Summary

This document presents an accessible implementation roadmap for building integrated risk management and compliance systems at the border in support of Recommendations R, S, T and V. The concept of this guide was initially presented to the twenty-ninth session as a collaboration with the International Trade Centre (ITC).

This document is presented under the responsibility of the Group of Experts on Risk Management in Regulatory Systems to the Working Party for information and eventual comments. It will be processed as a publication by ITC and the possibility of joint publication is being studied by United Nations Economic Commission for Europe (ECE).
1. Border agency cooperation and an integrated approach to risk management at the border are a key to a more efficient use of resources and improving border compliance while ensuring that non-compliant and dangerous products are not placed on the market.

2. Improving efficiency of border control and import compliance requires development and implementation of a comprehensive risk management strategy. This publication presents a coherent and integrated approach by border regulatory agencies in developing countries to conduct risk management. It aims to support trade development following the COVID-19 pandemic that depends on the safety, efficiency and predictability of international trade procedures. Furthermore, an integrated strategy strengthens the risk management principles and proposed practices of the World Trade Organization (WTO) Agreements, in particular those of the Trade Facilitation, Technical Barriers to Trade and Sanitary and Phytosanitary Measures Agreements.

3. This guide provides a unique, first-of-its-kind roadmap to design and implement a framework not only for a modern, effective risk management system – but also integrated and interconnected, where all border agencies holistically carry out their mandate in a synchronized and coordinated manner with a view to curb the time and cost of doing business.

4. With this guide, border regulatory authorities, policymakers and economic operators can work concertedly to enhance their national risk management systems and contribute to build resilience of supply chains beyond the COVID-19 pandemic and future crises.

5. This guide is a collaborative effort between the International Trade Centre (ITC) and the WP.6 Group of Experts on Risk Management in Regulatory Systems. It is being finalized for publication by ITC. ECE is studying the possibilities of making this a joint publication.

6. The content of the guide is provided in Annex to this document in the format that it has been finalized.
Annex

Managing Risk for Post-Pandemic Trade

Guide for Border Regulatory Agencies
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### Acronyms

Unless otherwise specified, all references to dollars ($) are to United States dollars, and all references to tons are to metric tons.

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<tr>
<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
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<tr>
<td>ASYCUDA</td>
<td>Automated System for Customs Data</td>
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<tr>
<td>CBIS</td>
<td>Compliance Based Intervention Scheme</td>
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<td>AW</td>
<td>ASYCUDA WORLD</td>
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<tr>
<td>AWB</td>
<td>Air Waybill</td>
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<td>B/L</td>
<td>Bill of Lading</td>
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<td>BACUDA</td>
<td>Band of Customs Data Analysts</td>
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<td>BCP</td>
<td>Border Crossings Points</td>
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<td>CA</td>
<td>Customs Authority</td>
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<td>CBRA</td>
<td>Cross-Border Regulatory Agencies</td>
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<td>CRM</td>
<td>Customs Risk Management</td>
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<td>EU</td>
<td>European Union</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>HS</td>
<td>Harmonized System</td>
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<td>IEC</td>
<td>International Electrotechnical Commission</td>
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<td>ISO</td>
<td>International Organization for Standardization</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>ITC</td>
<td>International Trade Centre</td>
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<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>OSCE</td>
<td>Organization for Security and Co-operation in Europe</td>
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<tr>
<td>PREDICT</td>
<td>Predictive Risk-based Evaluation for Dynamic Import Compliance Targeting</td>
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<td>RIA</td>
<td>Regulatory Impact Assessment</td>
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<td>SARS</td>
<td>Severe acute respiratory syndrome</td>
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<td>SDG</td>
<td>Sustainable Development Goal</td>
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<td>TFA</td>
<td>Trade Facilitation Agreement</td>
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<tr>
<td>UN/CEFACT</td>
<td>United Nations Centre for Trade Facilitation and Electronic Business</td>
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<td>UNCTAD</td>
<td>United Nations Conference on Trade and Development</td>
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<td>UNECE</td>
<td>United Nations Economic Commission for Europe</td>
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<td>US FDA</td>
<td>U.S. Food and Drug Administration</td>
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<td>WCO</td>
<td>World Customs Organization</td>
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<td>WCO Data Model</td>
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<td>WTO</td>
<td>World Trade Organization</td>
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<td>WTO SPS</td>
<td>Agreement on Sanitary and Phytosanitary Measures</td>
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<td>WTO TBT</td>
<td>Agreement on Technical Barriers to Trade</td>
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Executive summary

Why do border control agencies need integrated risk management?

Risk management is one of the key trade facilitation measures and its efficient application is a prerequisite for reducing non-tariff trade costs. As a tool that allows regulatory authorities concentrating on high-risk shipments and expediting the release of low-risk shipments, risk management helps eliminating redundant or sequential border controls that cause delays and impose unnecessary costs on traders. Good risk management at the border results in more efficient use of limited resources of various regulatory agencies involved in border control, reduces border compliance time and costs while ensuring that non-compliant and dangerous products are not placed on the market. It also serves as a basis for improving cooperation among regulators in ensuring compliance within export, transit and import procedures.

The COVID-19 crisis further highlighted the crucial role of risk management in border control. Implementing risk management to allow low-risk critical supplies to quickly pass clearance controls is one of the key trade policy responses to the current crisis. Countries are called to streamline regulatory and border procedures to facilitate access to COVID-19 related medical goods and essential food products. This requires regulatory authorities to correctly evaluate the non-compliance risk of products, so that they could 1) remove the need for applications, permits, and licenses for products that pose minimal risk to human health, environmental safety or consumer protection and to 2) streamline the procedures for other products, taking into the account their levels of non-compliance risk. Border control procedures, in turn, also need to be proportionate to the level of non-compliance risk of each incoming shipment, so that in case the probability that a shipment contains a non-compliant product is low or if the consequences associated with proliferation of the imported product to the market - even if it is non-compliant - can be tolerated, release of such shipment can be expedited.

According to the UN Global Survey on Digital and Sustainable Trade Facilitation, risk management is ranked as 5th most implemented measure (with 79 countries reported to have already implemented risk management - partially or fully - in border control procedures in 2019). At the same time, in 2021, according to the WTO Trade Facilitation Database, risk management remains to be one of the bottom 5 measures with lowest implementation rate (with 59.8% of implementation commitments). Not only that implementing risk management within trade procedures remains a challenge for many countries (35.9% of implementation commitments are "upon receipt of capacity building support"), most countries that had fully implemented risk management systems haven’t yet shown any reduction in time and costs of border compliance procedures years after the system started functioning.

There are two main sets of challenges that explain why implementation of risk management has not yet led to significant improvement in border compliance procedures. The first group of challenges include those that are associated with individual risk management capacity of regulatory agencies involved in border control, i.e. with processes, methodologies, IT systems and competences that aim at ensuring efficient and effective application of risk management in import compliance. In case evaluations of incoming shipments are biased (which is often the case when they are based on individual perceptions of inspectors) or incomplete (e.g., do

1 Risk management as a trade facilitation tool can and should be applied within all border compliance procedures, including export, transit and import. For the purposes of conciseness, an import compliance framework is used throughout the Guide as an example of how risk management tools can be applied in border control. All methods and approaches described in the publication can be applied in a similar fashion within export and transit frameworks. Import compliance procedures were chosen as the main focus of the publication due to their higher relevance within a trade facilitation context: in import compliance a regulatory authority of an importing country is evaluating compliance of products arriving from its trading partners (par contrast to export procedures) that will be placed on the importing country’s market (par contrast to transit procedures).


5 Results of data analysis are described in Chapter 1.
not take into account the probability of non-compliance and focus only on its impact), or if no risk criteria based on regulatory objectives is established, application of risk management will result in risk mitigation measures that are not proportionate to risks they were set out to address. It would only increase delays, cause a higher number of inefficient inspections and would also expose consumers and society to unnecessary risks.

The second set of challenges are related to integration of risk management procedures of all regulatory agencies involved in border control and to the functioning of an import compliance framework as a whole. In practice, border is a very busy area: in some countries, number of regulatory agencies involved in border control – sometimes inspecting one shipment - can be as high as 256. Each of the agencies is responsible for its own set of non-compliance risks associated with every incoming shipment. As a chain is as strong as its weakest link, risk management at the border is as good as it is applied by the least efficient – from the risk management perspective – regulatory agency. Overall border compliance time associated with an incoming shipment subject to inspections by several regulatory authorities will be at least as high as that of the longest inspection; if at least one regulatory agency does not have sufficient IT or human resources to evaluate risks and to act accordingly, it would lead to inefficiency of the entire system. Differences in approaches to risk evaluation used by agencies is another key aspect: in case criteria used by various regulatory agencies to evaluate the level of non-compliance risks - what constitutes “high” and “low” risk - of incoming shipments within their responsibility are not harmonized, implementation of risk management, even if applied by all agencies involved, will not lead to reduction of border compliance time and costs.

Indeed, in many countries risk management efforts seem to have stalled at the single agency (Customs) stage and have yet to achieve their full potential; the deployment of risk management beyond Customs is recognized to be a useful area for future capacity-building efforts7. Customs authorities, though playing a key role in border control, is only one of the agencies involved in border processing. According to the World Bank, evidence suggests it is often responsible for no more than a third of regulatory delays, and that traders are much more satisfied with the performance of customs than with that of other border management agencies8. The need for strengthening and consolidating of risk management systems applied by the Customs and other regulatory agencies involved in border control is highlighted in the UNECE Needs Assessment Reports on Regulatory and Procedural Barriers to Trade9. Not surprisingly, the new EU regulation on Market Surveillance (1020/2019) calls for intensifying compliance controls and promoting cross border cooperation among enforcement authorities, including through cooperation with customs authorities.

Trade policy response to the COVID-19 crisis also requires enhancing border management coordination mechanisms, both at the policy and operational levels, as well as supporting increased internal and external border agency collaboration to design special regimes for expedited clearance for essential medical goods, food products and farming inputs (World Bank, 2020).

The publication addresses both sets of challenges and describes a risk management strategy that governments can apply to increase efficiency of regulatory agencies and of import compliance procedures, reduce border compliance time and costs without exposing consumers and other regulatory stakeholders to unnecessary risks. It provides high-level policy recommendations supported by risk management methodologies and technical guidance aimed at 1) improving individual risk management capacity of every regulatory agency involved in border compliance and at 2) ensuring efficient integration of risk management procedures applied at the border.

A national strategy for integrated risk management at the border: policy recommendations

Improving efficiency of border control and import compliance for facilitating international trade requires development and implementation of a comprehensive risk management strategy, which includes building integrated risk-based import compliance frameworks. The strategy presented in the Guide is based on the following principles:

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• Application of formal and standardized methodologies for management of non-compliance risk within border control agencies;

• Strengthening the role of import compliance procedures in market surveillance and enforcement systems run by regulatory authorities responsible for product compliance;

• Integrating import compliance processes applied at the border with other building blocks of respective regulatory systems: ensuring that import compliance supports all regulatory objectives and respective SDGs;

• Ensuring efficient integration of risk management processes of all regulatory agencies involved in border control; when appropriate, on the basis of existing risk management frameworks of the Customs Authorities;

• Integrating risk management in border control with other trade facilitation tools, such as Single Window and others.

The risk management strategy described above, aiming at facilitating trade while protecting health and safety of consumers, society and environment by removing redundant and sequential controls, has the following benefits:

• From the international trade perspective, it supports and leads to more efficient implementation of the risk management principles of the WTO Agreements, in particular those of WTO TFA, TBT and SPS. It introduces and highlights the concept of a non-compliance risk, which is essential for ensuring that controls of every agency involved in import compliance support regulatory objectives. Non-compliance risks are prioritized according to both severity of the consequences of product’s non-compliance with relevant regulations, i.e., according to their impact on regulatory objectives, and on the probability that an incoming shipment contains a non-compliant product.

• From market surveillance perspective, strengthening the role of import compliance would increase the overall efficiency of enforcement activities of product regulators.

• Integration directions of the strategy provide for the most efficient application of risk management in border control and ensure application of holistic approach in the design of an import compliance framework, which is essential for collaborative border management. Integrated approach, which in most cases implies integrating risk management processes of regulatory agencies into the risk management system of the Customs, provides for a comprehensive overview of risks and allows analyzing the functioning of an import compliance framework as a whole, using overall border compliance time as main evaluation metrics.

Finally, integrated approach helps ensuring efficiency of risk management at the border, as it:

• Creates a common risk management language and processes at the border, including for defining risk tolerance and managing of non-compliance risks;

• Leads to more efficient cooperation among regulatory authorities: allows taking into account correlations among risks and findings of agencies involved in border control, using common data models and cooperating in development of risk profiles and compliance rules;

• Saves resources of regulatory agencies, as it allows for sharing risk management expertise, IT infrastructure and software tools and processes among regulators during developing and applying risk profiles and targeting non-compliance shipments. Within an integrated framework, all types of non-compliance risks of incoming shipments can be evaluated within one IT system based on integrated data source.

10 The concept of collaborative border management is described in (World Bank, 2011).
The biggest challenge of the presented strategy is associated with the complexity of projects required for its implementation: the strategy covers various aspects of border control and brings together several stand-alone areas. Its implementation requires running a portfolio of projects, which structure would depend on the risk management maturity of the existing framework, both in terms of the individual capacity of participating agencies and of the level of integration processes. The implementation roadmap is presented in the next section.

**Implementation roadmap and the structure of the Guide**

The implementation roadmap for building integrated import compliance systems at the border follows the strategy described above and contains the following layers:

1. **Organizational level:** implementation of formal risk management within regulatory agencies;
2. **Regulatory system level:** ensuring that relevant regulatory systems - those containing border control as a building block - support SDGs and are risk-based;
3. **Import compliance level of a regulatory agency:** implementing profiling and targeting techniques within regulatory agencies responsible for border control for the evaluation of non-compliance risk of the incoming shipments;
4. **Integration level:** integrating import compliance systems of regulatory agencies involved in border control.

The implementation roadmap is presented in Figure 1 as a pyramid, which can also be used as a maturity model for evaluating the level of integrated risk management at the border. Going bottom-up within the pyramid, every step within the roadmap can be skipped, in case already implemented within a border control framework. The right part of the picture shows the titles of the chapters of the Guide supporting each phase of the implementation roadmap.

**Figure 1 Implementation roadmap: integrated risk management maturity model**

Implementation of formal risk management at the organizational level lies at the basis of the roadmap for building an integrated system. It aims at ensuring common understanding of the risk management methodology and its application by all regulatory stakeholders involved in international trade and in border control, including business companies. Chapters 1 and 2 support this phase of the roadmap. The first chapter of the Guide “Risk Management as a Trade Facilitation Measure” presents trade as both a risk mitigation policy tool and a source of various and severe risks. It provides a classification of international trade risks and explains the increasing importance of management of non-compliance risk in trade transactions. It describes the role of international trade in the 2030 Agenda and continues with an analysis of the WTO Agreements from the risk management perspective; it also develops a list of risk management principles of international trade. It further highlights the importance of non-compliance risks in international trade and presents risk management in the context of other trade facilitation measures. It concludes with the analysis of the current level of risk management implementation in border control, its impact on compliance procedures and analyzes how the efficiency of risk management as a trade facilitation tool can be improved; in concludes with a detailed description of the main elements of the national risk management strategy presented above. Chapter 2 “Principles of risk management” provides an overview of the risk management concepts and tools that are especially relevant in the context of international trade and on which import compliance processes applied by regulatory agencies are based. It highlights the difference between formal and intuitive risk management, and describes the objectives of risk management (emphasizing that zero risk cannot be a valid regulatory objective), shows how to identify a risk and provides tools for choosing the best response to risks.

Application of formal risk management within regulatory authorities constitutes the necessary basis for building risk-based regulatory frameworks that support relevant SDGs, which constitutes the second phase of the implementation roadmap. Non-compliance risk cannot be managed without taking into consideration all other elements of regulatory systems. Import compliance procedures that regulatory authorities apply at the border constitute an indispensable part of market surveillance systems. These systems, as a form of post-market control, are a part of bigger regulatory frameworks, that contain another two main elements: regulatory requirements for products and services and conformity assessment procedures, as a form of pre-market control. In order for import compliance to be efficient, all elements of regulatory systems should be proportionate to risks they were set out to address and balanced. Chapter 3 “Risk-based regulatory frameworks in support of SDGs: integrating import compliance” provides guidelines on building risk-based regulatory systems in support of the SDGs. It describes import compliance procedures – presented as key risk mitigation measures for ensuring safety of international trade in the second chapter – from a slightly different but not least important perspective as one of the building blocks of regulatory frameworks. The Chapter describes the concept of the non-compliance risk and shows how management of non-compliance risk at the border supports the SDGs. It shows that in many cases import compliance procedures, if properly integrated with other elements of the framework, are the most efficient form of market surveillance and enforcement.

After proportionality of regulatory requirements, conformity assessment and market surveillance procedures (within each regulatory framework represented at the border) to risks to regulatory objectives is established, individual capacity of border control agencies in applying risk management tools can be enhanced based on international best practice. It includes application of profiling and targeting techniques for prioritizing border inspections on the basis of non-compliance risk. This phase of the implementation roadmap is more technical and is supported by three chapters that provide technical guidance on building targeting systems. Chapter 4 “Methodology for building a non-compliance risk targeting system in import compliance” presents a holistic reference model for a targeting system that can be used by any border control agency. It describes the main parameters of a risk-based compliance system and describes tools for designing the main inputs into the system: risk tolerance of a regulatory agency and a model of a non-compliance risk. Using an imaginary case study as an example, it gives practical guidelines on building such systems. It describes tools that regulatory authorities could use for developing compliance rules and building risk profiles to assess every incoming shipment, as well as for evaluating them using the risk tolerance as criteria. It underlines the steps that a regulatory authority needs to take to apply the developed compliance rules and to choose a sampling plan that is proportionate to the level of the non-compliance risk of a shipment.

The Customs Authorities operate in competitive surroundings and make constant efforts to respond to challenges and requirements for introduction of electronic public services. An appropriate internal regulatory framework on risk management, as well as adaptation of the existing organizational structure and
administrative procedures provide a proper basis for a more effective risk management system. Chapter 5 “Targeting and addressing Customs risks” describes how the reference model described in Chapter 4 can be applied by the Customs Authorities and demonstrates that using targeting techniques based on different sources of information and advanced data analytics support risk identification and reconcile two seemingly mutually exclusive objectives: revenue maximization and trade facilitation. It also addresses the need to adjust dedicated control strategies for each mode of transport taking into account the specificities of each mode. Moreover, the chapter contains measures to minimize the overall impact of the COVID-19 pandemic on economies and societies. Import compliance procedures are key tools for management of non-compliance risks of traded products. Non-compliance risk of a product is comprised of two main parameters: the consequences of non-compliance, associated with a product (how dangerous a product can be when non-compliant) and probability of non-compliance (how probable it is to find a non-compliant product in a shipment or on the market). Chapter 6 “Addressing the risk of product non-compliance” describes a general methodology that can be applied by product regulators to efficiently manage the risk of product non-compliance and provides examples of several existing frameworks that are applied by regulators responsible for food, agricultural and animal products, as well as electrical appliances.

Risk-based import compliance systems developed according to reference model described in Chapter 4 and international best practice presented in chapters 5 and 6 can be integrated into a single framework, which is the final phase of the roadmap. The technical guidance on integration of import compliance systems is presented in Chapter 7 “Building an Integrated Risk Management Framework”. It focuses on integration of import compliance procedures of various regulatory agencies – Customs and product regulators – involved in border control. It describes approaches for integrating the main elements of targeting systems of various regulatory authorities and emphasizes the benefits of integration. The chapter connects integrated risk management with other trade facilitation tools, such as Single Window and introduces the concept of an Integrated Risk Management Framework. It describes functions of targeting centers that can be operated at the Customs to run an integrated system.

Recognizing the leading role of the Customs authorities in border management, it develops a model of an integrated assessment of shipments and contains practical guidance on running projects aimed at building integrated import compliance frameworks.

Business companies are clients of integrated systems and should partner with regulators to optimize the effectiveness of risk management. Chapter 8 presents guidance to economic operators on how to cooperate and engage with border regulatory agencies as well as to promote compliance by investing in internal reforms and applying best practices.

11 In most cases, traded products are subject to regulatory requirements of several regulatory authorities and application of risk management to facilitate trade in goods is the main purpose of the Guide. At the same time, tools and methods described in the publication can be applied to evaluating compliance of other objects, such as services, means of transport, drivers, passenger traffic, etc.
Summary of the Guide: key concepts, recommendations and methodologies

Integrated risk management as a trade facilitation measure

International trade is a major driver of economic growth, poverty reduction and sustainable development. Achievement of most of the SDGs depends on the availability and compliance of products that are traded on international markets (e.g., trade in vaccines and medical equipment for the SDG 3 "Health"). Safety of international trade is equally important as its efficiency; as trade represents an opportunity, it has always been a source of broad range of risks: it was in the context of international trade that many of the risk management tools were first introduced.

International trade risks can be described at different levels. Major trade risks that are managed on the policy level are those that stem from the uncertainty associated with demand and supply of traded products.

Regulatory authorities are dealing with a diverse group of risks that are associated with traded products and that can have undesirable impact on consumers, society and environment; these risks require regulatory intervention and management of non-compliance risk at the border. Indeed, a shipment arriving at the border can be non-compliant with requirements of several regulatory systems and thus be a source of large variety of risks. These risks can be grouped as customs and security risks, risks of product non-compliance with technical regulations and standards, as well as SPS risks. Principles for management of such risks are described in international trade agreements and conventions, including WTO TFA, TBT and SPS Agreements.

Key factors that contribute to the increased significance of non-compliance risks include growth in trade in manufactured products, regional integration, new technologies, security challenges. Risks of product non-compliance and SPS risks are in many respects similar to customs risk. At the same time, risk management best practice, including tools developed for customs authorities, should be adapted to the specifics of this group of risks. Efficient management of non-compliance risks requires product evaluation (par contrast to shipment evaluation, as it is the case with customs risk), considering unlimited number of risks (a number of non-compliance risks associated with one shipment can be equal to all possible combinations of all non-conformities of all products to all regulatory requirements); more sophisticated, costly and time-consuming conformity assessment procedures, such as laboratory tests; different product grouping, more detailed than that of Harmonized System, and other aspects.

On the operational level, UNECE International Supply Chain Reference Model, visualizing the steps in the supply chain and modeling commodity trade across national borders, can be used to develop a comprehensive map of risks faced by exporters and importers in international trade. The latter are exposed to the following groups of risks: business risk, suppliers’ risk, quality risk, credit and currency risk, transportation and logistics, as well as legal risk. Trade disruption risks – risks associated with inadequate and disproportionate border compliance procedures, resulting in unnecessary and/or sequential inspections, applied by regulatory authorities – and the uncertainty that stems from them – lead to additional and unexpected costs for exporters and importers.

Data analysis shows that average time of border compliance procedures remains very high and uncertain in most of the regions of the world. Trade facilitation is a key policy measure that countries apply to lower the level of uncertainty and costs for importers. As inspections are the main cause of delays and uncertainty of border compliance, risk management, as a basis for deciding whether a shipment should be physically inspected or not, is one of the key trade facilitation measures listed in the WTO TFA. Risk management implementation in border control has the 5th highest implementation score according to the UN Global Survey on Digital and Sustainable Trade Facilitation but remains one of the five bottom measures with lowest implementation according to Trade Facilitation Agreement Database of WTO, with 35.9% of implementation commitments that depend on the receipt of capacity building support. Moreover, even countries that have fully implemented risk management in 2015-2019, still experience a significant need for improving the efficiency of border compliance procedures, as the functioning of risk management systems hasn’t led to substantial reduction in times of border compliance. Possible causes for that include: lack of efficiency of risk management applied by regulatory agencies involved in border control and application of risk management at the single-agency level. Integrated risk management, as a policy aimed at increasing individual capacity of regulatory agencies in the management non-compliance risk as well as at involvement of all regulatory
agencies in risk management will lead to better risk management at the border, lower level of uncertainty and reduced border compliance times and costs.

**Choosing best actions in response to risks: principles of risk management**

Risks have always been managed by border control agencies, but in many cases, it was intuitive and non-systemic management of risks. Biases associated with intuitive judgments of risks, especially of probabilities (the central parameter of any risks) are caused by the fact that people substitute probability with other heuristics. Formal risk management methodologies help avoiding errors in risk perception and their application by all regulatory stakeholders involved in international trade is a prerequisite for building an integrated risk-based import compliance framework at the border.

The internationally recognized definition of risk is “effect of uncertainty on objectives”. In practice, risks are often confused with risk events or their impacts; to avoid many of the risk perception errors risks need to be described in terms of risk sources, potential events, their consequences and their likelihoods.

Good risk management results in best actions in response to risks - those that allow finding the right balance between the following parameters: the reward associated with the achievement of the objectives, associated with the activity that contains a risk, the potential impact of a risk and the costs of actions chosen to address the risk.

Best actions in response to risk can be chosen from the following risk treatment strategies: modifying a risk, accepting a risk, transferring a risk and avoiding a risk. Table 1 summarizes situations where each of the strategies can and cannot be the best response to risk:

**Table 1 Criteria for choosing risk treatment strategies**

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Situation, in which it is a best response</th>
<th>Situations, in which it is not the best response to risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modifying (mitigating) a risk</td>
<td>Optimal way to mitigate the risk is chosen</td>
<td>The residual risk still remains too high</td>
</tr>
<tr>
<td></td>
<td>Cost of risk mitigation is proportionate to potential losses</td>
<td>Mitigation costs exceed the reward associated with the main activity (or are not proportionate to the reward)</td>
</tr>
<tr>
<td></td>
<td>Risk mitigation brings the risk to the desired level</td>
<td></td>
</tr>
<tr>
<td>Accepting the risk</td>
<td>There is no efficient way to modify the risk</td>
<td>The level of the accepted risk is higher than the actual level of risk that the business is willing to accept</td>
</tr>
<tr>
<td></td>
<td>The business wants to accept the risk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The stakes are high enough</td>
<td></td>
</tr>
<tr>
<td>Avoiding a risk</td>
<td>Risk that is not tolerable that cannot be modified and thus brought to the required level</td>
<td>There are proportionate risk mitigation measures</td>
</tr>
<tr>
<td></td>
<td>Risk mitigation costs exceed the reward from the main activity</td>
<td>Risk avoidance chosen because of the risk perception biases (fears)</td>
</tr>
<tr>
<td>Risk transfer</td>
<td>Transferring a risk is an optimal strategy (compared to risk mitigation)</td>
<td>Transferring a risk will create higher risks</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov. Table prepared to illustrate the methodologies described in the Guide.
Risk tolerance is “readiness to bear the risk after risk treatment in order to achieve the objectives”. In business environment, risk tolerance can be influenced by regulatory requirements; for a regulatory authority, risk tolerance is impacted by societal expectations.

Zero risk is not and cannot be a valid risk management objective. Not only because uncertainty will always be present and new unknown risks will emerge, but also because the likelihood and the impact of risks cannot be brought to zero, even if the most expensive risk treatment measures are implemented. Also, mitigating risks creates new risks.

Analysis of the WTO Agreements shows that many of the principles declared in them aim at achieving the risk management objective for the management of the trade related risk. The TFA, TBT and SPS agreements set out important principles of sound risk management that should be applied by regulatory authorities dealing with safety risks (at borders and in general). These principles include proportionality of regulatory requirements and compliance procedures, systemic risk management, principle of tolerable risk and principle of prioritizing on the basis of risk.

Guidelines for building risk-based regulatory frameworks in support of the SDGs: regulating international trade

Building risk-based regulatory systems is a prerequisite for efficient border control, since import compliance constitutes an indispensable part of a market surveillance system, which, in turn, is one of the building blocks of any regulatory framework. For import compliance to be efficient, it should be balanced with other elements of a regulatory framework: criteria for evaluation of non-compliance risks should be based on regulatory objectives, whereas stringency of import inspections should depend on the choice of conformity assessment procedures.

Regulatory frameworks contain requirements for products and services, including those that are traded on international markets. A food safety regulatory framework, for example, contains regulatory requirements for the allowed amount of pesticides in fruits and vegetables, health safety systems of countries establish compliance of medical devices, regulatory frameworks that are not sector specific contain general safety requirements for products. One shipment can be subject to several regulatory frameworks.

UNECE Recommendation R 12 “Managing risks in regulatory frameworks” presents a regulatory framework as a set of regulatory requirements, conformity assessment and market surveillance procedures; the recommendation sets out a process aimed at ensuring that regulations are proportionate to risks they were set out to address.

UNECE Recommendation T 13 sets out essential steps on building risk-based regulatory frameworks in support of the SDGs. SDGs and targets should be used as inputs when determining regulatory objectives, so that impact on SDGs can be turned into risk evaluation criteria.

Within a risk-based regulatory system, regulations in general and import compliance procedures in particular are results of risk management process, on which a regulatory system is based.

Methodologies for performing the main steps of the risk management process are described in the Chapter. Identification of risks within regulatory systems, including those related to non-compliance of products, can be performed on the basis of taxonomies, by generalizing risks of economic operators, by using categorization of impacts, including on SDGs, as well as by using other methods described in the Chapter. Proactive stakeholder involvement is key in risk identification, as economic operators as well as other regulatory stakeholders can provide valuable information that regulators might not be aware of.

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Developing a consequence/likelihood matrix is a key tool to evaluate the significance of risks and to perform risk ranking. Risks that occur within regulatory systems simultaneously impact several objectives and consequences of each risk should be evaluated against every objective, according to established criteria. Defining criteria for evaluating probability is equally important; since tools for evaluating probabilities of risk events differ depending on the availability of data, probability evaluation criteria should be formulated in terms of expert’s judgment, frequencies of events, statistical probabilities.

Regulatory authorities can apply any of the available risk treatment strategies. Table 2 summarizes the interpretation of the risk treatment strategies, as they can be applied within regulatory systems (using the risk “Pesticides in plant products will cause non-acute poisoning” within a food safety regulatory framework as an example):

<table>
<thead>
<tr>
<th>Risk treatment strategy</th>
<th>Interpretation of the strategy on a regulatory system level</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk avoidance.</td>
<td>Banning activities or processes where the risk can occur.</td>
<td>Banning the import of fruits and vegetables.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Banning the use of pesticides in local production.</td>
</tr>
<tr>
<td>Sharing the responsibility for managing the risk.</td>
<td>Sharing the responsibility for managing the risk, including bearing responsibility if it occurs, to economic or social actors.</td>
<td>Making economic operators responsible for the risk.</td>
</tr>
<tr>
<td>Mitigating the risk.</td>
<td>Developing a regulatory or non-regulatory response to reduce the probability and the expected impact of a risk. Risks that are above the tolerable level should be addressed by regulatory authority.</td>
<td>Imposing a regulation aimed at controlling the level of pesticides in products.</td>
</tr>
<tr>
<td>Tolerating a risk.</td>
<td>In a regulatory context, tolerating a risk means that the regulators decide they are unwilling or unable to take measure to reduce the probability and expected impact of a risk.</td>
<td>Preparing a plan for the case the risk occurs.</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov. Table prepared to illustrate the methodologies described in the Guide.

Regulatory requirements, conformity assessment procedures and market surveillance are key building blocks of any regulation. In case regulatory requirements are proportionate to risks they were set out to address, the level of risk associated with regulated products that are compliant with the requirements of relevant regulations is not higher than a tolerable level of risk, whereas each non-compliant product placed on the market poses a risk and requires regulatory response.

The objective of conformity assessment processes is not to allow non-compliant products to be placed on the market. Market surveillance, as a form of post-market control, aims at removing non-compliant products from the market, in case they were produced in spite of existing regulatory requirements and were not prevented from being placed on the market by conformity assessment.

The interrelation among the following three parameters: stringency of regulatory requirements, levels of risk of a compliant product and level of risk of a non-compliant product is crucial for setting priorities in market surveillance and import compliance. Non-compliant products can also be more or less dangerous. The damage that can be caused by the different non-compliant products will vary depending on many factors, such as safety expectations related to the product, its way of use, and many others. Inspecting products that are placed on the market is the main means of work of product regulators and market surveillance authorities.
Since it is not possible nor desirable to inspect all products, and given the limited resources of market surveillance authorities, one of the main challenges regulatory authorities face is prioritizing market surveillance activities: which products and when to choose for an inspection, and how to check them. Addressing this challenge requires developing risk-based market surveillance systems that allows:

- Targeting non-compliant products on the market and prioritizing market surveillance activities based on the evaluation of non-compliance risk posed by each product;
- Devising sampling plans that are proportionate to the level of non-compliance risk;
- Choosing adequate sanctions in case non-compliance is identified;
- Promoting the culture of compliance.

Approaches for developing such systems are described in UNECE Recommendation S\textsuperscript{14}.

Building such system requires ranking products against the following parameters:

- Consequences of non-compliance, so that products that are more dangerous when non-compliant (having more severe consequences of non-compliance) are given a higher priority than other products;
- Probability of non-compliance, so that products that have a higher probability to be found non-compliant on the market are given higher priority than other products.

It is more efficient to inspect imported products at ports of entrance, since such inspections:

- Minimize consumer exposure to non-compliant products;
- Allow more representative sampling: products are concentrated;
- Are less costly: products arrive to an inspector and not inspector arrives to products;
- In case non-compliance is identified, it is easier to remove products from the market;
- Products can be simultaneously inspected for various non-compliant risks;
- Products are in any case subject to Customs controls.

Methodology for building a risk-based targeting system in import compliance

Import compliance is the central element of any market surveillance and enforcement system. A risk-based targeting system, in turn, is the central element of any import compliance framework. Successful risk-based targeting allows regulatory authority making the right guesses about the actual statuses of the incoming shipments before or upon their arrival, so that regulatory authority could “concentrate on high-risk shipments and expedite the release of low-risk shipments”, as stated in the WTO TFA. This chapter outlines a methodology for building an efficient risk-based targeting system in import compliance that can be used by all regulatory authorities involved in border control.

Any border control agency performing import inspections targets the incoming shipments according to their levels of non-compliance risk, using formal tools or on the basis of inspectors’ intuition. Even the extreme cases of import compliance strategies, i.e., regulatory regimes in which every incoming shipment undergoes an inspection, or in the opposite case, when every shipment is released without an inspection, are indeed based on risk targeting. In the first case, every shipment is targeted as a high-risk shipment, whereas in the

second scenario every shipment is targeted as low-risk. Random inspections, a strategy widely applied in border control, is also a form of risk-based targeting; in this case high-risk shipments are selected using “tossing a coin” method, with the only difference that generators of random numbers are applied instead of a coin.

Targeting system assesses the non-compliance risk of every incoming shipment by comparing the characteristics of each shipment with the risk profiles or compliance rules, based on probability factors and consequences of non-compliance. It allows regulatory authority ranking incoming shipments according to the level of non-compliance risk and concentrate on those that are high-risk, i.e.:

1. Have high consequences of non-compliance (e.g. products in these shipments are dangerous when non-compliant)
2. Have a high probability of non-compliance.

Main parameters characterizing an import compliance framework include:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of incoming shipments</td>
<td>Total number of shipments within a given period.</td>
</tr>
<tr>
<td>Non-compliance rate</td>
<td>Percent of non-compliant shipments.</td>
</tr>
<tr>
<td>Inspection rate</td>
<td>Percent of the incoming shipments inspected.</td>
</tr>
<tr>
<td>Inspection units</td>
<td>Resources of regulatory authority invested in inspections (man-hours).</td>
</tr>
<tr>
<td>Number of inspected non-compliant shipments (targeted as high-risk)</td>
<td>Number of shipments that the system correctly identified as non-compliant. Represents losses, prevented by the targeting system.</td>
</tr>
<tr>
<td>Number of inspected compliant shipments (targeted as high-risk)</td>
<td>Shipments that the system identified as non-compliant but that were compliant as the result of an inspection; represents resources that could have been invested in high risk shipments.</td>
</tr>
<tr>
<td>Number of released non-compliant shipments (targeted as low risk)</td>
<td>Non-compliant shipments that were targeted as low risk and released without inspection (actual number of such shipments is often unknown). Represents losses associated with consequences of non-compliance.</td>
</tr>
<tr>
<td>Number of released compliant shipments (targeted as low risk)</td>
<td>Number of compliant shipments that were correctly classified as low-risk by the system and release without inspection.</td>
</tr>
<tr>
<td>Border compliance time</td>
<td>Time that a shipment is held at the border awaiting an inspection, during the inspection and the follow-up.</td>
</tr>
</tbody>
</table>

Chapter 4 describes and provides an implementation methodology for a reference model of a targeting framework:
The model presents available resource, risk tolerance and a structure of a non-compliance risk within the responsibility of the regulatory agency as fundamental inputs into the system. The objective of the import compliance system is to bring the level of risk to the tolerable level with minimum resources, and risk tolerance constitutes a fundamental input into an import compliance framework and should be proportionate to the available resources and be explicitly defined. Depending on the compliance rate and other parameters, it is possible that the tolerable level of risk cannot be achieved with the available resources; in this situation, either risk tolerance or available resources should be increased. The structure of the non-compliance risk is important as it constitutes a basis for performing risk profiling of the incoming shipments – assessment of the likelihood of non-compliance - and for evaluating the consequences of non-compliance.

As risk management is a process that inputs data, the model is structured around the three main elements of a targeting system – a flow of functions, a data flow required to support these functions and a resulting flow of risk evaluations.

Structure of non-compliance risk, especially the probability factors, forms the basis for building history datasets that are used for developing risk profiles or compliance rules. This building block of a targeting process can be implemented in many ways; from the simplest, i.e., using expert judgment or non-structured data, to the most sophisticated, that can imply using predictive algorithms, such as neural networks, random forests and others. The compliance rules and risk profiles should be evaluated and compared with the risk tolerance of a regulatory authority, for this purpose a test and validation datasets should be developed and simulations performed. Results of the simulations – application of compliance rules to the history data, providing information on what would have happened if a regulatory authority had applied the compliance rules in the past, describe the same parameters that are used to define the risk tolerance (the main characteristics of a targeting system described above). In case results of the simulation show that application of the compliance rules meet the risk tolerance requirement of a regulator and can be implemented by the available resources, they become operational.

Every incoming shipment is evaluated against the rules; as simple as it sounds, this operation requires data processing that would provide the system with all data that is necessary to implement the rules. The final step of the process is risk-based sampling – performing an inspection according to the risk evaluation or releasing the shipment without an inspection. In case an inspection is performed, it provides evidence on
how good the prediction provided by the targeting system was. In any case, the information on the inspections is added to the history dataset and used to update the compliance rules.

The model shows that a targeting system should be constantly updated. The updates of the system can be categorized as fundamental and operational. Fundamental changes include those that are related to fundamental inputs to the system. Changes in the risk tolerance of a regulatory authority, as well as in available resources, might require complete rebuilding of the compliance rules and risk profiles, since the updated regulatory regime would need to meet the new requirements in terms of the number of non-compliant shipments, which release without an inspection can be tolerated by the system. Changes in the structure of the compliance risk – appearance of the new cases of non-compliance, changes in the probability factors also require rebuilding of the targeting process, as such changes – at the very least – require building and processing of new datasets. Fundamental changes should not happen too often; in any case, the system should be reviewed with respect to the required fundamental changes on a system basis.

Operational updates of the system also happen periodically, but on a more regulator basis. The operational updates allow the targeting system benefit from the principles of machine learning and include updating the history datasets with the results of the inspections that were performed since the last update.

Risk-based inspections allow for shifting resources from low-risk shipments to those associated with higher level of risk. When shipments can be categorized in terms of non-compliance risk, regulatory authority can assign the following parameters to each risk group:

- Inspection frequency, or inspection rate;
- Sample size.

Approaches for designing sampling plans that are proportionate to the level of non-compliance risk of an incoming shipment are described in the chapter.

**Best practice in targeting customs risks**

Customs authorities around the world are incorporating risk management strategies into their procedures in the context of achieving their two main goals: ensuring compliance with customs laws and regulations by the efficient control of the cross-border movement of goods, passengers, and transport means; and accelerating economic growth by facilitating foreign trade and investment. Risk management is an efficient and effective technique that stems from progress in science, technology and management innovation.

