration attempts to tie a person to an officially issued identity document and discover whether the document owner has any negative information associated with him or her. Databases that may indicate that a travel document has been tampered with include lost and stolen passport databases. Administrations also consult various domestic and international terrorist, criminal, or fraud databases to identify persons of interest. Examples may include Interpol watch lists for stolen passports, and various police and regulatory law enforcement occurrence and infraction databases which can be polled for criminal activity.

3.6 Risk Management Programs

Administrations generally have four goals with regard to people:

- Preventing persons of interest (e.g., criminals, smugglers) from crossing into the country
- Controlling immigration
- Preventing terrorists from attacking modes of international transportation, particularly aircraft and trains
- Preventing terrorists from commandeering modes of international transport, particularly aircraft, and using them as weapons against the country

Keeping undesirables off of airplanes or trains is a combination of effective screening technology at the point of embarkation and receiving advance passenger/passenger name record information to process through automated systems. Screening technology includes inspectors, scanners or detector dogs and is beyond the scope of this document. Otherwise, countries will deny boarding to persons whom they discover on a watch list, a violator database or who hits on certain high-risk travel indicators.

Determining to deny someone boarding based on a positive match on negative information requires using automated systems. Administrations should:

- Require airlines to provide API and PNR data

- API data can be obtained as passengers check in and a final manifest once the airplane door is closed
 - PNR data is available as soon as reservations are made
- Understand that it can be difficult to match a name from an airline record exactly with a name as it may appear in a database or watch list
 - Names using different alphabets and character lists will be translated in multiple ways
 - Misspellings are common
 - Data quality is sometimes deficient both in the airline records and in the government databases
- Run the identity data from either source against appropriate databases
 - Not all matches are 100 percent
 - System will require algorithms intended to make fuzzy matches
 - All matches need to be reviewed by trained officers who may be required to perform research and sign off on the match
- Once a positive match is determined, the administration must decide whether to try and deny the person boarding, divert the plane, or arrest the person upon arrival
 - Action approval chains should be available 24x7x365
 - The workload versus the time available tends to dictate only trying to find terrorists or extremely dangerous people prior to the flight's departure
 - Criminals and less dangerous people may be discovered while the aircraft is in flight and apprehended upon arrival
 - In many instances positive identifications cannot be made and for persons for whom questions remain, they should be sent to secondary for further investigation
- The application should permit the officer to perform the following functions:
 - Pull API and PNR data from the airlines or their providers
 - Display the information received
 - Run the information against watch lists and rules
 - Show persons against which hits occurred against and what caused the hit
 - Prioritize hits based on urgency of cause

- Permit searches to be run against the stored data
- Mark someone as of interest
- Record an action to be taken, e.g., denied boarding, arrested, or sent to secondary for further questioning
- Record a disposition

3.7 Other Transport Modes

While air travel presents a very constrained time frame in which to check passengers, often other modes are worse, with the notable exception being when a visa is required. Some ocean vessel transport, e.g., cruise and container ship, can provide early information on crew and passengers, but often people are not vetted until they arrive at the border. For these modes, rail, truck, bus, automobile, small boat, or foot passengers, the best that can be done is running their identity information through an automated system at the border, at which point risk assessment can only be performed on arrival data. In case of suspicions or anomalous behavior, further examination is performed in secondary. Civil aircraft and small boats may require an advance notice of report via telephone or radio and in some instances can qualify for trusted traveler or registered traveler programs which permit border movements with less scrutiny for the exchange of traveler data upon registration and certification. Spot checks can be performed on occasion to measure and determine compliance.

3.8 Trusted Traveler Programs

Many countries are now working on trusted traveler programs. These programs permit a person to enroll in the program and provide proof of identity and a biometric that can be easily checked at the airport such as an iris scan. Typically they work as follows:

- Person enrolls by providing background information in an application
- The person is invited in for an interview with an officer
- A biometric is captured
- A background check is performed

If the person completes the above steps to the satisfaction of the program sponsor, they are accepted into the program. At the airport or other port of entry the person can clear passport control by going to a special kiosk and submitting to an iris scan to prove identity. Typically the

administration re-runs the background check periodically. If negative information is discovered the person is removed from the program.

4. Case Study of Risk Management Implementation: Barbados Customs & Excise Department

4.1 Introduction

The Barbados Customs and Excise Department (BCED) have recently undergone a significant change in the way it conducts business at the border. With the assistance of the Inter-American Development Bank (IADB), BCED is in the process of transforming to a risk management-based customs organization through the development and integration of new risk management technologies for customs processing and border management.

As previously discussed in this document, the transition to risk-managed decision making at all levels within any customs or border organization requires a multi-faceted organizational change and involves new policy, clear and continuous communication, technology, and training. BCED has committed to this change, and Mr. Frank Holder, the Comptroller of Barbados Customs and Excise Department, has graciously permitted his example of business transformation to be included in this KCP document.

As background, the Barbados Customs and Excise Department (BCED) has a mandate to be recognized as a world-class customs service respected for its professionalism, efficiency, fairness, and contribution to Barbados' economic and social development. BCED recognizes that international best practices for customs have evolved from standards and agreements such as the WCO's Framework of Standards to Facilitate and Secure Global Trade (SAFE) and the WCO's Columbus Program for Customs Modernization and Capacity Building. A key component of these best practices is effective risk management.

As previously discussed in this KCP document, the evolution of these best practices has led modern customs administrations to begin using automated risk management systems. These systems enable customs administrations to operate in a systematic framework that focuses operational resources on shipments of highest risk for closer scrutiny and potential regulatory inspection. At the same time, pre-approved and/or low-risk shipments are facilitated throughout the supply chain and across borders, thus enhancing the economy of the country and the surrounding region.

4.2 Background

In 2008, a post-implementation audit of the ASYCUDA++ system revealed that BCED risk management criteria were outdated and recommended the BCED form a dedicated Risk Management Unit (RMU). With the support of the Inter-American Development Bank (IADB), BCED established and trained a RMU. A review in February, 2009, determined that the RMU staff did not utilize the ASYCUDA++ system to carry out risk analysis and intelligence tasks. As a result, the IADB recommended that the BCED procure an automated risk management system to improve its performance in the area of risk management.

Four capabilities were identified as required for the risk management system:

- 1) Alignment with international best practices, including the WCO's SAFE Framework and Risk Management Guide, the European Union's Risk Management Policy Guide, and risk management systems and techniques used in North America by U.S. Customs and Border Protection and the Canada Border Services Agency.
- 2) Ingestion of data from existing Barbados Customs systems (ASYCUDA++) and enforcement of a clear access control system with roles to ensure only authorized users have access to data.
- 3) Merging of shipment and risk-related information, and a data presentation in a graphical interface to provide a single unified picture to users.
- 4) Performance of customized risk analysis and presentation of relevant results to the user for decision-making.

BCED, with the assistance of the IADB, selected GreenLine Systems to implement a technology platform as BCED's Automated Customs Risk Management System (ACRMS).

4.3 Project Overview

The main objective of the project was to deploy a technology platform as the automated risk management system for BCED, and assist its transformation to using modernized border management practices and principles.

In line with this objective, GreenLine met with BCED personnel to gather requirements that met the operational needs of BCED business units. As a result of these meetings, the following objectives were defined for the implementation of the platform in the BCED environment:

- 1) Integrate with ASYCUDA++ for the purposes of data extraction
- 2) Implement a Pre-Arrival Analysis Workflow (Risk Scoring of Manifests)
- 3) Implement an Arrival Analysis Workflow (Risk Scoring of Single Administrative Documents)
- 4) Implement three Risk Assessment Modules and associated risk scoring to support BCED risk management priorities of:
 - Revenue Protection
 - Narcotics
 - Security
 - Capture inspection results
 - Provide reporting for Post Clearance Audit Unit
 - Provide Management Reports
 - Train end users on the use of the platform core functions

This project required rapid execution and implementation; therefore achieving progress in a timely manner was critical.

This project also called for the inclusion of a diverse set of BCED personnel. At the onset of the project, five business units were identified as potential users of the new platform:

- 1) Risk Management Unit (RMU)
- 2) Enforcement Division
- 3) Inspection Units
- 4) Post Clearance Audit Unit (PCAU)
- 5) Field Audit Unit (FAU)

The platform Implementation for Barbados was comprised of five phases. Each phase and the related milestones are described in the following table:

Figure 16: BCED Project Plan Phases

#	Phase	Key Activities
0	Plan	Kick-off Meeting
1	Design	• Analyze SAD and Manifest Data • Analyze ASYCUDA++ Historical Transactions • Conduct Needs Assessment, Gather Requirements • Develop ConOps • Document Functional Requirements
2	Configure/Integrate/Develop	• Develop ASYCUDA++ Interface • Define Risk Assessment Models • Develop Custom Reports • Complete Additional Customizations to Fulfill Requirements Defined in the FRD
3	Test and Train	• Conduct Full Regression Test • Conduct End-User Training
4	Deploy	Deploy platform in the Production Environment

GreenLine facilitated a series of workshops to lead participants through the first two project phases. The primary objective of these workshops was to enable participants to define the functional requirements for the technology platform. These sessions fostered a collaborative environment and streamlined the requirements gathering process as participants were able to discuss requirements in an open, real-time forum.