The rapid growth of international trade limits the opportunity to control every trans-border movement of goods, passengers and transport means, and imposes restrictions on the inspection of such movements. Therefore, it is considered imperative that customs authorities introduce risk management strategies and practices into their activities, which requires a more effective approach to the planning and implementation of customs controls. More precisely, it needs to target those controls that have a high probability of detecting infringements.

Risk management targeting techniques rely on current knowledge and innovative methods, based on the application of intelligent IT systems that expedite customs inspections. Before these techniques were introduced, inspection was heavily dependent on the experience, judgment and insight of customs officers. IT-based intelligent risk analysis can also improve integrity by avoiding possible discretionary intervention by the customs authority in the selection of shipments to be controlled. This system collects all necessary data for risk analysis, enters these into risk analysis equations and produces results to be used for decision-making.

Modern administrations have progressively developed and implemented predictive approaches to profiling, targeting and inspecting non-compliant declarations to supplement intelligence-based selectivity. This approach is an integral part of modernization programs for administrations in developing and transition countries. Furthermore, it makes it possible to ensure that the majority of inspection resources are focused on declarations with a high-risk score.
One of the most powerful tools available to Customs to reconcile the functions of controlling the international movement of goods with the needs of trade facilitation is represented by data collection and analysis techniques. These techniques are supported by the use of statistics, algorithms and other mathematical tools, as well as by adequate IT systems for their treatment. If properly used, they can allow Customs to act in a targeted way to achieve their institutional objectives more efficiently. Customs authorities can improve the effectiveness of controls and their overall performances not only by analyzing the traders’ historical activity and the number of past frauds detected, but also by using additional sources of information, both internal and external to the administration. The reality, however, is that today most customs administrations use data analysis almost exclusively for conducting risk management and risk scoring activities. Instead, a holistic approach suggests that modern Customs should use such techniques also for facilitating trade, not only by minimizing obstacles for operators in terms of fluidity of their operations, but by observing and analyzing their behavioral patterns to introduce simplifications in customs procedures aimed to make them more user-friendly.

This predictive approach can be combined with customs intelligence to enable the risk management system to incorporate information procured from the intelligence services and to develop indicators for measuring performance, both in terms of efficiency in revenue collection and trade facilitation. With the application and integration of automated systems, customs risk management is becoming more dependent on the in-depth analysis of massive data. Customs in many countries have implemented big data initiatives. Probably, machine learning from historical data will be increasingly helpful for effective risk assessments and accurate targeting decisions. Many customs administrations have explored risk profiling with various data mining methods, such as clustering, classification, association and statistical scoring. Data mining allows Customs to identify the key risk indicators, to summarize the parameters from large databases and increase the accuracy of targeting. Thus, it can incorporate human expertise into machine learning, which can then determine the rules, which would not be able to be detected by human intuition and experience alone.

Data analysis, data warehousing and data mining techniques, as well as information exchanges, can greatly increase Customs’ tasks of revenue collection and protection of collective interests, enhancing their ability to detect irregular declarations and illegal or suspicious movements of goods, persons and financial flows. Advanced data analytics can enable Customs to identify risky transactions and create risk scores in real time, thus facilitating compliant traders while capturing fraudulent shipments. These techniques, when combined with information exchanges (e. g. with foreign customs administrations and other cross-border regulatory agencies) can maximize performances of Customs in the fight against frauds and other illicit activities as a result of more targeted action with minimal impediment to trade.

**Addressing the risk of product non-compliance in international trade**

A remarkable share of border controls is performed by regulatory authorities – product or sector regulators - responsible for compliance of imported products with technical regulations and standards. Technical regulations contain multiple requirements that cover families of different products; inspecting products in many cases requires costly laboratory testing.

Differences between risks of non-compliance with customs regulations and risks of non-compliance with regulations, containing technical requirements for products, explain the main challenges of planning border controls by product regulators. These challenges include:

- **Planning inspections on product level.** Risks of non-compliance should be evaluated on a product level, since different products, even within one family, can have different levels of non-compliance risks.

- **Prioritizing regulatory requirements.** Technical regulations contain multiple requirements; in case a shipment contains a variety of products, regulatory authority can inspect limited number of products with respect to only a limited number of requirements. Choosing which feature of which product against which requirements to inspect is crucial.

- **Knowing the “non-compliance delta” of each product.** Border controls should be focused on products that have the biggest “non-compliance delta”: the difference between how dangerous a given product is in a compliant and a non-compliant state.
Managing Risk for Post-Pandemic Trade: Guide for Border Regulatory Agencies

• **Longer inspections.** Establishing conformity with technical regulations and standards require sophisticated, costly and time-consuming conformity assessment procedures, such as laboratory tests.

International best practice in management of risk of product non-compliance described in the Chapter include New Zealand Risk Engine, US FDA PREDICT, Australia’s CBIS, EU’s system on food, feed, animal and plant protection, EU’s regulatory framework on manufactured products.

The process for targeting non-compliance risk of products includes the following steps:

1. Building a list of products,
2. Developing a list of technical factors,
3. Ranking products according to the consequences of non-compliance,
4. Developing probability factors for targeting non-compliance,
5. Developing compliance rules and risk profiles.
6. Applying compliance rules at the border.

The Chapter provides methodological and technical guidance on the implementation of each step of the process.

*Integrating risk management systems of border control agencies*

A shipment arriving at the border of any country is associated with a large variety of non-compliance risks. These risks can be broadly categorized as those within the responsibility of the customs authorities – since all imported products are subject to customs regulations - and risks within the responsibility of product regulators, which characteristics depend on the nature of imported products and applicable regulatory requirements.

Integration of risk management systems of individual regulatory authorities into a single framework should cover all processes and elements of a targeting system, from the development of compliance rules to performing inspections. The process for building an integrated framework described in the Chapter contains the following steps:

• Integration of inputs to the targeting system;
• Building an integrated dataset;
• Cooperation in development of compliance rules;
• Integrated evaluation of the targeting system;
• Applying compliance rules within an integrated system;
• Performing integrated inspections.

The chapter provides methodological and technical guidance on implementation of each step of the process.

Integrated identification of non-compliance risks and other key parameters of risk management systems of individual regulators makes it possible to perform a comprehensive analysis of non-compliance risks, risk tolerances and available resources of all border control agencies; it also provides an overview an import compliance system as a whole. These parameters can be reviewed on a policy level to ensure consistency in risk tolerances and resources of regulatory agencies involved in border control and their impact on trade facilitation objectives.

Developing of an integrated data set provides for:
• Developing a data model of basic characteristics of a shipment and of a standardized format for data storage;

• Performing analysis of correlations between the findings of different regulators and using this information in targeting.

Developing compliance rules that allow targeting high-risk shipments and performing import inspections in such a way that would efficiently allocate the available resources and bring the level of non-compliance risk to the level tolerable by the regulatory authority might be a challenging task that require risk management expertise and IT tools. Cooperation in development of the compliance rules allows for sharing risk management expertise and resources.

An integrated approach implies that every regulatory agency develops compliance rules according to its risk tolerance and available resources; at the same time, it calls for centralized shared expertise in risk management. Establishing a targeting center with risk management professionals that would assist regulatory agencies in developing compliance rules is an efficient way of allocating the – very often expensive - risk management expertise. In this case, regulatory agencies do not have to hire a full-time risk management professional and do not have to administrate IT tools for developing compliance rules. Integrated development of compliance rules also helps ensuring consistency in the format in which risk profiles are built and in their storage.

Evaluation of an integrated system based on an integrated dataset results in an overview of what would have happened at the border. Simulating how all regulatory authorities would have performed at the border if they had worked according to the developed compliance rules provides essential information for characterizing the import compliance system as a whole. Importantly, it allows calculating border compliance costs and time for importers and review it in the context of “overall” residual risk of non-compliance.

To evaluate compliance rules of all regulatory authorities and to simulate how they would have worked at the border requires developing an integrated history dataset, which includes all risk factors that are necessary to apply the compliance rules of all regulatory authorities.

Applying compliance rules, in most cases, requires basic information about the incoming shipment and an information system that can compare the characteristics of the incoming shipment with the conditions of the compliance rules. The integrated approach for import compliance implies:

• using one source of data on the incoming shipments and

• processing all compliance rules within one information system.

Finally, integrated assessment of the incoming shipment provides opportunities for regulatory authorities to optimize the inspection time by conducting parallel inspections and delegating an inspection to one authority.

Compliance strategy for business

One of the objectives of risk management is to lower cost of trading for economic operators. Businesses can best take advantage of the opportunity if their internal processes are geared to achieving better compliance with regulatory requirements. Active role of traders can include:

• Invest in cooperation and engagement with border regulatory agencies

• Stay informed of latest changes and updates in border regulations and procedures

• Demonstrate due diligence in compliance procedures

• Establish pre-compliance processes and a “reasonable care” checklist

• Apply an internal audit focusing on regulatory compliance

• Invest in training of staff and managers
• Make use of accredited and authorized operator schemes.

Who should read the Guide, why and how?

The publication brings together several stand-alone areas of knowledge, such as risk management, regulatory systems, machine learning and targeting, market surveillance and many others. Relevance of every chapter would depend on the maturity of the risk management application within import compliance system of regulatory authorities and border control framework as a whole.

Regulatory authorities involved in border control constitute the key target audience of the publication. Product regulators and import departments of ministries would get a comprehensive guidance on improving their risk management capacity and increasing the efficiency of the management of the non-compliance risks. The most relevant chapters for regulatory authorities are Chapters 2, 3, 4 and 6.

High-level government representatives. Integration of risk management systems of regulatory agencies at the border requires a high-level governmental perspective, and the Guide should help governments in establishing efficient cooperation among various regulatory agencies involved in border control in terms of common risk management methodologies, sharing IT infrastructure and risk management expertise. The most relevant chapters are 3, 4 and 8.

Trade facilitation bodies. Trade Facilitation bodies – constituting of public and private trade facilitation stakeholders – should benefit from reading the guide since they can get a full picture of their role in integration projects and in running an integrated risk management system.

Policy makers. Policy makers that want to make best use of scarce resources and strengthen risk-based regulatory systems in support of the Sustainable Development Goals (SDGs) in general and in shaping projects for implementing national risk management strategy aimed at ensuring efficient border compliance and trade facilitation, which is crucial for many of the SDGs. The most relevant chapters – summary of the Guide.

Customs authorities. Customs authorities are the leading agencies in integration projects and in most cases, it is the risk management system of the Customs authorities that is used as a basis for integration. Customs would benefit from a holistic model of a targeting system and of a description of the risk management best practice in customs procedures. The most relevant chapters are 4, 5 and 7.

Economic operators/traders. Business can play a key role in this process, by engaging, where possible, an ongoing dialogue and advocacy with the border regulatory agencies and focusing on improving their own compliance. This is addressed in a dedicated chapter which suggests practical and operational steps to strengthen the overall risk management and trade facilitation process as partners and collaborators, and how this can facilitate a conducive trading environment.

International organizations and donors. International organization and donors can use this guide as a basis for running capacity building and technical cooperation projects, assisting countries in implementing national risk management strategy.
CHAPTER 1 INTEGRATED RISK MANAGEMENT AS A TRADE FACILITATION MEASURE

This chapter highlights the crucial role of international trade and trade facilitation in the achievement of the Sustainable Development Goals (SDGs). As international trade can be both a risk mitigation tool and a source of risks, in the following pages risk management is presented in the context of trade procedures and trade facilitation. Classification of risks in international trade is then followed by a summary of the risk management principles of WTO Agreements. Based on these principles, the Chapter depicts risk management as a trade facilitation tool and analyzes the current level of its implementation, focusing on its impact on reduction of the non-tariff sources of trade costs. A national strategy for building integrated risk-based import compliance frameworks is presented as a key trade facilitation measure, aiming at improving the efficiency of risk management in border compliance procedures.

1.1 International trade: mitigating risks to sustainable development

International trade is a major driver of economic growth, poverty reduction and sustainable development. It plays a crucial role in the implementation of the 2030 Agenda, which calls for promoting a “universal, rules-based, open, transparent, predictable, inclusive, non-discriminatory and equitable multilateral trading system”\(^\text{15}\).

Some strategies for achieving several of the Sustainable Development Goals (SDGs) and targets directly mention the international trade system and present trade development as a risk mitigation tool:

- Achieving the “zero hunger” goal requires correcting and preventing trade restrictions and distortions in world agricultural markets;
- Trade related aspects of Intellectual Property Rights are mentioned in the context of research and development of vaccines, essential to ensuring public health (3b). It is especially important in the context of the COID-19 crisis, which highlighted the need for ensuring access to affordable medicines, especially for developing countries;
- Increasing exports of the developing countries is presented as a one of the strategies for promoting sustained, inclusive and sustainable economic growth (8a), and also for reducing inequality within and among countries (10a);
- International trade and WTO agreements are mentioned in the context of protecting the oceans, seas and marine resources, as one the means for mitigating the risk of overfishing and overconsumption.

Several of the SDGs indirectly depend on trade policies as well as on the efficiency and safety of international trade procedures. Well planned and strategically executed trade policy initiatives have a positive impact on sustainable poverty reduction; trade creates opportunities for women’s employment and economic development, since export sectors are an important source of jobs for women in developing countries. In general, trade and open markets increase competition and the transfer of technology, knowledge and innovation\(^\text{16}\).

In addition to direct or indirect dependence on trade, achievement of most of the SDGs requires efficient international trade simply because these goals depend on products that are traded on the international markets. Similar to how efficient trade in agricultural and food products is crucial for achieving the SDG 2 “Zero Hunger”, and trade in vaccines and medical equipment is a prerequisite for SDG 3 “Good health and


well-being”, progress in reaching most of the SDGs depends on quality, availability and safety of a large variety of products, and thus on the efficiency of the international trade system.

Safety of international trade is equally important as its efficiency. As trade represents an opportunity, it has always been associated with high level of uncertainty and a source of broad range of risks. To ensure that international trade doesn’t compromise the achievement of some of the goals and targets of Agenda 2030, these risks should be systematically addressed at all levels: from high trade policy level to the level of making a decision on how a shipment with imported products should be inspected. The following section describes current trends that explain the increased level of uncertainty in international trade and presents an overview of risks within the international trade system.

1.2 International trade as a source of risks

1.2.1 There would be no risk management without trade: a historic overview

As trade has always been associated with risks, international trade and risk management have a long and shared history. It was in the context of trade, specifically to mitigate the risk of exporters and importers, that many of the risk management strategies and tools – from insurance to hedging instruments - were first introduced.

The need for mitigating risks of traders led to invention of the insurance industry. The Emperor Claudius (10 BC-AD 54), eager to boost the corn trade, made himself a one-man, premium-free insurance company by taking personal responsibility for storm losses incurred by Roman merchants. Occupational guilds in both Greece and Rome maintained cooperatives whose members paid money into a pool that would take care of a family if the head of the household met with premature death. The famous “Lloyd’s List”, filled with information on the arrivals and departures of trade ships to London and intelligence on conditions abroad and at sea, marked the beginning of one of the biggest insurance companies.

The need to minimize the impact of price volatility and exchange rates on traders led to the development of complex financial instruments, such as futures and options that are widely used to implement hedging strategies. Already in the twelfth century, sellers at medieval trade fairs signed contracts, called lettres de faire, promising future delivery of the items they sold. In the 1600s, Japanese feudal lords sold their rice for future delivery in a market called cho-ai-mai under contracts that protected them from bad weather or warfare. For many years, in markets such as metals, foreign exchange, agricultural products [...] the use of contracts for future delivery has been a common means of protection against the risks of volatile prices.

Diversification strategy was applied by Chinese traders as early as 3000 years ago: traded goods were redistributed across vessels to limit losses.

The following section presents a more structured view on risks of international trade.

1.2.2 Risks of importers and exporters

Understanding the risks of international trade requires a comprehensive view of the international supply chain and trade procedures. The UNECE International Supply Chain Reference Model (ISCRM) (also known as Buy-Ship-Pay model) visualises the steps in the supply chain and models commodity trade across national borders.

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The UN/CEFACT\textsuperscript{20} model can be used for developing a taxonomy of risks to which importers and exporters are typically exposed. Risk of traders constitute an important part of the international trade risks and their understanding by regulatory authority is crucial for facilitating trade.

Importers and exporters are business companies that face the 4 groups of procedures described in the UN/CEFACT model as main business processes. Combined with standard risk classifications, most common risks of importers can be summarized as presented in Table 3:

Table 3 Using a UN/CEFACT model to identify key importer’s/exporter’s risks\textsuperscript{21}

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Risk category</th>
<th>Examples of importer’s/exporter’s risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial procedures</td>
<td>Business risk</td>
<td>Changes in demand on the imported product</td>
</tr>
<tr>
<td></td>
<td>Suppliers’ risk</td>
<td>Failure to supply the product by the exporter</td>
</tr>
<tr>
<td></td>
<td>Quality risks</td>
<td>Poor quality of imported products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product liability risks: product causes injury or damage to a person or their property</td>
</tr>
<tr>
<td>Financial procedures</td>
<td>Credit risk</td>
<td>Non-supply of the product by the exporter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-payment by a foreign buyer for the exported product</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insolvency of the buyer, bankruptcy, or protracted defaults/slow payment</td>
</tr>
<tr>
<td>Transport procedures</td>
<td>Currency risk</td>
<td>Devaluation of the local/foreign currency</td>
</tr>
<tr>
<td></td>
<td>Transportation risk</td>
<td>Physical loss or damage to the goods while transporting</td>
</tr>
</tbody>
</table>

\textsuperscript{20} The United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) is a subsidiary, intergovernmental body of the United Nations Economic Commission for Europe (UNECE) which serves as a focal point within the United Nations Economic and Social Council for trade facilitation recommendations and electronic business standards. It has global membership and its members are experts from intergovernmental organizations, individual countries' authorities and also from the business community. https://unece.org/trade/uncefact.

\textsuperscript{21} Importers and exporters are also subject to usual operational risks, such as human resources risk, infrastructure risk, operational health and safety risks and others.
Credit risk - insolvency of the buyer or any other factors because of which the exported product will not be paid for - is the major type of risk of exporters. Importers, at the same time, are exposed to a bigger variety of risks. Some of these risks, such as legal and regulatory risks (delays caused by import inspections and border compliance, introduction of new requirements on imported products, non-compliance of imported products with regulations) are related to risk mitigation measures that regulatory authorities implement to achieve safety and other policy objectives. A regulatory view on these risks is presented in the following section.

1.2.3 Changes in demand and supply of traded products

On the policy level, uncertainty associated with demand and supply of traded products constitutes the source of major trade risk. Gravity equation\(^{22}\) can be used to demonstrate this type of uncertainty. According to the equation, “normal” values of exports from one nation (the origin nation) to another (the destination nation), depend positively upon two factors:

- the destination’s aggregate demand (as measured by its GDP) and
- the origin’s aggregate supply (as measured by its GDP).

In the model, the product of GDPs is divided by the bilateral distance to reflect frictions. As distances don’t change, uncertainty associated with exports can be modeled by a parameter dependent on changes in the GDP of the origin nation, whereas changes in demand by modeling the uncertainty in the GDP of the destination nation.

Predictions made at the beginning of the recent COVID-19 crisis\(^{23}\), which were based on this model, resulted in the following implications:

1. Direct supply disruptions hindering production since the disease is focused on the world’s manufacturing heartland (East Asia), and spreading fast in the other industrial giants – the US and Germany.

2. Supply-chain contagion will amplify the direct supply shocks as manufacturing sectors in less-affected nations find it harder and/or more expensive to acquire the necessary imported industrial inputs from the hard-hit nations, and subsequently from each other.

3. Demand disruptions due to (1) macroeconomic drops in aggregate demand, i. e. recessions, and (2) precautionary or wait-and-see purchase delays by consumers, and investment delays by firms.

Though at the time of the writing of the Guide the COVID-19 crisis is still far from being over, it appears that trade has dropped far less than expected\(^{24}\).


1.2.4 Trade as a source of global risks

The World Uncertainty Index\(^{25}\) shows that international trade can be a cause of spikes in global uncertainty, as several of its major increases were related to trade:

Figure 4 Uncertain times


At the same time, international trade is also highly volatile in response to global uncertainty and economic crises. In the 2008 economic crisis, for example, globally, industrial production fell 12% and trade volumes fell 20% in the 12 months from April 2008 (Eichengreen and O’Rourke 2010)\(^{26}\).

1.2.5 Risks for consumers, society and environment

From a slightly different perspective, growth of international trade exposed countries to new systemic risks. One of the characteristics of these risks is that their impact is broader than potential losses of individual traders and hence they required regulatory intervention. Mostly, these risks are related to non-financial aspects of trade.

Disease has long followed trade routes, from infectious pandemics of past eras to SARS in more recent times. In an extreme example, the Black Death - a devastating global epidemic of bubonic plague that struck Europe and Asia in the mid-1300s - is believed to be spread by trading ships\(^{27}\). In a similar but less severe case, the more recent German E. coli outbreak was also caused by an imported product\(^{28}\). There is now an emerging evidence base that global trade is also linked with the rise of chronic disease in many low-medium income countries\(^{29}\).


\(^{27}\) History.com Editors (2020). Black Death. Available at https://www.history.com/topics/middle-ages/black-death


Many of the risks associated with international trade may have impact on consumers, society and environment, and require regulatory intervention (The Black Death is a rather extreme case of such risks). From a regulatory perspective, a shipment arriving at the border can be non-compliant with regulatory requirements of several regulatory systems and thus be a source of a large variety of risks. A shipment with agricultural products (fruits and vegetables), for example, which is essential for SDG 2 “Zero Hunger”, can simultaneously pose a risk to local agriculture, in case it contains dangerous pests. It can be also a source of health risk, if the imported fruits were treated with pesticides. The shipment can be used for smuggling other products, and its value can be incorrectly declared for the purposes of tax evasion. Most commonly, such a shipment will be inspected by three different regulatory agencies: Customs Authorities, market surveillance department of the Ministry of Health, and that of the Ministry of Agriculture.

Risks that require regulatory intervention can be grouped as follows:

- Customs and security risks;
- Product non-compliance risks;
- SPS risks;

These risks are addressed in international trade agreements and conventions. Agreements of the WTO – Trade Facilitation Agreement (TFA), Agreement on Technical Barriers to Trade and Agreement (TBT) on Sanitary and Phytosanitary Measures (SPS) - describe principles and frameworks that countries can apply to address these risks without creating unnecessary barriers to trade and without endangering consumers, society and environment.

The following sections describe each group of risks in the context of relevant international agreements.

**Customs risks**

The central group of risks inherent to the international trade framework consists of those with which the customs authorities deal. These risks include (OSCE, UNECE, 2012):

- various types of commercial fraud,
- counterfeiting,
- smuggling of highly taxed goods,
- drug trafficking,
- stolen motor vehicles,
- money-laundering,
- electronic crime,
- intellectual or cultural property theft,
- trafficking in endangered plant or animal species,
- smuggling of arms nuclear materials,
- toxic waste or weapons of mass destruction.
Risk management in Customs has a long history and using risk management techniques and information technology in this area is one of the trade facilitation principles described in the Revised Kyoto Convention\(^\text{30}\). Top risks identified by the Customs Authorities are those associated with misdeclaration of value, smuggling of narcotics, misdeclaration of the HS code of the good\(^\text{31}\).

These risks are the main focus of the WTO TFA, which states that “Each Member shall, to the extent possible, adopt or maintain a risk management system for customs control”. Best practice in the management of these risks is described in Chapter 5.

**Product non-compliance risks in the WTO agreements**

The second type of risks addressed in the TFA are those related to non-compliance of products with technical, sanitary or phytosanitary regulations. These risks are managed by sectoral regulators, and the TFA refers to border controls that aim at addressing these risks as “other relevant border controls”: “each Member shall concentrate customs control and, to the extent possible other relevant border controls, on high-risk consignments and expedite the release of low-risk consignments” (article 4.3).

The TFA does not provide any means of managing these risks, only states that when products are found to be non-compliant with technical regulations and standards, “the Member [should] allow the importer to re-consign or to return the rejected goods to the exporter or another person designated by the exporter” (article 8.1). It adds that in case “the importer fails to exercise it within a reasonable period of time, the competent authority may take a different course of action to deal with such non-compliant goods” (article 8.2).

Product non-compliance risks are addressed in greater detail in the World Trade Organization Technical Barriers to Trade Agreement (WTO TBT) and Agreement on the Application of Sanitary and Phytosanitary Measures (WTO SPS). The WTO TBT agreement looks at technical regulations and non-compliance risks mostly from the potential trade disruption perspective\(^\text{32}\). Its main goal is much broader however, namely to ensure the application of the proportionality principle of regulatory requirements and compliance procedures to risk. The agreement requires that “technical regulations are not prepared, adopted or applied with a view to or with the effect of creating unnecessary obstacles to international trade” (article 2.2, here and later in the paragraph). To achieve this goal, WTO TBT calls for the application of risk management tools in the design of technical regulations, so that regulations will not be “more trade-restrictive than necessary to fulfil a legitimate objective”. It also requires that when regulations are developed, “the risks non-fulfilment would create” are explicitly taken into consideration.

Similar requirements cover the import compliance procedures conducted by regulatory authorities at ports of entrance. Non-proportionate compliance procedures can compromise even most proportionate regulatory requirements, and the TBT agreement requires regulatory authorities to design compliance procedures so that they are not “stricter [… than is necessary to give […] the adequate confidence that products conform with the applicable technical regulations […].” The level of strictness of the compliance procedures, according to the agreement, should be determined by “the risks non-conformity [with technical regulations and standards] would create” (article 5.1.2). At the same time, with respect to compliance procedures, the TBT agreement states that they should be “undertaken and completed as expeditiously as possible” and in “a no less favourable order” for imported products than for domestic products.

**SPS related risks**

Similar logic with respect to designing regulatory requirements proportionate to risks is applied in the WTO SPS agreement, which covers risks arising from the entrance, establishment and spread of pests, diseases, disease-carrying organisms or disease-causing organisms. The agreement has a separate article (article 5)
entitled “assessment of risk and determination of the appropriate level of sanitary and phytosanitary protection”. It states, inter alia, that “members shall ensure that their SPS measures are based on an assessment, as appropriate to circumstances, of the risks to human, animal or plant life or health, taking into account risk assessment techniques developed by the relevant international organizations”. According to the agreement, testing, inspection, certification and approval procedures (including those applied at the border) are considered a part.

There are many examples of SPS related risks, one of them is described in (Baldwin, 2020). The ship, Grand Saint Antoine, had already come to the attention of the port authority of Livorno. A cargo ship from Lebanon loaded with expensive textiles, it reached the port of Marseille in 1720. The Health Commission had its doubts – the plague was widespread in the eastern Mediterranean. Like all ships from affected regions, the Grand Saint Antoine was placed in quarantine. Normally, the crew and the property would have had to stay on board for 40 days to rule out the possibility of an infectious disease. But a textile fair near Marseille, where the importing merchants hoped for rich business, would soon begin. Under pressure from the rich traders, the health agency changed its mind. The ship could be unloaded, the crew went to town. After only a few days it was clear that changing the initial decision had been a mistake. The ship had carried the plague. Now the disease spread like a forest fire in the dry bush. The city authorities in Marseille could not cope with the number of deaths, with corpses piling up in the streets.

1.2.6 Risks of product non-compliance and customs risks: the main differences

Risks of product non-compliance are in many respects similar to customs risks: these two types of risks belong to the safety group, both of which are related to non-compliance with regulations, and are managed by regulatory authorities. At the same time, risk management best practice, including tools developed for customs authorities, should be adapted to the specifics of product compliance risks, since there are substantial differences between customs risk and risk related to the compliance of products with technical regulations and standards. These differences include:

- Product vs. shipment evaluation. Compliance with customs regulations (in terms of safety) is evaluated with respect to the whole shipment, whereas compliance with technical regulations can be determined only per product;
- Limited vs. unlimited number of risks. The number of customs risks associated with a certain shipment contains a very large but still limited and standard set of events; a number of compliance risks associated with one shipment, in contrast, depends on the quantity and variety of products that the shipment contains; theoretically, this number can be equal to all possible combinations of all non-conformities of all products to all regulatory requirements;
- “Safe when compliant” vs. “not necessarily safe when compliant”. When a shipment is compliant with customs regulations, it can be considered safe. As will be explained later in Chapter 6, a product that is compliant with technical regulations and standards can still pose a risk to consumers. This fact often causes misunderstanding of the objectives of import compliance processes;
- Different nature of checks and associated costs. Opening a consignment is generally sufficient to identify if the shipment is compliant with customs regulations. This is most often not the case in product compliance: establishing conformity with technical regulations and standards requires even more sophisticated, costly and time-consuming conformity assessment procedures, such as laboratory tests;
- Different product groupings. Customs procedures and associated risks are structured around groups of products as they appear in the HS codes. Products that belong to the same HS code are considered to have the same level of customs risk. In contrast, with respect to compliance with technical

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regulations, products that belong to the same HS code group can be very different in terms of the non-compliance risks.

The differences between these two types of risk should be considered when applying risk management best practice to import compliance procedures; but the risk management principles outlined in the WTO agreements are as relevant to product non-compliance as they are to customs risks.

1.2.7 Uncertainty in border compliance: trade disruption risks

Trade disruption risks that occur within an international trade system are similar to operational risks for business organizations. A broader definition of these risks includes all events related to inadequate or failed internal processes, people and systems. Within an international trade framework, operational risks cover a broad range of events that might occur in “procedures for importation, exportation and transit (including port, airport, and other entry-point procedures)”.

Operational risks in international trade, especially those that are associated with inadequate border compliance processes, or trade disruption risks, lead to additional and – importantly – unexpected costs for exporters and importers. The impact of these risks cannot be underestimated: the cost of trade procedures “including Customs and border crossing procedures, amounts to between two and 15 per cent of the value of the goods being traded.” (OSCE/UNECE, 2012). Operational risks of international trade not just further increase these costs but also make them uncertain and hard to predict.

The graphs below show that average time of border compliance procedures remains very high in most of the regions of the world; this parameter is also associated with high level of uncertainty, since the average time of border compliance is very different from region to region and from country to country within one region:

Figure 5 Average time of border compliance procedures across regions


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The graph shows that even within one region, average time of border compliance procedures can be very different:

Figure 6 Range in time of border compliance procedures across regions


International community and countries apply a variety of measures to mitigate trade facilitation risks. Not only risk management itself, many other trade facilitation measures aiming at building transparent, predictable and straightforward border procedures that expedite the movement of goods across borders, mitigate the operational risks of the international trade system. Trade facilitation measures can be thus perceived as measures aimed at mitigating respective risks. TFA provisions on the “publication and availability of information” aim at minimizing the level of uncertainty trade stakeholders operate in; while minimizing incidence and complexity of import and export formalities simply limits the number of things “that can go wrong”; and border agency cooperation provisions help establish coordination among authorities to minimize operational failures.

1.3 Increasing level of non-compliance risk in international trade: the main trends

Several trends analysed in the following sections explain the increasing level of uncertainty associated with international trade and the need for more efficient management of risks by regulatory authorities, including those involved in border control.

1.3.1 Growth in trade in manufactured goods

Trade in manufactured goods has been growing within the recent years. Growth in volumes is complemented with the diversification of the trade patterns. Developing countries, for example, are no longer merely providers of raw materials, but increasingly import raw materials and intermediate goods to produce manufactured goods for export.

Growth of trade in manufactured products has increased the level of risk of international trade. Manufactured products are subject to more complex regulatory requirements than raw materials and thus are a bigger source of non-compliance risk. As manufactured products have a shorter path to consumers - as they are
directly placed on the market and are not processed by local industry, as it is the case with raw materials - consequences of non-compliance and a probability of an accident with non-compliant products are higher than in case of raw materials.

1.3.2 Globalized production processes and trade diversification

According to Michael Spence, a Nobel Laureate in Economics, Global Value Chains - the complex network structure of flows of goods, services, capital and technology across national borders - has become “one of the lens” to analyse global economy

Trade is increasingly part of global value chains. Historically, new technologies and changing trade patterns have tended to widen the circle of countries benefiting from expanding production. As countries’ costs rise, production tends to move into more capital-intensive goods, with the more labour-intensive tasks moving to lower-cost locations offshore. Inomata and Taglioni show that this trend might reverse due to automation in established manufacturing centers, businesses trade more and more in intermediate goods, with a growing share of intracompany trade. With regard to logistics expenditures, companies increasingly spend on transport and reduce expenditures on inventory holdings. This is because deliveries are often just in time and waiting times at borders need to be minimized and predictable.

The new international value chains further add to the complexity of the modern international trading system. In the past, goods were often labelled as ‘Made in country A’. This is no longer always the case. Global production networks and trade in intermediary goods now constitute a larger portion of international trade so that goods produced or manufactured within the geographical boundaries of a country contain parts from multiple different national locations. Despite globalization ambitions of a single, seamless global market with no trade barriers, in reality, today’s era is one in which global trade is more complex and fragmented.

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37 Ibid.
1.3.3 Regional integration and risk management

Regional integration brings a lot of economic benefits. At the same time, it made countries dependent on import compliance systems of other member countries. The following box describes the main types of regional economic integration models:

**Box 1 Five types of regional economic integration models**

**Free trade areas**
No tariffs or quotas are applied between member countries, but each member maintains its own tariff barriers against third countries. Examples include the area of the North American Free Trade Agreement and the ASEAN Free Trade Area.

**Customs unions**
No tariffs or quotas are applied between member countries that jointly apply a common external tariff to third countries. Examples include the Southern Common Market (Mercosur) and the East African Community (EAC).

**Common markets**
In addition to the free movement of goods, such as in a free trade area or a customs union, member states of common markets also agree on the free movement of labour, capital and services. Examples include the European Union (EU) and the Economic Community of West African States (ECOWAS).

**Economic and monetary unions**
Harmonization of economic policies and adoption of a single currency. Examples include the West African Economic and Monetary Union (WAEMU) and the EU’s Economic and Monetary Union.

**Total economic integration**
Unification of monetary, fiscal and social policies and establishment of a binding supranational organization. The EU has achieved a monetary union and is now attempting to attain convergence in the fiscal and social policy domains.

**Source:** International Trade Centre (2017). Charting a roadmap to regional integration with the WTO Trade Facilitation

Most countries are part of regional integration schemes, and intraregional trade is growing faster than global trade in most regions. The number of regional trade agreements continues to rise, as does the number of such agreements incorporating trade facilitation measures. More regional trade agreements can lead to a spaghetti bowl of such agreements, which require more certificates of origin in order to benefit from preferential tariffs, and raise the level of uncertainty associated with a trade transaction. Obtaining and submitting certificates of origin is uncertain and requires more paperwork and potential waiting times.

Benefits of integration include removing many of supply chain barriers, such as non-tariff measures and border administration. At the same time, a country within a common market or customs union has to rely on inspections that are made in a different country. The efficiency of import inspections and risk management systems of the countries operating large ports of entrance within an integration scheme thus becomes crucial to all countries. Indeed, in many existing integration schemes large shares of imported products are processed by several ports of entrance and respective import compliance systems; the latter determine the level of proliferation of non-compliant products into all countries participating in an integration agreement.

1.3.4 New technologies

New technologies, such as IT tools, have made it easier to manage trade related risks. At the same time development of new technologies has made products more complex; in many cases, these products have
become more dangerous when non-compliant than their older versions. Electric bicycle, for example, is more dangerous than a usual bicycle, whereas a cellular phone is associated with a bigger number of risks than an old stationary telephone. Also, the development of new technologies made it easier to introduce new products on the market, which are associated with high level of risk.

1.3.5 Security challenges

Terrorism and security threats that can exploit the international trade system constitute another source of uncertainty associated with trade. Counter terrorist policies tend to multiply the negative impact of terrorism on trading costs. Costly inspections and monitoring, tighter security at airports and seaports increase the costs of travel for both tourists and businessmen and the costs associated with shipping goods, especially when time is factored as a cost.38

Cybersecurity is another example of a key issue for trade policy, which is a relatively new development. In the last few years there have been a number of news reports about various governments’ incorporating spyware, malware, or similar programs into computer-based products that are exported around the world. In the internet-of-things era, almost all products can be connected to the internet, and most of them can also be used for spying and other malicious activities.39

The very nature of international trade and the growing level of uncertainty requires all stakeholders – both regulatory authorities and business companies – apply risk management tools to systematically address all risks associated with trade. Increase in the level of uncertainty cannot be compensated by the growth in resources; trade policy and safety objectives can be achieved only on the basis of systemic risk management.

1.4 Current status of risk management implementation in border control

1.4.1 Trade Policy to address international trade risks

Trade policy is a systemic way to address risks of international trade. Customs procedures, international trade agreements, trade restrictions on imported inputs, export finance and risk mitigations are elements of a trade policy described in OECD 40, are instruments that allowing addressing many of the risks described above. National Trade Policy Framework for Export Competitiveness 41 by ITC also advises on the following instruments:

- Create competitive infrastructure services;
- Promote export and foreign investment;
- Move goods across borders effectively [i.e. facilitate cross-border trade];
- Address export market issues;
- Improve inputs and capital goods.

The following pages focus on trade facilitation as a policy measure.

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1.4.2 Trade facilitation as a policy measure

The importance of trade facilitation was recognized long before the adoption of the 2030 Agenda: many of the trade related targets reflect earlier commitments included in WTO agreements (see Bellmann, 2015)\(^2\). Over the past decade, substantial progress has been made in trade facilitation and in reducing trade costs. As tariffs were lowered or eliminated, reducing non-tariff sources of trade costs, such as inefficient transport, logistics infrastructure and services, regulatory procedures (including documentary and border compliance), has become the main source of trade facilitation.

The Trade Facilitation Agreement of the WTO (WTO TFA), ratified by 93.9% of the WTO Member States\(^3\), contains the most comprehensive list of non-tariff trade facilitation measures. Aimed at expediting the movement, release and clearance of goods across borders, these measures can be grouped into the following categories (such categorization is used in UN Global Survey on Digital and Sustainable Trade Facilitation).

Figure 7 Trade facilitation measures

![Figure 7 Trade facilitation measures](image)

Source: Valentin Nikonov.

1.4.3 Progress in risk management implementation

Risk management, as a basis for deciding whether a shipment should be physically inspected or not, is one of the key trade facilitation measures listed in the Trade Facilitation Agreement of the WTO (WTO TFA), belongs to the “Formalities” group.

Figure 8 shows that risk management remains within the bottom 5 measures with lowest implementation rate:

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Figure 8 Risk management as one of the bottom 5 measures with lowest implementation rate

Figure 9 Implementation progress of TFA Article 7.4 on Risk Management


According to the WTO Trade Facilitation Agreement Database, as of May 2021, global implementation progress is evaluated as 59.6%. The progress in risk management implementation is heavily biased with respect to the development status of the Members:

The Figure shows that all developed countries have reported to have fully implemented risk management system to address the requirements of the TFA, whereas progress within least-developed, landlocked developed and developing members is only 22%, 33% and 57% respectively (with 66.4%, 66.3% and 39.2% of future implementation commitments).

Interestingly, according to the UN Global Survey on Digital and Sustainable Trade Facilitation, risk management as a trade facilitation measure has the 8th highest implementation score in the list of 53 measures. The following graph shows that the number of countries that fully implemented risk management as a trade facilitation measure was steadily growing during 2015-2019:

![Figure 10 Progress in risk management implementation in 2015-2019](https://www.untfsurvey.org/world)

65 countries reported that they “fully implemented” risk management in border control procedures, 37 countries “partially implemented” this measure; only 9 countries were at the planning stage, whereas 3 countries reported that they didn’t implement the measure at all.

1.4.4 Impact of risk management on time and cost of border compliance procedures

Successful implementation of risk management is supposed to minimize the time and cost of border compliance procedures, i.e. the time and cost associated with compliance with the economy’s customs regulations and with regulations relating to other inspections that are mandatory in order for the shipment to cross the economy’s border, as well as the time and cost for handling that takes place at its port or border.

Despite high level of risk management implementation in border control (according to the data of the UN Global Survey), analysis of the available import compliance data shows that there is still significant need

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for improving the efficiency of border compliance procedures. In 2015-2020, for example, 7 countries (5 of them claimed to have fully implemented risk management) have shown increase in average time of border compliance procedures, whereas 76 countries (43 countries have fully implemented risk management) showed no progress in improving the indicators.

The graph below shows that despite the overall reduction in average time of border compliance procedures among countries that have fully implemented risk management in 2015-2020, in most cases the functioning of risk management systems have not brought substantial reduction in times of border compliance.

Figure 11 Dynamics of border compliance time in countries that have reported progress in risk management implementation

![Dynamics of border compliance time across countries that have made progress in risk management implementation](chart.png)


Only 3 out of 12 countries that reported substantial progress in the risk management implementation showed an improvement in time of border compliance procedures, whereas other countries didn’t show any progress in the reduction of border compliance time. Dynamics of border compliance costs is presented in Figure 12.
1.4.5 Improving risk management in border control: searching for causes

Several examples of causes why risk management implementation has not yet had a substantial impact on time of border compliance procedures can be found in the UNECE Needs Assessment Reports (UNECE, 2012-2020).

UNECE Reports on Armenia\(^{46}\) and Georgia\(^{47}\) highlight the necessity of further strengthening and improving risk management systems and techniques at the border. Moldova, according to the Report\(^{48}\), should undertake a thorough review of the risk parameters and profiles in the Customs Integrated Information Systems, and place the emphasis on risk management in properly choosing approved economic operators.

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An important trade facilitation need of Albania, Belarus, Kyrgyzstan and Tajikistan was identified as “consolidating risk-based control management system and techniques” applied at the border. In case of Belarus, introducing a coordinated approach to risk management at the border was highlighted. Kyrgyzstan was recommended to “establish a link between the individual agencies’ risk management system and that of the UAIS, as the latter has established itself as the backbone of Kyrgyzstan’s broader risk management system” and to “review the risk management system” as a whole. Tajikistan should establish a “common risk management policy” that would “articulate a common conceptualization of risks and capture the fundamental aspects of risk management as they apply to all border control agencies” and contains principles that are necessary for “fostering border control cooperation”. It also recommends “identifying areas that could benefit from improved coordination and integration to ensure successful implementation of integrated border management”.

The overall need to strengthen risk management “with a comprehensive information system” for supporting risk identification, risk evaluation, creating of risk profiles and other essential functions of the process to enable Customs exchange information is highlighted in the overview of the needs assessment studies.

OECD states that “on balance, risk management efforts seem to have stalled at the single-agency (Customs) stage and have yet to achieve their full potential” and that “making risk management more comprehensive and integrating […] input from all border agencies”.

Analysis of World Bank shows similar results: “Customs is only one of the agencies involved in border processing, and evidence suggests it is often responsible for no more than a third of regulatory delays”. Traders are much more satisfied with the performance of customs than with that of other border management agencies.

1.5 National risk management strategy: integrated risk management at the border

Addressing the challenges described above requires implementing a national risk management strategy for border control. The strategy is based on the following principles:

- Application of formal and standardized methodologies for management of non-compliance risk within border control agencies;
- Strengthening the role of import compliance procedures in market surveillance and enforcement systems run by regulatory authorities responsible for product compliance;
- Integrating import compliance processes applied at the border with other building blocks of respective regulatory systems: ensuring that import compliance supports all regulatory objectives and respective SDGs;

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• Ensuring efficient integration of risk management processes of all regulatory agencies involved in border control; when appropriate, on the basis of existing risk management frameworks of the Customs Authorities;

• Integrating risk management in border control with other trade facilitation tools, such as Single Window and others.

The following chapters of the Guide provide basis for implementing the Integrated Risk Management Framework, the concept of which is represented in Figure 13:

Figure 13 A reference model of an integrated risk management framework


The risk management strategy described above, aiming at facilitating trade while protecting health and safety of consumers, society and environment by removing redundant and sequential controls has the following benefits. From the international trade perspective, it supports and even leads to more efficient implementation of the risk management principles of the WTO Agreements, in particular those of WTO TFA, TBT and SPS. It introduces and highlights the concept of a non-compliance risk, which is essential for ensuring that controls of every agency involved in import compliance support regulatory objectives and are prioritized according to both severity of the consequences of product’s non-compliance with relevant regulations, i.e. their impact on regulatory objectives, and on the probability that an incoming shipment contains a non-compliant product. By identifying non-compliant products at the border, it ensures more efficient enforcement.

Integration directions of the strategy provide for the most efficient application of risk management in border control and ensure application of holistic approach in the design of an import compliance framework, which is essential for collaborative border management (the concept is described in World Bank, 2011). Integrated approach, which in most cases implies integrating risk management processes of regulatory agencies into the risk management system of the Customs, provides for a comprehensive overview of risks and allows
analyzing the functioning of an import compliance framework as a whole, using overall border compliance time as main evaluation metrics.

Finally, integrated approach helps ensuring efficiency of risk management at the border, as it:

- Creates a common risk management language and processes at the border, including for defining risk tolerance and managing of non-compliance risks;
- Leads to more efficient cooperation among regulatory authorities: allows taking into account correlations among risks and findings of agencies involved in border control, using common data models and cooperating in development of risk profiles and compliance rules;
- Saves resources of regulatory agencies, as it allows sharing risk management expertise, IT infrastructure and software tools and processes among regulators for developing and applying risk profiles and targeting non-compliance shipments. Within an integrated system, all types of non-compliance risks of incoming shipments can be evaluated within one system based on integrated data source.

The biggest challenge of the presented strategy is associated with the complexity of projects required for its implementation: the strategy covers various aspects of border control and brings together several stand-alone areas. Its implementation requires running a portfolio of projects, which structure would depend on the risk management maturity of the existing framework, both in terms of the individual capacity of participating agencies and integration processes. The implementation roadmap is presented in the next section.

1.6 Implementation roadmap and the structure of the Guide

The implementation roadmap for building integrated import compliance systems at the border can be easily derived from the strategy described above and contains the following layers:

1. Organizational level: implementation of formal risk management within regulatory agencies;
2. Regulatory system level: ensuring that relevant regulatory systems support SDGs and are risk-based;
3. Import compliance level of a regulatory agency: implementing profiling and targeting techniques within regulatory agencies responsible for border control for the evaluation of non-compliance risk of the incoming shipments;
4. Integration level: integrating import compliance systems of regulatory agencies involved in border control.

The implementation roadmap is presented in Figure 1 as a pyramid, which can also be used as a maturity model for integrated risk management at the border. Going bottom-up within the pyramid, every step within the roadmap can be skipped, in case already implemented within a border control framework. The right part of the picture shows the titles of the chapters of the Guide supporting each phase of the implementation roadmap.
CHAPTER 2 PRINCIPLES OF RISK MANAGEMENT

Application of a formal risk management methodology by all regulatory stakeholders involved in international trade is a prerequisite for the successful management of risks in general and for building an integrated import compliance system for border control. As risks have always been managed by border control agencies, this chapter starts with highlighting the difference between intuitive and formal risk management and provides an overview of the main tools that can be used for managing risks in the context of international trade and import compliance. It analyzes the risk management principles of the international trade agreements that form a basis of an import compliance framework and provides guidance on choosing appropriate risk treatment strategies.

2.1 A need for a formal risk management in international trade

Human beings have invented the concept of “risk” to help them understand and cope with the dangers and uncertainties of life. These dangers included those associated with trade, and - as it was shown in the previous chapter - international trade and risk management share a long history. Although traders and regulatory authorities started managing risks thousands of years ago, in most cases it was an intuitive management of risks, which could not have been based on any formal methodology and often led to serious errors.

Intuitive and non-systemic risk management can lead to serious biases in risk perception and hence to wrong policy and regulatory responses. Biases associated with intuitive judgment of probability – the central parameter of any risk – are described in “Judgment under uncertainty: heuristics and biases.” The paper shows how people make mistakes in intuitive evaluations of probabilities because of substituting probability with other heuristics. The biases described are as relevant to import compliance as they are to any other field. Authors describe situations, in which people assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind, which, of course causes an error. If an inspector, for example, encountered two shipments from country A that were non-compliant (or read about them in a newspaper), he or she would overestimate the probability of non-compliance of shipments from this country. Other errors in intuitive evaluations or risks stem from the fact that people are often assessing the probability by the degree to which an object representative of, or similar to, the stereotype. Other biases are described in the paper and include insensitivity to sample size, predicting solely in terms of the favorableness of the description, and other.

Applying formal risk management methodologies does not guarantee but helps avoiding errors in risk perceptions. Management of risks in such a complex and multilayered system as international trade requires application of formal and harmonized risk management methodologies. International standards on risk management, such as ISO/IEC 31000, ISO/IEC 31010 and others became the basis of various risk management frameworks developed by international organizations working in different fields, such as the WCO (Risk Management Compendium), UNECE (Risk Management in Regulatory Frameworks: Towards a Better Management of Risks), and others.

The following sections introduce the main concepts of risk management that help avoiding risk perception biases and are essential for regulatory authorities involved in international trade and border control.

2.2 Full identification of a risk

Risks are often confused with risk events, such as “shipment is non-compliant” or “shipment will be stuck at the border”. The internationally recognized definition of risk is “effect of uncertainty on objectives”\(^{57}\). The definition of risk shows that identifying only a risk event is an incomplete identification of a risk: formal identification requires evaluating the level of uncertainty associated with the event (its probability) and the impact that this event will have on the objectives in case it occurs.

To avoid many of the risk perception biases, risk needs to be described in terms of risk sources, potential events, their consequences and their likelihoods\(^{58}\) and one way to describe a risk that is commonly used in practice is to develop a graphical representation, which shows how uncertainty impacts objectives as a cause-effect logic. Risk can be represented as a set of the following interrelated elements, as shown in the Figure 14:

Figure 14 Structure of a risk

Identifying a risk includes formalizing:

- Uncertain event: something that might happen in the future (or has already happened in the past, but we are not sure about),
- Likelihood of the event (to happen in the future or, if we don’t know if it happened or not, to have happened in the past),
- The impact of the event on the objectives, and
- A set of risk factors (vulnerabilities or hazards), that can cause the event.

\(^{58}\) ibid.
2.3 Objectives of risk management and the main functions of the risk management process

Risk management is a set of coordinated activities to direct and control organization with regard to risk\(^\text{59}\). In the context of import compliance and trade facilitation, risk management objectives can be defined as helping a regulatory stakeholder achieving its objectives by choosing and implementing the best actions in response to risks.

Best actions in response to risks are those that allow regulatory authority finding the right balance between the following three parameters: the reward associated with the achievement of the objectives, the potential impact of the risk (very often best described as ‘losses’) and the costs of actions chosen to address the risk (very often can be described as ‘safety measures’):

Figure 15 Objective of risk management: finding the right balance

The risk management process, essential for achieving the risk management objectives, calls for the implementation of the following functions:

- **Establishing the context**, or knowing what we are “protecting” – our strategy or assets, public health, market efficiency, etc. – and knowing who our stakeholders are.

- **Identifying the risks** (what are the events that might occur, why might they occur, how probable are they, and what impact could they have on us) and being familiar with as many of them as possible.

- **Understanding the risks** that are the most important for us, which is why we analyze and evaluate them.

- **Starting with the most important risks**, choosing a risk treatment option (we can retain the risk, share it with another party, or mitigate or avoid it by removing its source).

- **Implementing whichever decision has been taken**, which is the direct result of the risk management process.

\(^{59}\) ibid.
• Devising a crisis management plan for those risks that are accepted and for those that are mitigated. This results in an action plan for dealing with the risk, should it occur. It is a very important conceptual stage in the risk management process, since risk management is a tool for achieving adequate, but not absolute, safety.

Chapter 3 describes how each of these functions can be performed for building a regulatory system; approaches described can be applied in a similar fashion in other contexts.

2.4 Overview of risk treatment strategies: tools for choosing best actions in response to risks

Risk management methodology is universal and can be applied by any organization (and any person) to any type of risk. In many cases, risk management is a process that supports the main activities of an organization by reducing the impact of uncertainty on organization’s objectives and business processes, as well as by creating environment in which advantage can be taken of new opportunities that arise. At the same time, there are organizations – such as banks, insurance companies, border compliance agencies – for which risk management process lies at the core of their main activities. Management of risks within these organizations is one of their main business processes, which results constitute an important part of the services these organizations provide.

In either case, best actions in response to any risk can be chosen from the list of the following risk treatment strategies. These strategies can be applied to address both internal risks of any organization and those risks that organization manages within its main business processes (like, for example insurance companies, for which risk management is one their main business processes).

Risk treatment strategies represent possible “directions” for dealing with risks; they contain the following options:

• Modifying a risk
• Tolerating a risk
• Avoiding a risk
• Transferring a risk

2.4.1 Modifying a risk

Modifying a risk is the key strategy of risk management. It aims at changing the likelihood or the consequences of a risk event: minimizing the likelihood and the consequences of a negative risk event, and maximizing the likelihood and the consequences of a positive risk event (an opportunity). Although in many contexts – and especially within organizations that aim at establishing safety – it is quite common that risks are considered as “negative” events, the modern risk management approaches are based on the concept that uncertainty can also have a positive impact on objectives that also should be addressed.

The following approaches that can be used to modify risks:

• Changing the likelihood of the risk event, by removing the risk factors and other means;
• Changing the consequences of the risk event.

Issuing import permits, auditing businesses and performing border inspections (as, for example, it is commonly performed by some of the product regulators, in food safety, agriculture and other sectors) are examples of activities performed by regulatory authority that aim at modifying the non-compliance risk of

products. Importer may choose a more expensive shipping company to remove one of the risk factors of the risk “possible loss or damage of goods”, is an example of a risk modification performed by an importer.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Risk mitigation strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importer risk: goods spoiled during transport</td>
<td>Choosing a more expensive shipping company.</td>
</tr>
<tr>
<td>Regulator risk: proliferation of non-compliance products</td>
<td>Establishing border controls.</td>
</tr>
</tbody>
</table>

Risk mitigation includes risk treatments that deal with negative consequences (synonyms include “risk elimination”, “risk prevention” and “risk reduction”). Common approaches to risk mitigation, along with removing risk factors described above, include diversification and hedging. Changing the consequences of the risk event is another approach to modify the risk.

In general, actions that are performed with the objective of modifying a risk, no matter what they contain, are referred to as controls, and costs associated with them are often referred to as risk mitigation costs or safety costs. These controls, depending on the level on which risk management is implemented, can include implementing projects or processes within a business company, or developing new policies and regulations within a regulatory system.

### 2.4.2 Tolerating a risk

Accepting risks implies “retaining the risk by informed decision”. If this strategy is applied, the economic operator will not do anything about the risk that goods can be damaged during transit: it won’t bear the costs associated with the actions aimed at minimizing the potential losses.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Risk acceptance strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importer risk: loss of goods in transport</td>
<td>Not changing the shipping company (investing the money saved into something else).</td>
</tr>
<tr>
<td>Regulator risk: proliferation of non-compliance products</td>
<td>Abolishing import inspections (minimizing border compliance time)</td>
</tr>
</tbody>
</table>

### 2.4.3 Transferring a risk

Transferring a risk, or risk sharing, is a form of risk treatment that “involves the agreed distribution of risk with other parties”. Within a business context, the common approaches used to apply this strategy include insurance and outsourcing. In the first case, the risks are shared with an insurance company, whereas outsourcing implies sharing the activity that contains the risk with another party. Examples of how this strategy can be applied are summarized in the table below:

<table>
<thead>
<tr>
<th>Risk</th>
<th>Risk transferring strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importer risk: loss of goods in transport</td>
<td>Buying insurance.</td>
</tr>
<tr>
<td>Regulator risk: proliferation of non-compliance products</td>
<td>Transferring the risk to business companies.</td>
</tr>
</tbody>
</table>

### 2.4.4 Avoiding a risk

Risk avoidance doesn’t aim at modifying the parameters of the risk itself but instead focuses on the activities that contain the risk. Potential losses associated with can be avoided “by deciding not to start or continue

---

with the activity that gives rise to risk” (ISO 2019). Not importing goods will guarantee that they are not damaged during transit:

Figure 16 Risk avoidance strategy

Source: Valentin Nikonov, figure prepared to illustrate the methodologies described in the Guide.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Risk avoidance strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importer risk: loss of goods in transport</td>
<td>Not importing goods.</td>
</tr>
<tr>
<td>Regulator risk: proliferation of non-compliance products</td>
<td>Banning the imports.</td>
</tr>
</tbody>
</table>

2.5 Criteria for evaluating risk treatment strategies

Good risk management results in best actions in response to risks. Any risk can be treated with one of the strategies presented above, and when risk treatment strategies are properly chosen and implemented, they allow “making the best out of the uncertainty”, by preparing for its possible impacts so that they will not prevent – or will even contribute to – the achievement of the objectives.

Within a business context, the best actions can be presented as those that allow finding the right balance between the reward associated with the activity that contains a risk, costs of actions aimed at modifying the risk, and potential losses. These three parameters are interrelated in the following way. From a regulatory system perspective, examples of best actions in response to risk can be import inspections that allow a country enjoying the benefits of trade while minimizing the potential losses associated with non-compliance in the most efficient way.

The “reward – potential losses” relationship is key in risk management: in business (and also in gambling!) more ambitious the objectives are (higher are the stakes), higher are the potential losses, associated with the activities that are undertaken to achieve these objectives. Similarly, within the international trade context, rewards associated with increased trade volumes can lead to higher levels of losses associated with non-compliance.

The “costs of actions aimed at modifying the risk – potential losses” relationship can be different for different types of risks, but in general potential losses are proportionate to risk mitigation costs: higher the costs of risk mitigation measures, lower are potential losses.

Costs of risk mitigation measures impact the reward expected from the main activities: higher risk mitigation costs lead to lower reward.

Considering the relationship among the three parameters is crucial for choosing the best response to risks. Table 1 summarizes situations where each of the strategies can and cannot be the best response to a risk:
Table 1 Criteria for choosing risk treatment strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Situation, in which it is a best response</th>
<th>Situations, in which it is not the best response to risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modifying (mitigating) a</td>
<td>Optimal way to mitigate the risk is chosen</td>
<td>The residual risk still remains too high</td>
</tr>
<tr>
<td>risk</td>
<td>Cost of risk mitigation is proportionate to potential losses</td>
<td>Mitigation costs exceed the reward associated with the main activity (or are not proportionate to the reward)</td>
</tr>
<tr>
<td></td>
<td>Risk mitigation brings the risk to the desired level</td>
<td></td>
</tr>
<tr>
<td>Accepting the risk</td>
<td>There is no way to efficiently modify the risk (e.g. emerging risks).</td>
<td>The level of the accepted risk is higher than the actual level of risk that the business is willing to accept</td>
</tr>
<tr>
<td></td>
<td>The business wants to accept the risk</td>
<td></td>
</tr>
<tr>
<td>Avoiding a risk</td>
<td>Risk that is not tolerable that cannot be modified and thus brought to the required level</td>
<td>There are proportionate risk mitigation measures</td>
</tr>
<tr>
<td></td>
<td>Risk mitigation costs exceed the reward from the main activity</td>
<td>Risk avoidance chosen because of the risk perception biases (fears)</td>
</tr>
<tr>
<td>Risk transfer</td>
<td>Transferring a risk is an optimal strategy (compared to risk mitigation)</td>
<td>Transferring a risk will create higher risks</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.

2.6 Risk management principles of the WTO Agreements

Similar to general risk management objectives, those of any regulatory authority involved in border control can be defined as finding the balance among the following parameters (Figure 17):

- Potential losses associated with non-compliance risks and customs risks, that can be defined in terms of impact on health and life of consumers (injuries or loss of life), tax evasion, as well in terms of the impact that non-compliant products might have on the environment and other societal objectives.

- Investment into building a border compliance framework and costs associated with running it, that constitute various checks and inspections that regulatory authorities can perform, from document checks to most comprehensive physical checks of incoming shipments and imported products, including sending products to a lab. From a regulatory system perspective, time and money spent on checks by both regulatory authorities and business companies, as well as in terms of disruptions of the trade process and other impact that these measures have on supply chains can be presented as “safety costs” that are supposed to minimize potential losses associated with international trade.

- The anticipated payoff, in turn, can be expressed in terms of the benefits associated with trade, consumer satisfaction, market competition and other categories.
Ensuring the right balance between the potential losses associated with incoming shipments and costs of border compliance requires prioritizing import inspections on the basis of non-compliance risk. Risk management in border control is a priority setting tool that allows concentrating on high-risk shipments and expediting the release of low-risk shipments. Successful management of product non-compliance and customs risks, is of itself a risk mitigation measure, which helps minimizing trade disruption risks.

Analysis of the WTO Agreements shows that many of the principles declared in them aim at achieving the risk management objective for the management of the trade related risk. The TFA, TBT and SPS agreements set out important principles of sound risk management that should be applied by regulatory authorities dealing with safety risks (at borders and in general). These principles include:

- **Proportionality of regulatory requirements**: technical regulations and standards, as well as other regulatory requirements designed by regulatory authorities should be proportionate to risks that a product might pose to consumers, society, the environment, and other areas of the country’s security (WTO TBT and SPS);

- **Proportionality of compliance procedures**: compliance procedures that are introduced by regulatory authorities in order to identify products that do not meet the requirements of regulations should be proportionate to risks that a non-compliant product might create (WTO TBT and SPS);

- **Systemic risk management**: regulatory authorities should develop and maintain a risk management system for management of non-compliance risks (WTO TFA);

- **Principles of tolerable level of risks**: regulators should concentrate controls on high-risk consignments so that the release of low-risk consignments “could be expedited” (WTO TFA);

- **Principle of prioritizing** inspections based on risk: to identify high-risk and low-risk consignments, regulatory authorities should develop “appropriate selectivity criteria”, so that a person or a consignment for checks are selected in a risk-based manner. These selectivity criteria, according to the agreement, could be based on the Harmonized Commodity Description and Coding System (HS code), nature and description of the goods, country of origin, country from which the goods were shipped, value of goods, compliance records of traders, and other parameters (WTO TFA);
• **Principle of “uniform flexibility”**: Though the TFA states that “each Member shall apply common Customs procedures and uniform documentation requirements for release and clearance of goods”, it recognizes that this “shall not prevent Member from differentiating its procedures and documentation requirements for goods based on risk management”\(^{62}\).

### 2.7 Why zero risk is not a risk management objective

Risk management does not necessarily aim at minimizing the effect of uncertainty on objectives. Instead, it aims at bringing in an optimal way the effect of uncertainty to the level which can be tolerated by a regulatory stakeholder, by modifying the potential consequences of risks and their likelihoods.

Risk tolerance is “readiness to bear the risk after risk treatment in order to achieve its objectives”. In business environment, risk tolerance can be influenced by regulatory requirements; for a regulatory authority, risk tolerance is impacted by societal expectations.

Another important conclusion that follows from the objective of risk management is that zero risk is not and cannot be a valid objective. Not only because uncertainty will always be present and new unknown risks will emerge, but also because the likelihood and the impact of risks cannot be brought to zero, even if the most expensive risk treatment measures are implemented. Also, mitigating risks creates new risks.

The absence of zero risk can be also explained by referring to the balance between the level of risk, reward and the cost of safety measures: if brining risks to zero were feasible for getting a reward, it would create a “money machine”.

Determining the level of risk which is tolerable is a very complicated and – in many cases – personal/cultural/societal – even political decision, which cannot be judged in terms of ‘right or wrong’. One of the outcomes of the risk management performed by a regulatory authority is determining the tolerable level of risk associated with business processes, products and services: regulatory requirements are supposed to bring the level of risk of a compliant product to the level that a regulatory authority is willing to tolerate.

CHAPTER 3 BUILDING RISK-BASED REGULATORY FRAMEWORKS IN SUPPORT OF SUSTAINABLE DEVELOPMENT GOALS

Chapter 1 highlighted the important role of international trade in the achievement of the SDGs. It also showed that many of the goals depend on compliance of internationally traded products with applicable regulations. This chapter presents such regulations as a part of bigger picture, and shows how risk-based regulatory systems support the SDGs. It provides guidelines on building risk-based regulatory frameworks that are grounded in the risk management principles described in the previous chapter.

Building risk-based regulatory systems is a prerequisite for efficient border control, since import compliance constitute an indispensable part of a market surveillance system, which, in turn, is one of the building blocks of any regulatory framework. For import compliance to be efficient, it should be balanced with other elements of a regulatory framework.

3.1 Non-compliance risks and the SDGs

Regulatory systems supporting the SDGs contain regulatory requirements for products and services, produced and traded by economic operators: a food safety regulatory framework, for example, contains regulatory requirements for the allowed amount of pesticides in fruits and vegetables, health safety systems of countries establish compliance of medical devices and regulate use of medicine, environmental protection framework contains requirements on emissions.

Applying international best practice in risk management and referencing international standards in regulations is an important prerequisite for ensuring the proportionality of regulatory requirements. From a risk management perspective, regulatory requirements aim at bringing the level of risk associated with a certain product - to SDGs and other regulatory objectives - to a tolerable level.

In case regulatory requirements are proportionate to risks they were set out to address, the level of risk associated with regulated products that are compliant with the requirements of relevant regulations is not higher than a tolerable level of risk, whereas each non-compliant product placed on the market poses a risk and requires regulatory response. Examples of risks to SDGs described above are all related to different types of product non-compliance.

Conformity assessment as a form of pre-market control aims at minimizing risks to the SDGs by not allowing non-compliant products to be placed on the market. Regulatory authority can choose different conformity assessment procedures for products depending on their level of risk; e.g. self-declaration of conformity for low risk products and product certification provided by an independent body for those of high risks. No matter which conformity assessment tool is chosen, it aims at ensuring that production processes and products themselves meet regulatory requirements, and that non-compliance products are identified already at the premises of an economic operator.

Market surveillance processes, as a form of post-market control, complement conformity assessment in minimizing the risk of product non-compliance by inspecting products and services that are already placed on the market. It aims at removing non-compliant products from the market and thus minimizing the consequences associated with the risks non-compliant products pose to consumer, society and the SDGs.

The following sections provide a step-by-step guidance on building risk-based regulatory systems in support of the SDGs.
3.2 Turning the SDGs into regulatory objectives and defining the risk criteria

3.2.1 SDGs and regulatory system objectives

Setting regulatory objectives is the first step in building a risk-based regulatory system. The Sustainable Development Goals' targets constitute the basis of regulatory objectives of any regulatory system. To identify clear regulatory objectives and develop a sound implementation strategy from a regulatory and operational perspective, SDGs and their targets and should be analyzed within the given national and international contexts.

Relationship among regulatory systems and SDGs is "many-to-many": every regulatory framework can be linked to several SDGs and targets, and any SDGs and target can be addressed by several regulatory systems.

Table 4 presents the approach of how the SDGs and targets can be used as inputs to regulatory objectives of several regulatory frameworks (on the example of several of the SDGs and regulatory systems):

<table>
<thead>
<tr>
<th>SDGs and targets</th>
<th>Objectives of Food Safety Regulatory Framework</th>
<th>Objectives of Transport regulatory framework</th>
<th>Objectives of agricultural regulatory system</th>
</tr>
</thead>
<tbody>
<tr>
<td>End poverty in all its forms everywhere</td>
<td>Ensure the availability of food for poor and vulnerable.</td>
<td>Ensure availability of transport for the poor and the vulnerable. Create working places.</td>
<td>Resilience for shocks (climate and economic).</td>
</tr>
<tr>
<td></td>
<td>Support creation of work places.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End hunger, achieve food security and improved nutrition and promote sustainable agriculture</td>
<td>Increase trade in food.</td>
<td>Ensure efficient transport of food products.</td>
<td>Support new farms and economic operators in agriculture.</td>
</tr>
<tr>
<td>Ensure healthy lives and promote well-being for all at all ages</td>
<td>Safety of food. Safety of imported food.</td>
<td>Reduce emissions.</td>
<td>Reduce the use of pesticides.</td>
</tr>
<tr>
<td>Achieve gender equality and empower all women and girls</td>
<td>Ensure gender equality in regulated businesses.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure access to affordable, reliable, sustainable and modern energy for all</td>
<td>Ensure sustainable use of energy in the regulated businesses.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov. Table prepared to illustrate the methodologies described in the Guide.

Objectives of the regulated economic operators constitute another important input into objectives of a regulatory system.

3.2.2 Embedding objectives of economic operators into regulatory system objectives

It is generally accepted that the objective of economic regulation is to prevent market failures. In a broader way, the objectives of a regulatory system can be described as follows (UNECE, 2012b):

1. To promote growth, innovation, competitiveness and job creation without creating unnecessary risks to welfare, safety, public health and environment, and
2. To protect public health, welfare, safety and environment without stifling growth, innovation, competitiveness and job creation.

Promoting growth, innovation and competitiveness requires creating market conditions that would enable business companies achieving their objectives. The objectives of regulated business companies, hence, constitute an important input for setting the objectives of a regulatory system. Profitability objectives of an economic operators, for example, can be transformed into “ensure market efficiency” on the regulatory system level. Indeed, growth and innovation always comes from business; in a sense, regulators are dependent on business companies: it can be argued that business can survive without regulation, but it is certain that regulation will not be needed in case there is no one to regulate.

3.2.3 Impact on SDGs as risk criteria

From the risk management perspective, regulatory objectives are essential for defining the risk criteria, necessary to consider how likelihood and consequences (both positive and negative) will be defined and measured (ISO 31000). Risk criteria constitute a set of parameters that could be used to evaluate the significance and the level of tolerability of risks, against which risks can be evaluated. Objectives can be turned into “risk criteria” using the following scheme (Figure 18) as a guideline for categorization of the consequences, only instead of “financial”, “health and safety”, etc., objectives of a regulatory system should be applied:

Figure 18 Categorizing consequences of risks: example of a consequences scale

<table>
<thead>
<tr>
<th>Rating</th>
<th>Financial</th>
<th>Health and safety</th>
<th>Environment and community</th>
<th>Etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Max credible loss ($)</td>
<td>Multiple fatalities</td>
<td>Irreversible significant harm; community outrage</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>Minimum of interest ($)</td>
<td>First aid only required</td>
<td>Minor temporary damage</td>
<td></td>
</tr>
</tbody>
</table>


The following example (Table 5) illustrates one possible realization of this approach. Each objective of the food safety regulatory system can be turned it into a scale according to which impact of uncertainty on this objective will be measured.

Table 5 Example of establishing a consequences scale (risk criteria) within a regulatory framework on the basis of regulatory objectives

<table>
<thead>
<tr>
<th>Scale/Objectives</th>
<th>Ensure the availability of food for poor and vulnerable</th>
<th>Increase trade in food</th>
<th>Ensure safety of food</th>
<th>Efficiency of economic operators</th>
<th>Impact on SDGs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe consequences</td>
<td>Food is/becomes unavailable to large populations</td>
<td>Decrease in trade more than 50%</td>
<td>At least one victim.</td>
<td>More than $100,000 in additional costs</td>
<td>Heavy impact on an SDG</td>
</tr>
</tbody>
</table>
of poor and vulnerable.

<table>
<thead>
<tr>
<th>Medium consequences</th>
<th>Food is/becomes unavailable to less than half of the poor and vulnerable groups.</th>
<th>Decrease in trade less than 50%.</th>
<th>Poisoning involving more than 20 consumers.</th>
<th>Additional costs of $10,000 - $100,000</th>
<th>Medium impact on an SDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low consequences</td>
<td>Several cases, when food is unavailable/ no growth</td>
<td>No growth in trade.</td>
<td>Poisoning involving less than 20 consumers.</td>
<td>Additional costs of less than $10,000</td>
<td>No impact on SDG</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov. Table prepared to illustrate the methodologies described in the Guide.

The table is based on a 3 layered scale of severity, that measures the consequences of risks across all the regulatory objectives. Severe, medium and low impacts on every objective should be determined to build comprehensive risk criteria. Scale of consequences can include as many layers as regulatory authority may want.

### 3.3 Identification and assessment of risks to SDGs

#### 3.3.1 The objective of risk identification

The purpose of risk identification is to find, recognize and describe risks that might help or prevent achieving the objectives of a regulatory system. Using all the available relevant, appropriate and up-to-date information is important in identifying risks.

Risk identification should result in a formal document that provides regulatory authority with answer to the following question:

- What are the events that might occur that will impact regulatory objectives?
- What impact will these events have on all the SDGs?
- Why these events might they occur?
- How probable are they?
- What are the factors that make these events more or less likely?

Regulatory authorities can apply the following tools to ensure that risk identification is timely and comprehensive.

#### 3.3.2 Developing taxonomies for risk identification

Developing a checklist with all known types of risks and using it during risk identification can help ensuring that no group of risks is omitted during the risk identification. Checklists can be used during risk assessment in various ways such as to assist in understanding the context, in identifying risk and in grouping risks for various purposes during analysis. Checklist can be based on experience of past failures and successes but more formally risk typologies and taxonomies can be developed to categorize or classify risks based on common attributes (IEC, 2019).

Using risk typologies is very common in risk identification, an example of a risk typology that can be used by economic operators contains the following types of risks (UNECE, 2012b):
Table 6.1 Example of using risk classifications for the purposes of risk identification: assigning category to a risk

<table>
<thead>
<tr>
<th>Examples of risks</th>
<th>Risk category</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Possible loss of or damage to goods in transit”</td>
<td>Risks of processes related to the quality of product</td>
</tr>
<tr>
<td>“Supplier problems, including failure to supply”</td>
<td>Suppliers’ risk</td>
</tr>
<tr>
<td>“Transport delays and potential hold-ups at ports”</td>
<td>Risks of processes related to the quality of product</td>
</tr>
</tbody>
</table>

Table 6.2 Example of using risk classifications for the purposes of risk identification: identifying risks for each category

<table>
<thead>
<tr>
<th>Risk category</th>
<th>Examples of risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business risk</td>
<td>“Big international importer entering the local market”</td>
</tr>
<tr>
<td>Currency risk</td>
<td>“Local currency will devalue and imported products will become very expensive”</td>
</tr>
<tr>
<td>Legal risk</td>
<td>“Regulator will introduce new requirements on imported products”</td>
</tr>
<tr>
<td>Human resources</td>
<td>“Logistics expert will resign”</td>
</tr>
<tr>
<td>Occupational health and safety</td>
<td>“Accident at the port”</td>
</tr>
<tr>
<td>Operational risks</td>
<td>“Imported products of bad quality”</td>
</tr>
<tr>
<td></td>
<td>“Imported products non-compliant with regulations”</td>
</tr>
<tr>
<td>Infrastructure risks</td>
<td>“A truck will break”</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.
3.3.3 Risks of economic operators as risk identification source for regulators

Risks of economic operators and their products constitute the major source of risks that lie within the responsibility of a regulatory authority. One approach that can be a part of performing the identification of risks on a regulatory system level is generalization of risks of a single economic operator. Table 7 generalizes risk events of importers with the purpose of identifying risks on a regulatory system level:

Table 7 Risks of an economic operator as a basis for risk identification on a regulatory system level

<table>
<thead>
<tr>
<th>Risk of an economic operator</th>
<th>Risk of a regulatory system</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Imported products non-compliant with regulations”</td>
<td>“Use of poor-quality products in production processes”.</td>
</tr>
<tr>
<td>“Supplier problems, including failure to supply”</td>
<td>“Use of dangerous products in production processes”.</td>
</tr>
<tr>
<td>“Transport delays and potential hold-ups at ports”</td>
<td>“Shortage of the imported products on the market”.</td>
</tr>
<tr>
<td>“Possible loss of or damage to goods in transit”</td>
<td>“Disruption in the supply chain of critical businesses”</td>
</tr>
<tr>
<td>“A truck will break”</td>
<td>“Bankruptcies of importers”</td>
</tr>
<tr>
<td>“Accident at the port”</td>
<td>“Unavailability of transport infrastructure of the sector”</td>
</tr>
<tr>
<td>“A truck will break”</td>
<td>“Injuries at work”</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.

The table shows that even risks that seem to be internal to an economic operator, affecting its efficiency or profitability, can have undesirable external effects. When externalities are important, risks should be given due consideration by policymakers (UNECE, 2012b).

3.3.4 Identifying risks using categories of impact on SDGs

Risk classification that is based on the categorization of impacts of risks that can occur within a regulatory system is another important input into risk identification. The following classification describes (Table 8) risks that should be considered by a regulatory authority to determine whether they require regulatory intervention (UNECE, 2012b):

Table 8 Types of risks of economic operators from a regulatory system perspective (example)

<table>
<thead>
<tr>
<th>Type of risk</th>
<th>Example of a food safety regulatory system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risks that originate within an economic operator, whose consequences may have an impact on:</td>
<td>“Importers will expose consumers to long-term not acute impact from pesticides”;</td>
</tr>
<tr>
<td>• Consumers</td>
<td>“Consumers will be exposed to contaminated food”;</td>
</tr>
<tr>
<td>• Other businesses</td>
<td>“Poor hygiene at food producers and contamination”;</td>
</tr>
<tr>
<td>• The environment</td>
<td></td>
</tr>
<tr>
<td>• Society in general</td>
<td></td>
</tr>
<tr>
<td>Risks that originate with a single economic operator and whose mitigation requires coordination among economic operators because a single operator will not be able to mitigate on its own.</td>
<td>“Systemic shortage of essential products”.</td>
</tr>
<tr>
<td>Risks that cannot be left for control of an economic operator.</td>
<td>“Food importers make an agreement with to simultaneously raise prices”</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.

3.3.5 Identifying risks across regulatory objectives and SDGs

Regulatory objectives and SDGs provide for another important input that has to be taken into consideration to ensure the comprehensiveness of risk identification. The following table demonstrates an approach that can be used for identification of risks relevant to Sustainable Development Goals, using three SDGs and three regulatory systems as an example. Risks are identified against each of the objectives of a regulatory system that supports the achievement of the respective SDG, as shown in Table 9:
Table 9 SDGs and regulatory objectives as sources for risk identification

<table>
<thead>
<tr>
<th>SDGs</th>
<th>Objective of regulatory systems</th>
<th>Risk events (examples)</th>
</tr>
</thead>
<tbody>
<tr>
<td>End poverty in all its forms everywhere</td>
<td>Food safety: ensure the availability of food for poor and vulnerable.</td>
<td>Increase in food prices. Shortage in essential food products.</td>
</tr>
<tr>
<td></td>
<td>Transport: ensure availability of transport for the poor and the vulnerable.</td>
<td>Increase in oil prices.</td>
</tr>
<tr>
<td></td>
<td>Agriculture: increase resilience for shocks (climate and economic).</td>
<td>Delays in implementation of projects essential for increasing resilience.</td>
</tr>
<tr>
<td>End hunger, achieve food security and improved nutrition and promote sustainable agriculture</td>
<td>Food safety: increase trade in food.</td>
<td>Devaluation of the local currency.</td>
</tr>
<tr>
<td></td>
<td>Transport: Ensure efficient transport for food products.</td>
<td>Shortage of infrastructure in ports.</td>
</tr>
<tr>
<td></td>
<td>Agriculture: support new farms and economic operators in agriculture.</td>
<td>Lack of experts.</td>
</tr>
<tr>
<td>Ensure healthy lives and promote well-being for all at all ages</td>
<td>Food safety: ensure safety of food (including imported food)</td>
<td>Pesticides in plant products will cause non-acute poisoning.</td>
</tr>
<tr>
<td></td>
<td>Agriculture: Reduce the use of pesticides.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.

3.3.6 Applying taxonomies of other regulatory authorities

Many of the taxonomies that are currently applied by regulatory authorities for risk identification are available online (an example of risk taxonomy can be found here63). These taxonomies can also be used to ensure that as many as possible future events that have already happened in the past are taken into consideration.

3.3.7 Scenario analysis

Scenario analysis is a name given to a range of techniques that involve developing models of how the future might turn out (ISO 31010). Scenario analysis can involve building an imaginary but credible scenario then exploring the nature of risks within this scenario. Developing scenarios of a pandemic similar to one caused by COVID-19 and its impacts on every regulatory system is essential. More general changes that are commonly considered when performing scenario analysis include:

- changes in technology;
- possible future decisions that might have a variety of outcomes;
- stakeholder needs and how they might change;
- changes in the macro environment (regulatory, demographics, etc.);
- changes in the physical environment.