Objectives of the workshops included:

- Introduce project team members and their roles
- Define project framework
 - Implementation approach
 - Communication and change management
 - Project phases and major milestones
 - Functional requirements document and project schedule

- Discuss current state business processes
 - Inspection process
 - Risk analysis process
- Review use of existing applications and tools
 - ASYCUDA++
 - Other tools used to support BCED procedures

Following this, a design phase was initiated which included an in-depth analysis of ASYCUDA++ and historical transactions and data from both manifests and SADs. The analysis focused on achievement of three goals:

- 1) Identify the data elements contained within BCED's ASYCUDA++ database
- 2) Document the ASYCUDA++ database schema
- 3) Develop a detailed plan for ingesting data from ASYCUDA++ into the technology platform schema

Additional workshops were held to determine how the platform would be used by BCED and to define detailed functional requirements. The objectives of these onsite workshops were:

- Conduct a working session with key stakeholders to develop a Concept of Operations (ConOps)
- Conduct a working session with key stakeholders to define primary areas/topics of interest for risk management
- Gather additional information about how ASYCUDA++ is configured and used today; particularly the Selectivity Module

These workshops resulted in BCED's desire to concentrate and focus on three key areas for risk management: Revenue Protection, Security, and Narcotics.

Figure 17: Workshops with BCED Representatives



Once the Concept of Operations was accepted and finalized, the group focused on the customization of the technology platform for implementation in the BCED environment. This effort included the development of three major components:

1. An interface for ingesting data from ASYCUDA++ into the platform
2. Three Risk Assessment Modules (Revenue Protection, Security, and Narcotics)
3. Customized Reports

Risk indicator rules were implemented in the platform. These rules were used to configure the three RAMs identified during the Design Phase (Narcotics, Revenue Protection, and Security). In creating these RAMs, BCED leveraged the WCO's Global Information and Intelligence Strategy's (GIIS) Standardized Risk Assessments (SRAs) and Global High-Risk Indicator Document (GHRI). In addition, input from BCED subject matter experts was used to begin tailoring these RAMs for use in Barbados.

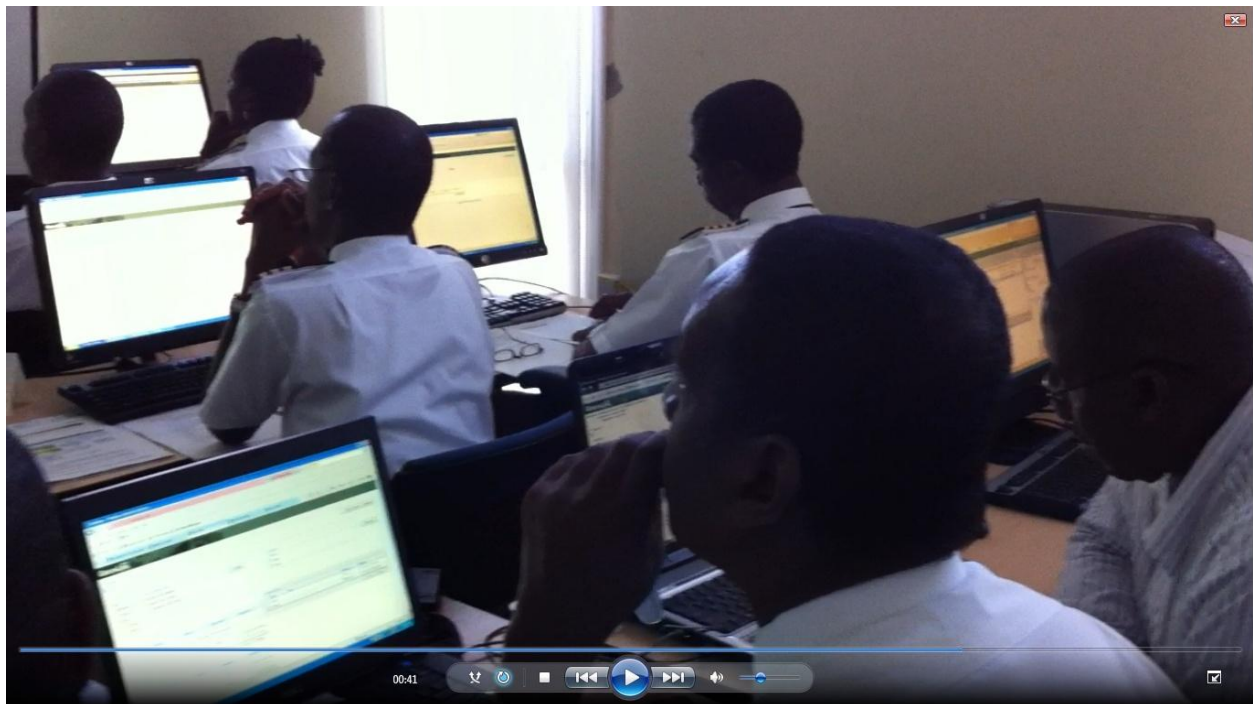
The revenue protection RAM contained risk indicator rules and interest factors designed to scan data for potential indications of revenue evasion threats including undervaluation, misdescription, misclassification, incorrect origins, and other indicators of false declarations. The narcotics RAM contained risk indicator rules and interest factors designed to scan data for

potential narcotics based threats. The Security RAM contained risk indicator rules and interest factors designed to scan data for potential security based threats.

4.4 Deployment and Training

End-user training was delivered to BCED employees who participated in a two-day, hands-on training course.

Figure 18: BCED staff receiving hands-on training



After end-user training was completed, the final ASYCUDA/new platform Integration Code was deployed to BCED's production environment. This deployment enabled the technology platform to begin extracting and loading new and updated bills and declarations at intervals required by BCED. In addition, the platform risk analysis and scoring process was initiated to score all historical transactions in the system (in a fully automated process).

4.5 Conclusion

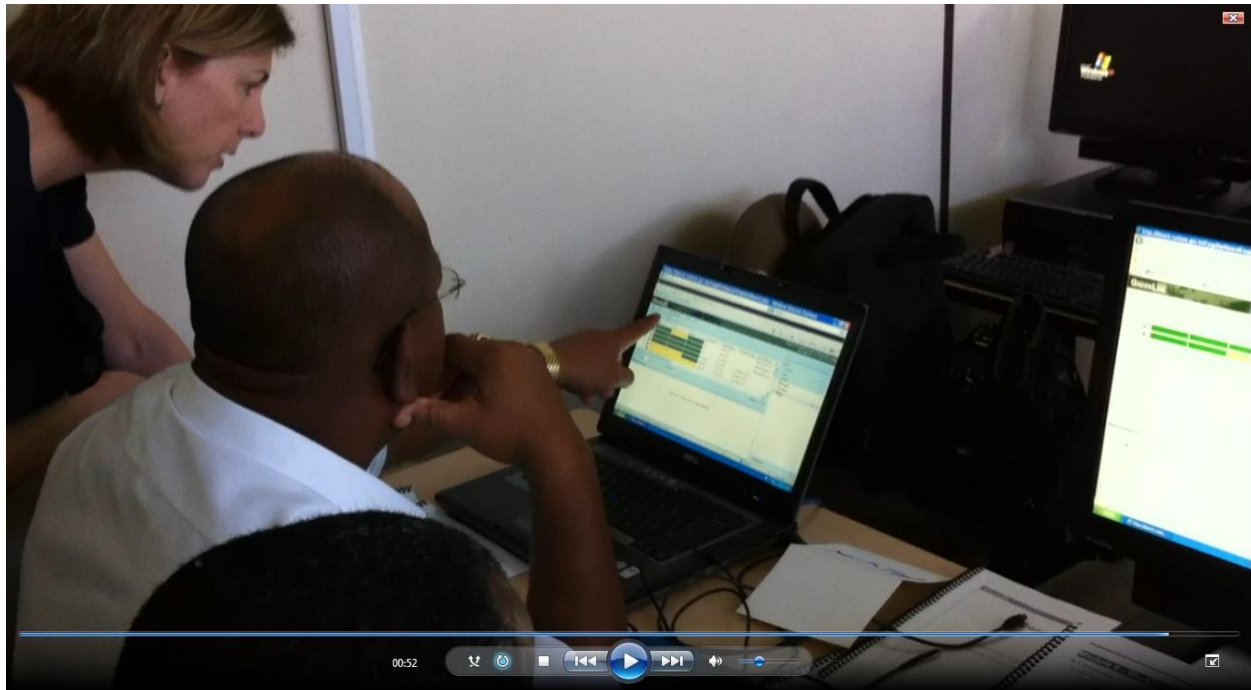
BCED has continued its modernization activities while using a technology platform as the core decision-making tool for cargo and imports entering Barbados. Performance measurement criteria have been put in place to measure increases in duties and taxes collected and overall enforcement actions. Low-risk trade will be facilitated, thus increasing revenues and promoting

economic growth and sustainability. High-risk trade will be the focus of efforts which will hinder illegal and illegitimate trade, identify evaded revenue, and increase overall enforcement actions.