Regulatory authorities can use various combinations of the approaches described above to perform a comprehensive risk identification. No matter which approach is chosen, data-driven approaches in risk identification should be applied.

### 3.3.8 Stakeholder involvement

Proactive stakeholder involvement is key in risk identification. Economic operators can provide valuable information about risks that regulatory authorities might not see; similarly, market surveillance authorities and conformity assessment bodies are exposed to non-compliance risks that other regulatory authorities cannot see.

Inclusiveness is key in risk identification. Following stakeholders should be invited to participate in risk identification within a regulatory system:

- Regulated economic operators;
- Standardization bodies and relevant technical committees;
- Conformity assessment bodies;
- Market surveillance authorities and enforcement bodies;
- Consumer organizations;
- Academia.

### 3.4 Prioritizing risks to SDGs

The main objective of the risk evaluation is to find which of the identified risks are the most significant within a regulatory system. Several tools can be used to analyze, assess and evaluate each of the identified risks so that they could be compared to one another and with the risk criteria. This requires evaluation of probability and consequences of each risk.

#### 3.4.1 Evaluating an impact of a risk

Risks that occur within regulatory systems simultaneously impact several objectives and consequences of each risk should be evaluated against every regulatory objective. Consequences of a risk of possible loss or damage to goods, especially in case of essential food products, can be evaluated against the regulatory objectives of the food safety system, as in the example below:

<table>
<thead>
<tr>
<th>Risk/objectives</th>
<th>Ensure the availability of food for poor and vulnerable</th>
<th>Increase trade in food</th>
<th>Ensure safety of food</th>
<th>Business efficiency</th>
<th>Impact on SDGs</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Possible loss of or damage to goods in transit (essential products)”.</td>
<td>Affordable food becomes unavailable to vulnerable groups.</td>
<td>Decrease in trade.</td>
<td>No immediate impact.</td>
<td>Additional costs of $50,000</td>
<td>Medium impact on SDGs</td>
</tr>
</tbody>
</table>

The table shows the impact of the risk on all regulatory objectives. Impact on every objective can be compared with the respective scale (see risk criteria). In the example, the highest level of consequences that the risk can cause is medium. One of the available approaches is to consider the level of consequences of a risk as the highest impact that it can cause on all objectives. Other approaches, e.g. applying different weights, can also be applied.
3.4.2 Evaluating probability of a risk

As in case with evaluating the impact, defining the criteria for evaluating probability of risk events is essential. Since tools for evaluating probabilities of risk events differ depending on the availability of data, probability evaluation criteria should be formulated in terms of:

- Expert’s judgment, for cases in which no data is available;
- Frequencies of events, for the cases when only frequencies are available, or when frequencies are best estimators of probabilities risk events (e.g. pandemics);
- Statistical probabilities, when data on risk events and relevant risk factors is available.

Probability criteria can be presented in a form of likelihood-probability table, the logic behind the development of such table is shown in Figure 20 (ISO 31010):

![Figure 20 Establishing likelihood criteria: example of a likelihood scale](Source: IEC, 2019)

<table>
<thead>
<tr>
<th>Rating</th>
<th>Descriptor</th>
<th>Descriptor meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Likely</td>
<td>Expected to occur within weeks</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Remotely possible</td>
<td>Theoretically possible but extremely unlikely</td>
</tr>
</tbody>
</table>

Within a regulatory system, the approach described can be applied to develop the following table:

Table 10 Establishing risk criteria: example of a likelihood scale

<table>
<thead>
<tr>
<th>Frequencies of similar events in the past</th>
<th>Statistical probability</th>
<th>Expert’s judgment</th>
</tr>
</thead>
<tbody>
<tr>
<td>High likelihood</td>
<td>Happened more than 10 times during the last year</td>
<td>More than 0.5</td>
</tr>
<tr>
<td>Medium likelihood</td>
<td>Happened less than 10 times during the last year</td>
<td>0.1-0.5</td>
</tr>
<tr>
<td>Low likelihood</td>
<td>Never happened before</td>
<td>&lt;0.1</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.

The probability of any risk can be evaluated against these criteria.

3.4.3 Evaluating the significance of risk: developing a consequence/likelihood matrix

A consequence/likelihood matrix is a convenient tool for risk evaluation and for risk ranking. To develop such a matrix, combining the scales of consequences and likelihood that allows assigning a risk category that is
based on both parameters is essential. Figure 21 depicts the combined risk criteria with risk categories assigned to combination of probability and consequences can be presented in the following way:

Figure 21 Example of consequence likelihood matrix

![Consequence Likelihood Matrix](image)

Source: IEC (2019).

To evaluate the significance of risks, a list of identified risks (with their estimates of consequences and probabilities/likelihood) should be combined with risk criteria, as in the table below for the food safety system:

Table 11 Risk criteria of a regulatory system: combining consequences and likelihood scales (example)

<table>
<thead>
<tr>
<th>Consequences</th>
<th>Probability</th>
<th>Consequences</th>
<th>Probability</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food is/becomes unavailable to large populations of poor and vulnerable, or decrease in trade more than 50%, or death or group poisoning, or SDG not achieved</td>
<td>Never happened before or statistical probability &lt;0.1 or experts say “will never happen”</td>
<td>Happened less than 10 times last year or Statistical probability &gt;0.1</td>
<td>Happened more than 10 times last year or Statistical probability &gt;0.5 or experts say “Will definitely happen”</td>
<td></td>
</tr>
<tr>
<td>Food is/becomes unavailable to less than half of the poor and vulnerable groups, or decrease in trade less than 50%, or poisoning involving more than 20 consumers, or heavy impact on at least one SDG</td>
<td>“Consumers will be exposed to contaminated food”; “Food importers make an agreement with to simultaneously raise prices”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Several cases, when food is unavailable to poor and vulnerable, no growth in trade, poisoning involving less than 20 consumers, no impact on SDGs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.
Evaluation of a risk within a regulatory system can be heavily influenced by subjective perceptions of risk of the consumers and result in a biased evaluation of a risk.

Risk management and assessment activities including key indicators should be underpinned by current scientific knowledge through formalized and independent advisory processes. Such an approach will ensure that the risks perceived by stakeholders and regulators are examined against existing scientific and technical evidence providing transparency while fostering support from stakeholders. This will enhance the science-informing policy and policy-informing science paradigms and approaches but will require exchange of best practice.

3.5 Building regulatory frameworks in response to risks

Regulatory authorities can apply any of the risk treatment strategies described earlier in the Guide to the identified risks. When choosing risk treatment strategies, it is important that regulatory authorities avoid applying the approach of “looking at risk in isolation from the bodies that make decisions”. This means avoiding focusing on smaller risks that is easier to address, but focusing instead on the big risks that threaten several Sustainable Development Goal outcomes.

Table 2 summarizes the interpretation of the risk treatment strategies, as they can be applied within regulatory systems (using the risk “Pesticides in plant products will cause non-acute poisoning” within a food safety regulatory framework):

<table>
<thead>
<tr>
<th>Risk treatment strategy</th>
<th>Interpretation of the strategy on a regulatory system level</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk avoidance.</td>
<td>Banning activities or processes where the risk can occur.</td>
<td>Banning the import of fruits and vegetables. Banning the use of pesticides in local production.</td>
</tr>
<tr>
<td>Sharing the responsibility for managing the risk.</td>
<td>Sharing the responsibility for managing the risk, including bearing responsibility if it occurs, to economic or social actors.</td>
<td>Making economic operators responsible for the risk.64</td>
</tr>
<tr>
<td>Mitigating the risk.</td>
<td>Developing a regulatory or non-regulatory response to reduce the probability and the expected impact of a risk. Risks that are above the tolerable level should be addressed by regulatory authority.</td>
<td>Imposing a regulation aimed at controlling the level of pesticides in products.</td>
</tr>
<tr>
<td>Tolerating a risk.</td>
<td>In a regulatory context, tolerating a risk means that the regulators decide they are unwilling or unable to take measure to reduce the probability and expected impact of a risk.</td>
<td>Preparing a plan for the case the risk occurs.</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.

Choosing a risk mitigation strategy that is proportionate to the risk being addressed can be a challenging task for regulatory authorities, which requires systematizing big amounts of information from different sources. In the following pages, we introduce tie analysis as an efficient tool that can be used by regulatory authorities when choosing proportionate risk mitigation strategies. It allows for graphical representation of...
possible causes and consequences of a risk helps analyzing possible ways of modifying the likelihood and the impact of a risk. An example of the bow-tie diagram is presented in Figure 22:

Figure 22 Example bowtie

Source: IEC (2019).

To illustrate the method, we assume that a regulatory authority responsible for public health is tasked with developing a proportionate response to “pesticides in plant products”. To apply a bow-tie analysis technique, the following steps are required:

- Representing the risk event by the central knot of the bow tie: “Pesticides in plant products”;
- Listing the sources of risk on the left-hand side of the knot and joining them to the knot by lines representing the different mechanisms by which sources of risk can lead to the event:
  - Improper use of pesticides in local agriculture;
  - High level of pesticides in imported products;
- Drawing on the right-hand side of the knot lines to radiate out from the event to each potential consequence:
  - Products with pesticides will be directly consumed by vulnerable groups;
  - Products with pesticides will be used in food production processes;
  - Acute poisoning;
- Designing preventive controls, those that can minimize the impact (or remove) each of the risk sources, and depicting them as vertical bars across the lines, examples include:
  - Regulatory requirements on the maximum level of pesticides in products;
  - Regulatory requirements on the use of pesticides in production;
  - Certification of local food producers;
  - Inspecting imported products;
3.6 Regulation as a risk mitigation tool

3.6.1 Regulation: the essential building blocks

Regulation is one of the available risk mitigation tools, that can be presented as a set of three interdependent building blocks, as shown in Figure 23 (along with the major regulatory challenges):

![Figure 23 Building blocks of a regulation](source)

The objective of the first element of a regulatory framework – regulatory requirements – is not to allow dangerous products to be placed on the market (the term “dangerous” is, of course, relative; in this context, a dangerous product is a product that has a level of risk that is higher than the accepted level of risk).

The objective of the second element of a regulatory system – conformity assessment processes – is not to allow non-compliant products to be placed on the market. According to the “Blue Guide” on the
implementation of European Union product rules” by the European Union, conformity assessment, as a form of pre-market control, is the “process carried out by the manufacturer in demonstrating whether specified requirements relating to a product have been fulfilled”. 65

Finally, market surveillance, as a form of post-market control, aims at removing non-compliant products from the market, in case they were produced in spite of regulatory requirements and were not prevented from being placed on the market by conformity assessment.

In case the achievement of a Sustainable Development Goal requires regulatory intervention, regulations, standards and guidelines should be developed from the premise that “people want to comply”. The mechanisms of implementation and awareness raising must be efficiently integrated within the operations of a given sector to be effective at reaching a given objective, including through the adoption of guidelines and relevant enforcing jurisdiction.

Applying a regulation as a risk mitigation tool requires undertaking the following actions.

3.6.2 Making regulatory requirements proportionate to risks

This step includes developing the text of a regulation, conducting the regulatory impact assessment and implementing a regulation.

The WTO TBT agreement defines technical regulation as a “document which lays down product characteristics or their related processes and production methods, including applicable administrative provisions, with which compliance is mandatory, […] which may include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method”.

The “product characteristics or their related processes and production methods” that constitute requirements for a product to make it safer generally aim at removing sources of various risks associated with products (any risk can be mitigated by means of removing risk factors). Although risk factors change from product to product, common examples include poor production processes, use of dangerous materials, use of the product by children, and many others. If a technical regulation establishes the required quality of the product production process, or in case it forbids the use of dangerous materials, etc., it reduces the level of risk of a product, given that it complies with the requirements. At the same time, no technical regulation will make a product absolutely safe: a certain amount of risk, which must be not higher than the level that a regulatory authority is willing to tolerate, will still be associated with the compliant product.

In case of the risk of pesticides in the example used earlier, these rules may contain:

- The allowed maximum amount of pesticides and chemical in products;
- Requirements for procedures for internal control of economic operators,
- Requirements for personnel working with pesticides,
- Etc.

The moment regulatory requirements are established, a product becomes a regulated product, which may be either compliant or non-compliant with regulations. Compliant product is a product which level of risk is tolerated by a regulator. Products that do meet the requirements of regulations are not risk free: they are not more dangerous than the level of risk that is tolerated by the regulator.

Defining the tolerable level of risk associated with a product, or the level of risk of a compliant product, is one of the most challenging tasks of a regulatory authority, especially in case of new products.

Conformity assessment and market surveillance are the main processes that aim at mitigating the risk of non-compliance within any regulatory framework.

3.6.3 Choosing conformity assessment procedures

Building conformity assessment processes (pre-market control) is an essential step to ensure that products and services meet the requirements specified in the regulation. Conformity assessment procedures can be implemented in various forms – from self-declaration of conformity to obligatory third-party certification. Since conformity assessment is a form of pre-market control, a product cannot be placed on the market unless these procedures are properly implemented.

In the ideal world, in case conformity assessment procedures are in place, only those products that conform to regulatory requirements are placed on the market. In many economic sectors, however, conformity assessment cannot guarantee that only compliant products are placed on the market even after conformity assessment procedures have been performed. Procedures for pre-market control are complemented with market surveillance activities.

3.6.4 Choosing market surveillance activities to minimize the risk of non-compliance

Conformity assessment procedures, as a form of a pre-market control, aim at preventing non-compliant products from being placed on the market. Market surveillance procedures, including import compliance, in turn, aim at blocking the impact of the non-compliance risks by removing non-compliant products from the market.

Market surveillance activities, such as inspections of imported products, inspections of production processes with the local supply chain are performed by competent authorities. Enforcement is a necessary component of any regulatory system and sufficient resources should be allocated to its planning and its execution.

Local market surveillance authorities and enforcement bodies play a vital role in the achievement of regulatory objectives and the SDGs, since they are responsible for enforcing all regulations, no matter by which authority and at which level it was set (e.g., including international regulations). (UNECE, 2018) highlights that in the presence of regulatory failures, including high levels of non-compliance, instead of introducing new regulations, policy-makers would be well advised to analyze the regulatory system in its entirety, including the need to enhance the market surveillance framework.

3.7 Challenges of market surveillance and enforcement: regulatory requirements, dangerous and non-compliant products

3.7.1 An overview of the market surveillance challenges

Florentin Blanc provides a comprehensive overview of the main challenges and problems of market surveillance. He highlights the disbalance between the efforts invested into improving regulations for businesses and those aimed at improving the enforcement and delivery of these regulations. Indeed, developing regulatory requirements and ensuring their proportionality to risks is the objective of several methodologies, including Regulatory Impact Assessment, which has become obligatory in many countries; no common methodology on market surveillance has become as popular as RIA.

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The reports state that in many countries, inspections are based on insufficiently clear requirements, create significant costs for the state and burden for business, providing disappointing outcomes in terms of securing public goods. Insufficient risk-focus is highlighted as one of the main reasons for such inefficiency, leading to a situation in which “many businesses get inspected, even though their risk level is low or moderate”. Other causes include frequent overlaps in the activities of different inspecting agencies and frequent focus on finding violations rather than improving compliance and outcomes.

Clarifying which agency should deal with which type of risk and ensuring risk focus in resource allocation, planning and implementation of market surveillance are presented as critical issues for successfully improving the inspection and enforcement systems.

3.7.2 A compliant product can be dangerous: the concept of the non-compliance risk

The interrelation among the following three parameters - stringency of regulatory requirements, levels of risk of a compliant product and level of risk of a non-compliant product – is crucial for setting priorities in post-market control.

Figure 24 Regulatory requirements, risk of a compliant and of a non-compliant product


Figure 24 illustrates the interrelation among the parameters. A non-regulated product cannot be compliant; hence its level of risk is equal to that in a non-compliant state. When “low” (or “less stringent”) regulatory requirements are introduced to a product, risk of a compliant product becomes smaller than the risk of a non-compliant product. More stringent regulatory requirements increase the difference between the risk of a compliant and a non-compliant products (the terms “low” and “high”, or “more or less stringent” - are in this context relative terms). Products that have the biggest difference between the risks in the compliant and in
the non-compliant states should be considered as products of the highest priority by market surveillance authorities and border agencies.

Non-compliant products can also be more or less dangerous. The damage that can be caused by different non-compliant products will vary depending on many factors, such as safety expectations related to the product, its way of use, and others.

Figure 25 illustrates the classification of products from “dangerous when compliant” and “dangerous when non-compliant” perspectives:

![Figure 25 Categorization of products in terms of “dangerous-compliant”](image)


Conformity assessment and market surveillance are dealing with the risk “non-compliant product placed on the market” and their main objective is to minimize the non-compliance risk associated with the product. Hence a high-risk product for market surveillance authority is not a product that is perceived as dangerous (but meets regulatory requirements), but a product that is non-compliant and is dangerous when non-compliant.

This requires management of non-compliance risks, which can be expressed in terms of consequences and probability of non-compliance. For market surveillance and import compliance procedures to be proportionate and to effectively complement the other two parts of a regulatory framework, they should focus on high-risk products (shipments): those that are dangerous when non-compliant and have a high probability of non-compliance.

3.7.3 Import compliance as a form of post-market control

Import compliance procedures are an important block in any market surveillance system, since “points of entry [are] the place where all products from third [party] countries have to pass by [and they are] the ideal place to stop non-compliant products before they are released for free circulation [...]” (EU, 2016).

Inspecting products that are placed on the market is the main means of work of product regulators and market surveillance authorities. Since it is not possible nor desirable to inspect all products, and given the limited resources of market surveillance authorities, one of the main challenges regulatory authorities face is prioritizing market surveillance activities: which products and when to choose for an inspection, and how to check them.

Addressing this challenge requires developing risk-based market surveillance systems that allows:
• Targeting non-compliant products on the market and prioritizing market surveillance activities based on the evaluation of non-compliance risk posed by each product;

• Devising sampling plans that are proportionate to the level of non-compliance risk;

• Choosing adequate sanctions in case non-compliance is identified;

• Promoting the culture of compliance.

Building such system requires ranking products against the following parameters:

• Consequences of non-compliance, so that products that are more dangerous when non-compliant (having more severe consequences of non-compliance) are given a higher priority than other products;

• Probability of non-compliance, so that products that have a higher probability to be found non-compliant on the market are given higher priority than other products.

Market surveillance framework should be based on evaluation of the non-compliance risk of a product par contrast to the inherent risk of a regulated product (risk of a compliant product).

Import compliance procedures and border inspections are essential for efficient market surveillance. Market surveillance authorities are responsible for both locally produced and imported products. Locally produced products can only be inspected when sampled from places in which they are sold, whereas imported products can be inspected both at the ports of import and at the later stages of marketing. It is more efficient to inspect imported products at ports of entrance, since such inspections:

• Minimize consumer exposure to non-compliant products;

• Allow more representative sampling: products are concentrated;

• Are less costly: products arrive to an inspector and not inspector arrives to products;

• In case non-compliance is identified, it is easier to remove products from the market;

• Products can be simultaneously inspected for various non-compliant risks;

• Products are in any case subject to Customs controls.

Import inspections can be compared to a water filter, which is filtering water to the pool; inspections at later stages are similar to trying to remove substances out of the water when the pool is full. Import compliance frameworks are hence key means regulatory authority have at their disposal to minimize risk of product non-compliance associated with traded products. Guidelines on building import compliance procedures that are based on the principles described above are presented in the following Chapters.
CHAPTER 4  METHODOLOGY FOR BUILDING A RISK-BASED TARGETING SYSTEM IN IMPORT COMPLIANCE

A risk-based targeting system is the central element of any import compliance framework. Any border control agency performing import inspections targets the incoming shipments according to their levels of non-compliance risk, using formal tools or on the basis of inspectors’ intuition. Even the extreme cases of import compliance strategies, i.e. regulatory regimes in which every incoming shipment undergoes an inspection, or in the opposite case, when every shipment is released without an inspection, are indeed based on risk targeting. In the first case, every shipment is targeted as a high-risk shipment, whereas in the second scenario every shipment is targeted as low-risk. Random inspections, a strategy widely applied in border control, is also a form of risk-based targeting; in this case high-risk shipments are selected using “tossing a coin” method, with the only difference that generators of random numbers are applied instead of a coin.

Successful risk-based targeting allows regulatory authority making the right guesses about the actual statuses of the incoming shipments before or upon their arrival, so that regulatory authority could “concentrate on high-risk shipments and expedite the release of low-risk shipments”, as stated in the WTO TFA. If not performed well, however, targeting might cause situations in which compliant shipments are inspected (and proved to be compliant as a result) and non-compliant shipments are released without an inspection, generating various kinds of losses (depending on what kind of non-compliance risk is being addressed by the targeting system).

Any import compliance targeting system is risk-based, i.e. it evaluates the level of uncertainty associated with each incoming shipment – if it is compliant or not - and the impact that the given case of non-compliance will have on regulatory objectives. As in all cases of risk management application, targeting can be more and less efficient. This chapter outlines a methodology for building an efficient risk-based targeting system in import compliance that can be used by all regulatory authorities involved in border control. It starts with an overview of the main parameters of a targeting system, which are required for both setting the objectives of import compliance that can be used by all regulatory authorities involved in border control. It starts with an overview of the main parameters of a targeting system, which are required for both setting the objectives of import compliance, defining the risk tolerance of a regulatory and evaluating the efficiency of risk-based targeting. Description of the main parameters of the system are followed by a holistic reference model of an import compliance targeting system; the model sets out the main processes of the system, outlines their main outcomes and presents a data flow supporting each process. The reference model can be used as a basis for building new and evaluating the existing risk-based targeting frameworks.

The following sections of the chapter focus on each of the main processes of a targeting system and their inputs, using a case study to provide a practical example of how these processes can be implemented in practice. Targeting high-risk shipments requires assessing the level of non-compliance risk of each incoming shipment (and, quite often, comparing it with that of other shipments); special attention is given to tools that allow comprehensive identification of non-compliance risks, which is a key step in targeting non-compliance. The following sections focus on each of main processes of risk-based targeting in import compliance – from developing and evaluating compliance rules and risk profiles to their implementation and risk-based sampling, to provide regulators with clear guidance and templates for achieving one of the main objectives of the WTO TFA – concentrating on high-risk and expediting the release of low risk shipments.

4.1 The main parameters of a targeting system

The following “toy” case study (that reflects real situations at the border) will be used for illustration purposes throughout the chapter. Ten shipment containing toys – scooters, pedal cars and dolls – have just arrived at the border and have to be processed by the responsible regulatory authority. Since it is a toy case study, a regulatory authority responsible for toy’s safety will be used as an example; though approaches described in this chapter can be applied to any set of regulatory requirements. Moreover, arrived shipments are subject to many other sets of regulatory requirements, but for the purposes of this chapter, we will limit the description with one set of requirements only.
4.1.1 Uniform inspection example: every shipment targeted as “high-risk”

To describe the main parameters of a risk-based targeting system and import compliance in general, we first consider the two extreme scenarios of import compliance.

In the first scenario, every shipment is targeted as a high-risk shipment and is inspected. Results of this compliance strategy are presented in Figure 26, in which a red box represents a non-compliant and a green box compliant shipment:

Figure 26 A case study: all incoming shipments targeted as “high risk”

To find out the actual compliance status of the arrived shipments, a regulatory authority needs to perform 10 inspections that require allocating 10 inspection units (to simplify the example, we will use an “inspection units”, similar to man-hour measure, as a parameter characterizing the resources required to perform an inspection, in terms of time costs - its duration, time for the follow-up and human resources).

Inspection units allocated per shipment determine the border compliance time for an importer. Even if 1 man/hour is required to perform an inspection of a shipment, and an inspector assigned to perform an inspection, time of border compliance will be more than an hour, because of the waiting time and the time required to perform a follow-up after the inspection is performed. For the purpose of the case study, we will consider border compliance time 150% of an inspection duration.

The inspection rate in this case is 100% (every shipment is evaluated). In the example, 4 shipments are found to be non-compliant with regulatory requirements, thus a non-compliance rate (or interception rate), one of the main parameters of a targeting system, is equal to 40%. Regulatory authority can reduce the non-compliance rate by promoting compliance and working with the importers; at the same time, a targeting system cannot change the non-compliance rate and this parameter does not characterize the efficiency of a targeting system.

From the targeting perspective, the results of the uniform regulatory regime in which every shipment is considered to be of high risk are represented in Figure 27: every shipment that was correctly evaluated by the targeting system is represented by a green box, and all other cases by the yellow box:
Figure 27 A case study: Performance of a targeting system in case every shipment is targeted as “high-risk”

Only 4 shipments were correctly evaluated by the targeting system, those that were targeted as high-risk and were found to be non-compliant as a result of an inspection. Six shipments that are represented as yellow boxes are compliant shipments that were targeted as high-risk and inspected.

The assumption in this example is that results of inspections correspond to the actual status of the incoming shipment. In reality, however, one has to take into account the possibility of errors in the inspections. Every inspection is indeed sampling, which efficiency depends on the amount of resources available, its duration and the quality of the equipment. Efficiency of inspection should be taken into account when building a targeting system, and a number of non-compliant shipments that were inspected and considered compliant as well as a number of compliant shipments that were inspected and considered non-compliant are two important parameters of the import compliance system.

4.1.2 Uniform inspection example: every shipment is targeted as “low-risk”

To illustrate other important characteristics of a targeting system a scenario in which every shipment is targeted as a low-risk shipment can be considered. This regulatory regime, in which regulatory authority would invest zero inspections, results in the following scenario, as displayed in Figure 28:
Figure 28  A case study: Performance of a targeting system in case every shipment is targeted as "low-risk"

Two important parameters that this scenario represents are the number of non-compliant shipments released without an inspection and the number of compliant shipments, which release was expedited. From the targeting perspective, 4 brown boxes represent errors in targeting that led to various losses associated with the consequences of non-compliance (losses can be different depending on the nature of regulatory requirements) and 6 green boxes represent the correct functioning of the system.

Most of the parameters that characterize a targeting system represent various combinations between the following three parameters: shipment assessment, performed by the targeting system, actual status of the evaluated shipment, and – in case shipment was targeted as high risk and inspected – result of the inspection (whether it corresponds to the actual status of the shipment). Figure 29 displays the possible combinations of these parameters:
Figure 29 Main parameters of a targeting system

Source: Source: Valentin Nikonov. Figure prepared to illustrate the methodologies described in the Guide.

Table 11 summarizes all the parameters and their values in case of the two scenarios described above:

Table 11 Parameters of a targeting system: example of the case studies

<table>
<thead>
<tr>
<th>Parameter, characterizing a targeting system</th>
<th>Comments</th>
<th>The system targets every shipment as high risk</th>
<th>The system targets every shipment as low risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of incoming shipments</td>
<td>Total number of shipments within a given period.</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Non-compliance rate</td>
<td>Percent of non-compliant shipments.</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>Inspection rate</td>
<td>Percent of the incoming shipments inspected.</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Inspection units</td>
<td>Resources of regulatory authority invested in inspections (man-hours).</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Number of inspected non-compliant shipments (targeted as high-risk)</td>
<td>Number of shipments that the system correctly identified as non-compliant. Represents losses, prevented by the targeting system.</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Number of inspected compliant shipments (targeted as high-risk)</td>
<td>Shipments that the system identified as non-compliant but that were compliant as the result of an inspection; represents resources that could have been invested in high risk shipments.</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>
These parameters can be represented as percentage of the total amount of shipments. Parameters that represent inspection errors – i.e. compliant shipments that were inspected and considered non-compliant and vice versa will be introduced later in the chapter.

### 4.2 Objectives of a targeting system

The two uniform import compliance systems introduced in the previous sections can be formally considered as risk-based, but in both cases the assessment of the non-compliance risks is in many cases inaccurate and leads to two types of “regulatory errors”. In the first scenario, when every shipment is inspected, resources of regulatory authority are inefficiently allocated: each case in which a compliant shipment is inspected, represents an opportunity cost, since the resources invested in the inspection of a compliant shipment could be shifted to high-risk shipments. In a scenario when there are enough resources to inspect all 10 shipments that arrived, even if it would not reduce the overall border compliance time for importers, it still would be more efficient to switch resources from low-risk into high-risk shipments. More resources allocated per inspection ensures its higher efficiency and reduces the number of errors.

The second scenario, although characterized by zero border compliance time for importers and no resources required to perform inspections, leads to losses associated with non-compliance of shipments and imported products. 4 non-compliant shipment would not be stopped as a result of an inspection at the border. Losses associated with non-compliance can be different, depending on the type of non-compliance risk within the responsibility of a regulatory authority; in case of toys safety regulator consequences of non-compliance, in severe cases, can lead to loss of life.

Both scenarios described above are not optimal in terms of losses, associated with consequences of non-compliance, inspection units allocated to perform the inspections and border compliance time. Zero inspection units and border compliance time do not justify the consequences of non-compliance, whereas minimizing the losses, associated with the consequences of non-compliance can be performed in a more efficient way.

The ideal system would target as high-risk the 4 non-compliant shipments, allocate 4 inspection units to prevent proliferation of non-compliant products onto the market and release the other 6 compliant shipments without inspection. Depending on the available resources, this scenario would lead to 6 hours of border compliance time (this parameter can be reduced if more resources are allocated to perform each inspection). The ideal targeting system is, however, not an achievable goal, since - as any risk management system - it cannot aim at zero risk: uncertainty will always remain and no system can ever eliminate it.
In general, as in case of any risk management application, the targeting system aims at allowing regulatory authority finding the right balance between the three parameters (within a given period) (UNECE, 2012b):

- Anticipated payoff, in a regulatory context this parameter represents the achievement of regulatory objectives; in case of import compliance, it can be expressed by border compliance time for importers, as a symbol of free undisrupted trade;
- Potential losses, which in the import compliance case include losses associated with consequences of non-compliance and can be measured by amount of non-compliant shipments that were released without an inspection (targeted as low risk) or considered compliant as a result of an inspection;
- Costs of safety, which is represented by inspection units allocated to perform inspections.

The three parameters are interdependent, as shown in the Figure 30:

![Figure 30 Relationship among main parameters of a risk-based import compliance system](image)

For any given non-compliance rate (parameter that targeting system cannot change):

- Decisions to minimize the compliance time and costs will necessitate the increase in resources required to perform the inspections (number of inspection units) or will cause an increase in the consequences of non-compliance (more non-compliant shipment will be released);
- If a regulatory authority wants to lower the number of inspection units allocated for performing border control, it will necessarily increase the potential losses associated with the non-compliance risks or time of border compliance.
- Minimizing the potential consequences of non-compliance risks will necessitate an increase in resources required for performing the border inspections or will lead to higher compliance time and costs for importers.

In terms of the parameters introduced in the previous section, the interdependency of these parameters can be expressed in the following way. For a given level of risk management implementation,

- Minimizing the number of non-compliant shipments released without inspection will necessitate the increase in the total number of inspections and thus will lead to an increase in the number of compliant shipments that are inspected;
• Minimizing the number of compliant shipments inspected will necessitate the decrease in the total number of inspections and will increase the consequences of non-compliance;

• Border compliance time can be lower by increasing the number of inspection units available, for a given level of non-compliance risk (represented as a number of non-compliant shipments released without inspection).

4.2.1 Balancing the risk tolerance of a regulatory authority with available resources

A risk-based targeting system can be also viewed in the context of other decision-making frameworks, in which decisions address uncertain situations. Courtroom verdicts made by judges or medical diagnosis systems are examples of such frameworks. No matter how different the scope of the application of these systems might be, they are based on the same statistical concepts of hypothesis testing. At the time of shipment arrival at the port, similarly to many cases when a defendant is brought to a courtroom, the truth is unknown; both a judge and an import compliance framework function on the principle of evaluating hypothesis. In the first case the default, or the null hypothesis, is that a defendant is innocent; similar approach can be applied in import compliance (“shipment is compliant”). Without going into mathematical details, in both cases evidence – facts that are considered to be known, true - is gathered to be used to evaluate whether the hypothesis can be accepted or should be rejected. In case of a courtroom, evidence will constitute artefacts from the crime scene and witnesses; in case of import compliance evidence constitutes everything that is known about the shipment when it arrives: who is the importer, what is the product, what was the route of the ship, etc.

In all systems that are based on hypothesis testing principle, after all the available evidence about uncertain situation has been analyzed, two types of errors are possible. Cases in which a judge convicts an innocent defendant, an import compliance system inspects a compliant shipment, or a medical diagnostic system states that a healthy person is sick, are examples of type I error. The magnitude of the type I error in a regulatory environment can be measured by the number of compliant shipments that were evaluated as high-risk and inspected. Type II error is a situation in which a judge acquits a criminal, or an import compliant system releases a non-compliant shipment without inspection, or a medical diagnostic system states that a sick person is healthy.

These two types of errors are embedded in any risk-based systems and should be explicitly taken into account when devising a targeting framework. In the import compliance context, both type I and type II errors can be considered as regulatory errors. Error of type II, in which a non-compliant shipment is released, manifests itself in terms of losses associated with consequences of non-compliance. One of the strategies to reduce error of type two is to increase the total number of inspections, which would require more resources of the regulatory authority and will necessarily lead to an increase in error of type I, which can be expressed as a number of compliant shipments that were inspected.

Risk tolerance, or the level of non-compliance risk that is tolerable to a regulator, can be represented by the type II error and can be expressed in terms of a tolerable number of non-compliant shipments that will be released. The objective of the import compliance system is to bring the level of risk to the tolerable level with minimum resources, and risk tolerance constitutes a fundamental input into an import compliance framework and should be proportionate to the available resources and be explicitly defined. Depending on the compliance rate and other parameters, it is possible that the tolerable level of risk cannot be achieved with the available resources; in this situation, either risk tolerance or available resources should be increased.

4.2.2 Setting priorities in import compliance based on the evaluation of the non-compliance risk

Targeting system assesses the non-compliance risk of every incoming shipment by comparing the characteristics of each shipment with the risk profiles or compliance rules, based on probability factors and consequences of non-compliance. It allows regulatory authority ranking incoming shipments according to the level of non-compliance risk and concentrate on those that are high-risk, i.e.:

a. Have high consequences of non-compliance (e.g. products in these shipments are dangerous when non-compliant)
b. Have a high probability of non-compliance.

Example of results of risk-based targeting are displayed in Figure 31:

Figure 31 Example of the results of evaluation of non-compliance risk of incoming shipments

One of the principles of risk management is that zero risk is not a viable regulatory objective: indeed, no regulatory authority can inspect all shipments. The graphical representation of shipment evaluation is very convenient for setting priorities of regulatory interventions. A shipment can have products that are very dangerous when non-compliant, but the probability of non-compliance that products in the shipment are indeed non-compliant can be extremely low. Or the opposite: products in the shipment can have a very high probability of non-compliance, but the consequences of non-compliance can be very low. Both of these cases are less important than a situation in which the products are both dangerous when non-compliant and has a high probability of being found non-compliant on the market. Non-compliance risk, thus, is relative and can be evaluated in comparison to a certain benchmark, e.g. to that of other products.

A possible way to represent a non-compliance risk of incoming shipments is on a graph on which all shipments belonging to a certain set of regulatory requirements are represented (similar to the picture above) showing:

a. How severe the consequences of non-compliance, associated with each shipment are;

b. How probable it is that each shipment is non-compliant or contains non-compliant products.

The graph allows for ranking shipments according to the non-compliance risk by using the Pareto optimality principle in terms of consequences of non-compliance and the probability of non-compliance. The latter means that one can say that one shipment has a higher level of non-compliance risk only if for a given probability of non-compliance, the consequences of non-compliance of this shipment are higher; or, if two shipments that have the same consequences of non-compliance, but the probability of non-compliance associated with one shipment is higher. Red dots on the graph represent shipments that can be considered “high-risk” shipment; all other shipments have either smaller probability of non-compliance for a similar level of harm, or smaller level of harm for the same probability of non-compliance.
4.3 Building a targeting system: a reference model

The reference model described in the following pages is a prerequisite for developing a targeting system that would bring the non-compliance risk to the tolerable level and will be performing as close as possible to an ideal framework, i.e. with minimal required resources of regulatory authority.

Figure 2 Reference model of a risk-based targeting framework

The reference model (Figure 2) presents available resource, risk tolerance and a structure of a non-compliance risk within the responsibility of the regulatory agency as fundamental inputs into the system. The relationship between the available resources and risk tolerance have been already described; the structure of the non-compliance risk is important as it constitutes a basis for performing risk profiling of the incoming shipments – assessment of the likelihood of non-compliance - and for evaluating the consequences of non-compliance.

As risk management is a process that inputs data, the model is structured around the three main elements of a targeting system – a flow of functions, a data flow required to support these functions and a resulting flow of risk evaluations.

Structure of non-compliance risk, especially the probability factors, forms the basis for building history datasets that are used for developing risk profiles or compliance rules. This building block of a targeting process can be implemented in many ways; from the simplest, i.e. using expert judgment or non-structured data, to the most sophisticated, e.g. using predictive algorithms, such as neural networks or random forests. The compliance rules and risk profiles should be evaluated and compared with the risk tolerance of a regulatory authority, for this purpose a test and validation datasets should be developed and simulations performed. Results of the simulations – application of compliance rules to the history data, providing information on what would have happened if a regulatory authority had applied the compliance rules in the past, result in the same parameters that are used to define the risk tolerance (the main characteristics of a targeting system described above). In case the risk the compliance rules and risk profiles meet the risk tolerance requirement of the regulator and can be implemented by the available resources, they become operational. Every incoming shipment is evaluated against the rules; as simple as it sounds, this operation requires data processing that would provide the system with all data that is necessary to implement the rules. The final step of the process is risk-based sampling – performing an inspection according to the risk evaluation or releasing the shipment without an inspection. In case an inspection is performed, it provides evidence on how good the prediction provided by the targeting system was. In any case, the information on the inspections is added to the history dataset and used to update the compliance rules.
The model shows that a targeting system should be constantly updated. The updates of the system can be categorized as fundamental and operational. Fundamental changes include those that are related to the changes in the fundamental inputs of the system. Changes in the risk tolerance of a regulatory authority, as well as in available resources, might require complete rebuilding of the compliance rules, since the regulatory regime implemented by them would need to meet the new requirements in terms of the number of non-compliant shipments, which release without an inspection can be tolerated by the system. Changes in the structure of the compliance risk – appearance of the new cases of non-compliance, changes in the probability factors also require rebuilding of the targeting process, as such changes – at the very least – require building and processing of new datasets. Fundamental changes should not happen too often; in any case, the system should be reviewed with respect to the required fundamental changes on a system basis.

Operational updates of the system also happen periodically, but on a more regulator basis. The operational updates allow the targeting system benefit from the principles of machine learning and include updating the history datasets with the results of the inspections that were performed since the last update. As we will show later, in most cases bigger datasets provide for better risk profiles and compliance rules.

The following pages focus on the structure of the non-compliance risk, since its full and comprehensive identification by a regulatory authority is a prerequisite for the success of risk-based compliance.

4.4 Understanding the structure of the non-compliance risk

Figure 32 presents a general model of a non-compliance risk together with an example of how it can be applied within the context of the toys case study:

Figure 32 Understanding the structure of a non-compliance risk

Source: Valentin Nikonov. Figure prepared to illustrate the methodologies described in the Guide.

Any targeting system is based on the structure of the non-compliance risk within its scope. Correct and comprehensive identification of the non-compliance risk is thus crucial for setting priorities of a regulatory authority in general and for correct targeting of the incoming shipment in particular. Risk was introduced in Chapter 2 as effect of uncertainty on objectives; uncertainty in case of import compliance stems from our lack of knowledge about the actual status of the shipment (before it is inspected). Objectives are those of the regulatory system that contains regulatory requirements non-compliance with which is being assessed.