As of 2010, this is the first known time an automated risk management system has been fully integrated with the ASYCUDA commercial filing system. In addition, this automated risk management system leverages the World Customs Organization's (WCO) Standardized Risk Assessments (SRAs), and Global High Risk Indicator Document (GHRI) within the default system rules. This is also the first occasion in which a WCO product (i.e., SRAs and GHRI) has been this closely integrated with ASYCUDA. Promoting compatibility between the WCO and ASYCUDA or any automated customs management system can be seen as an added success for customs management worldwide.

Barbados has made a significant step forward in its modernization that can be considered a benchmark and best practice for other partner customs administrations in the Caribbean, Latin America, and around the globe. Now successfully deployed and operational, the technology platform provides BCED with a systematic approach to adopting risk management for decisions at the border and stages an efficient and secure system to manage their border.

Figure 19: BCED Officer using the Technology Platform to Risk Assess Commercial Data



5. Managing Business Changes

5.1 Organization Considerations

Effectively managing change within large organizations poses significant challenges. Administrations that have successfully pursued a customs modernization program have made change management a priority. Failing to do so can lead to resistance to change, employee turnover, and overall lowered productivity. Common tactics that previous customs administrations have used to manage the impacts of changing business processes and focuses are:

- Establish a steering committee composed of executive members of, at a minimum, customs and finance, since issues of customs control, revenue, and trade facilitation will be central to the committee's operation. Any agency that intends to be involved in joint risk assessment, inspection, or data sharing endeavors should also be represented. This committee should have obvious senior executive sponsorship and be empowered to drive legal, policy, and procedural changes throughout their organizations.

- Phased-in approaches and pilot projects should be used where possible to accustom staff to new business processes and software systems.
- Communicate often internally to inform staff of recent changes, the impacts, and the rationale behind them.
- Communicate proactively with trade and industry groups regarding changes that will impact them.

5.2 Human Resource Considerations

Risk management can allocate scarce human resources to where they will provide the maximum value to a nation. Sufficient training in new targeting and inspection processes help ensure this value is realized. Extending the normal training of customs officers to include the principles of relevant trade operations, supply channels, and data available should be considered. It is encouraged to vary operational staff across ports to promote the sharing of investigative techniques outside of formal training.

Standardization and clarification of job roles, particularly the separation of duties, should be performed at the outset of any broad customs modernization. These should be communicated to staff and the trading community at large to aid the private sector in communicating and working effectively with the newer processes. Finally, communication of a solid human resource plan can aid in change acceptance by allaying concerns of redeployment or layoffs.

5.3 Performance Management

An organization experiencing business change must have the ability to measure the impact of that change on performance. These measurements can expose issues at the earliest possible point and trigger remedial actions as appropriate. Validating of the effort to enact the business transformation can also be aided through concrete performance statistics.

Some basic recommendations for performance management are as follows:

- Create common definitions and terms for communication between management and employees
- Define measures in terms of owner, unit of measure, collection frequency, and data quality
- Measure actual accomplishments, not merely work that is performed

- Use targets and thresholds to focus employees' attention on what matters most to succeed
- Regularly review these metrics and targets, particularly as new programs and processes are added

A common performance metric in the customs domain is the time to process a cargo shipment. This should have a defined start point (e.g., receipt of the importer's declaration) and a defined end point (e.g., release of the goods). Clear responsibility boundaries should exist between control agencies with regards to their actions on each shipment, for example, review of the declaration, initial triage or full container inspection. Internal education programs should make employees aware of average release times for high, medium, and low-risk shipments and encourage improvement upon those benchmarks. Both achievement of shorter average release times and counter-balancing achievements (e.g., seizures) should be recognized internally. Overall, performance measurement is integral to a successful business transformation and should be managed as a key part of such a change.²⁸

6. APPENDIX A: Table of Recommendations

Overall, this report recommends adopting a balanced approach to risk management modernization, with specific strategic, tactical, and operational recommendations²⁹ outlined below to promote the doctrine of risk management.³⁰

6.1 Strategic Recommendations

The strategy of an organization defines its goals and direction needed for desirable outcomes. A developing customs administration should consider implementing the following six strategic recommendations:

²⁸ Significant literature has been written on this subject and the intention of this section is only to highlight considerations that could be explored in the future, not provide an exhaustive discussion of all aspects of performance management.

²⁹ Sourced from the GreenLine Systems implementation methodology

³⁰ The differences between the terms *doctrine*, *strategy*, *tactics* and *operations* can be complex and the sentences in this section attempt to apply them to a Customs administration. For a lengthy discussion on the usage in corporate and military parlance, see <http://www.ribbonfarm.com/2007/09/24/strategy-tactics/>

#	Description	Expected Outcome	Desired Outputs (Tasks)	HR Composition	Comments
S1	Establishing a steering committee to provide policy direction and measure progress with respect to implementing a risk management doctrine. This committee should have the necessary authority to change laws, policies and business processes throughout the customs administration.	Steering Committee	This Committee will approve: • Trade - Customs Legislation • Policies • Business Process	Customs and Trade Agency upper management	The proper implementation of a Risk Management project depends on the ability of this committee to expediently approve modifications in legislation, policies and processes
S2	Establishing a transition team with the authority and desire to drive change throughout the organization.	Transition Team	• Align incentives for personnel and stakeholders within the program • Ensure the infrastructure and organizational needs for the new program exist • Produce training and communication materials for all affected personnel • Develop Standard Operating Procedures (SOPs) to enhance existing risk management practices and support the business transformation.	• Customs and Trade Agency upper management • Key Expert Consultants (Ad Hoc)	The addition of external consultants is desirable at this stage to bring an unbiased view. The participation of the private sector is recommended to align them with the proposed changes.
S3	Establishing a regular risk assessment working group of customs and representatives from other domestic agencies that have an interest in border security.	Risk Assessment Working Group	• Align and merge existing screening programs across agencies into a common risk management approach • Construction and maintenance of the risk management framework, threat rankings and response selections • Determine an	• Customs and Trade Agency Risk Mgmt Officials • Inter-Agency Risk Management Personnel • Risk Management Expert Consultants	This working group will remain beyond the implementation of the project to provide maintenance to the Risk Management Framework

#	Description	Expected Outcome	Desired Outputs (Tasks)	HR Composition	Comments
			approach for providing joint inspection services • Determine reporting requirements (time & content) from trade • Determine common data elements and acceptable formats needed for such reporting	(Ad Hoc)	
S4	Drafting a dynamic risk management framework to shape future targeting within common pillars, goals and objectives. This framework should align with the existing international frameworks of: • EU Risk Management Guide • WCO Safe Framework • WCO RM Guide • APEC SAFE Framework • Kyoto Convention	Risk Management Framework	Establish pillars, goals and objectives for future risk targeting	• Risk Assessment Working Group • WCO and Multilateral Expert Advisors • Risk Management Expert Consultants	This framework is dynamic and will require an ongoing commitment. The framework will form the core of the future customs program.
S5	Reviewing of customs and trade legislation to provide the: • Relevant authorities to the appropriate field personnel • Simplification to ease application of laws by field personnel • Separation of duties to limit corruption • Use of joint, cross-agency, inspections with clarifications as to each agency's role and mandate	Trade / Customs Legislation	Review and draft new legislation, policies and business processes to be approved by the Steering Committee.	• National Legal Experts • Transition Team	This recommendation depends heavily on the support of the Steering Committee to achieve approval of new legislation.

#	Description	Expected Outcome	Desired Outputs (Tasks)	HR Composition	Comments
S6	Establishing of the legal and privacy foundation to enable the sharing of select customs information with domestic and international agencies	Legal Framework to Share Information	- Review and draft new legislation to share information, to be approved by the Steering Committee - Establish Workshops with Domestic and International Agencies to draft information sharing agreements	- National Legal Experts - Transition Team	Sharing of information at an international level will require the participation of different governments on common fora.