According to the general model of a risk (see Chapter 2), full identification of a non-compliance risk requires knowing:
• Specific case (or cases) of non-compliance that is being targeted (a risk event);
• Impact that this case of non-compliance will have on the regulatory objectives (impact of a risk);
• Risk factors (often referred to as probability factors or vulnerabilities), formulated in terms of known characteristics of an incoming shipment or a supply chain that determine the likelihood the case of non-compliance being targeted;
• Likelihood or probability that a shipment has the specific case of non-compliance (identified as a risk event).

4.4.1 Identifying cases of non-compliance for targeting

Even in case a targeting system is limited to one set of regulatory requirements, like in the case study of shipments with toys, in which an assumption was made that only toy safety regulations are within the scope, formalizing cases of non-compliance that should be included into a targeting system can be a challenge.

Most of regulations that are applied in border control contain multiple requirements on regulated products; regulations on toys safety, for example, include provisions on labelling as well on materials that can be used in products. Non-compliance with these provisions constitute different risks, since they can be defined by different probability factors and consequences. In general:

• A shipment can be non-compliant with one or several regulatory requirements.
• Non-compliance with different regulatory requirements can be treated as different non-compliance risks that might have different probability factors, different consequences and thus different impacts on regulatory objectives.
• Separate targeting of every non-compliance case would be in most cases unpractical, as it might overwhelm the system.

The following approaches for determining the cases of non-compliance within a targeting system can be applied:

• Non-compliance case can be defined as non-compliance with any applicable regulatory requirement: a shipment is considered non-compliant in case it doesn’t meet at least one – any - regulatory requirement. “A shipment contains non-compliant toys” is an example of application of this approach:

Though it is relatively easy to implement it, a system based on such risk identification will treat a shipment with toys that are not properly labelled as non-compliant in the same fashion as those that have dangerous materials used in their production.

• Non-compliance case can be defined as non-compliance with a set of regulatory requirements. Regulatory authority can choose which regulatory requirements are of highest priority and consider
shipment to be non-compliant only in case any of these requirements are not met (if a shipment is non-compliant with other requirements, it will be considered compliant).

- Non-compliance case can be defined for every regulatory requirement. In this situation, the system will target each case of non-compliance separately:

Defining the cases of non-compliance within the scope of the targeting system can depend on:

- Priorities of regulatory authority;
- Consequence of non-compliance with different regulatory requirements.

4.4.2 Evaluating the consequences of non-compliance

Consequences of non-compliance, or level of harm associated with non-compliance, is a key parameter of a non-compliance risk, which alone can be used for setting priorities in import compliance. Consequences of each case of non-compliance allow better understanding of which cases should be included in targeting.

As it was shown in Chapter 2, consequences of non-compliance are generally inversely proportionate to the stringency of regulatory requirements. Determining the consequences of non-compliance depends on the nature of the regulatory requirements and different approaches can be used in different economic sectors.

Consequences of non-compliance can be product or shipment specific. In case regulatory requirements cover a set of products, one product can be more dangerous than another when non-compliant with the same requirements, and in this case consequences of non-compliance – whether with a particular requirement or with a set of them – should be evaluated per product. In many cases, consequences of non-compliance can be evaluated on a shipment level, e.g. in case of non-compliance with most of the customs regulations.

Scale against which the consequences of non-compliance can be evaluated can be built using approaches similar to those described in Chapter 3 “Building risk-based regulatory framework in support of sustainable development goals”. Approaches for building indices that allow ranking products according to the consequences of non-compliance are described in Chapter 6 “Addressing the risk of product non-compliance”.

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4.4.3 Determining the probability factors

Probability factors constitute the basis of any risk-based targeting system: they are the “language” (the terms) in which compliance rules and risk profiles are built.

In classic risk management, when risks are referred to events that might or might not happen in the future, probability factors are called risk sources (which, in turn, are often referred to hazards, dangers or vulnerabilities) – elements which alone or in combination with others has the intrinsic potential to give rise to risk. Indeed, “bad road” (a hazard) and “unskilled driver” (a vulnerability) are sources of a risk “car accident”. The key feature of risk sources is that they are considered to be certain: we know that they road is of bad quality and a driver is unskilled and use this knowledge to evaluate the probability of a car accident.

In targeting systems, which are mostly dealing with uncertainty that stems from the lack of knowledge about actual status of evaluated objects (shipments in import compliance, defendants in court, patient in diagnostics), probability factors can be treated as positive or negative signs: object’s characteristics that can be used as sources of evidence to make an educated judgment about its status.

Identifying probability factors constitute an indispensable part of any risk identification and should be determined for every non-compliance risk. The model of non-compliance risk describes the following groups of probability factors that can be used as a guidance in their identification. There are at least three main sets of questions that are explicitly or implicitly taken into account when making a judgment on the probability that an incoming shipment contains a non-compliant product. These questions include:

- Is there anything new within the supply chain associated with the shipment? Something that was not seen before: a new product, a new supplier, a new importer, etc.? Since past experience reduces the level of uncertainty, every new element within the supply chain makes the level of uncertainty associated with a shipment higher;

- How focused are the stakeholders involved in the import process associated with the product? The hypothesis behind this question is that when an importer or supplier works with a limited number of products, he or she has more experience and more knowledge on these products; and hence the level of uncertainty associated with a shipment that was imported by an importer focused on the imported products is lower than that of an importer that is working with a broader range of products, often changing his/her focus.

- What is the compliance history of the stakeholders, associated with the incoming shipment? The compliance history is the main source of information/evidence that helps evaluate the probability of non-compliance; clearly, the probability that an importer that had brought many non-compliant products would bring another non-compliant product is higher than in the case of an importer that didn’t have any non-compliance history.

Answers to these questions provide sources of information that can be used as sources of evidence that the evaluation of probabilities can be based on.

4.4.4 Likelihood of non-compliance

Targeting systems assess the likelihood that a shipment contains a non-compliant product. Approaches for evaluating probability and for developing compliance rules are described in the following sections.

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4.5 Targeting non-compliance: developing risk profiles and compliance rules

Developing risk profiles and compliance rules is one of the available approaches to evaluate the likelihood that a shipment (or its products) is non-compliant. The logic of the process is presented below:

In the following pages, we introduce a variety of approaches – from simple analytical tools to sophisticated predictive modeling – that regulatory authority can choose to perform consistent assessment of the incoming shipments.

4.5.1 Gathering basic compliance history: results of previous inspections

Basis parameters of each shipment are those that can be taken from accompanying documents and are known to regulatory authority without any data processing: these most commonly include country of import, HS code of the product, importer’s name, etc. Gathering available basic historic data is key for building a targeting system, no matter which tools for developing compliance rules and risk profiles regulatory authority chooses to apply. Regulatory authorities involved in border control have basic records about each incoming shipment. These records can be stored in different formats: from physical paper documents to various databases and information systems. Basic characteristics of shipments that are available to regulatory authorities might differ, but usually they contain the following data:

- Shipment identifier;
- Arrival date;
- Product identifier (name or code);
- Name of the importer;
- Name of the producer;
- Port of entrance;
- Result of the inspection;
- Etc.

Identifying the available sources of data and combining them into a single dataset is a prerequisite for developing compliance rules. Basic parameters of shipments (described earlier in the case study) that will be used for illustration of each step of the targeting process are presented in table 12:

Table 12 A case study: parameters of shipments (history dataset)
The dataset shows the 10 shipments described in the case study were imported by the importer, who is dealing with 3 types of products from 3 different producers that are scattered across 3 countries. The shipments arrived into two ports of entrance; the results of the inspections show that 4 out of 10 shipments were non-compliant with regulatory requirements. This information can already be used to develop compliance rules and risk profiles. For example, one can see that 2 out of 3 products that were produced by “The best toys” were non-compliant; using this data a compliance rule “Incoming shipments with product from the producer “The best toys” are of high risk” can be built. In practice, however, basic parameters characterizing a shipment are insufficient for building compliance rules and risk profiles, since they do not allow to identifying risk patterns.

4.5.2 Deriving information from history data: developing a data model of a non-compliance risk

The use of the available data will be efficient in case the dataset used for developing compliance rules follows the structure of the non-compliance risk, as it was introduced in the previous sections. The logic of building a data model of a non-compliance risk is the following, as presented in Figure 33:

<table>
<thead>
<tr>
<th>Shipment number</th>
<th>Importer</th>
<th>Producer</th>
<th>Product</th>
<th>Country of origin</th>
<th>Port of entrance</th>
<th>Actual status of the shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipment 1</td>
<td>Lucky Import</td>
<td>The best toys</td>
<td>Scooters</td>
<td>A</td>
<td>B</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 2</td>
<td>Lucky Import</td>
<td>The best toys</td>
<td>Scooters</td>
<td>A</td>
<td>B</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 3</td>
<td>Lucky Import</td>
<td>We love toys</td>
<td>Pedal Cars</td>
<td>E</td>
<td>B</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 4</td>
<td>Lucky Import</td>
<td>We love toys</td>
<td>Pedal Cars</td>
<td>E</td>
<td>B</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 5</td>
<td>Lucky Import</td>
<td>Toys of the world</td>
<td>Scooters</td>
<td>C</td>
<td>D</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 6</td>
<td>Lucky Import</td>
<td>Toys of the world</td>
<td>Scooters</td>
<td>C</td>
<td>D</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 7</td>
<td>Lucky Import</td>
<td>The best toys</td>
<td>Dolls</td>
<td>A</td>
<td>B</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 8</td>
<td>Lucky Import</td>
<td>Toys of the world</td>
<td>Dolls</td>
<td>C</td>
<td>D</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 9</td>
<td>Lucky Import</td>
<td>We love toys</td>
<td>Pedal Cars</td>
<td>C</td>
<td>D</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 10</td>
<td>Lucky Import</td>
<td>We love toys</td>
<td>Scooters</td>
<td>C</td>
<td>D</td>
<td>Compliant</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.
To develop a data model of a risk, every probability factor of an identified risk (left part of the picture) should be turned into a data column, using the available parameters of the shipments as a basis. The datasets below – the first one with basic parameters of the shipments and the second one containing probability factors as shipment characteristics – present an example of how a data model of a risk can be developed.

Lines in each dataset describe a shipment: only the first table provides basic data about each shipment, whereas the second table contains information that can be used as evidence to assess the likelihood that a shipment is non-compliant. The name of importer of itself can be hardly helpful in targeting non-compliance; this data can be used to understand whether a shipment was imported by a new importer, someone who didn’t have any experience and thus whose knowledge about the regulations is not clear; this factor that was
identified as one of the probability factors of the risk. In the example, there is only one importer, so when the first shipment arrived, importer was new to a regulatory authority; this is why the first shipment has “1” in the column “new importer”. Similar logic is used to turn data about producers into information that can be used to help targeting non-compliance – “unknown producer” can be an example of a factor that might increase the level of probability that a shipment contains a non-compliant product: products from the unknown producers are associated with a higher level of uncertainty. A factor “new product for producer” reflects the following logic: if a producer wants to enter a new market, there is higher probability that a mistake in compliance is made than in case with products that were exported for long periods of time.

Importantly, both datasets contain a column with a compliance status of each shipment. Analyzed together with probability factors, one can see which patterns – which combinations of shipment’s characteristics - are more likely to result in non-compliance.

The term likelihood is used to refer to the chance of something happening, whether defined, measured or determined objectively or subjectively, qualitatively or quantitatively, and described using general terms or mathematically (such as a probability or a frequency over a given time period) (ISO, 2018).

Analytical and risk profiling approaches that can be used as formal tools that allow consistent evaluation of the probability (determined in different ways) that an incoming shipment is non-compliant using the available information are described in the next sections, starting from those that require minimal data. These include:

- **Analytical approaches:**
  - Using experts’ judgment for shipment profiling;
  - Using past frequencies of non-compliance for targeting incoming shipments;
  - Using simple statistical probability that a shipment is non-compliant;

- **Risk profiling approaches:**
  - Using risk sources and risk factors as a basis for the evaluation of probabilities: hypothesis testing as basis of shipment targeting;
  - Predicting compliance as a machine learning task.

### 4.5.3 Analytical approaches for assessing the probability of non-compliance

**Using expert’s judgement for shipment profiling**

Measuring uncertainty associated with every shipment by applying the expert’s judgment method is commonly used in daily life, especially when no history data is available and no formal risk management tools are implemented within a regulatory authority. It is impossible to inspect all the incoming shipments and inspectors are compelled to apply the principles of selectivity. Looking at an incoming shipment and using the intuition, an experienced inspector can say “I’m sure that this shipment is non-compliant”. A statement like this is an evaluation of likelihood that doesn’t require any data to be processed (data is represented by the inspector’s intuition). Such an evaluation belongs to a certain scale, which can contain similar expressions for other levels of uncertainty, such as, for example:

- “we are quite sure the shipment is compliant”,
- “we don’t think that the shipment is compliant”,
- “we are quite sure that the shipment is non-compliant”,
- “we are absolutely sure the shipment is non-compliant”.

In case a regulatory authority wishes to apply expert’s judgment to target non-compliant shipments, a scale of likelihoods similar to one presented above should be developed. Very often such scales use the word “likely”: the shipment is “highly likely to be non-compliant”, “very likely”, “likely”, “unlikely” or “very unlikely”.

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When such scale is developed, experts can be asked to evaluate the incoming shipments according to it, combining their experience of inspections in the past with the information about an incoming shipment.

Challenges associated with this approach stem from its heavy reliance on subjective evaluations. Subjectivity and various perceptions of the same terms by different experts involved can lead to meaningless evaluations. Meanings of every descriptive term used to evaluate the likelihood of non-compliance should be explicitly defined. There are many possible biases which can influence estimates of likelihood and care should be taken to understand the possible effects of individual (cognitive) and cultural biases (ISO 2019).

**Using non-compliance frequencies for targeting the incoming shipment**

Another approach to assess the likelihood that an incoming shipment is non-compliant is using frequencies as a parameter according to which incoming shipments are targeted. Frequency is a number of events or outcomes per defined unit of time (ISO 31000). This estimate is rather easy to get: the only data that is required is the number of cases in which the non-compliant shipments arrived in the past. Frequency can be calculated applied to past shipments and then as a measure of likelihood or probability of non-compliance for incoming shipments.

Frequency can be expressed in terms of “non-compliant shipment arrives almost every day”, “only arrives once in a while” or “it only arrives once in a year”. Various scales can be developed and used for evaluating the likelihood of non-compliance based on frequencies, e.g. as presented in Table 13:

<table>
<thead>
<tr>
<th>Frequency class</th>
<th>Frequency</th>
<th>Verbal description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Once in a week</td>
<td>Very frequently</td>
</tr>
<tr>
<td>2</td>
<td>Once in a month</td>
<td>Often</td>
</tr>
<tr>
<td>3</td>
<td>Once every half a year</td>
<td>Sometimes</td>
</tr>
<tr>
<td>4</td>
<td>Once a year</td>
<td>Seldom</td>
</tr>
<tr>
<td>5</td>
<td>Once in 10 years</td>
<td>Incredible</td>
</tr>
</tbody>
</table>

The only data that is required to estimate the frequencies and use them for targeting is the following:

Table 14 Illustration of application of frequencies for assessing the likelihood of non-compliance (case study)

<table>
<thead>
<tr>
<th>Shipment number</th>
<th>Date</th>
<th>Actual status of the shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipment 1</td>
<td>10 months ago</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 3</td>
<td>8 months ago</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 5</td>
<td>6 months ago</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 7</td>
<td>4 months ago</td>
<td>Non-compliant</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov. Table prepared to illustrate the methodologies described in the Guide.
In case regulatory authority from the case study has only this data to perform profiling, it can calculate the frequency of an incoming shipment as “every two months” and use this as a probability of non-compliance.

Using frequencies requires minimum data but can lead to substantial biases in the evaluation of probabilities of non-compliance: this evaluation doesn’t require knowing the total number of shipments that arrived and is only based on the number of non-compliant shipments.

Using statistical probability for non-compliance targeting

Estimating probability that an incoming shipment is non-compliant requires more data and more effort than estimating frequencies. It allows avoiding biases associated with using frequencies and experts’ opinions. Calculating the simple probability that the incoming shipment is non-compliant requires knowing two parameters: the total number of shipments that arrived within a certain period of time and the total number of cases in which shipments were non-compliant.

Statistical probability of non-compliance in the toys case study is equal to 40%, as 4 out of 10 shipments were non-compliant. The only data that is required to calculate the statistical probability is as presented in Table 15:

Table 15 Illustration of a dataset required to calculate statistical probability (case study)

<table>
<thead>
<tr>
<th>Shipment number</th>
<th>Date</th>
<th>Actual status of the shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipment 1</td>
<td>10 months ago</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 2</td>
<td>9 months ago</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 3</td>
<td>8 months ago</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 4</td>
<td>7 months ago</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 5</td>
<td>6 months ago</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 6</td>
<td>5 months ago</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 7</td>
<td>4 months ago</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 8</td>
<td>3 months ago</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 9</td>
<td>2 months ago</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 10</td>
<td>1 months ago</td>
<td>Compliant</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.

Statistical probability is the same as interception rate: it gives an overall impression of the share of non-compliant shipments and can be used to evaluate the resources required for the inspection. The main limitation of this approach is that knowing that on average “4 out of 10 shipments are non-compliant” doesn’t provide any information about which out of the next 10 shipments will be non-compliant. Targeted inspection requires tools described in the following sections.
4.5.4 Applying predictive algorithms and risk profiling approaches to assessing the probability of non-compliance

Hypothesis testing

Hypothesis testing is a technique that allows using known characteristics of shipments (probability factors) to evaluate the likelihood that the next shipment is non-compliant. To illustrate the technique, the following dataset can be used as an example (see Table 16):

Table 16 Example of a dataset for the illustration of the hypothesis testing technique (case study)

<table>
<thead>
<tr>
<th>Shipment number</th>
<th>Date</th>
<th>Producer</th>
<th>Actual status of the shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipment 1</td>
<td>10 months ago</td>
<td>The best toys</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 2</td>
<td>9 months ago</td>
<td>The best toys</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 3</td>
<td>8 months ago</td>
<td>We love toys</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 4</td>
<td>7 months ago</td>
<td>We love toys</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 5</td>
<td>6 months ago</td>
<td>Toys of the world</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 6</td>
<td>5 months ago</td>
<td>Toys of the world</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 7</td>
<td>4 months ago</td>
<td>The best toys</td>
<td>Non-compliant</td>
</tr>
<tr>
<td>Shipment 8</td>
<td>3 months ago</td>
<td>Toys of the world</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 9</td>
<td>2 months ago</td>
<td>We love toys</td>
<td>Compliant</td>
</tr>
<tr>
<td>Shipment 10</td>
<td>1 month ago</td>
<td>We love toys</td>
<td>Compliant</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov. Table prepared to illustrate the methodologies described in the Guide.

The name of the producer can be used as an example of a probability factor for testing a hypothesis “shipments that contain products from producer ‘The best toys’ are high-risk shipments”. To do so, the name of the producer should be used to calculate the statistical probability of non-compliance.

To understand how producer influences the probability that a shipment is non-compliant, the Bayes rule can be used. In the example, 2 out of 4 non-compliant shipments were produced by “The best toys”, 40% of shipments were non-compliant, and 30% of all shipments came from this producer; this results in a conditional probability of 0.375 that the next shipment containing products from this producer will be non-compliant.

The benefit of this approach is that it allows selecting – or targeting - shipments for inspection based on their characteristics.

Import compliance as a machine learning task

The current level of development of IT tools for data mining and predictive modelling, as well as availability of IT infrastructure at regulatory agencies, allow regulatory authorities applying a variety of statistical and machine learning tools for targeting non-compliant shipments. These tools, in essence, are based on the similar concepts as those described in hypothesis testing section. They allow taking into account as many probability factors as required and processing very big history datasets. Data mining tools can be used to implement an automated learning process that analyses big amounts of data to provide authorities with a
set of relevant compliance rules and risk profiles. To ensure that compliance rules reflect the actual situation, import targeting systems should be based on the concepts of machine learning.

A computer program is said to learn from experience $E$ with respect to some class of tasks $T$ and performance measure $P$, if its performance at tasks in $T$, as measured by $P$, improves with experience $E$\textsuperscript{69}. Targeting incoming shipments can be represented as a machine learning task:

- **Task (T):** classifying incoming shipments in terms of:
  - $0$ – compliant shipment
  - $1$ – non-compliant shipment.

- **Experience (E):** results of the inspections performed in the past (inspection history).

- **Performance measure (P):** number of shipments that were correctly evaluated.

Machine learning tools provide automated solutions for discovering behavioural patterns and building risk profiles; in other words, they allow targeting incoming shipments using many probability factors (shipment’s characteristics) at once.

To illustrate the principles of machine learning algorithms, which are similar to those of hypothesis testing, we will use a two probability factors example.

The table with data model of the non-compliance risk (with information on each probability factor in case of each incoming shipment) of the toys case can be presented as in Figure 35, in which red circles represent shipments that were non-compliant, and blue circles represent shipments that were compliant and grey dots represent shipments that haven’t yet been inspected:

**Figure 35 Example of a graphical representation of a machine learning task**

Source: Valentin Nikonov. Figure prepared to illustrate the methodologies described in the Guide.

The placement of each dot on the graph represents the values of the two risk factors (“new product” and “new producer”) and shows how each of the factors in each case influence the outcome (compliant and non-compliant shipments). Drawing a straight line on the graph, which is supposed to separate in the best possible way the areas with red dots from areas with red dots is a very simple example of a supervised machine learning algorithm, which can be used for predicting the statuses of new shipments based on the same information, which is available before the shipment even arrives.

---

The graph shows that shipments that contain products that were already imported before and come from an old producer are compliant, whereas both shipments that contained new products from unknown producers were non-compliant. If five new shipments, as represented in the graph with grey dots, arrive, according to the developed model, the shipments that is below the line has a high probability of being compliant, whereas the two shipments that are above the line represents the opposite case.

In machine learning classification tasks, compliant and non-compliant shipments are examples of the two classes, whereas risk factors are referred to attributes. Assigning a class to an incoming shipment based on the available attributes is similar to other classification problems, such as e-mail classification (spam/not spam), online transactions (fraudulent/not fraudulent), etc.

The graphs above show a classification problem with only two classes and two attributes, but the number of classes and the number of attributes can be much higher (the number of attributes can be even infinite, but this is hardly needed within the regulatory contexts). All predictive algorithms, no matter how complicated they might seem, are used to formulate a “hypothesis” or “build a decision boundary”, and indeed solve the same problem: they separate the classes based on the known attributes. Various predictive algorithms are different in how they perform the task: they can be linear (when a straight line is used to separate the two classes), also more complex functions and approaches can be used (such as random forests, neural networks, etc.).

Most of the mathematics within the machine learning theory focuses on how to best represent a class by the available attributes: how to build a model which will give the right answers. The current level of development of IT tools makes it relatively easy to apply even most complicated predictive algorithms and doesn’t require the actual knowledge about how they work.

Predictive algorithms that are most commonly used in regulatory environment include decision trees, random forests and logistic regression. These algorithms can be interpreted and represented as a set of conditional statements (rules). Graph above (Figure 35) allows formulating the following simple rules, that allow evaluating new incoming shipments and making predictions on whether they are non-compliant:

• “shipments that contain products that have not been inspected before and were produced by unknown producers are non-compliant”;

• “shipments that contain known products that were produced by known producers are compliant”.

Predictive models, including compliance rules in the example above, can have different predictive quality and need to be evaluated before their implementation.

Building a classification model is a challenging task: both in terms of the “length” and the “width” of the dataset. It requires running simulations on the available data, which is usually divided into three parts:

• Training set: used to develop compliance rules;

• Test set: used to test how the compliance rules work and to evaluate the algorithm;

• Validation set: used to validate the rules.

To illustrate the concept, we assume that a regulatory authority from the toys case study has data only on 10 shipments that were inspected in the past. Regulatory authority can use all the whole table to develop the rules, but in this case, it will need to accept them without any tests. The usual approach to test compliance rules is to run a series of simulations to answer the question “what would have happened if we had inspected the shipments according to the compliance rules?”. Since the actual results of the inspections are known, such simulations provide all the information that is required to evaluate how good the rules are in terms of the two regulatory errors described in the beginning of the Chapter.

The regulatory authority uses the probability factor that combine information on the product and producer in one variable “new product for producer”, and to develop compliance rules it would use only first 6 lines of the table and will apply it on the 4 last lines. As the table shows, all shipments for which the factor “new product for producer” is relevant were non-compliant; hence it can be used as a rule for targeting non-compliance. If
before applying this rule on new shipments, authority would want to know what would have happened if it applied the rules for the last 4 months, it would get the following results:

Figure 36 Example of results of a simulation aimed at testing compliance rules

Simulations allow regulatory authority evaluate the quality of compliance rules. If shipment 7 were assessed according to the rule “shipment containing a product which is new the producer”, it would be evaluated as a high-risk shipment and its compliance status would be “non-compliant”: it was the first case in which the shipment contains the product “dolls” produced by the company “the best toys”, thus the factor “new product for producer” is relevant for this shipment. In this case, the assessment of the shipment would be correct – the actual status of the shipment is “non-compliant”. Shipment 8 also contains dolls but produced by “Toys of the world”; before the arrival of shipment 8, “Toys of the world” was known to the regulator as a producer of scooters, hence in this case dolls is also meets the compliance rule “a new product for producer” and the assessment of the shipment is “high-risk”. In reality, though, shipment 8 was compliant and if this shipment hadn’t been inspected, it would not have exposed consumer to unnecessary risks. In case of shipment 9, the system also made the right guess – shipment was assessed as low-risk and it indeed was compliant, whereas case 10 is similar to case 8.

In machine learning, evaluation of predictive algorithms is performed by the means of false-positive analysis. Classification can be:

- True positive (the algorithm guessed “compliant shipment”, shipment was indeed compliant, as in case 9);
- False positive (the algorithm guessed “compliant shipment”, shipment was non-compliant);
- True negative (the algorithm guessed “non-compliant shipment”, the shipment was compliant, as in cases 8 and 10);
- False negative (algorithm guessed “non-compliant shipment”, the shipment was non-compliant, as in case 7).

Building a confusion matrix is a convenient way to perform false positive analysis. In case of the simulation described above, the confusion matrix would be like the following:

<table>
<thead>
<tr>
<th>Compliant shipment in reality</th>
<th>Non-compliant shipment in reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipment assessed as low-risk (compliant)</td>
<td>1</td>
</tr>
</tbody>
</table>
The matrix shows that 1 out of 3 shipments that were compliant in reality was assessed by the compliance rule as compliant, whereas the other two were evaluated as non-compliant. At the same time, 1 non-compliant shipment was evaluated as high-risk.

Precision and recall are two main parameters that are used to evaluate classification algorithms. Precision is an evaluation of how often the algorithm causes a false alarm: it shows what part of all consignments that the algorithm has predicted as non-compliant were indeed non-compliant. Calculating precision requires dividing the number of true positives by the number of predicted positives. Higher is the precision, better is the algorithm. In the example, precision is 100%.

Recall shows how sensitive is the algorithm: it shows how many of the shipments that are non-compliant the algorithm correctly detected. Calculating recall requires dividing the number of true positives by the number of actual positives (true positives and false negatives). Higher recall means a better algorithm. In the example, recall is 50%.

The following section shows how the false positive analysis can be performed in the context of an import compliance targeting system.

4.6 Evaluating compliance rules

False positive analysis provides regulatory authority with 4 out of 9 characteristics of a risk-based regulatory regime that were introduced earlier in the Chapter. Indeed, true positive parameter of false positive analysis corresponds to number of inspected non-compliant shipments, false positive – to number of non-compliant shipments released without an inspection. False negative characterizes the number of compliant shipments that were targeted as high-risk and inspected, whereas true negative corresponds to a number of compliant shipments that were targeted as low-risk and released without an inspection. Number of non-compliant shipments that were targeted as low-risk and released without an inspection represents the residual risk associated with an import compliance regime – it can be used as an estimate of potential losses caused by the consequences of non-compliance.

Determining the tolerable level of residual risk is a challenging task for any regulatory authority. Risk management doesn’t provide guidance on how much risk to tolerate; it is a decision that depends on societal expectation, policy objectives and risk propensity of a regulator. From the risk management perspective, it is important to ensure that the residual risk is to the resources of a regulatory authority allocated to border inspection and border compliance time.

Results of false positive analysis can be reviewed together with other key characteristics of a targeting system: general parameters, such as number of incoming shipments and inspection rate and those characterizing the costs of safety: number of inspection units required to achieve the given level of residual risk for regulatory authority and border compliance time (for importers).

Evaluation of compliance rules can be performed by comparing the results of a simulation with certain benchmarks, e.g. regulatory regime in which every consignment is targeted as high-risk, or the opposite case – regulatory regime in which every consignment is released without an inspection. Evaluation of compliance rules based on the simulation of 4 incoming shipments is presented in Table 17:

<table>
<thead>
<tr>
<th>Parameter, characterizing a targeting system</th>
<th>Comments</th>
<th>The system targets every</th>
<th>The system targets every</th>
<th>Compliance rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipment assessed as high-risk (non-compliant)</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metric</td>
<td>High Risk</td>
<td>Low Risk</td>
<td>Remarks</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------</td>
<td>----------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>Number of incoming shipments</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Non-compliance rate</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Inspection rate</td>
<td>100%</td>
<td>0%</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>Inspection units</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Number of inspected non-compliant</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>(targeted as high-risk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of inspected compliant</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>(targeted as high-risk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of released non-compliant</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>(targeted as low risk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of released compliant</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>(targeted as low risk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Border compliance time</td>
<td>6</td>
<td>0</td>
<td>4.5</td>
<td></td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.

Sample compliance rules regulatory regime can be compared with one that assumes inspection of every shipment and it is more efficient, requiring less resources for the same level of residual risk. Not inspecting any shipment results in residual risk of 1, but doesn’t require any resources and has zero border compliance time. Both regulatory regimes are optimal in terms of residual risk — resources — border compliance time; choosing between them depends on the risk tolerance of a regulatory authority.

It is common to use a validation set for evaluating compliance rules; validation set is similar to a test set and contains data on shipments with known compliance statuses.

Table 18 illustrates a typical structure of training set, test set and a validation set:
### 4.7 Assessing incoming shipments

Assessing incoming shipments according to compliance rules or risk profiles requires implementing a separate process. To illustrate the main function of the process, we assume that regulatory authority adopted the regulatory regime that can be formulated as follows:

- All shipments that contain a combination “Product – Producer” that has not been seen before, is a high-risk shipment;
- All shipments that do not belong to the first group, are shipments of low risk.

The regulatory authority received information on the following 3 shipments, containing the basic information about shipments:

<table>
<thead>
<tr>
<th>Shipment number</th>
<th>Date</th>
<th>Importer</th>
<th>Producer</th>
<th>Product</th>
<th>Country of import</th>
<th>Port of entrance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipment 11</td>
<td>tomorrow</td>
<td>Lucky</td>
<td>Toys of the world</td>
<td>Dolls</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>Shipment 12</td>
<td>tomorrow</td>
<td>Lucky</td>
<td>Toys of the world</td>
<td>Scooters</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>Shipment 13</td>
<td>tomorrow</td>
<td>Lucky</td>
<td>The best toys</td>
<td>Scooters</td>
<td>A</td>
<td>B</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov. Table prepared to illustrate the methodologies described in the Guide.
The first two shipments contain dolls and scooters produced by “Toys of the world”, and the third shipment contains scooters produced by the best toys. The actual status of the shipments is unknown, and to evaluate the probability that each shipment is non-compliant, regulatory authority uses compliance rules that were developed based on the analysis of the history data. In the example, to apply the rule, regulatory authority needs to know whether a shipment contains a product type that is new for the producer; in other words, that the combination "Producer-Product" never appeared in the table with history data. In the simple case, one can easily check each combination associated with every incoming shipment to see if dolls produced by “Toys of the world” and scooters produced by “the best toys” and “toys of the world” were ever were imported; according to the compliance rules adopted by the regulatory authority the incoming shipments are of low risk and their release can be expedited.

Table 20 Predicting compliance status of incoming shipments

<table>
<thead>
<tr>
<th>Shipment number</th>
<th>Date</th>
<th>Importer</th>
<th>Producer</th>
<th>Product</th>
<th>New product for producer</th>
<th>Predicted compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>tomorrow</td>
<td>Lucky</td>
<td>Toys of the world</td>
<td>Dolls</td>
<td>0</td>
<td>Compliant</td>
</tr>
<tr>
<td>12</td>
<td>tomorrow</td>
<td>Lucky</td>
<td>Toys of the world</td>
<td>Scooters</td>
<td>0</td>
<td>Compliant</td>
</tr>
<tr>
<td>13</td>
<td>tomorrow</td>
<td>Lucky</td>
<td>The best toys</td>
<td>Scooters</td>
<td>0</td>
<td>Compliant</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.

The overall logic of data processing for applying the risk profiles is presented in Figure 37:

Figure 37 Logic of data processing for applying risk profiles

Source: Valentin Nikonov. Figure prepared to illustrate the methodologies described in the Guide.
Compliance rules are formulated in terms of probability factors (e.g., “new importer”), whereas data on incoming shipments contains basic information, such as numbers and names of stakeholders (“importer’s name”). In order to apply compliance rules to the incoming shipments, the values of the probability factors should be calculated: the regulatory authority should know not just the name of the importer, but also the value of the probability factor (whether importer is new or not). To do so, data from the history dataset should be processed and combined with the data on the incoming shipments. When data on the incoming shipments is enriched by the probability factors, compliance rules can be applied and the values of “predicted compliance” appear in the table.

4.8 Performing risk-based inspections

“Zero” risk or absolute safety cannot be a valid regulatory objective, even with 100% inspection of every shipment, also because any inspection implies sampling. Since inspection is equivalent to sampling, the level of scrutiny of an inspection and a respective regulatory regime is determined by the following parameters:

- Tolerance level, or the level of detection, which is the measurable level of the prevalence of non-compliant products that regulators are willing to accept on a commodity;

- Confidence level, which is the level of certainty that sampling will detect a level of prevalence of non-compliant products that exceeds the tolerance level.

The sampling plan should reflect the non-compliance risk of an incoming shipment in the following way (Nikonov V., Patir Z., 2020):

- a. The confidence level should reflect the probability of non-compliance associated with an incoming shipment;

- b. The level of detection should reflect the consequences of non-compliance associated with the incoming shipment.

Inspections have three main parts:

- Documentary checks;

- Identity checks;

- Physical checks.

In many regulatory contexts, the scope of the risk-based import compliance system contains only physical checks: documentary and identity checks are obligatory.

Risk-based inspections allow for shifting resources from low-risk shipments to those associated with higher level of risk. When shipments can be categorized in terms of non-compliance risk, regulatory authority can assign the following parameters to each risk group:

- **Inspection frequency**, or inspection rate;

- **Sample size**, since it is usually not feasible to inspect entire consignments and inspection is performed mainly on samples obtained from a consignment. To determine the number of samples to be taken, regulatory authority should select a confidence level (for example, 95%), a level of detection (for example, 5%) and an acceptance number (for example, zero), and determine the efficacy of detection (for example, 80%). From these values and the lot size, a sample size can be calculated.
For a given acceptance number and efficacy of detection, a risk-based inspection scheme can be defined using the following structure, as shown in the example presented in Table 21:

**Table 21 Example of a risk-based sampling plan**

<table>
<thead>
<tr>
<th>High consequences of non-compliance</th>
<th>Medium consequences of non-compliance</th>
<th>Low consequences of non-compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High probability of non-compliance</strong></td>
<td>Frequency: every shipment</td>
<td>Frequency: 50%</td>
</tr>
<tr>
<td></td>
<td>Level of detection: 0.1%</td>
<td>Level of detection: 0.5%</td>
</tr>
<tr>
<td></td>
<td>Confidence level: 99%</td>
<td>Confidence level: 99%</td>
</tr>
<tr>
<td><strong>Medium probability of non-compliance</strong></td>
<td>Frequency: every shipment</td>
<td>Frequency: 50%</td>
</tr>
<tr>
<td></td>
<td>Level of detection: 0.1</td>
<td>Level of detection: 0.5%</td>
</tr>
<tr>
<td></td>
<td>Confidence level: 99%</td>
<td>Confidence level: 95%</td>
</tr>
<tr>
<td><strong>Low probability of non-compliance</strong></td>
<td>Frequency: 50%</td>
<td>Frequency: 25%</td>
</tr>
<tr>
<td></td>
<td>Level of detection: 0.1</td>
<td>Level of detection: 0.5%</td>
</tr>
<tr>
<td></td>
<td>Confidence level: 90%</td>
<td>Confidence level: 90%</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov, table prepared to illustrate the methodologies described in the Guide.

The structure of the sampling plan reflects the following logic: level of harm associated with consequences of non-compliance is reflected by acceptable amount of non-compliant products in the consignment, represented by the parameter “level of detection” (higher are the consequences, lower is the level of detection). Shipments that contain products associated with high consequences, for example, can be assigned 0.1% of allowed non-compliant products (the most stringent case in most of the sampling standards). Shipments containing products with medium consequences of non-compliance can be inspected according to 0.5% level of detection, whereas in case of low consequences of non-compliance level of detection could be within the range of 1%-5%. Other things equal, lower level of detection means bigger sample and thus higher inspection costs.

Probability of non-compliance is associated with the parameter that represents the probability that the number of non-compliant products in the shipment is indeed not higher than the level of detection, or confidence level (higher is the probability of non-compliance, higher is the confidence level). Shipments with high probability of non-compliance can be inspected with the confidence level of 99%, those of medium probability – 95%, etc.

**4.9 Updating the datasets**

Information on whether a shipment was inspected or not, and the results of the inspection in are added to the dataset, so that the compliance rules could be regularly evaluated. The three incoming shipments in the example were released without an inspection, so the regulatory authority doesn’t know their actual status within an import compliance framework. If information on non-compliant products is received during later stages of market surveillance (non-compliance products found on the market), it should be traced back so that it is included into the datasets that are used to develop compliance rules.
5.1 Non-compliance risks within the responsibility of the customs authority

5.1.1 Institutional Arrangements and Procedures

The increase in cross-border transactions and the importance of global trade for national economies are compelling governments to develop more efficient border management procedures. As the role of Customs authorities is changing from purely looking after a country’s fiscal revenue to playing a more important role in managing international trade, outdated working practices can restrict the efficiency of Customs organizations and other border agencies. Inefficiency and out-of-date procedures do not only prevent effective revenue collection and pose a risk to security, they also negatively impact foreign trade. In a competitive international business environment, the private sector finds it highly cumbersome and discouraging to conduct business or invest in a country where goods cannot move safely and quickly across its borders. Effective clearance and controls can link national industries to the global supply chain and can be an attractive feature for direct foreign investment.

Creating the necessary operational capacity is the most difficult task for any administration undergoing reform. CBRAs have to demonstrate their ability to manage and control external borders effectively and efficiently in the interest of both the citizens and trade operators. Globalization, fast-growing trade and increasing traffic volumes force the CBRAs to harmonize regulations and procedures as far as possible. Another new challenge is the crucial role CBRAs have to play in ensuring the security of the international supply chain, which call for closer international cooperation, harmonized and modernized procedures, practices and processes.

At the same time, business operators expect trade facilitation measures to ensure efficient procedures and controls based on risk management, as well as short border crossing times. To minimize the costs, data and documentation requirements and the time necessary to complete border formalities, the CBRAs should work paperless, and the single window and one stop shop approach should be implemented. Only a stable, efficient, flexible and competent government administrations will be able to meet these challenges. All these developments led to the conclusion that it would be useful to take account of new priorities and challenges while building up the necessary organizational and operational capacity, which might influence on state revenue.

The challenge for Customs and other border agencies is to stop threats while at the same time facilitating legitimate trade and transport across borders. The rising volume of cross-border transactions has put pressure on administrations in many countries to modernize their legislation and structures. Coping better with increasing trade volumes and decreasing human resources could be improved by introduction risk management which supports allocation of limited resources to the highest risk areas and focus on non-compliant traders. In managing risks, a balance must be struck between costs and benefits, as clearly it will not be cost effective to address all risks equally. New requirements for security and revenue collection as well as the increased insistence of traders on faster, safer and more reliable services have necessitated the introduction of modern processes, which in turn has often required the modernization of laws and administrations.