6.2 Tactical Recommendations

Tactically, an organization must also decide what specific actions are appropriate for its operations people to undertake. A developing customs administration should consider implementing the following tactical recommendations:

#	Description	Expected Outcome	Desired Outputs (Tasks)	HR Composition	Comments
T1	Performing a cost/benefit assessment of existing customs software and the capabilities of existing COTS products in the market with regards to automating targeting and risk assessment processing. The optimal solution selected should align with WCO international standards and the risk management framework of the administration. A proof-of-concept project should then be initiated with the most effective	Proof-of-Concept Project	- Cost Benefit Assessment - Risk Management Project Draft	Risk Management Expert Consultants	This is the tactical implementation that will provide momentum for change while avoiding previous pitfalls in modernization.

#	Description	Expected Outcome	Desired Outputs (Tasks)	HR Composition	Comments
	option.				
T2	Establishing a pre-arrival targeting and risk screening component into existing border control programs.	Pre-arrival targeting and risk screening component	• The ability to generate program decisions on cargo and passengers before arrival will be used to facilitate low risk entries and target high risk entries for exam. • If other considerations prevent a facilitative approach (for example, legislation mandating 100% screening), high risk shipments should be targeted to undergo a more comprehensive inspection, while low risk entries should have a faster, less resource-intensive inspection.	• Risk Assessment Working Group • WCO and Multilateral Expert Advisors • Risk Management Expert Consultants	More thorough inspections on selected shipments results in more seizures for a given set of resources.
T3	Empowering cross-agency decision-making at the field level	Collaborative Border Management	• Establish and use standardized risk assessments and indicators to be used throughout the agencies. These should incorporate and build upon the existing WCO Standardized Risk Assessments (SRA) and General High Risk Indicator (GHRI) documents. • Interoperable decision-making across all agencies to encompass all people and goods	• Risk Assessment Working Group • Inter-Agency Risk Management Personnel	Open channels of communication at varying levels are key for successful cross-agency communication.

#	Description	Expected Outcome	Desired Outputs (Tasks)	HR Composition	Comments
			crossing borders		
T4	Acquiring the human and technical resources to expand the available inspection types to incorporate such technologies as x-ray, gamma-ray, and canine inspections	Advance Inspection Mechanisms	- Fully implemented State-of-the-Art Inspection Technologies: - X-Ray, - Gamma-Ray - K9 Team	- Risk Assessment Working Group - WCO and Multilateral Expert Advisors - Risk Management Technology Expert Consultants	Short Term for definition and implementation; Permanent for the incorporation of new inspection mechanisms
T5	Establishing a trusted trader program with concrete facilitation benefits to trade in exchange for them undertaking the obligation to secure their supply chains and be subject to validation of such.	Trusted Trader Program	Authorized Economic Operator program in place	WCO and Multilateral Advisors	Any AEO program needs to be aligned with the AEO programs of trading partners. It is paramount to have mutual recognition.
T6	Determining of which nations and international agencies customs should engage in a data-sharing protocol with. Technical and timing constraints should be carefully considered, such as ease of integration into existing customs business and software processes.	International Data Sharing Program	International Agreements between trade partners for data sharing	- Transition Team - National Legal Teams - Ad Hoc International Experts and Multilateral Advisors	This activity requires the establishment of a Legal Framework to share information (S6)

6.3 Operational Recommendations

Operationally, an organization's members must apply the appropriate tactics for a given situation in order to align with its strategic goals. A developing customs administration should consider implementing the following operational recommendations:

#	Description	Expected Outcome	Desired Outputs (Tasks)	HR Composition	Comments
O1	Establishing of control processes that incorporate risk management concepts throughout the pre-arrival, arrival and post-clearance stages of the customs process.	Risk Management Control Processes	Define Risk Management Control Processes	- Risk Assessment Working Group - Risk Management Expert Consultants	These are the business processes that actualize the strategic risk management goals.
O2	Establish/strengthen a post-clearance audit unit to continually validate, monitor and review control processes and trusted trader programs.	Post-clearance audit unit	- Fully equipped and operational Post-Clearance Audit Unit - Bi-Annual Report with validation of Control Processes - Annual Report of Trusted Trader Program	Customs and Border Control Agencies	Many agencies have a post-clearance audit unit. This unit should be fully aware of the Risk Management Framework and technology at its disposal. Training might be necessary.
O3	Communicating with trade entities through an outreach program to advise, educate and assist with the new processes and requirements that customs is initiating as part of a risk management doctrine.	Private Sector Interaction	- Create Outreach Program - Deploy Private Sector Risk Management Workshops	- Transition Team - Private Sector - International Expert Speakers - Ad Hoc Marketing team - Expert Consultants - Government Agency in charge of Government Outreach programs if available	Long Term based on milestones. i.e. new procedure in place implies creating a workshop to present it to the private sector
O4	Determining the business processes with which customs	Data Sharing Business	- Daily working processes - Arrangements for	- Legal Experts - Transition Team	Scheduling data sharing reinforces its

#	Description	Expected Outcome	Desired Outputs (Tasks)	HR Composition	Comments
	data would be shared amongst domestic and international agencies. Similarly, the business processes for integrating external (but still domestic) or internationally-acquired data must also be defined.	Processes	periodic sharing of risk assessment data	• Risk Assessment Working Group	importance.
O5	Determining the operational procedures by which joint inspections will occur	Joint Inspections Operational Procedures	• Daily working processes	• Risk Assessment Working Group • Risk Management Expert Consultants	One activity would be providing feedback to strengthen the risk management framework.

7. APPENDIX B: Qualitative & Quantitative Estimation of Probability

There are two major methods of determining the probability of an event – **qualitative** and **quantitative**. The *qualitative* method uses expert judgment and experienced personnel to broadly categorize risks in terms of their likelihood of occurrence. The *quantitative* method of analysis assigns actual numeric probabilities to risks based upon historic information and studies.

When analyzing risks in a *qualitative* manner, it is important that everyone involved exercise their judgment according to the same criteria. To aid this, a common **scale** of ranking should be developed against which risks are measured. This could be a simple numeric scale (e.g., 1-10) or text descriptions (e.g., “low,” “medium” and “high”) and need only be to a sufficient level of granularity to permit meaningful decisions on their probability. This scale should take into account multiple factors such as intelligence evaluations, previous incident history, and known source agents of the threat.

The following chart could be used to factor in intelligence evaluations, event histories, and known data about the groups or source agents behind a potential risk to produce a qualitative ranking of the likelihood of the event occurring during any given border crossing.

Figure 20: Sample Qualitative Ranking Chart

Rating	Intelligence Evaluation	Event History	Source Agents
10 Urgent	Scenario is imminent. The likelihood of this risk occurring in a given customs transaction is very likely . Internal decision-makers, external law enforcement and/or intelligence agencies determine the threat is credible .	Event has occurred frequently in the past in this administration.	Multiple, large, highly organized groups exist, are capable and highly motivated to instigate this threat.
8 High	Likelihood of scenario is high. The likelihood of this risk occurring in a given customs transaction is probable . Internal decision-makers and/or external law enforcement and intelligence agencies determine the threat is credible .	Event has occurred in the past in this administration.	At least one large, organized group exist, is capable and motivated to instigate this threat
6 Medium	Likelihood of scenario is medium. The likelihood of this risk occurring in a given customs transaction is possible . Internal decision-makers and/or external law enforcement and intelligence agencies determine the threat is known, but is not verified .	Event has occurred in the past, in other administrations with strong customs controls.	Multiple loosely organized groups, perhaps of smaller size, exist that are capable and motivated to instigate this threat
4 Low	Likelihood of scenario is low. The likelihood of this risk occurring in a given customs transaction is possible . Internal decision-makers and/or external law enforcement and intelligence agencies determine the threat exists, but is not likely .	Event has occurred frequently in the past, but only in other nations with weak customs controls.	A select few groups, either small or disorganized, exist that are capable and motivated to instigate this threat
2 Minimal	Likelihood of scenario is remote / negligible. The likelihood of this risk occurring in a given customs transaction is negligible . Internal decision-makers and/or external law enforcement and intelligence agencies determine the threat is non-existent or extremely unlikely .	Event has occurred infrequently in the past and only in other nations with weak customs controls	The few groups that do exist are both small and disorganized, or lack sufficient motivation to instigate this threat

At a minimum, all identified risks should undergo the above level of analysis to estimate a probability. For those risks that are either.

- sensitive due to current organization priorities,
- estimated to be close in probability to each other,
- have changed recently,

- are new to the organization;

It is recommended that a more detailed *quantitative* analysis be performed. Some common techniques (and issues) used in quantitative analysis of risk are:

- Enforcement and/or referral statistics
 - This is the use of previous records of enforcement, usually compared to overall shipment volumes, to generate a meaningful probability
 - While useful to acquire a general feel for the level of probability of a given risk, without a baseline of mathematically random inspections, it is impossible to know the inherent biases. For example, the decision of individual officers to refer a shipment can often depend upon current policy focuses, current events, or the officer's experience and training (which understandably vary among officers).
 - In addition, particularly rare risks are often over-represented as they tend to be higher-impact and receive proportionally higher detection resources
- Interviewing/Delphi techniques
 - This is the simple expedient of asking customs personnel to assign a numeric probability to each qualitative ranking. For example, a panel of suitable experts may decide that, for a given administration, an imminent threat (from Figure 2) has a 20 percent chance of occurring in any given customs transaction.
 - This suffers from personal bias as per enforcement statistics above
- Intelligence studies
 - Using intelligence gleaned from undercover operations and informants, it is occasionally possible to determine more accurately how many threats in a time period were performed by a given source group and what percentages of those were successful.
 - The accuracy and credibility of the sources used for this determination should be carefully considered.
- Sponsored scientific case studies
 - This is the performance of a systemic sampling of customs transactions, correlated with enforcement actions, in the administration in question, to determine the exact rates of risk presence over time.

- These are usually the most accurate methods for determining a quantitative probability for an event.
- Particularly rare risks are often under-represented (non-existent) by sampling techniques, and care should be taken not to assume a rare risk has a zero probability simply due to its absence in the samples chosen.
- Records of case studies at other administrations
 - These are case studies performed by either research groups or other administrations
 - Care must be taken to ensure that assumptions and definitions in the studies are applicable to the customs administration that is using the resultant probabilities.
 - These can be very cost-effective

8. APPENDIX C: Estimating Risk Impacts

Some risks are more complex to quantify an impact for than others. Ideally, a more statistically sound and nationally applicable study should be used to calculate real numbers with a reasonable degree of accuracy. But for the purposes of an initial risk analysis, the following mechanisms may suffice to rank risks.

The costs of misclassification and direct revenue-related offenses can usually be estimated through examination of indictment rates for customs fraud-related offenses compared to the total amount of duty revenue collected. The general concept is to make the assumptions that all fraud-related offenses are independent, of the same value, and that individual customs transactions have some relation to the Gross Domestic Product (GDP) of a country. Thus, given some basic statistics for a developing nation shown in the example below one could estimate that, approximately $[\$5\text{B} * 0.25 * (200,000 / 40\text{M}) * 0.5] = \3.125M is the direct lost revenue on a yearly basis from this risk alone. Additional factors that could also be incorporated into this calculation include the impact from deterring legitimate trade (due to the perceived lack of a level playing field for imports) and the positive correlation between a high value of misclassification offenses and corruption within customs itself.

Figure 21: Sample Statistics of a Fictional Developing Nation

Country GDP	\$5,000,000,000 (billion)
Percent of GDP attributed to duties & taxes	25%
Number of customs transactions per year	40,000,000 (million)
Number of customs transactions that involved misclassification, nonpayment or other fraud	200,000
Average loss of duty / tax from a given misclassification offense	50%

Publicly available reports may be obtainable for other threats that are more international in nature, such as the impact of illicit drugs on society, from research institutions that have already performed similar studies. Even if these are not completely independent of a nation, reasonable results can often be extrapolated back to the nation of concern. For example, one study³¹ indicates the costs to U.S. society of illicit drugs are approximately \$181 billion. Expressed as a percentage of the U.S. GDP (\$14.119 trillion³²), this represents effectively 1.2 percent of the entire national production being diverted. When applied to the above, fictional, statistics of a developing nation, that would translate into this risk accounting for a $[1.2\% * \$5 \text{ billion}] = \60 million monetary impact on society. Care must be taken however, to interpret the results of these public studies appropriately. In this example using drugs, additional factors such as the impact on trade relations if a trade partner perceives that illicit drug usage is commonplace or the positive correlation with corruption should again also be considered.

Finally, quantifying the cost of terrorism can be exceptionally vexing, as not only does it tend to be a low-probability risk, but in many cases the complete economic costs are unknown as there has yet to be a precedent set for certain incidents. That notwithstanding, there have still been studies performed that have applied estimation techniques to calculating the impact of a terrorist act on the economy in addition to the impact from the destruction of property alone. A nuclear attack at a major U.S. seaport could cause losses of up to \$500 billion and disruption of trade valued at 200 billion (U.S. Congressional Research Service, 2005). As a result of the attack, countries would be afraid to trade with the affected country because of the absence of

³¹ Office of National Drug Control Policy. The Economic Costs of Drug Abuse in the United States: 1992-2002. Washington, DC: Executive Office of the President (Publication No. 207303), 2004.

³² http://en.wikipedia.org/wiki/List_of_countries_by_GDP_%28nominal%29

sufficient security. The report states that during heightened terrorism from 1975-91, annual FDI (Foreign Direct Investment) was reduced by 13.5 percent from Spain and by 11.9 percent from Greece.

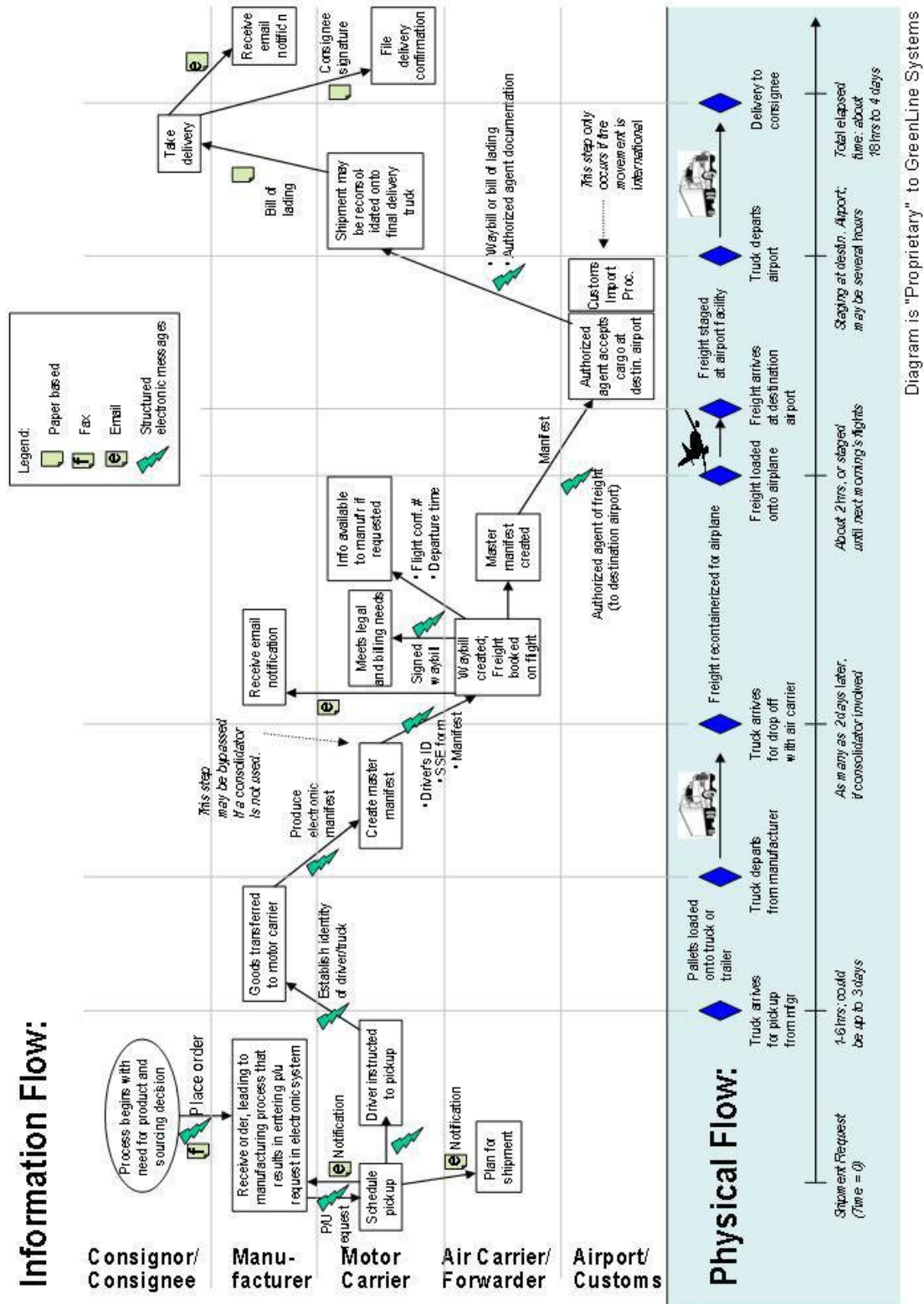
Figure 22: Economic Impacts of Terrorist Acts

Terrorism Act	Economic Cost of Event
Ongoing terrorism threats in the United States	Loss of about 0.2% U.S. GDP
Terrorist attack on pipelines in Pakistan	Disruption in natural gas supplies to business deferring investors in future pipelines
Terrorist bombing tragedy in Bali	Tourist arrivals fell by 2.2%, 1% of Indonesia's GDP
Heightened Terrorism during 1975-91	Reduced FDI inflow by 13.5% in Spain and 11.9% in Greece
After 9/11 incident	2001 international tourist arrivals fell by 0.6% the first year of negative growth since 1982
Terrorism Events	Currency of economies seen as carrying higher risk premiums and may experience exchange rate volatility and depreciation in response to terrorism events as investors switch to US dollar.