5.1.2 Risk Management Process and Implementation

Risk management in the customs control has a long and rich history: customs authorities have been world leaders in applying formal risk management in regulation and standardizing risk management at a global level. The concept of customs controls of the WCO requires the latter be “carried out on a selective basis using risk management techniques to the greatest extent possible”. The risk management objectives declared by the WCO follow the principle of the risk management triangle, described earlier in the publication and include:

- Ensuring more effective use of available resources;
- Increasing ability to detect offences and non-compliant traders and travelers;
Offering compliant traders and travelers greater facilitation;
Expedite trade and travel.

WCO has developed a wide range of instruments aimed at ensuring efficient management of risks at the border; these instruments are compatible with and complementary to the WTO TFA.

Already through the provisions of the Revised Kyoto Convention, the WCO was essentially attempting to achieve a general adoption of a risk-managed style of regulatory compliance.

As a result of international cooperation and risk management standardization work of the WCO and other international organizations, risk management systems of the customs form the natural basis for an integrated risk management at the border. Risk management system of the customs are based on a standardized data model70; in many countries, data processing and risk management tools are based on a UNCTAD developed system (ASYCUDA)71.

Targeting systems of the customs authorities are based on the same processes as described in the previous chapter; the way these processes can be implemented at the customs to constitute a basis for an integrated risk management system is described in the following pages.

5.1.3 Cooperation and Information Exchange

All border regulatory agencies need to engage with Customs from time to time therefore proactive engagement between agencies is crucial. The main objective of this cooperation is to ensure that the government response to the challenges of supply chain security is both efficient and effective, by avoiding duplication of requirements and inspections, streamlining processes, and ultimately working toward global standards that secure the movements of goods in a manner that facilitates trade.72 At the national level there should be a policy in place to ensure that the CBRAs cooperate and coordinate their activities to ensure compliance and promote economic development in more proactive ways. However, often there is persistent lack of coordination and cooperation among the CBRAs.

A reform limited only to Customs will be substantially less effective if other agencies and service providers, who are participants in the trade logistic chain, are not enhancing their performance. All the border agencies should join forces with Customs in applying advanced risk profiling methodologies to reduce intrusive inspections.

The number of different government agencies involved in developing and enforcing policy and controls and procedures is not as important as how they exchange information. Also important is whether they work separately or are integrated using a "whole of government" approach. Lack of coordination between government agencies involved in controlling cross-border transactions encumbers trade. Trading parties often must adapt not only to different types of information being requested but, more critically, to the same information being requested in different formats or at different times. This fragmentation of requirements increases not only the risk of mistakes but also the cost of transactions. Moreover, the effectiveness of border regulatory agencies is also reduced if the same information is collected several times by different organizations.

It is thus clear that cooperation between the agencies operating at borders would lead not only to better processing efficiency, but also to substantial financial savings. However, coordinating government border activities require the combining of many different functions, cultures and organizations.

The key benefits for border agencies include a reduction in administration and enforcement costs through:

- Process reengineering to streamline and harmonize procedures
- Empowering staff across agencies for shared responsibilities
- Coordinated risk management: shared information for shared decision on high-risk cargo
- Sharing of non-intrusive inspection equipment and inspection bays (e.g. integrated check posts and mirror image facilities across borders)

The key benefits for the trading community include:

- Decreased compliance costs through streamlined and simplified procedures
- Increased efficiency in inspection and release of phytosanitary goods
- Improved quality of services rendered by border agencies
- Expedited border crossing thorough harmonized physical inspections; improved flow management

5.1.4 Technology support

Even though information technology general infrastructure is established in many CBRAs, risk management specific information technology and tools are not always available. Risk management does not require expensive computer systems or software. As long as the flow of high quality information is assured proper decision can be made about risk management. Computer systems may expedite the process, but they are not mandated. Nevertheless, integrated IT system environment might support the business strategy of the administration, facilitates trade, provides risk management and ensures that organization of business is conducted to the highest level of efficiency.

5.2 Inputs into the targeting system of Customs: tolerable level of risk, available resources and the probability factors

5.2.1 Types of customs non-compliance risks

Customs administrations objectives continuously evolve, including the primary role of revenue collection and other objectives such as protection of public health, environmental protection, consumer protection, etc. Trade facilitation has been added to Customs objectives in recent years, and customs administrations are increasingly taking over security role such as the one underpinning the WCO SAFE framework of standards. Customs administrations have two primary roles: revenue collection and security of their citizens related to health, environment, products consumption, intellectual property rights, etc.

The variety of risks customs administrations are managing evolves accordingly. Table 22 provides an overview of types of customs risks in five distinctive areas from revenue collection, public health, environmental protection, fight against terrorism and fair competition.

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74 ITC Blueprint Report – Improve the current RM practices in border regulatory agencies, 2019.
Table 22 Origin of risks for different customs objectives\textsuperscript{75}

<table>
<thead>
<tr>
<th>Non-declared goods</th>
<th>Revenue Collection</th>
<th>Public Health</th>
<th>Environmental Protection</th>
<th>Fight Against Terrorism</th>
<th>Fair Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-declared goods</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Proper Tariff Classification</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Proper Valuation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Proper Country of Origin</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Trade Policy Measures</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proper Customs Procedures</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Intellectual Property Rights (IPR)</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Trade Agreements Compliance</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Money Laundering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Environmental Crime</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smuggling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drugs and Precursors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Weapons of Mass Destruction</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firearms</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>CITES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Nuclear and Radioactive Materials</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Customs Duty Goods</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


5.2.2 Probability factors for targeting non-compliance risks

To assist authorities in effective management of such a broad set of risks, the WCO has developed a risk management methodology, including methods for risk assessment, profiling and targeting. The methodology is described in the document “Risk Management Compendium”\textsuperscript{76}.


The methodology includes a set of general high-risk indicators, description of the process for standardized risk assessment and model risk profiles.

Risk indicator is another term used for a probability factor of a non-compliance risk, as described in chapter 2 “Principles of risk management”. According to the formal definition, a risk indicator is “specific criteria which, when taken together, serve as a practical tool to select and target movements that pose a risk of potential non-compliance with Customs laws”: a set of characteristics of a trade transaction known to the authority allowing to assess the probability that a trade transaction is non-compliant. Risk indicators are used for developing compliance rules or building risk profiles, “description of any set of risks, including a predetermined combination of risk indicators, based on information which has been gathered, analyzed and categorized”.

As in general case, probability factors for non-compliance risks include characteristics of the stakeholders within a supply chain, associated with a trade transaction. Table 23 provides guidance for ensuring a comprehensive list of stakeholders involved in a trade transaction (according to the UNECE CEFACT buy-ship-pay model). This allows for full identification of the probability factors by the customs. The model outlines four main categories of supply chain actors: Customer, Supplier, Intermediary and Authority:

Table 23 Categories of Supply Chain Actors

<table>
<thead>
<tr>
<th>Customer</th>
<th>Supplier</th>
<th>Intermediary</th>
<th>Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buyer</td>
<td>Seller</td>
<td>Transport Service Provider</td>
<td>Customs Authority</td>
</tr>
<tr>
<td>Invoicee</td>
<td>Invoicer</td>
<td>Bank</td>
<td>Environmental Agency</td>
</tr>
<tr>
<td>Payor</td>
<td>Payee</td>
<td>Credit Agency</td>
<td>Agricultural Agency</td>
</tr>
<tr>
<td>Importer</td>
<td>Exporter</td>
<td>Insurer</td>
<td>Chamber of Commerce</td>
</tr>
<tr>
<td>Final Consignee</td>
<td>Original Consignor</td>
<td>Customs Agent</td>
<td>Consular Authority</td>
</tr>
<tr>
<td>Transport Services Buyer</td>
<td>Transport Services Seller</td>
<td>Carrier Agent</td>
<td>Inspection Agency</td>
</tr>
<tr>
<td>Ship To</td>
<td>Ship From</td>
<td>Commission Agent</td>
<td>Port Health</td>
</tr>
<tr>
<td></td>
<td></td>
<td>etc.</td>
<td>etc.</td>
</tr>
</tbody>
</table>

Source: UN/CEFACT (2013).

Customs supply chain is widely classified as a complex system, due to not only the large number of actors, but also their complex structural links, and the interactions between these actors. It incorporates all aspects of moving cargo from the exporter through the transport process, the logistics operations and border control (declaration processing, custom clearance, data analysis, risk assessment, document checking, scanning, physical inspection, etc.) to the final importer. The economic, political and social impacts of various risks are highly detrimental to the countries, businesses and to the public. For this reason, risk management in the customs supply chain context is becoming a crucial issue to ensure the sustainability, safety and performance. Risk management-based approach as systematic identification and implementation of all measures necessary to limit exposure to customs risk, determines which persons, goods, and means of transport should be examined and to what extent. Accordingly, it is important to use a risk assessment approach and an effective analyze of the risk faced in customs context, thus enabling decision makers to understand the capabilities and resources that need to be deployed so as to successfully implement risk management in the customs supply chain.77

General high-risk indicators, that alone or in combination can be used to develop compliance rules and build risk profiles, are grouped in the Risk Management Compendium according to the sources of data, from which information regarding these indicators can be gathered. The main groups of indicators include:

- Carrier Manifest
- Country
- Commodity
- Transportation
- Container
- Business Entity (local)
- Business Entity (shipper)

Description of each group are provided in the next section.

**Carrier Manifest Detail**
A carrier is at risk if any of its crew are associated with terrorist or criminal organizations (Carrier Profile). In terrorist-related and smuggling activities, the principal concern is accurate identification of country of origin, the transshipment country and the method of transport. This information is part of the carrier manifest. Data required in this regard concerns the commodity, its origin, the route and packing. Shipper and consignee information is less reliable, this data is reported to the carrier, independent of the carrier’s integrity, and is therefore subject to manipulation and inaccuracy.

**High-Risk Country Identification**
The second risk factor is the originating country and transhipment country. The level of threat for a specific country is determined by intelligence sources for countries posing a risk for smuggling-related activities. The general conditions for identifying high-risk countries are:

- Cooperation with the UN is poor or non-existent. One example would be if no counter-narcotics measures are in effect;
- Level of corruption for both high and low-ranking government officials is high;
- Toleration of extremist groups sympathetic to terrorist activities;
- Absence of money laundering legislation; and
- The government does not have strict controls to prevent diversions of essential or precursor chemicals. This would indicate that other dual-use products would just as easily be diverted or facilitated.

**Commodity and transport**
The transport mode selected by traders is greatly connected to the type of commodity. As such the following factors giving rise to international trade risks are interrelated:

- Shipment has unusual routing or is not cost-effective;
- Shipment is a consolidation with no identifiable participants;
• Packing method for commodity is not usual i.e., product is normally packed in cartons, but is now seen in drums, or commodity not usually palletized and shrink-wrapped is now packed in this manner; and
• Shipment contains high risk commodities in the dangerous goods category.\(^{78}\)

**Container aspects**

This risk attribute concerns situations in which details about the container give rise to concern. For example:

• Number on security seal different from number on bill of lading;
• Invalid container number (check-digit);
• Unusual open spaces in the load;
• Container type inconsistent with goods;
• Temperature in reefer abnormal for commodity; and
• Unusual weight for container size.

**Importer/exporter aspects**

This risk attribute relates to the consignee (the buyer/recipient of the shipment). Specific warning signs include:

• The identity of the consignee is not previously known, which can be determined through historical research;
• The consignee is very recent. The importer may be attempting to establish an importing history prior to commencing smuggling activity;
• Address is suspect. The address may not fit the import – i.e., if it is a commercial shipment for a residential area, if the address does not exist, if the address has P.O. Box, if the address is in suspect area, or if there is an incomplete address;
• Sudden large importation for new or relatively recent importer, indicating deviation from the usual trade pattern;
• One to one relationship: importer same as exporter (groups, common directors etc.);
• Previous enforcement (compliance history: recovery, difference between assessed and declared parameters)\(^{79}\);
• Inadequate capacity or resources for importer to import goods (the import value is substantially out of proportion to the business size);
• Inconsistency with previous importation patterns; and

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\(^{78}\) High risk commodities in the dangerous goods category is explained in WCO literature and in relevant Conventions, such as Chemical Weapon Convention, the Montreal Protocol (on ozone depleting substance), WCO’s annual publications and reports on Customs and IPR, Customs and Drugs Reports, Illicit Trade Reports, Customs and Tobacco Reports.

\(^{79}\) Recovery refers to recovery of outstanding liabilities of duties and tax payments. Parameters are data-elements of trader’s declaration of import or export, such as a commodity code and description, value of goods, quantity, unit of measurement, country of origin, tariff, journey of goods etc. Difference between the declared parameter and what was found (on assessment or audit by Customs or OGA) is a measure of non-compliance risk.
• An unusual commodity for importer, exporter or vendor.

Shipper aspects
The last risk factor relates to attributes of the shipping entity itself. Warning signs might include:

• Shipper has never been seen previously, as determined by historical research;
• Shipper is established, but now has a new manufacturer ID, with a new foreign address;
• No phone listing exists for foreign business (data for this can be obtained through commercial sections officers working in partner countries);
• Address is suspect: Country or Region is high risk, the address is in a Free Zone, the business is not licensed for Free Zone, the other address is incomplete;
• Shipper is a bank, non-vessel operating common carrier (NVOCC) or Freight Forwarder;
• Shipper has never exported this commodity (unusual HS code-Exporter combination).

General factors that can be taken into account when building risk profiles include the following

Domain knowledge or familiarity
• Transaction history of entities; frequency and volume of transactions – e.g. first-time, recently established, low volume, very high volume etc.;
• Identity confirmation: unique number, business registration profile;
• Accredited or known client category, like Authorized Economic Operator (AEO) systems.

Intelligence
• Strategic information: e.g. country of origin, country of export;
• Tactical information: person, container, product description.

Geographical / locational parameters
• Origin location;
• Transit location;
• Destination location;
• Routing information, e.g. ports of call, transhipment history.

History of non-compliance
• Accurate or probable matches to internal prior violation history, subject of investigation and other law enforcement records;
• Ranked based on severity.

Risk indicators should be specific and defined. If they are too broad, they will result in false positives (identified for targeting without having committed any violation) or false negatives (failure to target those who may have committed violations). The quality of data is also essential to avoiding false results.
5.2.3 Risk register

Risk register is an organizational planning document identifying compliance risks and allocating identified risks to risk owners. It supports risk-based approach by covering both financial risks and other risks related to security, safety, IPR, environment etc. A risk register is based on assessment of risks at regional level along with potential strategic threats. Risks should be ordered according to the assumed hierarchy of threats (high, medium, low) assigned to risk areas. It allows introduction of risk owners to manage organizational and operational risks in a more structured manner.\(^{80}\)

Risk register should include information of identified risks and show risk owners. It will allow a structured management of risks. Risk register informs of identified (confirmed) or potential risk areas and is setting priorities for addressing risks. It should be updated on a regular basis and periodically verified, for instance on a quarterly or semi-annual basis.

5.3 Developing compliance rules and risk profiles for targeting Customs risks

5.3.1 Sources of information for risk management

A risk-based approach relies on the collection, evaluation, and analysis of information in different forms, of different types, and from different sources. Information supports decision making at the different levels of a CRM approach: information is evaluated at strategic, tactical and operational level. Table 24 shows the evaluation of the information on the strategic, tactical and operational level.

Table 24 Evaluation of the information on the strategic, tactical and operational levels

<table>
<thead>
<tr>
<th>Management Level</th>
<th>Time Period</th>
<th>Frequency</th>
<th>Source</th>
<th>Certainty</th>
<th>Area</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic</td>
<td>Long-term</td>
<td>Low</td>
<td>Mostly External</td>
<td>Less Certain</td>
<td>Broad</td>
<td>Summarized</td>
</tr>
<tr>
<td>Tactical</td>
<td>Midterm</td>
<td>Medium Ad hoc</td>
<td>Internal/ External</td>
<td>Medium Certainty</td>
<td>Specific</td>
<td>Detailed</td>
</tr>
<tr>
<td>Operational</td>
<td>Short-term</td>
<td>High</td>
<td>Mostly Internal</td>
<td>More Certain</td>
<td>Specific</td>
<td>Detailed</td>
</tr>
</tbody>
</table>

Source: Rafal Pryk, elaborated for this Guide.

The WCO Risk Management Compendium (Volume 2) (WCO, n.d.) describes the following sources of data that are internal to a customs administration: seizure reports; strategic, tactical, operational reports of other Customs administrations; intelligence data; information exchange with other Customs Administrations; risk signals from Customs officers and other law enforcement personnel; cooperation or interviews with other knowledgeable people from the import and transportation trade, e.g. Customs brokers, cargo agents, warehouse personnel, etc., transport documents such as manifests, airway bills, etc., available national Customs (or other law enforcement agencies) databases, signals and alerts.

It's now common to divide sources of information two different types: external and internal information. The information used in CRM can also be categorized as primary and secondary sources of information. The primary source of information includes interviews, reports and other first-hand information. Secondary sources of information are publicly available information, whether they are coming from within the organization or from the outside that provides:

\(^{80}\) ITC Blueprint Report – Improve the current RM practices in border regulatory agencies, 2019.
• Internal search for multiple types of information such as databases, text documents, reports, visual objects such as maps and graphs, e-mail and intranet discussions.
• An external search of web-based sources such as web pages, messaging services, and databases.
• Comprehensive, adaptable word-based searches, phrases, concepts, dates, and other search capabilities.
• Web indexing using a "spider" application based on predefined queries by the user.

Sources of risk management at border crossing points for goods clearance can be divided as follows:

• Intelligence products created at the local and regional customs intelligence offices and strategic intelligence products created at the central customs headquarters;
• Information sharing with other government and law enforcement agencies;
• Information and feedback based on customs controls, in the form of seizure reports;
• Cooperation with stakeholders (airlines, shipping lines, agents, airport/port operators, competitors);
• Other customs administrations and international sources;
• Open-source information (Internet, Really Simple Syndication – RSS, etc.), social media (Facebook, Twitter, etc.);
• Tax collection agencies;
• Informants.

Despite a growing trend towards automation and use of IT systems in risk management, the role of the Customs officers cannot be overlooked. Customs Intelligence offers, and risk analysis experts, and the operational staff at borders and informants are valuable information sources for the risk management and are need to understand and give meaning to data and documents.

In addition to human sources, customs administrations can use an open source of information like message services, newsgroups, and other external forums.81

WCO Data Model

The WCO data model is an important instrument that provides a basis for ensuring effective gathering and storage of data required, inter alia, for risk targeting purposes. The WCO DM is a compilation of clearly structured, harmonized, standardized and reusable sets of data definitions and electronic messages designed to meet operational and legal requirements of cross-border regulatory agencies (CBRAs), including Customs, which are responsible for border management.82 Importantly, standardized data sets and electronic messages that include data beyond the focus of Customs allows Customs administrations, CBRAs and the private sector to benefit from the use of the WCO DM.

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Data model allows regulatory authority to build a history dataset according to risk factors relevant for each risk that needs to be targeted. The principles of developing a data model of non-compliance risks by the customs are similar to those described in Chapter 4. The following sections focus on technical issues related to collecting and cleaning data.

Risk indicators may be developed from the data provided by an intelligence source, such as investigation reports, or bulletins from law-enforcing agencies. Analysis of quantitative open sources, such as internationally reported trade, crime and seizures, may also be used as an input to this process.

Data can be collected from the following sources:

- Seizure reports;
- Intelligence data;
- Cooperation and intelligence from other law enforcing agencies;
- Information from trade and industry, carriers, brokers etc.
- Irregularities detected in transactions and audits;
- Trade documents like invoices, lists of ship cargo, transport documents etc.
- Information available on open sources.

Data comes in various formats and standards. To make it usable, it has to be properly tabulated, converted into a database, and tested to ensure uniformity of formats (e.g. date formats, values with currencies, units of measurements and so on). The following steps should be taken to achieve this:

- Verify reliability and accuracy of data;
- Select chart formats that allow comparison of pertinent data;
- Itemize data elements in the chart;
- Convert into a computer database, if feasible.
Deriving risk factors from the available data

Data sources and types of data described in the previous pages should be used to develop a set of risk factors using the reference model of a targeting framework and approaches described in Chapter 4. The database containing risk factors is often referred to as “a derived database” (since it contains parameters derived from transactional data). As it was shown in Chapter 4, it can contain aggregated values like averages, ranges (min. max. deviations), and other derived values, which can be used for configuring selectivity filters and for applying compliance rules. In the context of customs risks, these parameters may include traders’ categories according to their regularity or frequency, performance indicator averages, thresholds, product classifiers based on non-compliance incidences, and trade trends (growth rate, or projected volume of trade) etc. Compliance rules and selectivity filters should be validated, applied and updated according to the reference model described in Chapter 4.

Box 2 Tips for preparing data

- Always retain the original copies of data received from anywhere, i.e. “save as” another copy for cleansing, manipulation and further steps;
- Check duplicate records;
- Check format consistency, especially date-formats, currency, unit of measurement;
- Check boundary values, such as maximum and minimum values appearing in numerical columns;
- Check “null” values in columns where it is not expected to be null;
- Take summary values, aggregate count of transactions or entities, or sum value, and see if it makes intuitive sense

WCO BACUDA project: supporting Customs with data analytics

BACUDA is a collaborative research project between Customs and data scientists whose objective is to develop data analytics methodologies, including algorithms in open-source programming languages (R or Python). To develop the algorithms, BACUDA analysts use Customs data at the most disaggregated level, i.e. the transaction level. Such data is collected from Customs administrations wishing to support the project, and is then anonymized to respect the confidentiality of the information that has been provided.

The potential success of the project lies with access to a huge amount of data at the transaction level, but BACUDA experts also work with open-source data. This data is not limited to macro-economic or geographical and spatial data sourced from international organizations. It also includes satellite images in the public domain published by some spatial and military agencies. In addition, experts also make use of some platforms that enable the movement of means of conveyances, such as planes, to be tracked as well as criminal activity or specific events. Together, this data enables to gain a better understanding of border-related activities and supply chains.

Thanks to text-mining and web scraping tools, unstructured data can be extracted from web pages or social networking sites, and then analysed. For example, price data on online shopping platforms can be cross-referenced to assess the conformity of the declared value of an item for Customs valuation purposes.

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83 In addition to a transactions database, another important segment in a risk management database is a derived database. This computes and stores aggregated values like averages, ranges (min. max. deviations), and derived lists of values, which are used for configuring selectivity filters. This derived/computed risk management database is regularly refreshed from transactional data. Conventionally, if risk management team misses it out in design, the utility of tool is then limited only to very simple filtering which is not adequate for configuring complex profiles as envisaged in WCO SRA.
The project team has already developed basic methods and algorithms categorized by the following objectives: Mirror Data Analysis with R and Shiny, Forecasting Customs Revenue, Revenue Gap Analysis, Web Scraping of Price Data, and Customs Fraud Detection by Machine Learning with Random Forest and Python.\textsuperscript{84}

5.3.2 Risk Management at border crossing points

Border crossings points (BCP) are the official points of entry and exit into a country and national customs territory. Goods are placed under customs control and are subject to compliance with national regulations including customs law and traffic regulations. The customs clearance procedure itself, however, does not necessarily take place at the border crossing point. For instance, under a Customs transit regime, goods provisionally exempted from duties, taxes and commercial policy measures applicable to imports move between two points in a Customs territory, via a different Customs territory, or between two or more different Customs territories. The regime reduces the risk of congestion at external borders, sea ports, airports and land borders by shifting controls inland, at departure and destination, closer to the traders’ premises.\textsuperscript{85} Thus, different control procedures apply at border crossing points, and the risk management approach and practices also differ. The differences in risk management at border crossings and risk management as part of the customs clearance procedure lie with the nature of risks and sources of information used for targeting. In addition, targeting is commonly not automated.

At BCP, the control of financial (commercial) risks is less important compared to the control of risks related to public health, environmental protection, national security and fight against terrorism. Security is the main border threat and has grown in importance in past years due to the focus on fighting terrorism. Smuggling of weapons and prohibited goods that can be used for attacks should be prevented at border crossings. CA and other government agencies also enforce regulatory objectives, such as protection of human, plant and animal life and the environment are also enforced at border entry points, to prevent harmful substances, pests, and diseases to enter the territory. Because of this different environment and nature of risks, Customs officers at BCP, therefore, have to rely on different information sources for the risk management. The targeting at BCP uses local profiles, intuition, intelligence and other information sources from third parties, such as military, immigration, forwarding agents as explained above.

Entry procedures at border crossing points frequently cause long waiting times and delays as traffic volumes are growing and the infrastructure and design of border stations are often not adapted to the border control operations. Effective control of goods, passengers, and means of transports is therefore complex and difficult. A specific risk management approach at BCP enables CA to improve performance and to facilitate border crossing, including through simplification measures such as fast lanes. Integrated border management and Common IT systems are essential aspects underpinning risk management at border crossing points.\textsuperscript{86}

5.3.3 Risk management related to modes of transport

Modes of transport describe the different ways of transportation used in international trade; maritime, air and road. Different means of transportation are used for each mode. Each mode has specific characteristics relevant for Customs control and CRM. A CAs, therefore, needs to adopt dedicated control strategies for each mode taking into account the specificities of each mode of transport.


Air transportation

The specificities of air transportation allow an efficient application of risk management: There are few operators and they are normally subject to strict governments controls requiring professional operations and respect of international rules including security; In addition entry points of air cargo are limited to airport facilities which are facilities tightly regulated (scrutiny and authorization of staff, adoption of quality and security protocols) and managed following international and national norms; and finally, information on goods and persons is available by the carrier in electronic format and the submission of pre-arrival information is now mandatory in many countries. In addition, the journey follows a most direct route, limiting opportunities of access to the cargo for non-authorized persons so that air cargo operators and the carriers can effectively control cargo.

The most valuable document related to air cargo transportation is the air waybill (AWB). The AWB consists of the unique identification number, shippers, and consignees’ name, and address, the airport of departure and destination, declared the value and the information related to the transported goods (content, weight, quantity). On the basis of the AWB which is transmitted to CA in advance, CA can start processing, namely the risk analysis process to target shipments for inspection upon arrival.

Land transportation

Land transportation as a specific mode of transport can be conducted through rail transportation and road transportation.

Rail transportation: Rail stations are defined as railroad systems with at least one switch, providing a starting and ending point for trains and allowing them to swerve or turn. Rail transport has a shortage of variants and flexibility because they have to move along the railroad and as a result of this they like the air, water and pipe transport make the transportation from terminal to terminal, and not from point to point unless the companies have a railroad in their premises. The infrastructure of rail modes of transport is composed of rail stations (properties, buildings and other facilities to perform safe cargo and passengers transport by rail) and railroad systems. At border crossing points and specific inland stations as a part of rail station infrastructure, there is customs authority authorized to control passengers and cargo transported by the rail.

Road transportation: Road transportation is effectuated with cars and buses for passengers and trucks for goods. Trucks can transport the goods for medium costs that can vary based on the sensitivity of goods transported, fluctuations of the cost of fuel and the condition of roads. In most of the cases, the risk assessment for road mode of transportation related to trucks, cars, buses, or foot passengers can carry out through their identity information (vehicle and passengers’ information) with the help of an automated system (intelligence, suspect list, alert systems) at the BCPs. Also, of utmost importance is the knowledge and experience of customs officers at the BCPs to identify suspicious or anomalous behavior by passengers and implement further examination.

Sea transportation

Sea transport remains the major mode of transport in international trade. Maritime shipping is generally used for large quantity shipments with lower commercial value and a longer delivery timeframe. The transport document used in the sea transport is the bill of lading (B/L), and a B/L has important information for that can be used for risk assessment before the actual arrival of the ship.

Modes of Transport and CRM Elements

Table 25 presents the different modes of transport and CRM elements:

<table>
<thead>
<tr>
<th>Mode of Transport</th>
<th>Processes</th>
<th>Cargo pre-arrival information</th>
<th>Passenger pre-arrival information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Air Transport</td>
<td>Rail Transport</td>
<td>Road Transport</td>
</tr>
<tr>
<td>Easy</td>
<td>Easy</td>
<td>Easy</td>
<td>Easy</td>
</tr>
<tr>
<td>Easy</td>
<td>Difficult</td>
<td>Difficult</td>
<td>Difficult</td>
</tr>
<tr>
<td>Speed</td>
<td>Fast</td>
<td>Slow</td>
<td>Moderate</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>Costs</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Cargo Selectivity/Targeting</td>
<td>Easy</td>
<td>Easy</td>
<td>Easy</td>
</tr>
<tr>
<td>Passengers Selectivity/Targeting</td>
<td>Easy</td>
<td>Difficult</td>
<td>Difficult</td>
</tr>
<tr>
<td>Tracking and Tracing of Shipments</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Source: Rafal Pryk, elaborated for this Guide.

Maritime 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 customs administrations to easily acquire data well in advance of arrival and provide an excellent opportunity for quality risk assessment to be performed.

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. Business and consumer demand for fast, efficient shipment of goods has fueled the rapid growth of the air cargo industry. 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 plane.

Rail cargo reports are mainly provided by rail carriers and reveal much the same information as maritime cargo reports and can be risk assessed in a very similar manner. 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. However, information on passengers is rarely available.

Similar to rail cargo, road cargo can also be difficult to adequately inspect due to infrastructure constraints at land border crossings. Like other modes, road border operations should seek to legally acquire pre-arrival data for decision support. Road 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.87

**Other modes of transportation**

In addition to these three above mentioned modes of transport, other conveyance possibilities can be used to transport specific types of goods:

- **Pipelines** are a mode of transport restricted to commodities that are liquids or gas such as oil and natural gas.
- **Electronic transport or cable** is the fastest mode of transport, but it is limited to special commodities that can be transported electronically, such as electric energy, data, and products containing electronic data such as music, pictures, and text.

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• **Unmanned aerial vehicle transport** is still in a testing stage (Amazon.com and other transportation companies).

This method uses drone transportation of goods and currently is used on a regional or national level, but the technological developments are promising. This mode of transport could become a global option for express transport of small quantity of goods and small-parcel delivery. These modes of transport, especially the transport through pipelines and the electric transport, energy are performed by authorized traders that are part of the risk assessment in the authorized process. On the other hand, these modes of transport use equipment that can precisely measure the quantity of the transported goods. 88

5.3.4 Building risk profiles

Risk profiles are rules based on observations of passengers, traders, goods, means of transport, specific information from the international customs community, and predictive data analytics. These rules are a logical combination of two or more indicators, ranging from relatively simple to highly complex algorithm. 89

Traditional selectivity and profiling systems only manage watch lists – that is, lists of suspect entities – through combining selectivity filters. For effective outlier detection, insights from databases and machine learning techniques are employed. For an ICT-based selectivity tool, the system should provide configurability to create user-defined risk rules that allow multiple variables and combinations of risk indicators. More complex rules typically combine several conditions or calculations. Continuously updating existing rules or defining new rules is vital for the effectiveness of risk management.

A risk profile should contain a description of the risk area, an assessment of the risk, the counter-measures to be taken, an action date, and an evaluation of the effectiveness of the action taken. The counter-measures included in risk profiles are instructions on how to deal with the particular shipment given the circumstance of the event. Such circumstances can impact the treatment decision for a particular shipment. 90

The procedure used for profiling a transaction must be based on a standardized and objective methodology to avoid arbitrary decisions basely solely on the whim of an individual, and to avoid possible collusion and corruption. Conversely, given the evolving nature of world trade, risk management practices must be dynamic and scalable. A consistent and well-structured risk management framework provides incentives for economic operators and influences their behavior. The procedure underlying the elaboration of risk profiles must not be decodable by economic operators; they must not be given any opportunity to circumvent the rules. Finally, risk management systems must be implemented using computerized processes, in accordance with the Revised Kyoto Convention and the recommendations of international institutions on the modernization of border control practices using standardized, non-intrusive methods. 91

**Analytical approach for developing risk profiles**

Creating a risk profile requires a comprehensive understanding of all data forms, from intelligence reports to audit findings, in order to best identify potentially risky combinations. These data are then converted into a profile, which includes selection filters. For instance, historical shipment data and corresponding inspection results can be studied to identify risk indicators and evaluate patterns.

The rules for filtering out unusuals or outliers can be developed by human inspection of the data, or a computer-system model using artificial intelligence, pattern recognition or data mining techniques.

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89 ibid.
90 ibid.
**Example of a risk profile**

The risk profile then characterizes the risk based on the risk area, selection criteria and risk indicators to create a risk profile.

![Risk profile diagram](image)

**Figure 39 Generation of a risk profile**

The indicator can be single variable or multivariable as follows:

- Simple single-variable risk indicators
- HS Code = Chapter 23
- Declared Value > 1000$
- Importer has < 3 importers of this item in last 5 months
- Multivariate-risk indicators
- Direction: Import or Transit
- Last port of call is ABC: AND
- HS is 7203% or 7204%: AND
- Country of Origin is not related to Declared HS Code

**Assigning weights to risk factors**

Risk indicators can perform a retrospective comparative analysis of customs data for a specific type of consignment, based on attributes such as country of origin or shipping dates - that assigns risk scores using statistical methods. These basic indicators are entered into the risk management system and used to calculate the score. Use/combine of additional indicators can trigger a comparative analysis. The various indicators combined with the historical non-compliance models can assist in the creation of risk profiles.
risk management should be able to calculate the value for each indicator in the non-compliance model to a standard numeric score by comparing an individual indicator value against another consignment that is being profiled. The more a consignment suspiciously deviates from its peers, the higher is the assigned score.  

Risk indicators can be combined to form rules to address a specific threat or mode of transportation. Rules may consist of system-based or user-defined rules, or look-up lists and tables.

Rules are aggregated into multivariate rules to combine various specific risk profiles. Each rule is assigned a quantitative value or ‘weight’. The weight-setting score for the transaction or shipment is the sum of the total of the weights for all the rules which trigger the selection of that transaction or shipment.

A simplified weight-setting example is as follows:

Table 26 Risk indicator weight setting example

<table>
<thead>
<tr>
<th>Rule ID#</th>
<th>Rule Description</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>R007</td>
<td>First time importer</td>
<td>100</td>
</tr>
<tr>
<td>R044</td>
<td>First time shipper</td>
<td>50</td>
</tr>
<tr>
<td>R055</td>
<td>High risk origin list L7</td>
<td>70</td>
</tr>
<tr>
<td>R025</td>
<td>Country of interest list C2</td>
<td>35</td>
</tr>
<tr>
<td>R066</td>
<td>Accredited entity / AEO member</td>
<td>-75</td>
</tr>
</tbody>
</table>

5.3.5 Overview of data analysis approaches for developing risk profiles

Data analysis helps risk management in the detection of deviations by providing a system foundation based on a combination of indicators, profiling of similar entities (people, means of transport) and commodities combined with the analytical tools and data mining algorithms. By using the risk management system, customs specialists can define peer groups and compliance models for declared consignments and people. They can perform a retrospective comparative analysis of customs data for a specific type of consignment, based on attributes such as weight, country of origin or shipping dates - that assigns risk scores using statistical methods. These basic indicators are entered into the risk management system and used to calculate the score. Use/combine of additional indicators can trigger a comparative analysis. The various indicators combined with the historical non-compliance models can assist in the creation of risk profiles. The risk management should be able to calculate the value for each indicator in the non-compliance model to a standard numeric score by comparing an individual indicator value against another consignment that is being profiled. The more a consignment suspiciously deviates from its peers, the higher is the assigned score. Finally, a hierarchy of scores or “ground for suspicion” is created from the profiles, with high-risk consignment being flagged for selection and review. Data mining drives the success directly affecting the “hit rates” of inspections of targeted consignments. Effective targeting, through the ability to produce accurate and timely decisions about potential fraud violations can help in improving the regulatory enforcement and resource deployment.

The business intelligence system can assist the risk management analysts to enhance case selection, and proactively prevent fraud and other regulatory violations. The data analysis tools provide the risk management analysts with more efficient ways to manage and mining the data to identify importers/exporters that are misdeclaring their consignments. Risk management gather a wide variety of structured and unstructured data. The data warehouse and business intelligence is the solution to manage such a complex data layers. The customs administrations must have a clear understanding of what drives their business and technological needs. Examples of the structured and unstructured data can include:

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• Historical crime incidents: location, crime type, severity, victims, suspects, convictions, criminal behaviors, and attributes;
• Enabling factors: place, route, time of year, month or week;
• Trigger events: holidays, weekends or working day;
• Unstructured data: pictures, audio/video, and text contained in irregularities reports, email and open source.

This information is critical for analyzing interactions and uncovering the attitudes, desires, and motivations of entities to get the details ahead with offenses.

Advanced data analytics, pattern-recognition (data-mining) and knowledge extraction techniques can also help to identify risks. Predictive analysis techniques, for instance, can analyse historical cargo and transactional data and outcomes to identify and verify relationships. CRM and intelligence must evaluate past predictions and actions captured. The feedback loop lets the predictive models grow smarter and helps risk management to focus effort in the areas.

Data mining

Crime prediction and prevention analytics from data mining can assist risk management to make the best use of the resources and information and to measure and predict crime and crime trends. Mining of the law enforcement data provides insight that lets risk management and intelligence to track criminal activities, predict the probability of crime/incidents, effectively deploy resources and solve cases faster.

The data mining can assist the risk management in following perspectives:

• Instrumented - Information/enforcement records collected from multiple data sources and analyzed for hidden patterns and relationships that are vital to fighting violation of Law;
• Interconnected – data warehouse, business intelligence and data mining can provide risk management with quick and reliable access to easily understand analytic crime forecasts based on historical data, intelligence, open sources, etc.;
• Intelligent - Criminal behavior, patterns, and proactive tactical enforcement decisions - generated in predefined time frame or ad – hoc basis, on the dashboard, reports, and analysis risk management will need to extend the domain of the data, by implementing the text mining techniques that are capable of extracting knowledge from text data about something that was previously unknown.

Machine learning

Machine learning is a method used in data mining. It consists of algorithms that analyse a set of data in order to deduce rules constituting new knowledge and to analyse new situations. This method is capable of analysing vast volumes of data, while providing in-depth predictive analysis. It is widely regarded as a technique that can provide this analytical power to model complex, non-linear relationships.

Machine learning includes a range of analytical tools that can be classified as ‘supervised’ and ‘unsupervised’ learning tools. Supervised machine learning involves the creation of a statistical model to predict or estimate a result based on one or more inputs (in our case this article predicts the non-compliance of a customs declaration registered in the IT system of the partner administration in accordance with several variables or risk factors). In unsupervised learning, a set of data is analysed with no dependent variables to estimate or predict. Instead, data is analysed to show patterns and structures in a dataset.93

**Decision trees**

The decision tree is a non-parametric supervised learning method used for classification purposes and for the development of predictive algorithms. The objective in using decision trees, in this article, is to create a model that predicts the value of a target variable by learning simple decision rules derived from the characteristics of the data.

Decision trees are constructed by seeking, through the successive fragmentation of the training set, partitions in the space of the optimal predictors capable of predicting the modality of the response variable. Each rupture is done in accordance with the values of a predictor. During the first step, all the predictors are tested in order to identify which are best. Then the process is repeated at each new node until a stop criterion is satisfied. The determination of the best rupture at each node is made in accordance with a local criterion. The choice of criterion is the main difference between the various existing methods of tree induction.\(^\text{94}\)

**Text mining**

Text databases are rapidly growing due to the increasing amount of information available in electronic form. This includes electronic publications, news articles, research papers, books, digital libraries, e-mail, etc. The Worldwide Web can be used as an interconnected, dynamic text database. The data and information should be stored in the form of structured text databases. Unlike the field of database systems, focused on query and transaction processing of structured data, in text mining is a way to organize and retrieval of information from a large number of text-based documents. The goal of text mining is to discover or derive new information from data, finding patterns across datasets, and/or separating signal from noise (or snowflakes). There are many approaches to text mining, which can be classified from different perspectives. The approaches are differed on the inputs in the text mining system and the data mining tasks to be performed. The major approaches to text mining, based on the kinds of data they take as input are:

- The keyword-based approach; where the input is a set of keywords or terms in the documents;
- The tagging approach, where the input is a set of tags; and
- The information-extraction approach, which inputs semantic information, such as events, facts, or entities uncovered by information extraction.

**Predictive analysis**

Predictive analysis is of great importance to CRM considering the output of predictive and descriptive models. Within this information environment, analysis becomes second nature. CRM at any level have ready access to useful information that helps them make decisions grounded in data. Better decisions, based on data prediction, help CRM to predict forthcoming events, prevent irregularities, delegate, and allocate the resources and to provide an accurate and timely response.

**Transactional risk analysis**

Real-time or transactional risk analysis is a form of risk classification (or filtering) of customs declarations and supportive documents submitted by the trader. The risk classification performed either solely on the basis of the information in the submitted document; or by all available supplementary information about a trader, including the information in the customs declarations. What characterizes such an application is its real-time nature, where the standard risk cycle is stopped pending the output of the risk analysis and the subsequent flow is dependent on the output. The objective is essential to classify the transactions or events (e.g., the incoming declarations or items in the declaration) into some categories (dependent on the type or the purpose of the calling system) each requiring a particular type of action. The most straightforward example involves classification of the objects into two categories – those requiring some form of intervention (e.g., a customs inspection) before the CRM cycle can resume and those that do not require any intervention before the CRM cycle can resume. The transactional risk module is tightly integrated, or “plugged into” the

\(^{94}\) ibid.
processing flow of the corresponding part of the customs declaration processing system. As such, it is triggered (or called) by the production system that needs the risk module to undertake a risk analysis, and the risk module makes its output available back to the calling system in a suitable form. In the Customs context, one of the main purposes of using the transactional risk analysis is for risk screening related with the goods in clearance process: pre-arrival information (e.g., manifest) and customs declarations. The transactional risk analysis determines the risk associated with the shipment (either at the level of the whole shipment or on the individual consignment level) and the need for physical intervention.

*Behavioral risk analysis*

The objective of behavioral risk analysis is to undertake in-depth profiling of the risk entities (e.g., traders, passengers, means of transport, etc.) from various risk perspectives, to supporting a subsequent business process which is dependent on this risk rating. The analysis is performed on user request - either on an ad-hoc basis or according to some predetermined schedule (e.g., when a trader first registers or at a particular time of the year). Behavioral risk analysis is used for different purposes:

- To provide qualifying input into the transactional risk analysis stage – for example, rules in the transactional risk analysis stage often invoke a rating of the trader associated with the transaction being analyzed to provide a greater level of precision in the transactional analysis;
- To rate the risk entity regarding one or more certification programs (such as an AEO program, the partnership program, the key customer program);
- To identify which of the risk entities need to be subjected to some form of control action, as is the case in post-clearance audits and various types of quality assurance audits.  

5.4 Evaluating compliance rules and risk profiles

Any ICT-based automated selectivity environment must be tested and calibrated before it is implemented.

5.4.1 Test set and validation set

A profile test can be run on recent historical data, such as that of the previous three-month period, to answer the following questions:

- Is the type of transaction selected in the profile the same as that to be filtered for selectivity?
- Is the total number of expected interventions in a period (e.g. per day) manageable through available resources?

This may require a separate software utility or application to test-run and simulate a profile (or set of profiles) and examine results. This testing process helps show if a profile is likely to give expected results and reveal the right number of entities. A method shared by the US Customs and Border Protection team in a risk management training workshop is given below.

A performance management system is important for optimizing an organization’s overall resources. Through a test-run of risk profiles, the number of expected interventions and resources required can be estimated. This estimation will be based on actual past performance in respective processes (e.g. average time taken in inspections, assessments, sampling etc.). A risk threshold might need to be adjusted (by changing profile-weights) based on the availability of organizational resources.

Risk Management and Performance Management systems are linked. Without performance measurement, risk management cannot be effectively used for resource optimization (please refer to “Reviewing the Risk

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Profiles”). The following diagrams depict how rules may be defined through a rule-building utility. A generic view is shown below.

### 5.4.2 “Confusion Matrix” – testing profile efficacy example

In the two-class scenario, samples can be categorised into four groups after the classification process is denoted in the confusion matrix. This study adopts the two-class classification for customs risk detection, assuming that the predicted positive declarations are considered to be of high risk and inspected, while the predicted negative declarations are considered of low risk and released. The confusion matrix is presented in Table 27.

#### Table 27 Confusion matrix of 2-class classification for customs risk detection

<table>
<thead>
<tr>
<th>Actual class</th>
<th>Predict positive – inspected</th>
<th>Predict negative – released</th>
</tr>
</thead>
<tbody>
<tr>
<td>False</td>
<td>False declaration inspected (True positives, TP)</td>
<td>False declaration released (False negatives, FN)</td>
</tr>
<tr>
<td>True</td>
<td>True declaration inspected (False positive, FP)</td>
<td>True declaration released (True negatives, TN)</td>
</tr>
</tbody>
</table>

Source: Rafal Pryk, elaborated for this Guide.

In this two-class classification model, there are two types of errors: false negative (FN) and false positive (FP). False negative (FN) refers to the false declarations that are wrongly released. False positive (FP) refers to the true declarations that are unnecessarily inspected. Obviously, the actual losses of different types of misclassification are different. Take the bank’s loan business for instance, it will incur much higher costs when misjudging an ‘actual bad’ as an ‘actual good’ than misjudging an ‘actual good’ as an ‘actual bad’. Similarly, regarding risk detection in Customs, the consequences of misjudging a false declaration as legitimate are much more serious than misjudging a true declaration as a fraudulent one. Therefore, customs risk detection could be categorised into the cost-sensitive decision-making process, where different misclassification errors incur different costs.

In view of this, the cost-sensitive classification technique can be introduced to generate a model that has the lowest cost (Elkan, 2001). Therefore, the classifier can cover more positive examples, although at the expense of generating additional false alarms. The cost matrix for custom risk detection is provided in Table X. The cost of committing a false negative error is denoted as Cost (A), and the false positive error is denoted as Cost (B). The cost of correct classifications—true positive and true negative—are both set to be zero.

#### Table 28 The cost matrix for customs risk detection

<table>
<thead>
<tr>
<th>Actual class</th>
<th>Predict positive – inspected</th>
<th>Predict negative – released</th>
</tr>
</thead>
<tbody>
<tr>
<td>False</td>
<td>0 Cost (A)</td>
<td></td>
</tr>
<tr>
<td>True</td>
<td>Cost (B)</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Rafal Pryk, elaborated for this Guide.

According to the previous assumption that all the positive predictions are inspected, higher Cost (A) will lead to a larger proportion of positive predictions, that is, the rate of inspection will increase. So that the cost matrix could be set according to the target inspection rate and the detective rate (successfully seized rate). As a result, the ratio of Cost (A) and Cost (B) in the cost matrix in Table X is basically the trade-off between trade security and facilitation. For the purpose of detecting high-risk commodities such as drugs, the ratio
should be significantly higher. In contrast, if it is for general risk profiling of regional declarations, the ratio could be adjusted under the constraints of limited inspection resources.\textsuperscript{96}

Tax administrations use a “confusion matrix” to test efficacy of their models as illustrated by the following:

Table 29 Confusion matrix

<table>
<thead>
<tr>
<th>Predicted</th>
<th>Actual</th>
<th>Complying</th>
<th>Evading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complying</td>
<td>True Negative (TN)</td>
<td>False Positive (FP)</td>
<td></td>
</tr>
<tr>
<td>Evading</td>
<td>False Negative (FN)</td>
<td>True Positive (TP)</td>
<td></td>
</tr>
</tbody>
</table>

Source: Rafal Pryk, elaborated for this Guide.

The basic terms used in the matrix are described below:

- **True Positives (TP):** cases in which the model predicted “yes” (they have the risk), and they do have the problem (i.e. discrepancy is found).
- **True Negatives (TN):** the Model predicted “no”, and they do not have the problem.
- **False Positives (FP):** the Model predicted “yes”, but they don’t actually have the any discrepancy.
- **False Negatives (FN):** the Model predicted “no”, but they actually had the discrepancy.

Based on this matrix, one can compute several selection criteria:

- **Accuracy rate:** \((\text{TN+TP)}/\text{Total}\) - measures the percentage of cases predicted correctly by the model;
- **Prediction efficiency:** \(\text{TP/(TP+FN)}\) - measures the percentage of non-compliant cases correctly predicted by the model;
- **Strike rate:** \(\text{TP/(TP+FP)}\) - measures the percentage of non-compliant cases likely to be detected if predicted evading cases are checked for compliance.

**Illustration**

Below is an example of a confusion matrix for a binary classifier (yes or no). It represents a prediction result of a total 165 transactions or cases. It predicted “yes” (risk exists) in 110 cases and “no” in 55.

On actual inspection or audit, discrepancies were found in 105 cases. The remaining 60 cases, though identified by the risk engine, were found without any anomaly.

<table>
<thead>
<tr>
<th>n=165</th>
<th>Predicted</th>
<th>Predicted</th>
</tr>
</thead>
</table>

Using the confusion matrix terms, it may present as follows:

<table>
<thead>
<tr>
<th></th>
<th>Predicted</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Actual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>TN = 50</td>
<td>FP = 10</td>
</tr>
<tr>
<td>Actual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>YES</td>
<td>FN = 5</td>
<td>TP = 100</td>
</tr>
</tbody>
</table>

\[
\text{Accuracy} = \frac{(TP+TN)}{\text{total}} = \frac{(100+50)}{165} = 0.91 = 91%
\]

Alternatively, \((FP+FN)/\text{Total} = \frac{(10+5)}{165} =0.09 = 9\%\) is “error rate”

Precision is measured as \(\frac{TP}{(\text{Predicted YES})} = \frac{TP}{(TP+FP)}\)

It measures ‘when it is predicted YES, how often it is correct?’

“Sensitivity” or “Recall” or Total Positive Rate

It is calculated as \(\frac{TP}{\text{Actual YES}} = \frac{TP}{(TP+FN)}\)

It measures ‘when it is actually YES, how often it predict YES?’

The results of the model, such as value addition (for instance, additional revenue collected, or value of goods confiscated) as a result of interventions, and the effectiveness of individual rules, should be analysed to show if there are ineffective profiles or risk rules, which can be revised or removed, or the statistical model can be re-calibrated.

5.4.3 Updating risk profiles

Based on an effectiveness analysis, a profile may be modified or de-activated. The approval process for updating risk management profiles should be defined and complied with. Any major review of profiles should be presented to the Risk Management Committee.
Risk profiles need to be continuously reviewed due to identification of new risks, changes in legislation, procedures and processes. Outdated or irrelevant profiles, if not disabled, may result in over-hitting (false positives) or under-hitting (false negatives) and leading to failure to achieve the purpose of selectivity. The review of profiles should also be done by measuring the results of interventions to assess efficiency of the risk profiling system.\textsuperscript{97}

5.5 Applying compliance rules: activating risk profiles

After running simulations and fine-tuning the rules for selectivity, a risk profile system can be activated and may be put into action through any available communication channels, such as alert bulletins, briefing sessions, telephone and email.

5.5.1 Pre-arrival, pre-departure information

An additional global trend is the pre-arrival and pre-departure exchange of information that requires electronic submission of the declaration data and other information to customs administration before the arrival and before departure of goods. The benefits which could be gained by the customs administrations are following:

- Acceleration of customs procedures and facilitation of legitimate trade;
- Prevention of undervaluation – revenue collection;
- Promote/improve cross-border communication and cooperation;
- Automated data matching - less documentary and physical control;
- Pre-arrival risk assessment – pre-arrival clearance.

Pre-arrival exchange of information is also supporting risk management. An increasing number of customs administrations now requires that operators submit declaration data and other information before the arrival and before departure of goods. In such a way risk management can be used to its full potential.\textsuperscript{98}

<table>
<thead>
<tr>
<th>Box 3</th>
<th>US case study: Timelines requirement for incoming cargo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Vessel: 24 hours prior to loading</td>
</tr>
<tr>
<td></td>
<td>• Air: 4 hours prior to arrival or wheels-up from the following locations:</td>
</tr>
<tr>
<td></td>
<td>Canada, Mexico, Caribbean, Central America, South America (above the Equator)</td>
</tr>
<tr>
<td></td>
<td>• Rail: 2 hours prior to arrival</td>
</tr>
<tr>
<td></td>
<td>• Truck: 1 hour (30 minutes for FAST)</td>
</tr>
</tbody>
</table>

Note: The Free and Secure Trade (FAST) program is a commercial clearance program for known low-risk shipments entering the United States from Canada and Mexico. Initiated after 9/11, this innovative trusted traveller/trusted shipper program allows expedited processing for commercial carriers who have completed background checks and fulfill certain eligibility requirements.

\textsuperscript{97} ITC Blueprint Report – Improve the current RM practices in border regulatory agencies, 2019.

**Manifest data elements required for selectivity**

The following are the data elements that regulatory agencies may require for their analysis – although these may vary by mode of transportation:

- Bill Number;
- Conveyance details: Carrier Code, Arrival Data, Route (last ports of call);
- Shipper details: Name and address;
- Consignee details: Name and address;
- Commodity description: many border agencies systems are now mandating 6 digit HS codes to be declared as part of manifest details;
- Piece count;
- Weight;
- Container details: type, size, ISO code;
- Dangerous goods category;
- Strategic Trade items declaration.

Recently, the International Convention for the Safety of Life at Sea - an international maritime treaty (SOLAS) - has also mandated container weights. Requirements for some countries or regions may vary – for example US CBP has 10+2 requirements for Importer Security Filing and Additional Carrier Requirements (commonly known as "10+2"). This rule applies to import cargo arriving in the United States by vessel.

**Limitations due to textual or unstructured information**

There are certain common problems that confront administrations in cargo selectivity. Product codes may not be available in the manifest information, or only available at HS 6 digits. Product descriptions are also vague and require clarification or cleansing before they can be used for analysis.

A second problem is that names of entities (consignee or shipper names) may not be relevant, and bank or notified party names may appear instead of the actual consignee. Even if names of consignees are given in the cargo manifest, they may be in text form that traditional IT systems cannot identify correctly from the registered traders' database.

The above problems can be solved through analysis techniques for unstructured or semi-structured data.

**5.5.2 Assessing incoming shipments: risk targeting in transaction processing**

An important part of risk management is preventive and does not merely involve selectivity and targeting. A process flow for international trade transactions and interactions with an ICT-based risk management system needs to be defined (see Figure 40).
Processes should have risk management principles embedded in each step and thus be designed to pre-empt errors and non-compliance by detecting anomalous inputs at early stages. This can be done in several ways:

**Declaration filing**

To prevent errors, checks and validations are built into declaration filing. A mature system will send declarants wrong entry alerts and will have support utilities to help them enter correct inputs, e.g. tariff search, classification search.

**Tariff and policy checks**

Tariff exemption claims, quota claims and free trade agreement claims are validated according to business rules. In advanced systems, all tariff, exemptions and concessions, and import and export policies are translated into validation rules. Many errors or inadmissible claims can be filtered out or pre-empted at this stage if tariff and policy tools (ICT-based system) are appropriately set up.

**Compliance-level checks**

Using the risk management database, which will provide a classification such as risk ranking or category, the system validates the history of entities involved. In situations where the Post Clearance Audit is not yet mature or has not been integrated into the risk management process, the system has to rely solely on trade transactions made by the declarant and agent, or other operators involved.

If the Audit shares a compliance level of entities with a transaction processing system, the risk management system is assumed to have a historical profile of each economic operator involved in a transaction (consigner, consignee, carrier, third parties). The aggregate risk associated with all such entities or operators involved in the value chain should be factored in to make the system more intelligent and effective. In other words, instead of relying on one party (importer or exporter), as less-mature RM systems often do,
compliance level of all supply-chain actors involved in the transaction should be aggregated in order to arrive at a targeting decision.

**Selectivity filters**

These are rules and risk management profiles embedded in the system through the risk management process. Detection of non-compliance or unusual or risky transactions, may be triggered by either or both the following elements:

- *Process and rules defined by humans into system;*
- *Artificial intelligence and data-mining techniques triggering outliers and unusual patterns.*

Advanced techniques used for knowledge discovery and patterns are discussed in the Data and Analytics section

**Targeting decision**

After selectivity, the targeting centre monitoring team decide whether to intervene in the transactions identified.

The role and discretion of personnel varies according to organizational culture. In mature systems, staff may be given discretion to override system selectivity, and may turn a “red channel” transaction into green channel, after looking into the details. They can thus prevent organizational resources reacting to false positive alerts. In other cultures, staff may not be allowed to override transactions identified by the system. For example, in Malaysia and Pakistan, officers are not given discretion to make any judgement on system-identified red channel entries.

**Random checks and saturation checks**

These processes provide additional layers in identifying false negatives and patterns not otherwise discovered through risk identification or analysis processes. Transactions selected through this process are stopped for compliance checks.

**Performing a risk-based inspection by Customs authorities**

Tools and techniques used for compliance risk management in an international trade system include audits, enforcement operations, compliance checks at borders, document examination, physical inspection, scanning of cargo, tracking of movements, selectivity and profiling systems.

If a risk management system is fine-tuned to appropriately segment its clients, workloads at various stages (pre-arrival / departure, during clearance process and after release) can be distributed to the relevant teams. Through this approach, a risk management system can both reduce the cost of compliance and regulatory burden for legitimate and compliant trade and optimize resources for better compliance management.

The concept of a compliance continuum recognises the fact that some members of the regulated community will always seek to comply, while others have no intention to do so. These two ‘compliance behaviours’ sit at opposite ends of the compliance continuum. Those who willingly comply represent the lowest risk, and those who are deliberately non-compliant represent the highest risk.

The appropriate regulatory response will depend on where the regulated entity sits on the continuum, and will range from the highest level of penalty to the highest status of AEO. Most members of the international
trading community will fall between these two extremes, and the more compliant they become, the less punitive the regulatory response will be.  

One example to demonstrate the many different stages of compliance, and where regulations and enforcement become necessary, is usefully visualized in the Australian Customs’ Compliance document below. 

Figure 41 Compliance continuum (Australian Customs)

The Australian model, which also maps compliance behaviour against regulatory responses, goes further by identifying the types of regulatory interventions that are considered appropriate to address certain types of compliance behaviours. For example, at the low-risk end of the continuum the administration adopts a ‘self-regulation’ approach, using a monitoring program to oversee compliance behaviour, whereas at the other extreme an ‘enforced regulation’ approach is adopted, which involves investigation and prosecution. For those traders who are seeking to comply but not yet compliant, a strategy of ‘assisted self-regulation’ is employed, which includes a range of support services including education and advice.

The goal is to ensure there is control of the risk management process of cross-border transactions from pre-arrival to post-release. As a general principle, the physical control of agencies should be focused only on those goods which belong to entities that are not auditable, or goods or entities will later not be trackable. RMS envisages a change of role from a gate-keeper (e.g. physical controls at port) to pre- and post-release controls. Post-release controls are “audit”-based. Operators’ financial and inventory records are audited based on risk. Many operators (especially small and medium-sized businesses) may not be maintaining records of inventory and financial transactions according to general accounting principles and practices and


audit-based controls will not work in these instances. For example, certain fraudulent or fly-by-night operators appear for a period, conduct transactions, and then vanish.

For others, who maintain auditable records according to general accounting and auditing practices, audit-based controls are the preferred approach.

Targeting decision, timing and action largely depend upon the entity's level of compliance. This approach facilitates legitimate and compliant trade.

**Urgency or response time for compliance checks**

Timing for compliance check interventions depends upon the profile of the economic operators involved in the transactions. A transaction may generate a high-risk score based on product or geographical indicators, but if the declarant is auditable and has a first-rate compliance ranking, the transaction may not be interfered with while the cargo is at the port or border. Although it might be released, it may be triggered for inspection at the premises of the business concerned or through post-release verifications.

Control levels are thus spread out, starting with pre-arrival declaration or manifest filing and continuing until after release through audits and verifications.

### 5.7 Reviewing risk profiles

Changes in legislation, procedures, processes, data codes and versions mean risk rules need to be constantly reviewed. Outdated or irrelevant profiles, if not disabled, may result in over-hitting (false positives) or under-hitting (false negatives) and defeat the purpose of selectivity.

Risk profiling therefore needs to be regularly reviewed. Each profile should have a sunset (or end-date) provision, set at the outset of activating the profile, and which triggers a process for review.

Profile review should also be done by measuring the results of interventions against actual findings to see how effective the system is. This should culminate in a continuous process to optimize interventions with resources available (such as inspections or documentary examinations).

This is a critical learning loop for the system to mature and stay relevant. Feedback can come in various forms such as seizure and other analytical and written reports, intelligence, and oral reports and briefing sessions.

### 5.8 ICT systems for shipment targeting

#### 5.8.1 System overview and data linkages

A typical cargo targeting system, designed for the purposes of risk management, provides support through the following functionalities:

- Risk assessment functionality;
- Making *ad hoc* queries and monitoring transactions;
- Receiving and analysing data from other streams of transaction processing, audit records and enforcement (seizures and detention records);
- Receiving data from external systems, e.g. carriers/transporters arrival and departure notices;

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103 ‘Auditable’ refers to a business entity that maintains financial and inventory records that regulatory agencies can rely on for verifying their compliance level.
The results of interventions (examination or assessment) initiated through the selectivity criteria must be feeding back into the risk management database. This helps in ‘system learning’ and classifying next transactions based on similarity of transactions where an anomaly was actually found or otherwise.

5.8.2 Queries, searches and drill-down functionality

A targeting system allows users to retrieve data and relevant information, while an advanced search feature will allow users to select filtering criteria. An analyst or monitoring officer can use this to search and retrieve shipments, trade entities, rules (or risk profiles) and weight sets.

This system enables the monitoring officer to see what risk profiles (or selectivity rules) have triggered it for selection and should also allow the user to generate summary reports, e.g. a quick summary of records filtered during a search. It may be linked to related drill-down screens, including the importer’s history and profile, the commodity history and the risk profile.

5.8.3 ASYCUDA ++

ASYCUDA ++ relies on a decentralized architecture, operational on the local level. Many countries are using different tools to migrate the data from the local level to a “central server” that is used for reporting and analysis services. The risk profiles must be inserted on each of ASY++ local servers manually.

The selectivity criteria on ASYCUDA ++, are inserted through IFTTT commands (ASY Structure Query Language-SQL). One risk profile can have more risk indicators, such as country of origin, tariff code, company, registration plate number, etc. To ensure adequate risk analysis efficiency, the criteria set in ASY ++ must provide one selectivity criterion for each risk indicator and mathematical and logical operators cannot be used to combine two or more risk indicators in one selectivity criteria.104

5.8.4 ASYCUDA WORLD

ASYCUDA WORLD (AW) is web-based customs declaration processing system relying on a centralized IT architecture. The inserting of risk profile selectivity criteria and indicators is centralized and complex mathematical and logical operators (AND, OR, XOR, NOT, LIKE, etc.) can be used.

In the case when the customs declaration matches three risk profiles, the AW is channeling the CD to the strongest profile. AW is not providing the results from the selectivity criteria (neither risk profile nor risk indicators). The selectivity (in IT terminology transactional) risk module is embedded, or “plugged into” the processing flow of the corresponding module of the CDPS (e.g., import, export, etc.). As such, event triggers (or called) the risk module to perform the targeting. The risk module sends its output available back to the calling event in a suitable form. Systemic limitations cause 34 OIC MS to use only the selectivity as a risk management method. In its latest version, AW allows enter results from the control based on selectivity, limited to one dropdown list (with five irregularities) and free text as a “control act.”105

5.9 Measures to mitigate the effects of the COVID-19 pandemic

The COVID-19 pandemic has shown the importance of both the WCO Revised Kyoto Convention (RKC) and the WTO Trade Facilitation Agreement (TFA), including major concepts supported by these instruments: an all-digital clearance process, and efficient risk management.

Implementing modern risk-based Customs processes that balance the need for compliance with trade facilitation will help to ensure that essential goods reach their destination on time, compliance is maintained,

105 ibid.
and managing the clearance process remotely and digitally enables the health of Customs officers and importers/exporters to be protected.

Encouraging the adoption of risk management systems and pre-arrival/departure procedures, with a view to expediting the release of low-risk shipments upon arrival/departure, and to minimize personal contact, protect both Customs officers and importers/exporters.\footnote{WCO News 92 June 2020 BACUDA: supporting Customs with data analytics. By Steven Pope, Vice President, Head of Go Trade, Deutsche Post DHL Group. Retrieved from https://mag.wcoomd.org/magazine/wco-news-92-june-2020/covid-19-and-its-impact-on-customs-and-trade/}

Whilst some measures will be implemented only on a temporary basis during the pandemic, many should become part of everyday operations, and the use of risk management should be a tool in every Customs administration’s armory. Both risk management systems and risk profiling are key enablers for trade facilitation and ensuring compliance. It also helps administrations to optimize the use of finite Customs resources.

It is critical to continue facilitation the cross-border movement of, not only relief goods, but goods in general, to help minimize the overall impact of the COVID-19 pandemic on economies and societies. Customs administrations were strongly urged to establish a coordinated and proactive approach with all concerned agencies to ensure the integrity and continued facilitation of the global supply chain.


5.9.1 Facilitating the cross-border movement of relief and essential Supplies

In the event of a natural disaster and similar catastrophes, as well as sustained emergencies such as famine or disease, aid to those affected by such catastrophes obviously needs to be delivered and moved across international boundaries efficiently and expeditiously. The effectiveness of humanitarian assistance is dependent to a large extent on the speed with which it can be furnished. It is therefore imperative that Customs administrations be as facilitative as possible and be prepared to rapidly clear goods that, as a result of catastrophic events, are being forwarded as aid.

The vast majority of relief consignments are highly regulated items such as foodstuffs, medication, medical equipment, vehicles and telecommunication equipment. In the clearance process, Customs often enforces legislation on behalf of other government agencies and proper dialogue and coordination with those agencies is paramount, both in the disaster preparedness and response phases, for the simplification and facilitation of the clearance process. Inspections by other government agencies and inspections by Customs should be coordinated and, if possible, carried out at the same time.

Coordination with neighbouring countries is also indispensable, especially when it comes to measures that restrict the movement of people and goods.

Simplification and streamlining of procedures is equally important for facilitating the cross-border movement of relief consignments. Granting import duty waivers is recommended in the international legal framework, but it will not have the desired effect if a cumbersome procedure needs to be followed to obtain the duty waiver.

Below is a list of measures that Customs can implement to facilitate the cross-border movement of relief and essential supplies:

- Coordinate and cooperate with other government agencies with the objective of speeding up the clearance of relief goods.
• Prioritize the clearance of relief consignments on the basis of a list of essential items.

• Clear relief consignments as a matter of priority.

• Provide for the lodging of a simplified goods declaration or of a provisional or incomplete goods declaration.

• Provide for pre-arrival processing of the goods declaration and release of the goods upon arrival.

• Apply risk management and perform inspections on relief goods only if deemed high risk. Ensure inspections by other government agencies and inspections by Customs are coordinated and, if possible, carried out at the same time.

• Advocate for or support the waiving or suspension of import duties and taxes for relief items.  

5.9.2 Supporting the economy and sustaining supply chain continuity

The COVID-19 pandemic impacted borders between countries, land transport, civil aviation, maritime shipping and business. Government-imposed measures such as border closures, travel bans, export restrictions, social distancing, lockdowns and closures of non-essential businesses have had an immediate effect. Many businesses were closed, and more were and continue to be not fully functional as a result of disrupted supply chains, staffing constraints and sanitary restrictions. This impacted everything from operations to financial capabilities, and, ultimately, to the potential for a speedy recovery of global trade.

Below is a list of measures that Customs can implement to support the economy and sustain supply chain continuity:

• Set up crisis teams to ensure the overall performance of Customs tasks. Take measures to guarantee personnel availability in the long term. Operate a 24/7 Customs clearance system.

• Create a Helpdesk to resolve issues faced by importers/exporters.

• Advocate for sustaining end-to-end supply chain continuity, including the smooth and unhampered movement of goods inland.

• Apply risk management to keep physical inspections to the minimum necessary and to speed up Customs clearance. Optimize use of non-intrusive inspection equipment.

• Designate priority lanes for freight transport and introduce measures to guarantee the supply chain continuity.

• Facilitate the continuation of transport by road, including for goods in transit, in cases where the driver of the means of transports has COVID-19 symptoms.

• Remove restrictions on containers.

• Introduce tax relief measures, such as extending payment of duties, payment of duties in installments, and duty drawback.

• Allow for flexibility in extending AEO certifications during the pandemic, while maintaining an appropriate monitoring mechanism.

• Waive penalties for delays that are due to late arrival of commercial documents from exporting countries.
• Introduce facilitative measures with regard to the requirements to submit original documents or to stamp certain documents.
• Provide greater facilities to ATA carnet holders when the temporarily imported goods cannot be re-exported due to a state of emergency.\(^\text{109}\)

5.9.3 Protecting staff

The safety of Customs and other border agencies staff, as well as those in the private sector involved in the movement and clearance of goods, is critical and should be a high priority. All parties should follow the health safety guidelines issued by each country. In addition, staff should have access to personal protection equipment to ensure their safety.

Below is a list of measures that Customs can implement to protect their staff:

• Provide personal protection equipment to staff, such as masks, gloves, sanitizers, etc.
• Establish an emergency hotline for staff enquiries on preventive measures and reporting of COVID-19 symptoms.
• Apply social distancing measures.
• Enable teleworking when and where feasible.
• Encourage the use of electronic services in conducting business with Customs.
• Reduce physical inspection to only those shipments identified through risk assessment as high risk.\(^\text{110}\)

5.9.4 Protecting society

Customs plays an important role in protecting society by securing transport chains, by ensuring product safety and by combating cross-border crime. Customs prevents threats to citizens' health, safety and the environment, combats the smuggling of narcotics and other dangerous substances, as well as tax and duty evasion.

At the level of borders, many WCO Members play an important role in national response strategies to mitigate epidemic-related public health and safety risks. Customs administrations are often a country’s “first and last lines of defence”, and Customs officers are among the first government authorities to meet travellers and crew members on board arriving vessels, aircraft, and other types of transport. In this context, it is of utmost importance that Customs administrations with health and safety responsibilities are adequately integrated as part of the preparedness and preresponse mechanisms.

Below is a list of measures that Customs can implement to protect the society:

• Ensure appropriate integration in the preparedness and response mechanisms of Customs administrations with health and safety responsibilities.


\(^\text{110}\) ibid.
• Share advance passenger information (API) with sanitary control authorities.

• Measure certain indicators and provide statistical data to the government to inform decisions in the response to the pandemic.

• Make COVID-19 related information available on official web-sites and social media accounts.

• Intercept trafficking of counterfeited medical supplies.

• Expand the tax-free use of undenatured alcohol used for disinfectant production. Donate seized alcohol for the production of disinfectants.111

111 ibid.
CHAPTER 6 ADDRESSING THE RISK OF PRODUCT NON-COMPLIANCE

A remarkable share of border controls is performed by regulatory authorities responsible for compliance of imported products with technical regulations and standards. Planning these controls, which are often performed by the customs on behalf of responsible regulatory authorities, is a challenging task. Technical regulations contain multiple requirements that cover families of different products; inspecting products in many cases requires costly laboratory testing. This chapter shows how the reference model of a targeting system described in chapter 4 can be applied to risks of product non-compliance. Building such systems by product regulators allows prioritizing import control on the basis of product non-compliance risks and is a prerequisite for developing an integrated risk management system at the border. The chapter describes international best practice in the management of risk of product non-compliance risk in various fields and shows how this experience can be used in building a targeting system.

6.1 Challenges of product non-compliance inspections

Differences between risks of non-compliance with customs regulations and risks of non-compliance with regulations, containing technical requirements for products, explain the main challenges of planning border controls by product regulators. These challenges include:

- **Planning inspections on product level.** Risks of non-compliance should be evaluated on a product level, since different products, even within one family, can have different levels of non-compliance risks. From the customs authority risks perspective, shipments with toys, described in the case study, can be considered similar, whereas for a toy safety regulator, these shipments are associated with different levels of risk.

- **Prioritizing regulatory requirements.** Technical regulations contain multiple requirements; in case a shipment contains a variety of products, regulatory authority can inspect limited number of products with respect to only a limited number of requirements. Choosing which feature of which product against which requirements to inspect.

- **Knowing the “non-compliance delta”**. As it was shown in chapter 3 “Building risk-based regulatory frameworks in support of sustainable development goals”, border controls should be focused on products that have the biggest “non-compliance delta”: the difference between how dangerous a given product is in a compliant and a non-compliant state.

- **Longer inspections.** Establishing conformity with technical regulations and standards requires sophisticated, costly and time-consuming conformity assessment procedures, such as laboratory tests.

The international best practice, presented in the following pages, provides insights on how these challenges could be addressed.

6.2 International best practice in the management of product non-compliance risk

6.2.1 New Zealand Risk Engine: non-compliance risk of electrical appliances

The New Zealand Risk Engine, a methodology for evaluating the risk of product non-compliance in the field of electrical appliances, is a predictive risk management tool, which was developed and is being

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112 Adopted from (Nikonov, Patir 2020).
Currently used by the New Zealand regulator (and regulators from other countries as well) for choosing appropriate regulatory interventions. Figure 42 represents the Risk Engine ‘in action’ and we can see the main elements of the tool:

Figure 42 Risk Engine: Evaluation of non-compliance risk of electrical appliances

- the X-axis is a measure of the consequences of non-compliance associated with the family of products. As you can see on the graph, the scale has the total of 30 units; more units a product has, more dangerous it is when it is non-compliant. The scale is based on a list of 30 technical factors; each factor is a feature of the product or the environment that it is being used in that makes the product more dangerous in a non-compliant state. For example, a technical factor for electrical appliances can be “a product hold in hand” or “product used by unsupervised children”. Every product is evaluated against each factor: if a factor is relevant to the product (the product is indeed used by unsupervised children), it gets a “1”, if not – “0”. The approach implies that the number of technical factors relevant to the product represent an index measuring how dangerous a non-compliant product can be.

- the Y-axis measures the probability of finding a non-compliant product on the market. The approach is similar to that of measuring the consequences of non-compliances, only a set of different factors are used (such as – “there has been a recent change in the standard”, “the product has high compliance costs”, etc.). On the graph, the scale contains 18 probability factors; as in the previous case, each product is evaluated against each factor and the sum of applicable factors represents the probability of non-compliance.

- Each dot on a graph represents a product within the scope of responsibility of the regulatory authority, with measures of the consequences of non-compliance and the probability to find a given product on the market in a non-compliant state.

This representation is very convenient for devising regulatory interventions: a product can be very dangerous when non-compliant, but the probability of non-compliance can be extremely low. Or the opposite: the
product can have a very high probability of non-compliance, but the consequences of non-compliance can be very low. Both of these cases are less important than a situation in which the product is both dangerous when non-compliant and has a high probability of being found non-compliant on the market.

Another important approach that can be learned from the New Zealand Risk Engine is using the technical and probability factors for evaluating the consequences of non-compliance and the probability of non-compliance. Although the factor approach itself is not new for risk evaluation (any hypothesis testing technique is based on known factors), the factors themselves that were developed by the New Zealand regulator can be extremely helpful. They contain some general features that can be applied to all products and that can help characterizing the non-compliance risk. For example, probability factors like “product uses new technology”, “there are cost disincentives for compliances” and technical factors like “product likely to be installed by unskilled persons”, “product likely to be moved during uses” can be easily applied to agricultural products.

The New Zealand Risk Engine is now applied in Australia and ASEAN countries, and which was modified to be used for gas appliances and other families of products.

6.2.2 US FDA PREDICT: addressing food safety risks

In 2011 FDA implemented Predictive Risk-based Evaluation for Dynamic Import Compliance Targeting (PREDICT)\(^{114}\), a computerized tool intended to improve the screening of FDA-regulated imports and the targeting of entry lines for examination. PREDICT was designed to estimate the risk of imports using information such as the history of the facility, inspection records, and country of origin.

FDA’s motivation to introduce a risk-based approach to import inspections was mainly driven by the increasing volumes of imported food, that made it not feasible to inspect every consignment. According to the FDA, it would “face a Sisyphean task if its employees are asked to inspect everything that enters our ports”, and according to the estimates of 2011 there were “20 million shipments of FDA-regulated imports handled by fewer than 500 inspectors”.

The open descriptions of the PREDICT\(^{115}\) system allowed us guessing some of the data sources and probability factors that are used to calculating the scores that characterize the non-compliance risk of every incoming shipment that contains food products (the simplified logic of the system is presented in the picture below):

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The most important principle that can be learned from the PREDICT system, however, was not related to the nature of the data sources and to the probability factors that can be applied. The approach applied in PREDICT recognizes that the risk of non-compliance changes from shipment to shipment: even though the consequences of non-compliance change only when there is a change in the product itself, the probability of non-compliance is different for every shipment. The evaluation of the non-compliance risk associated with every shipment and planning of the inspections accordingly is hence required to make import compliance framework efficient.

This principle, as simple as it sounds, is different from many of the existing risk-based compliance frameworks: in many countries, risk-based inspections are designed by setting an inspection rate for a group of products that is determined on, say, a “country of import – product” level, meaning that all products of a certain type coming from a given country are subject to the same inspection type. This approach doesn’t allow taking into account many different aspects associated with the supply chain associated with a given shipment and thus may lead to biased evaluations of the non-compliance risk.

### 6.2.3 Australia CBIS: plant protection

Non-compliance history associated with an incoming shipment is one of the major factors for evaluating the probability of non-compliance of a shipment. One can use many parameters that represent the compliance history of, say, importer: an average compliance rate per month, total number of non-compliance cases, percent of non-compliance cases, etc.

The approach for the most adequate representation of the history of non-compliance was found when analysing the Compliance Based Inspection (since recently – Intervention) Scheme run by the Australian Department of Agriculture\(^\text{116}\). One of the central ideas of the approach is using the number of consecutive consignments of a given product associated with a given importer and checked without any noncompliance identified as a measure of a probability that the next similar consignment (of the same product from the same importer) might contain a non-compliant commodity. For example, this approach might imply that if 5 consecutive consignments of the same product of a certain importer were checked without any non-compliances in the past, a different, less stringent compliance regime can be applied for the next consignment of the same importer and of the same product in the future. For a given combination “importer-product”, the necessary number of consecutive consignments for applying a less stringent compliance regime can be determined by performing statistical analysis of the historic data and hypothesis testing.

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Within the CBIS, the parameter that characterizes the practical application of the framework and which has the highest visibility to importers is the inspection rate. The inspection rate is applied as a ‘probability of inspection’ individually to each eligible line within a consignment and can range from 10 to 50 percent frequency.

6.2.4 European Union: food, feed, animal health and plant protection

The Regulation 2017/625 of the European Union “on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products” requires the Member States, inter alia, to perform official controls “on consignments upon their arrival at border control posts”, including “identity checks and physical checks” at “an appropriate frequency dependent on the risk posed by each consignment of animals or goods”. The Regulation also requires the frequency of physical checks to “be determined and modified on the basis of risks” (to human, animal or plant health and to the environment) so that the resources are allocated where “the risk is highest”. When managing risks, Competent Authorities, according to the Regulation, should “make use of available data sets and information, and of computerized data collection and management systems”.

Regulation establishes uniform inspection rate for different products, which includes the minimal percentage of shipment that should be inspected within a certain period.

6.2.5 European Union: manufactured products

Regulation 2019/1020 of the European Union on market surveillance and compliance of products covers manufactured products, referred to in 70 regulations and directives (listed in Annex A of the regulation).

The regulation states that “non-compliant and unsafe products put citizens at risk, and might distort competition with economic operators selling compliant products within the Union” and calls for strengthening market surveillance, by the means of, inter alia, intensifying compliance controls and promoting closer cross-border cooperation among enforcement authorities, including through cooperation with customs authorities.

The regulation describes an effective way to ensure that unsafe or non-compliant products are not placed on the Union market as “to detect such products before they are released for free circulation”, which essentially requires efficient management of non-compliance risk at the border. Authorities are required “to carry out adequate controls on a risk assessment basis”, which include “appropriate documentary and, where necessary, physical or laboratory checks of products before those products are released for free circulation”.