Source: B. Frey, S. Luechinger, A. Stutzer, "Calculating Tragedy: Assessing the Costs of Terrorism", 2007

The table above demonstrates some of the economic impacts that have been calculated from previous major terrorist attacks on U.S. interests. Economic impacts range from short-term loss in tourism to long-term reductions in foreign investment due to fear of unsecure supply chains. Also as supply chains become more unsecure, insurance costs increase, which will ultimately be added to the supply chain costs passed on to consumers and retard economic development.

9. APPENDIX D: Sample Air Cargo Supply Chain Dataflow



10. APPENDIX E: Sample Air Way Bill

999 YXY 00018830		999 00018830				
SHIPPERS NAME AND ADDRESS SHIPPERS ACCOUNT NUMBER 79815100		NOT NEGOTIABLE AIR WAYBILL (AIR CONSIGNMENT NOTE) YOUR AIRLINE Airline's contact information It is agreed that the goods described herein are accepted in apparent good order and condition (except as noted) for carriage SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILITY. Shipper may increase such limitation of liability by declaring a higher value for carriage and paying a supplemental charge if required. TO EXPEDITE MOVEMENT, SHIPMENT MAY BE DIVERTED TO MOTOR OR OTHER CARRIER AS PER TARIFF RULE UNLESS SHIPPER GIVES OTHER INSTRUCTIONS HEREON				
CONSIGNEES NAME AND ADDRESS CONSIGNEES ACCOUNT NUMBER 53703680		ISSUING CARRIERS AGENT NAME AND CITY ALSO NOTIFY NAME AND ADDRESS (OPTIONAL ACCOUNTING INFORMATION)				
AGENTS IATA CODE 999 AIRPORT OF DEPARTURE (ADDR OF FIRST CARRIER) AND REQUESTED ROUTING Whitehorse		ACCOUNTING INFORMATION INVOICE :				
ROUTING AND DESTINATION TO BY FIRST CARRIER 4N TO YOC BY 4N TO YEV BY 4N YDA AIRPORT OF DESTINATION Inuvik FLIGHT/DATE 307E 31/01/03		CURRENCY CHGS WT/VOL OTHER DECLARED VALUE FOR CARRIAGE DECLARED VALUE FOR CUSTOMS CDN CODE PPD COLL PPD COLL NVD NCV AMOUNT OF INSURANCE INSURANCE- If shipper requests insurance in accordance with conditions on reverse hereof, indicate amount to be insured in figures in box marked amount of insurance TC				
HANDLING INFORMATION these commodities licensed by US for ultimate destination Diversion contrary to US law is provided						
NO. OF PIECES RCP	GROSS WEIGHT	RATE CLASS COMMODITY ITEM NO.	CHARGEABLE WEIGHT	RATE CHARGE	TOTAL	NATURE AND QUANTITY OF GOODS (INCL. DIMENSION OR VOLUME)
1	16	P	16.00	1.60 NSC 7%	25.60 1.79	FISH NOT RESTRICTED
1	16.0				27.39	
A. 27.39		B. DELIVERY CHARGES		C. DEST. ADVANCE CHARGES		D. DESCRIPTION OF ORIGIN ADVANCE
E. TAX		F. SHIPPER'S R.F.C.		G. OTHER CHARGES AND DESCRIPTION		H. ITEMS PREPAID
I. 1.92		J. TOTAL OTHER CHARGES DUE AGENT		K. TOTAL OTHER CHARGES DUE CARRIER		L. DESCRIPTION OF DEST. ADVANCE
M. COD →		N. CURRENCY		O. TOTAL PREPAID		P. TOTAL COLLECT
Q. TOTAL PREPAID		R. TOTAL COLLECT		S. EXECUTED ON		T. SIGNATURE OF SHIPPER OR HIS AGENT
U. CURRENCY CONVERSION RATES		V. TOTAL COLLECT IN DESTINATION CURRENCY		W. 30-01-2003 12:50 Whitehorse		X. SIGNATURE OF ISSUING CARRIER OR ITS AGENT
Y. FOR CARRIERS USE ONLY AT DESTINATION		Z. CHARGES AT DESTINATION		AA. TOTAL COLLECT CHARGES		AB. 999 00018830

11. APPENDIX F: Example of Advance Data Reporting Regulations

The European Advance Cargo Declaration Regime³³ will finally enter into force on January 1, 2011. A number of shipping companies are already complying with it. However, compliance will be mandatory from that date. The Regime aims to tighten security with respect to goods entering or leaving the EU by means of more efficient customs controls and a common risk management framework. The idea behind it is to identify high-risk cargo in advance of a vessel's arrival so that authorities can take proper action. The Regime is similar to the U.S. advance reporting scheme and will therefore have the greatest impact on container vessels and lines, although it applies to all vessel types. It is in addition to existing customs rules and is a further regulatory burden on ship operators.

The Regime is comprehensive. It will apply to all goods imported to or exported from the EU, and to transit goods which are not in free circulation. It will cover all shipping sectors: deep sea containerized shipping, deep sea bulk shipping, short sea shipping and combined transport. It will apply to all "economic operators," meaning anyone involved in the course of their business in activities covered by customs legislation. Economic operators will be obliged to declare certain cargo information to customs offices in advance, rather than upon presentation for import or export. Under the Regime, all cargo declarations must be made electronically. This is likely to require changes to the computer systems of customs authorities and shipping companies. (There is no common electronic standard across the EU.)

The Regulations are detailed. Key points to note are as follows:

1. Where cargo is being imported into the EU, an Entry Summary Declaration (ENS) must be sent electronically to the customs authorities at the first port of entry into the EU, irrespective of whether the goods are due to be discharged at that port or not. For deep sea containerized cargo, the ENS must be submitted at least 24 hours prior to loading (at a non-EU port) the vessel that will bring the cargo into the EU. There are shorter time limits for deep-sea bulk (four hours prior to arrival) and short sea sailings (two hours prior to arrival) and road/rail movements.
2. A number of major shipping lines are already requiring customers to provide specified information well in advance of shipment in order to allow them to comply

³³ This article reproduced from the European Community Shipowners' Associations newsletter <http://www.ecsa.be/newsletters/EU%20advance%20cargo%20declaration.pdf>

with the Regime. The kind of information required will include the bill of lading number, shipper and consignee name and address, notify party (mandatory if consignee is “To order”), acceptable goods description, four-digit HS commodity code, package type, number of packages, container number, gross weight of cargo (in kg), UN code for dangerous goods, seal number, and method of payment for prepaid cargo.

3. Where goods are being exported from the EU, the declaration is provided either on a customs declaration for export, re-export for outward processing, or, where none of those is applicable, on an Exit Summary Declaration (EXS).
4. Vessels must also submit an Arrival Notification (AN) at their first port of entry into the EU. This allows customs to identify all ENS data for cargo onboard.
5. “Authorized Economic Operator” (AEO) status can be granted where a company is recognized by authorities as presenting a low security risk. Economic operators with AEO status will be permitted to declare less cargo information.
6. The legal responsibility for ensuring that an ENS is submitted lies with the ship operator. While an ENS can be submitted by a ship’s agent on its behalf, the responsibility remains with the operator.
7. A freight forwarder can also submit the ENS but only if the ship operator consents. In these circumstances, ship operators may seek indemnities from the forwarders for any inaccurate information submitted. This approach may be particularly relevant in the containerized trade.
8. Responsibility for submitting the advance cargo declaration shifts from the ship operator in two special cases:
 - i. Combined transport (i.e. trucks being driven onto ro/ro vessels). Here, the truck company/driver is responsible for the advance cargo declaration.
 - ii. A Vessel Sharing (or Slot) Agreement (often used in the container trade), where the bill of lading issuing carrier is responsible.

Non-compliance with the Regime could result in financial penalties being imposed by Member States. It could also lead to vessel delays, interruption to cargo operations, and disruption of cargo flows and supply chains. Ship operators should therefore ensure that they understand the requirements of the Regime and have implemented any necessary changes to their

procedures in advance of it coming into force. An IT review to ensure compatibility with the IT systems of customs authorities in relevant countries is also recommended. Finally, ship operators may wish to have regard to the Regime when drafting charter parties, vessel sharing/slot agreements and bill of lading contracts, to ensure that responsibility for submission and liability for information submitted under the Regime is clear.

12. APPENDIX G: Expert Automated Risk Assessment System Components

Customs administrations should consider procuring automated risk assessment systems that help the administration strategically, operationally, and tactically identify high-risk people, goods, and conveyances. These *expert systems* provide end-to-end risk management and inspection solution for customs, border, and government single window applications and are the greatest catalyst needed to move a customs or border administration towards a risk management regime. These systems should provide an easy-to-use graphical user interface (GUI) and a logical workflow that delineates roles and responsibilities to ensure that the right people have the right information at the right time to mitigate vulnerabilities and threats to a country's health, safety, and security.

An automated risk assessment system should include the following components:

- Data Extraction and Management
 - These are components that integrate customs transactions and historical data.
- Risk Assessment Framework
 - These are configurable set of parameters that supports the risk assessment process and provides the foundation for selectivity and inspection processes.
- Pre-Clearance Risk Assessment
 - These are tools that provide end-to-end transparency of the risk assessment and inspection processes performed via operational content and pre-clearance risk analysis profiles.
- Post-Clearance Risk Analysis
 - This is audit-based analysis functionality utilized to determine candidates for new risk profiles and selectivity profiles that will target future transactions.
- Control and Case Management

- This is a mechanism that allows for the management of an electronic dossier of tasks, case files, activities, and findings relating to pre- and post-clearance controls.
- Selectivity Profiling
 - This is a component that refers transactions based on pre-defined selectivity profiles. This should also incorporate some capacity for random selections.
- Business Intelligence and Reporting
 - These are services that provide comprehensive and robust reporting capabilities.
- Conveyance Based Risk Assessment
 - This is a module that fuses vessel geospatial and registration data into a holistic graphical display for marine conveyances.

12.1.1 Data Extraction and Management

Any risk assessment system should be capable of extracting and loading transactions in a variety of common formats including the common EDI formats of EDIFACT, ANSI, and XML. These can be received from a variety of data sources in both batch and real-time modes, and the system should be capable of processing in either mode. In addition, these extraction processes should be customizable to allow for full integration with legacy systems.

12.1.2 Risk Assessment Framework

A robust and highly configurable risk process to identify transactions for inspection or release should be a capability of any risk assessment system being used by customs administrations and their partners.

The overall framework should contain rules extracted from the World Customs Organization's Global High Risk Indicator (GHRI) document, and the WCO Standardized Risk Assessments (SRAs). Both intelligence products are derived from the WCO's Global Information and Intelligence Strategy (GIIS), which forms as a foundation within the WCO's *SAFE Framework of Standards to Secure and Facilitate Global Trade*. The framework should draw from a number of benchmarks and industry best practices originating from developed customs administrations such as those operating within the European Union, the United States Customs and Border Protection, and the Canada Border Services Agency.

Risk assessment rules should be grouped into levels of granulation by utilizing a parent-to-child relationship methodology. The top groupings should be aligned to policy focuses, such as Revenue Evasion, Narcotics and Security, whereas subsequent child groupings should be aligned towards anomalous supply chain behavior.

These groupings of rules should be highly configurable with a rules editor included in the overall platform. This will allow a customs administration to modify the initial framework as a result of policy changes, post-clearance analysis (PCA) results, and intelligence efforts. By providing an adaptable framework with end-user tools, the system should provide a customs administration with the capability to continually adapt to current international best practices and indicators.

12.1.3 Pre-Clearance Risk Analysis

An automated risk assessment system should be capable of providing customs with a single, central control space where operational content and risk analysis data is presented in a user-friendly GUI. It should provide a holistic view of operational content, including inspection results and the results of ad-hoc risk analysis and identification tasks.

12.1.4 Post-Clearance Risk Analysis

On-Line Analytical Processing (OLAP) should be available in a risk assessment system to satisfy post-clearance analysis requirements. This component should provide the customs administration with the capability to analyze and manipulate data utilizing a robust set of functions that query stored data submissions and examination results.

12.1.5 Control and Case Management

Tasking and case management functionality for the management of inspections and other case types as defined by a customs administration must also be part of any risk assessment system. This functionality will be used to complete the risk management cycle and integrate the judgment and decision-making of the analyst or inspector with the actions and findings of field personnel. Individual case files, workflows, and results templates are used to support both pre-clearance and post-clearance controls. These features of a system provide the standard workflow capabilities one would expect allowing for intra-agency collaboration, inter-agency reporting, collection of metrics, and performance measurement.

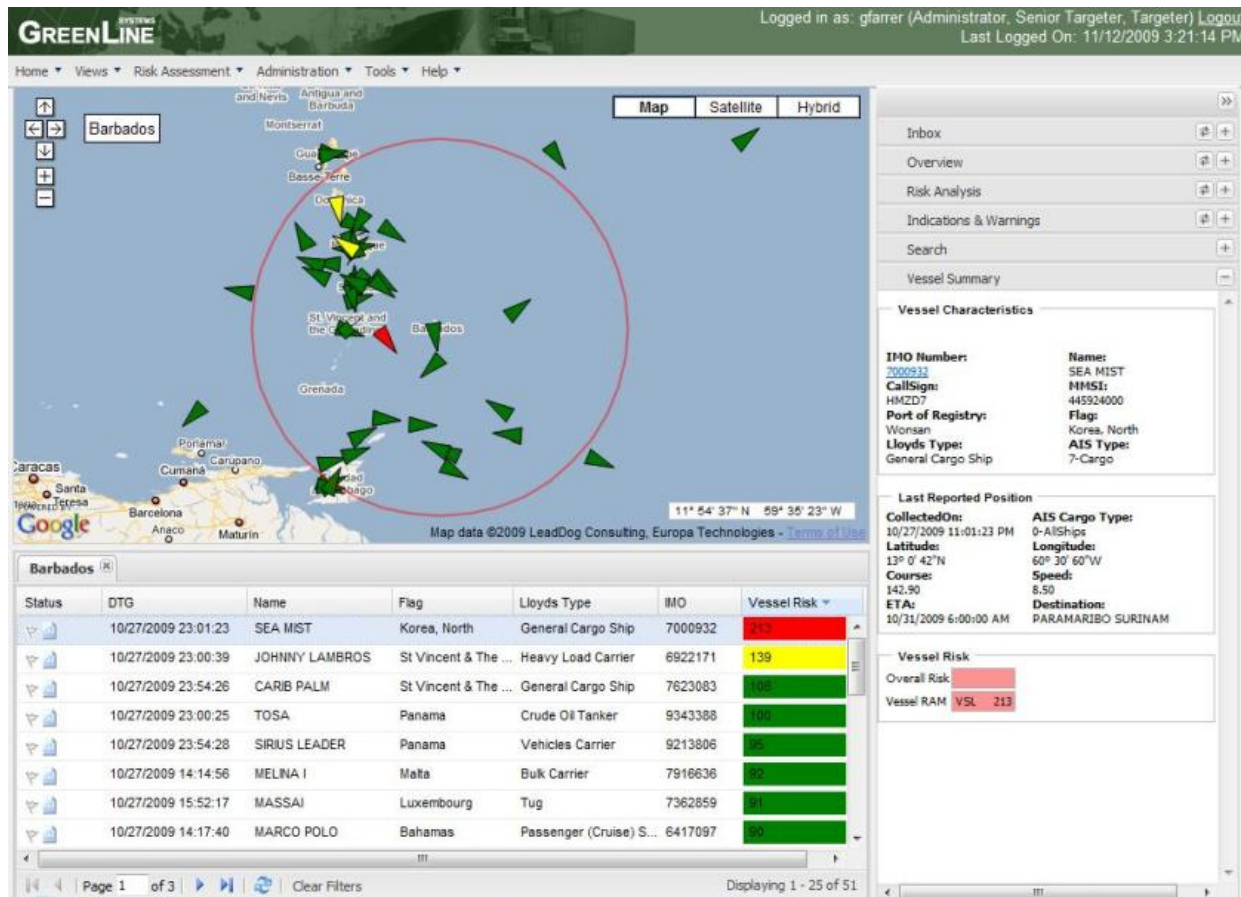
12.1.6 Business Intelligence and Reporting

An automated risk assessment system should be capable of providing a customs administration with several types of managerial and performance reports to supplement the end-to-end system process with consolidated information, key metrics, and statistics. Other useful capabilities, whether within the core reporting modules or in additional add-on modules, would be full-text searches, link-analysis, statistical regressions, sequence clustering, neural net training, text mining, or other common data mining features.

12.1.7 Conveyance Risk Assessment

An automated risk assessment system should also be capable of provide a customs administration with a conveyance risk assessment module. In the maritime mode, this should fuse real-time automatic identification system (AIS) vessel positional data, vessel characteristics, ownership information, schedules, inspections and detentions, and historical movement data with shipment, container, or crew information into a common customs operating picture. Analysts can select a vessel and then drill to the cargo records to view the risk scores for all manifests received to date. An example of a conveyance risk assessment application is demonstrated in the following figure:

Figure 23: Sample Conveyance Risk Assessment Application



Source: GreenLine Systems Inc, 2009

Additional risk analysis can be performed using data sources such as AIS, Lloyd's-Register Fairplay, Lexis-Nexis, Advanced Notice of Arrival, and Port/Vessel Traffic Systems to identify suspect activities such as loitering, rendezvous, irregular operations, unusual commercial practices or fleet management activities which may be an indication of smuggling behavior.

12.1.8 Hop-linking / Pattern Analysis

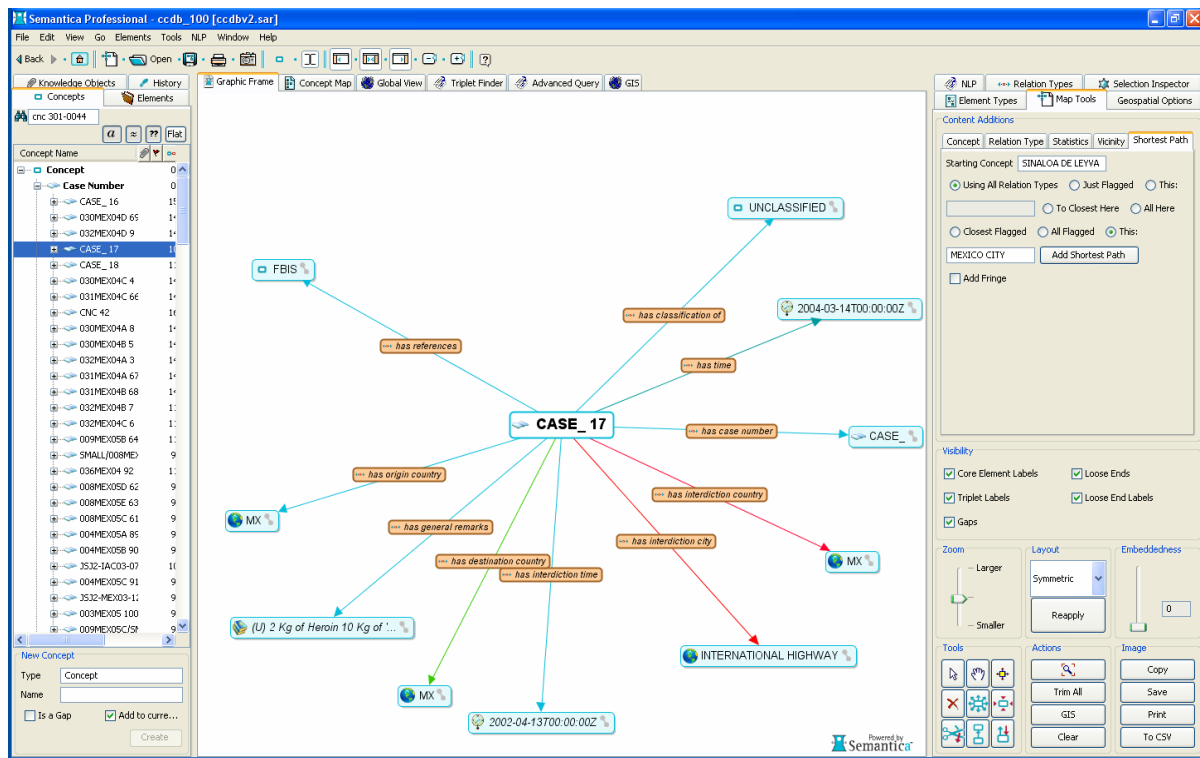
For more advanced analytics, additional tools are commercially available that provide functionality to allow analysts to combine data and information from disparate sources with a single intuitive analytical tool. These methods of analysis can be time-consuming to perform and thus, their usage is more appropriate to situations that have a reasonable lead time.

Tracking, storing, visualizing, and sharing information about vessels, cargo, and individuals all rely on being able to store the information in a manner that help analysts to

quickly discover the relationships between the three. Therefore it makes sense to utilize an application that can ingest all those information types, as well as any specific information or attributes about each of the three categories of information. Link-charting and visualization tools have proven to be able to store information about suspected drug traffickers, their transportation routes, vehicles used, and the dates and times of the specific transactions. These tools can easily store and provide link analysis of cargo, people, locations, and organizations of interest.

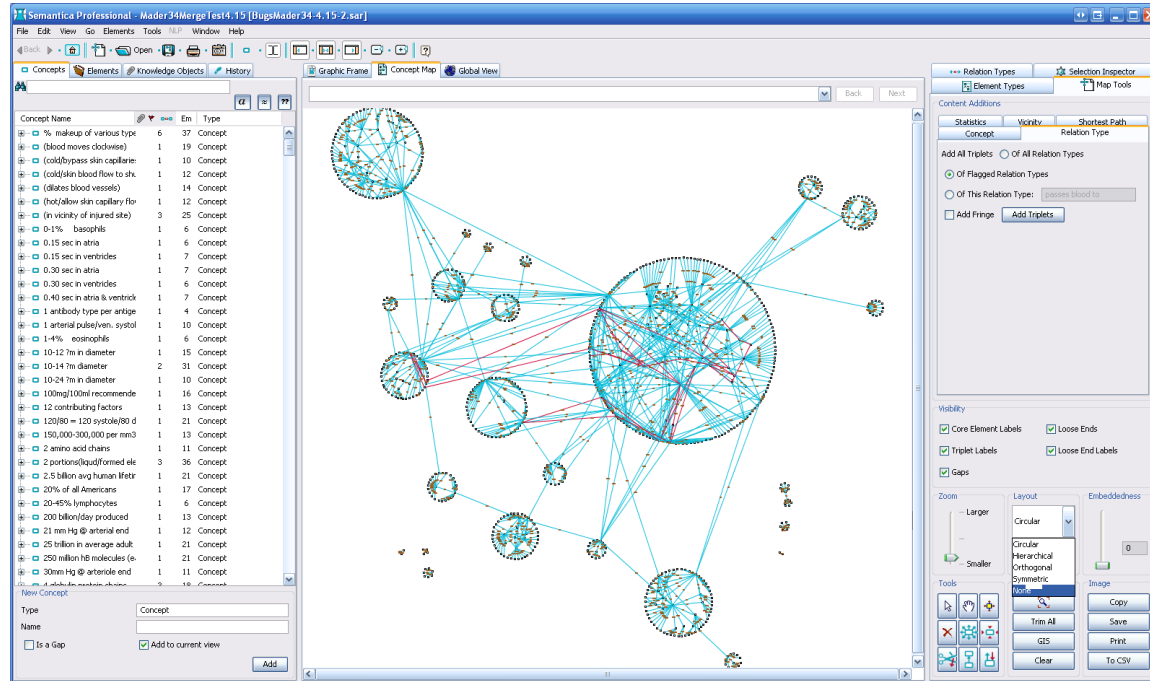
For each of the associated types of nodes, these systems can also track all of the various pieces of meta-data associated with those concepts. For cargo, as an example, the tool can capture what vessel the cargo container is on, what the contents of the container are, who shipped the cargo, who the planned recipient is, the date and time it was shipped, as well as the date and time the cargo was received. This would enable the analyst to have a visual display of the links or connections relating to the cargo container in question, as well as any of the associated information in just a mouse click or two. Built-in geo-spatial and temporal capabilities can display the network on a map and show its changes over time. This is critical when looking for patterns that can only be revealed when watching how a network transforms over time, in relation to the specific places or regions on a map or imagery.

Figure 24: Sample Pattern Analysis Application Demonstrating a Hub & Spoke View



Source: Semantic Research, 2009

Figure 25: Sample Pattern Analysis Application Demonstrating a Node / Cluster Analysis



Source: Semantic Research, 2009