The regulation highlights the need for data exchange among authorities, including information concerning non-compliant products and information on economic operators where a higher risk of non-compliance has been identified.

6.3 Applying the reference model for targeting product non-compliance risk

In case of product compliance, structure of a non-compliance risk is represented by a list of products, a list of technical factors that are used to evaluate the consequences of non-compliance and a list of probability factors.

6.3.1 Building a list of products

Building a list of products is the first essential step for the management of product non-compliance risk. Customs procedures and associated risks are structured around groups of products as they appear in the HS codes. Products that belong to the same HS code are considered to have the same level of customs risk. In contrast, with respect to compliance with technical regulations, products that belong to the same HS code group can be very different in terms of the non-compliance risks.

Harmonized Commodity Description and Coding Systems (HS) is the most commonly used product classification. The HS comprises approximately 5,300 article/product descriptions that appear as headings and subheadings, arranged in 99 chapters, grouped in 21 sections. The six digits can be broken down into
three parts. The first two digits (HS-2) identify the chapter the goods are classified in, e.g. 09 = Coffee, Tea, Maté and Spices. The next two digits (HS-4) identify groupings within that chapter, e.g. 09.02 = Tea, whether or not flavoured. The next two digits (HS-6) are even more specific, e.g. 09.02.10 Green tea (not fermented)... Up to the HS-6 digit level, all countries classify products in the same way (a few exceptions exist where some countries apply old versions of the HS)\textsuperscript{117}.

HS allows participating countries to classify traded goods on a common basis for customs purposes. Indeed, defining products according to the Harmonized System codes is sufficient for the Customs authorities; at the same time, products that belong to the same group HS code can be associated with different levels of non-compliance risks for product regulators.

Non-compliance risks are product specific, and different products (even belonging to the same group and sharing the same HS code) can have different levels or types of non-compliance. Dolls and pedal cars, for example, products that may have very different levels of non-compliance risk, belong to the same code – 95030095. Regulatory authorities use different definitions of products for the purpose of managing the non-compliance risk.

Moreover, it is common that SPS regulators define product as a combination “product name – country of import”, so that the same product coming from different countries is treated as different product: i.e. apples from Italy and apples from the US. In general, it is possible that a shipment carrying 1 product from Customs perspective has a number of different products from the perspective of a product regulator.

Some of these forms of non-compliance may be more dangerous with the potential to cause loss of life, while some may be less dangerous. Finding a balance between safety costs and potential losses requires formalizing the non-compliance risks of each product within the responsibility of the regulatory authority.

There is no common distribution of products among regulatory authorities around the world; countries have different regulatory frameworks and different names for bodies responsible for similar groups of products. Most commonly, the Ministry of Health is responsible for import compliance checks on food products, drugs, and medical equipment; the Ministry of Agriculture is responsible for import compliance checks on agriculture products – fruit, vegetables, seeds, etc.; the Ministry of Transport is responsible for performing compliance checks on transport related products; and the Ministry of Economic Affairs is responsible for market surveillance of toys, electrical appliances and other consumer products.

Developing a list of products within the responsibility of a regulatory authority can be a challenging task. The (UNECE, 2016b) calls for referring to “international and national standards, and to the catalogues of producers/importers, as well as to other sources” when performing this task.

The next two examples of product lists offer an idea of how long such lists may be. In research entitled “The fruit and vegetables import pathway for potential invasive pest arrivals” (Lichtenberg, Olson, 2018), which studied all U.S. fruit and vegetable imports from 2005-2014 in order to estimate the model of the probability of potential invasive species arrival, the product list contained 2,240 products. The paper explains that over the period 2005-2014, approximately 2.8 million shipments comprising 139 different fruit and vegetable commodities were imported from 64 different countries\textsuperscript{118}. In agriculture, it is common for a product to be defined in terms of “commodity/country of origin”, and this explains why the number of products is so high.

Another example of products lists can be found in the description of the New Zealand Risk Engine analytical risk assessment tool developed by the New Zealand “Energy safety” regulator, presented earlier in the Guide. A list of electrical products within the responsibility of the regulator contains more than 200 products.

Products inventory developed by a regulatory authority should be as detailed as to ensure that:

\textsuperscript{118} Lichtenberg, E., Olson, L.. The fruit and vegetable import pathway for potential invasive pest arrivals. 2018. Available at https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0192280.
- Products within a group (a line in the table) have a similar level of non-compliance risk;
- Two product groups (two lines in a table) have different levels of non-compliance risk.
- Available data on previous inspections can be a valid source for developing a product inventory.

Product inventory may have the following structure:

Table 30 Products with different levels of non-compliance risks belonging to the same HS code (case study)

<table>
<thead>
<tr>
<th>HS code</th>
<th>Product name</th>
</tr>
</thead>
<tbody>
<tr>
<td>95030095</td>
<td>Scooters</td>
</tr>
<tr>
<td>95030095</td>
<td>Pedal cars</td>
</tr>
<tr>
<td>95030095</td>
<td>Dolls</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov. Table prepared to illustrate the methodologies described in the Guide.

6.3.2 Evaluating the consequences of non-compliance: developing a list of technical factors

One approach to evaluate the consequences of non-compliance risk for a family of products is to develop a list of technical factors. This approach is applied in the New Zealand Risk Engine, a methodology applied in market surveillance of electrical appliances in New Zealand (Morfee, 2018). It was later broadened and described in UNECE Recommendation S (UNECE, 2016b).

Recommendation S defines a technical factor for a group of products as “vulnerability that might increase the impact of any of the product-related risks when a product is in the non-compliant mode”.

According to the methodology, in order to develop a list of technical factors, identification of risks related to each product with a certain family of products is essential. Identification of risks requires formalizing risk events, their likelihoods, as well as their impacts and set of risk factors (vulnerabilities). Most of the vulnerabilities related to product risks are also technical factors for a family of products: in most cases non-compliance simply increases the impact of a product’s risk. At the same time, a list of technical factors should also include specific safety factors that make a compliant product safer but a non-compliant product more dangerous.

In most cases, technical factors belong to the following groups:

- Factors that increase the probability of an accident with a non-compliant product
- Factors that increase the level of harm in case of an accident with a non-compliant product.

Non-compliant toys can be more, or less, dangerous. To identify factors that characterize non-compliance risks related to toys, we must imagine a non-compliant toy and think about elements that might ‘exploit’ non-compliance and increase the probability of an accident and its level of harm. For example, “product needs be assembled” becomes a technical factor. In itself, this fact does not make a (compliant) toy dangerous. However, a non-compliant product (e.g. poor materials were used) that needs to be assembled becomes more dangerous than a non-compliant product that does not need to be assembled. If we compare two toys in a non-compliant state, that which needs to be assembled becomes more dangerous simply because a mistake in putting it together is an additional source of harm and, together with any non-compliance, increases the probability of an accident. Similarly, many other factors can be identified for toys, including the following:

- A product must be stable when a child is sitting on it;
- A product can be put into a child’s mouth;
- A product releases kinetic energy;
• A product has finger traps;
• A product is dangerous without proper marking.

To further demonstrate the logic behind the identification of technical factors, let us look at examples of technical factors associated with electrical products as they are applied in the New Zealand Risk Engine. These include:

• **The product is likely to be moved during use**: a non-compliant electrical product that is moved is more dangerous than a non-compliant product that is not moved;
• **A product relying on guards and barriers to prevent mechanical injury**: in a non-compliant product, the guard relied on for safe use may be not functioning, thus making the product more dangerous in a non-compliant state;
• **The product is likely to be used by unsupervised or lightly supervised children**: a non-compliant product that is used by children is more dangerous than a non-compliant product that is not likely to be used by children, since children might not notice that the product is non-compliant.

*Characterizing products using technical factors*

To evaluate how dangerous a non-compliant product can be, a regulator needs to assess each product against every technical factor identified earlier. This can be done by means of building a product-risk matrix, which fully characterizes a family of products with respect to the relevant technical factors.

To demonstrate the process, let’s evaluate the non-compliant risk of two electrical products – a toaster and a kettle – against the following technical factors:

• A product used by children;
• A product combining electricity and water;
• The product is likely to be moved during use;
• The product is high-powered (heat or mechanical energy).

Apparently, both products can be used by kids. On the other hand, kettle is a product that has both electricity and water, a fact that any non-compliance might exploit making it more dangerous than a toaster (which doesn’t have water).

Both products are high-powered – their surfaces are hot; however, a kettle is likely to be moved during use, whereas a toaster is not. Combined with any non-conformity (e.g. related to the plastic from which a kettle is made) this factor makes a product more dangerous. A product risk matrix is a table that characterizes every product with respect to the relevant technical factors. An example with a limited number of products and limited factors is presented in Table 31 (in the event of a factor being relevant to a product, it gets an evaluation of 1, if not – 0):

<table>
<thead>
<tr>
<th></th>
<th>Kettle</th>
<th>Toaster</th>
<th>Product X</th>
</tr>
</thead>
<tbody>
<tr>
<td>A product used by children</td>
<td>1</td>
<td>1</td>
<td>…</td>
</tr>
<tr>
<td>A product has electricity and water</td>
<td>1</td>
<td>0</td>
<td>…</td>
</tr>
<tr>
<td>Product is likely to be moved during use</td>
<td>1</td>
<td>0</td>
<td>…</td>
</tr>
</tbody>
</table>
Ranking products

After the product-risk matrix is built, several techniques may be used by regulators to evaluate the risk of each product and to compare the product with respect to their own levels of risk. The first approach is to calculate the non-compliance index for each product and to rank each product respectively (in this case, a kettle gets an evaluation of 4, and a toaster of 2). Additionally, specific combinations of technical factors may be defined in terms of having higher weights (for argument’s sake, featuring a combination of factors: “a product is high-powered” and “a product is used by children” may have a weight more than 2). Alternatively, a regulatory authority may decide that any product that is used by children and has electricity and water is a high-risk product, while products that are not characterized by these factors are not.

In any case, the result of this step is a table of products ranked by the level of how dangerous a product can be in the event of non-compliance:

Table 32 Ranking products according to consequences of non-compliance

<table>
<thead>
<tr>
<th>Product</th>
<th>Consequences of non-compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kettle</td>
<td>4</td>
</tr>
<tr>
<td>Toaster</td>
<td>2</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov. Table prepared to illustrate the methodologies described in the Guide.

6.3.3 Probability factors for targeting product non-compliance

Principles for building the framework that were described in chapter 4 “Methodology for building a risk-based targeting system in import compliance” contained three sources of evidence that the evaluation of probabilities can be based on. These sets of questions include:

1. **Is there anything new** within the supply chain associated with the shipment? Something that we didn’t see before: a new product, a new supplier, a new importer, etc.? Since past experience reduces the level of uncertainty, every new element within the supply chain makes the level of uncertainty associated with a shipment higher;

2. **How focused** are the stakeholders involved in the import process associated with the product? The hypothesis behind this question is that when an importer or supplier works with a limited number of products, he or she has more experience and more knowledge on these products; and hence the level of uncertainty associated with a shipment that was imported by an importer focused on the imported products is lower than that of an importer that is working with a broader range of products, often changing his/her focus.

3. **What is the compliance history** of the stakeholders, associated with the incoming shipment? The compliance history is the main source of information/evidence that helps evaluate the probability of non-compliance; clearly, the probability that an importer that had brought many non-compliant products would bring another non-compliant product is higher than in the case of an importer that didn’t have any non-compliance history.

These questions can be turned into a set of parameters that cover all the sources of information identified in the questions above.

A “something new in the supply chain” set of parameters can contain the following characteristics of the incoming shipments:
• New Country/Old Country; Old country means that at least one product from this country was imported into the country (by any of the suppliers and importers).

• A shipment/inspection is characterized as “New Product from the Country of Import” when it is the first time the given product is imported from this country (the product could have been imported from other countries and other products could have been imported from the country).

• A shipment/inspection is characterized as “New Product for Importer” if the importer has never imported this product before (he could’ve been working with other products). If an importer is new, the first shipment gets a “New Product for Importer” flag.
  - A shipment/inspection is characterized as “New Product for Supplier” in case the product in the shipment has never been imported to Israel from this supplier (it could have been imported to other countries).

To see how focused stakeholders are the following parameters can be introduced:

• Importer’s diversity: if the importer has experience in working with more than 5 different products, he is considered as “Very high diversity”, 2-5 “medium diversity”, 1 product “Single product importer”

• Supplier’s diversity (same logic as in the case of importer).

Finally, to fully address the compliance history of the supply chain, an approach of focusing on interrelationship among the various chains of the network, as shown in the Figure 44 \(^{119}\), can be applied:

Figure 44 Deriving probability factors for characterizing compliance history of the supply chain


\(^{119}\) Nikonov, Patir 2020.
The development of this concept of the prediction model is based on the Australian CBIS and PREDICT (see the principles of described in the previous chapter). In addition to the number of successful inspection that the given importer passed with a given product, other supply chain combinations can be taken into account: e.g. how many successful checks the supplier of the product has passed, and all other possible combinations. In other words, a number of consecutive successful inspections of “importer – supplier”, “supplier-product”, “product – country of import”, “importer – country of import” combinations, etc. These parameters provide regulator with an opportunity to design very flexible and understandable compliance rules that reflect their vision of the world.

The philosophy behind this concept reflects the real world: what is more important is not how many non-compliance checks, say, an importer had in the past, but rather how stable he or she is in from the compliance status until “now”. The number of consecutive successful checks perfectly reflects the current compliance status. So, the number of consecutive successful checks approach was applied to various combinations of supply chain stakeholders “importer – supplier”, “importer – product”, etc.

Examples of the parameters that were derived include:

- How many consecutive successful checks the importer has passed until the given inspection (with all products).
- How many consecutive successful checks the supplier has passed until the given inspection (with all products).
- How many consecutive successful checks the importer has passed with the given product;
- How many consecutive successful checks the supplier has passed with the given product;

Based on these concepts, the following parameters can be known before the shipment is opened for an inspection and that can be used as sources of evidence with respect to the probability of non-compliance, as shown in Figure 45:

Figure 45 Example of probability factors used to assess the probability of non-compliance

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The automated system was developed by the project team that processes basic available data (Product Name, Importer, Supplier, Country) and returns a table with all the parameters described above. Enriched
with data, these probability factors (sources of evidence) can be used to build models based on the history of inspections and to running simulations for choosing optimal risk-based regulatory regimes.

6.4 Developing compliance rules and risk profiles for targeting product non-compliance

Evaluation of a product with respect to the consequences of non-compliance associated with it, in the form of an index of its technical factors or in other forms, is one of the two parameters that characterize the non-compliance risk of a product, and which are required for prioritization of the import compliance processes. Even if we don’t know the probability that a shipment contains a non-compliant product, knowing that it contains products that are not dangerous when non-compliant can be sufficient for making a decision regarding the priority of the inspection of the shipment in question. Importantly, the parameter characterizing how dangerous a non-compliant product is doesn’t change unless there are changes to the product itself (in the production processes or in the product design); and re-evaluation of this parameter should be performed regularly, but not too often (quarterly or biannually).

To complete the prioritization of shipments and the decision-making process, the evaluation of the probability that a certain shipment contains a non-compliant product is necessary. This parameter is specific to every shipment. If a choice must be made with respect to two shipments containing the same product (the same level of non-compliance index), priority should be given to the shipment that has a higher probability of non-compliance.

Regulators can apply two principal methodologies for evaluating the probability of non-compliance of consignments to technical regulations and standards, using an analytical or profiling (targeting) approach (or combination thereof), as described in chapter 4.

Gathering and processing data from external sources should be one of the essential steps in building risk-based inspection procedures.
When a predictive model is built, the characteristics of shipments become model variables that we need to know in order to make a prediction as to whether a shipment contains a non-compliant product.

These characteristics can be derived from many parameters and can be fairly sophisticated: application of the CBIS model described earlier, for example, requires calculating a number of consecutive successful checks that an importer with a given product has passed. The model identifies how big this number should be to ensure that the probability of compliance is sufficiently high, and this number is applied as a rule for deciding whether to conduct an inspection or not.

The application of such a model requires that at the moment a shipment arrives at the port, a regulator should know all the parameters (variables) characterizing the incoming shipment, so that he can feed into the model to obtain a prediction. Continuing the example of the CBIS model, when a shipment arrives in port, apart from the name of the importer and the imported product, the regulator should also find out how many consecutive successful checks this importer has passed with this product. If this data is not efficiently gathered, it will cause delays in clearing the shipment; in many cases, cooperation and data exchange with the Customs can be crucial to solving this issue.

6.5 Risk-based sampling

In many regulatory frameworks, the following types of inspections are applied to an incoming shipment:

- Documentary checks;
- Identity checks;
Physical checks. Since any inspection, especially physical checks of products, is indeed sampling (there are very few cases in which an entire consignment can be inspected), regulatory authorities have to decide on the appropriate sampling strategies. After incoming shipments are prioritized according to their levels of non-compliance risks, for each level of risk an appropriate inspection frequency and/or sampling size should be established, along with other parameters that might impact the quality of an inspection (inspector’s experience and time allocated for performing inspection are examples of such parameters), to ensure that priority is given to high-risk shipments.

The Risk-Based Sampling symposium materials constitute the world’s largest source of best practice in import compliance. Though focused on plants and plant products, tools and approaches described can be adapted and applied by regulatory authorities to all other goods that require visual inspection.

To each level of non-compliance risk of incoming shipments, regulatory authority can assign the following parameters:

- **Inspection frequency**, or inspection rate – which percent of the shipments that will be inspected;

- **Sample size**, how many products from the shipment will be inspected. Since it is usually not feasible to inspect entire consignments and inspection is performed mainly on samples obtained from a consignment. To determine the number of samples to be taken, regulatory authority should select a confidence level (for example, 95%), a level of detection (for example, 5%) and an acceptance number (for example, zero), and determine the efficacy of detection (for example, 80%). From these values and the lot size, a sample size can be calculated.

For a given acceptance number and efficacy of detection, a risk-based inspection scheme can be defined using the following structure, as shown in the example presented in table 33:

<table>
<thead>
<tr>
<th>Level of non-compliance</th>
<th>High consequences of non-compliance</th>
<th>Medium consequences of non-compliance</th>
<th>Low consequences of non-compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>High probability of non-compliance</td>
<td>Frequency: every shipment</td>
<td>Frequency: 50%</td>
<td>Frequency: 25%</td>
</tr>
<tr>
<td></td>
<td>Level of detection: 0.1%</td>
<td>Level of detection: 0.5%</td>
<td>Level of detection: 1%</td>
</tr>
<tr>
<td></td>
<td>Confidence level: 99%</td>
<td>Confidence level: 99%</td>
<td>Confidence level: 95%</td>
</tr>
<tr>
<td>Medium probability of non-compliance</td>
<td>Frequency: every shipment</td>
<td>Frequency: 50%</td>
<td>Frequency: 10%</td>
</tr>
<tr>
<td></td>
<td>Level of detection: 0.1</td>
<td>Level of detection: 0.5%</td>
<td>Level of detection: 1%</td>
</tr>
<tr>
<td></td>
<td>Confidence level: 95%</td>
<td>Confidence level: 95%</td>
<td>Confidence level: 90%</td>
</tr>
</tbody>
</table>

120 In case of several types of products, the scope of the risk-based import compliance system contains only physical checks: documentary and identity checks are obligatory.


The structure of the sampling plan reflects the following logic: level of harm associated with consequences of non-compliance is reflected by acceptable amount of non-compliant products in the consignment, represented by the parameter “level of detection” (higher are the consequences, lower is the level of detection). Shipments that contain products associated with high consequences, for example, can be assigned 0.1% of allowed non-compliant products (the most stringent case in most of the sampling standards). Shipments containing products with medium consequences of non-compliance can be inspected according to 0.5% level of detection, whereas in case of low consequences of non-compliance level of detection could be within the range of 1%-5%. Other things equal, lower level of detection means bigger sample and thus higher inspection costs.

Probability of non-compliance is associated with the parameter that represents the probability that the number of non-compliant products in the shipment is indeed not higher than the level of detection, or confidence level (higher is the probability of non-compliance, higher is the confidence level). Shipments with high probability of non-compliance can be inspected with the confidence level of 99%, those of medium probability – 95%, etc.

Devising a risk-based inspection scheme similar to one presented above results in shifting resources from low-risk shipments to those associated with higher level of risk. It implies that regulatory authority explicitly makes a decision on the level of tolerable risks: the acceptable level of risk is determined by the number of non-compliant products of each risk group that might cross the border with a certain probability, for a given amount of available resources.
CHAPTER 7  INTEGRATING RISK MANAGEMENT SYSTEMS OF BORDER CONTROL AGENCIES

A shipment arriving at the border of any country is associated with a large variety of non-compliance risks. The structure of these risks depends on the imported products and applicable regulatory requirements. At the same time, these risks can be broadly categorized as those within the responsibility of the customs authorities – since all imported products are subject to customs regulations - and risks within the responsibility of product regulators, which characteristics depend on the nature of imported products and applicable regulatory requirements.

A case study of imported toys used in chapter 4 to provide an example of how a reference model of a targeting system for border control can be applied in practice; these shipments, as all other imported shipments, are subject to customs regulations (best practice in the management of these risks is presented in chapter 5 “Targeting and addressing customs risks”) and to toys safety or product regulations. Other products, such as food and feed, products of plant and animal origin are commonly subject to regulatory requirements enforced by even bigger number of agencies. Fruits and vegetables, for example, are typically inspected by food safety authorities (ministries of health) to ensure, among other things, that they don’t contain dangerous pesticides, and plant protection authority, which aims to ensure that products don’t contain dangerous pests.

This chapter aims at providing tools that would allow efficient management of all non-compliance risks at the border, which requires collaboration among the involved regulatory authorities and building an integrated risk management system. In case all regulatory authorities apply approaches described in chapter 4, risk management systems of individual regulatory authorities can be integrated – united – in one system. Integrated system simultaneously processes all relevant risks of each incoming shipments and ensures that border compliance costs and time are proportionate to these relevant risks.

Integrated risk management at the border requires cooperation among all regulatory authorities. Firstly, cooperation can be built around the idea that regulatory authorities can help each other with risk evaluation. Regulatory authorities and customs should check if there is a correlation between interceptions on a regular basis: if such a correlation exists and is sufficiently high, it means that importers that are non-compliant with customs regulations also tend to be non-compliant with technical regulations, and vice versa. Exchanging this information could benefit all authorities involved. Secondly, the application of profiling models and rules developed by a regulatory authority will be most efficient if data exchange processes with Customs are established. Risk evaluation will be even more efficient if the rules are applied by Customs within their information systems. Indeed, when a shipment arrives at the port or is on its way, its characteristics should be processed according to the regulator’s rules so that the probability of non-compliance can be evaluated and a decision on the inspection made. Most commonly, regulatory authorities do not have online data about the incoming shipments; whereas the customs authorities are “the first to know” that the shipment is coming and can perform the evaluation in as efficient a manner as possible.

The objectives of these changes in the management approach are trade facilitation and security. Beyond other aspects, these approaches include mechanisms for regular exchange and joint assessment of information, and cross-government integration at policy and operational level.

To achieve the cross-border co-operation between border agencies on risk assessment and controls CAs will need to develop:

- Agreements and mechanisms for intra-organizational risk assessment, intelligence sharing, conduct of coordinated and cross-border joint control and operations;
- Risk assessment instruments (joint collection, development, and management of risk indicators; storage and analysis of data; analysis of threats, etc.);
- Share the infrastructure – facilities, tools, and equipment for the inspection and examination of goods;
• Mechanisms and procedures for the exchange of information (strategic/tactical intelligence, operational information, inter-service communications, liaison officers);
• Joint operating procedures (legal framework; common training; procedures, military-to-civilian reporting procedures).\textsuperscript{123}

7.1 Benefits of integration

Integration of risk management systems of individual regulatory authorities into a single framework covers all processes and elements of a targeting system, from the development of compliance rules to performing inspections. The main idea of an integrated risk management system is in optimizing the resources, removing duplicate functions and applying standardized methodologies.

Table 34 summarizes the benefits of integration of all steps of the profiling process:

<table>
<thead>
<tr>
<th>Step of the process</th>
<th>Strategic benefits of integration</th>
<th>Benefit of IT integration</th>
<th>Impact of integration on the use of human resources</th>
<th>Impact of integration on data processing and storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs into profiling system: structure of non-compliance risk, risk tolerance and available resources</td>
<td>Consistent identification of non-compliant risks, risk tolerance and available resources. Standardized risk management methodology on a government level.</td>
<td>Development of scripts for building a history dataset is centralized.</td>
<td>Regulators do not have to hire risk management experts.</td>
<td>Data on risks is centrally stored and protected.</td>
</tr>
<tr>
<td>Building a history data set</td>
<td>A history dataset of an import compliance system as a whole.</td>
<td>Risk management expertise available to assist regulators in building a dataset.</td>
<td>A centralized process for storing and updating the history dataset.</td>
<td></td>
</tr>
<tr>
<td>Developing risk profiles and compliance rules</td>
<td>Correlation between non-compliance risks is explicitly taken into account. Cooperation among regulatory authorities.</td>
<td>One IT and data mining tools used for developing compliance rules.</td>
<td>Expertise available for the application of predictive algorithms.</td>
<td>Compliance rules developed within a single IT infrastructure.</td>
</tr>
<tr>
<td>Evaluating compliance rules</td>
<td>Simulation provide integrated data on border compliance time and costs and residual non-compliance risk.</td>
<td>A uniform methodology and IT system for false positive analysis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applying compliance rules</td>
<td>Available overview of all import compliance risk associated with an incoming shipment.</td>
<td>Regulatory authorities do not have to invest in their own profiling systems.</td>
<td>One source of data on incoming shipment, minimum duplications. Compliance rules centrally stored and updated;</td>
<td></td>
</tr>
</tbody>
</table>

Performing inspections

Parallel inspections can be implemented (knowledge about all non-compliance risks).

Source: Valentin Nikonov. Table prepared to illustrate the methodologies described in the Guide.

The following pages describe how each function of a targeting process, as presented in chapter 4, of each regulatory agency can be integrated into a single system and the benefits of integration on the level of IT systems, use of human resources and risk management expertise, and data processing and storage.

7.2 Defining inputs into an integrated risk management framework

The concept of integration

Structure of non-compliance risks within the responsibility of a regulatory agency, its risk tolerance and available resources, as well as inspection costs are not only the main inputs into the risk management process, but also parameters that reflect the philosophy and strategy of each regulator. Within an integrated framework, each regulatory agency remains responsible identifying these parameters.

An integrated approach for developing key inputs into risk management system calls:

• Establishing a coordinating body for integrating risk management;

• Developing of the guidance documents to ensure a standardized way of risk identification and other parameters of a risk management system;

• Raising awareness and establishing a common risk management language;

Data harmonisation

Data harmonisation should be done to eliminate redundancies in required data and duplication in the submission of trade data to government authorities. The ultimate outcome should be one set of standardised data requirements and standardised messages that fully comply with the internationally used data model. Within cross border transactions trade will provide the required data elements by submitting standardised messages to meet government requirements for import, export and transit. This will facilitate trade, reduce costs and make it feasible to provide more timely and accurate information.124

Benefits of integration: common language, single formats and bird’s eye view

Integrated identification of non-compliance risks and other key parameters of risk management systems of individual regulators makes it possible to perform a comprehensive analysis of non-compliance risks, risk tolerance and available resources of all border control agencies and to view an import compliance system as a whole. These parameters can be reviewed on a policy level to ensure consistency in risk tolerances and resources of regulatory agencies involved in border control and their impact on trade facilitation objectives.

7.2.1 Building an integrated history dataset

The concept of integration: developing a single history dataset

Developing a history data set is essential for using data mining techniques and predictive algorithms for developing compliance rules. A history dataset that can be developed according to the structure of a non-

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compliance risk of a regulatory agency was already presented in chapter 4. Integrated approach to risk management calls for creating a single dataset with inspection results of all regulatory agencies involved.

**Benefits of integration: one storage, one format, more precise targeting**

- Developing a data model of basic characteristics of a shipment and of a standardized format for data storage;
- Performing analysis of correlations between the findings of different regulators and using this information in targeting.

**Example**

To illustrate the concept, the following example presented in Figure 47 shows how two datasets of regulatory agencies (customs and toys regulator) can be joined:

**Figure 47 Joining datasets of two regulatory agencies**

Source: Valentin Nikonov. Figure prepared to illustrate the methodologies described in the Guide.

The example shows the principle of how a history dataset of a toy regulator, which has the first and the third shipment non-compliant can be joined with a dataset of the customs authorities (which, in the case study, found all three shipments non-compliant with customs regulations). The resulting dataset contains the characteristics of the shipments that are used by both authorities (Shipment number, importer, producer, country of origin and port of entrance), and those that are used by one authority but not used by the second one (HS code is used by the customs but not used by toys regulator, the product name in case of toys regulator). Importantly, the joined dataset contains results of import inspections. This information can be used to perform correlation analysis and for finding dependencies among various non-compliance risks. Obviously, in the simple example above, a fact that a shipment is non-compliant with the customs regulations is indicative of non-compliance with toys safety requirements.

7.2.2 Cooperation in development of compliance rules and risk profiles

**The concept of integration: sharing risk management expertise and resources**

Developing compliance rules that allow targeting high-risk shipments and performing import inspections in such a way that would efficiently allocate the available resources and bring the level of non-compliance risk to the level tolerable by the regulatory authority might be a challenging task that require risk management expertise and IT tools.

An integrated approach implies that every regulatory agency develops compliance rules according to its risk tolerance and available resources; at the same time, it calls for centralized shared expertise in risk management. Establishing a targeting center with risk management professionals that would assist
regulatory agencies in developing compliance rules is an efficient way of allocating the risk management expertise. In this case, regulatory agencies do not have to hire a full-time risk management professional and do not have to administrate IT tools for developing compliance rules. Integrated development of compliance rules also helps ensuring consistency in the format in which risk profiles are built and in their storage.

A targeting centre, tends to operate on 24/7 basis, might be set up to have a nationally coordinated targeting approach that enables more effective and efficient allocation of resources through integrated targeting and operational coordination. The centre can provide a physical facility for border agencies to be collocated and contribute to the governments’ capacity to better achieve their whole-of-government border management objectives. At the same time, the centre can provide a common border sector agency interface for operational border management issues. The centre can be operated by single agency on behalf of other authorities as well as all border agencies are invited to join and work in the centres. This has enabled better planning, coordination (joint targeting) and response actions contributing towards more efficient and cost-effective delivery of whole-of-government border management goals. A major feature of such an approach is the fact that even though one agency physically hosts this centre, each participating organization keeps its agency-specific mission, role and identity. This encourages wider buy-in to the concept and enables government to achieve common approach without destabilization of wider institutional and agency arrangements. 125

Example

For the purposes of the case study, the two regulatory authorities developed the following set of rules:

- Toys safety regulator: if an importer brings a product from a new producer, it is a high-risk shipment; other shipments are low risk;
- Customs authority: HS code '95030095' and country of origin “A” – a high-risk shipment.

Cooperation in development compliance rules and risk profiles includes the following main elements:

- Sharing data
- Correlation in non-compliance risks
- Using the best IT infrastructure available
  - Information system
  - Data mining systems

7.2.3 Evaluating of a targeting system: integrated overview

The concept of integration: an integrated dataset and an overview of what would have happened at the border

Simulating how all regulatory authorities would have performed at the border if they had worked according to the developed compliance rules provides essential information for characterizing the import compliance system as a whole. Importantly, it allows calculating border compliance costs and time for importers and review it in the context of “overall” residual risk of non-compliance.

To evaluate compliance rules of all regulatory authorities and to simulate how they would have behaved at the border requires developing an integrated history dataset, which includes all risk factors that are necessary to apply the compliance rules of all regulatory authorities. The example below illustrates the concept.

An integrated dataset that allows performing a simulation of how the customs authorities and the toy safety regulator would have inspected the following shipments that arrived, must contain the fields that allow applying the compliance rules described above. The table should contain data on: whether an importer is bringing a product from a new producer (required for applying the compliance rules of the toys safety regulator), and HS code and the country of import (to apply the compliance rules of the customs authority). This dataset can be derived from the basic history set in the following way:

Figure 48 Example of a dataset necessary to perform a simulation of application of compliance rules of two regulators

<table>
<thead>
<tr>
<th>Shipment number</th>
<th>Importer</th>
<th>Producer</th>
<th>HS Code</th>
<th>Product</th>
<th>Country of origin</th>
<th>Port of entrance</th>
<th>Shipment number</th>
<th>New product for producer</th>
<th>HS code</th>
<th>Country of origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Lucky Imports</td>
<td>We love toys</td>
<td>95030095</td>
<td>Pedal Cars</td>
<td>A</td>
<td>B</td>
<td>4</td>
<td>095030095</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Lucky Imports</td>
<td>Toys of the world</td>
<td>95030095</td>
<td>Scooters</td>
<td>C</td>
<td>D</td>
<td>5</td>
<td>195030095</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Lucky Imports</td>
<td>Toys of the world</td>
<td>95030095</td>
<td>Scooters</td>
<td>C</td>
<td>D</td>
<td>6</td>
<td>095030095</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

Source: Valentin Nikonov. Figure prepared to illustrate the methodologies described in the Guide.

The integrated table allows simultaneous simulation of all compliance rules. Along with performing false positive analysis and evaluating the efficiency of predictions, it also allows assessing the border compliance time and costs that importers would have experienced, if the compliance rules had been applied:

Figure 49 Integrated application of compliance rules: results of a simulation (example)

The analysis of the predictions made show one false negative in case of the fifth shipment (it was predicted as non-compliant but was actually compliant) and allows calculating total border compliance time of the whole import compliance system. In case a customs and toys safety inspections last an hour, the regulatory regime would result in 2 hours of compliance time.

The benefits of performing integrated simulations include:

- Evaluating the trade facilitation and risk parameters of the import compliance framework as a whole;
- Ensuring centralized data storage.
7.2.4 Applying compliance rules in an integrated system: one data source, one system

As it was shown in the previous chapters of the Guide, compliance rules are developed as a result of analysis of the basic characteristics of the shipments. Applying compliance rules, in most cases, requires basic information about the incoming shipment and an information system that can compare the characteristics of the incoming shipment with the conditions of the compliance rules.

The integrated approach for import compliance implies:

- using one source of data on the incoming shipments and
- processing all compliance rules within one information system.

The integrated process has the structure as presented in Figure 13.

**Figure 13 A reference model of an integrated risk management framework**


The main steps of the process include:

- Regulatory authorities transfer compliance rules to the integrated profiling system.
- In order to apply these rules, the system builds an integrated history dataset which includes all risk factors that are used in compliance rules developed by regulatory authorities.
- When an incoming shipment arrives, the system gets its characteristics from the integrated history dataset;
- The system applies the conditions of the compliance rules and returns results to regulatory authorities.

**Example**

To illustrate the integration concept, an assumption can be made that information on the incoming shipment is represented by the following table:
The integrated profiling system received the compliance rules of the customs authorities and of toy safety regulator, as described in the previous section. To apply the rules, an integrated system must get from the history dataset information whether shipment 7 contains a product from an unknown producer. Applying compliance rules of the customs, in this case doesn’t require a dataset – they include only basic characteristics of a shipment.

Result of the prediction that the system would be:

<table>
<thead>
<tr>
<th>Shipment number</th>
<th>Predicted compliance with toy safety regulations</th>
<th>Predicted compliance with the customs regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipment 7</td>
<td>Non-compliant</td>
<td>Non-compliant</td>
</tr>
</tbody>
</table>

7.2.5 Integrated inspections

Integrated evaluation of the incoming shipment provides opportunities for regulatory authorities to optimize the inspection time by conducting parallel inspections and delegating an inspection to one authority.

Figure 50 Sequential vs. Synchronized intervention

Sequential or uncoordinated intervention

Synchronized or coordinated intervention (more efficient)

7.3 Customs as a lead agency for integrated risk management system

Establishment of lead agency is a political as well as a strategic issue which in many countries results in selection of Customs as lead agency in the implementation of integrated risk management approach while all the participating agencies shall undertake a coordinate process reengineering both legal and technology platforms. Customs authorities play a central role in border control and the most efficient way to build an integrated risk management framework is to use the customs IT infrastructure as a basis:

- Customs regulations cover every incoming shipment, whereas most regulatory authorities regulate a subset of the total trade volume;
- Customs authorities work according to an international data model;
- Customs authorities have advanced information system;
- Customs authorities in more than 90 countries are using the UN developed IT system ASYCUDA, which contains a module for management of risks. A standard integrated system can be developed.
- Customs authorities gathered substantial expertise in risk management.

Product non-compliance risk management can be integrated into the customs clearance process, as described on page 100 of the OSCE/UNECE 2012 handbook (OSCE/UNECE, 2012). Cooperation can be built around the following functions in the clearance process:

1. Cargo declaration by carrier to Customs upon the arrival of goods or by means of advance declarations;
2. Preparation and submission of goods declaration by the importer/broker either on paper or by electronic means, most commonly before the goods arrive;
3. Automated risk management/channelling and selecting shipment for checks according to data analysis in the declaration;
4. Checking the goods declaration and supporting documents;
5. Physical inspection of the goods can take the form of either a non-intrusive inspection with equipment such as X-ray, or a manual inspection;
6. Release of goods by Customs.

The integrated application of the compliance rules can be described as follows:

1. During the first step, the regulatory authority builds a historic dataset and develops models and rules for the evaluation of the probabilities that incoming shipments contain non-compliant products;
2. When the rules are designed and evaluated, regulatory authorities pass the rules to the customs authorities for implementation;
3. Customs authorities add the regulator’s profiling rules to their profiling system as a separate module;
4. During the “cargo declaration by carrier to Customs” and “preparation and submission of the goods declaration” (when a shipment is on its way to the port), the customs authorities process the data so that the information about the shipment required for running the predictive algorithms of regulatory authority and Customs is gathered;

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5. During the “automated risk management/channelling” phase, Customs apply both profiling algorithms and their rules, as well as those of the regulatory authority, and obtain the following evaluations:
   
a. The probability that the shipment is not compliant with the customs regulations;
   
b. The probability that the shipment is not compliant with the technical regulations.

6. The customs selection module channels the declaration to red, orange and green channels, according to the evaluation of the customs risk.

7. The Customs authority returns the evaluation of the probability that the shipment is non-compliant with the regulatory authority, so that it can combine the evaluation of the probability that products in the consignment are non-compliant with the evaluation of the danger level of a non-compliant product.

8. The regulatory authority decides whether a shipment should be checked and if so, the required level of scrutiny.

9. “Physical inspection of goods” is an optional phase both for Customs and product regulatory authorities. Integrated risk management can result in a situation where a shipment is checked by Customs and not checked by product regulators; or checked by product regulators and not by the Customs; or not checked at all; or checked by both authorities.

10. After checks are performed or if they were not required, the regulatory authority informs Customs that the shipment can be cleared.

11. The regulatory authority updates the dataset with historic data; updates the predictive models and rules; and sends the updated version to Customs.

Implementing this process will lead to effective cooperation among regulatory authorities and Customs. According to the OSCE/UNECE 2012 handbook, “Customs authorities are most often responsible for introducing border co-ordination activities” (OSCE/UNECE, 2012). Customs authorities could use this process to initiate projects for establishing cooperation of this nature with other regulatory agencies.

7.4 Risk management in ASYCUDA: a basis for integration

ASYCUDA is a computerised management system currently used in over 90 countries which covers most foreign trade procedures.

Risk management is implemented in the system by the means of the selectivity module. Description of the model shows that it can be used to implement simple import compliance rules.

“Selecting the examination procedure for the goods is assisted by the selectivity module based on information in the criteria files. The system will allocate a "channel" status of either green (the cargo will be released without examination), yellow (the cargo will be released after further documentary validation), red (the cargo will be released after a physical examination) or blue (post audit control).

The criteria files are built using national and local control file data. According to their nature, data elements are compared individually and/or in combination to the criteria contained in the control files. The results of such risk analysis should be analysed periodically in order to maintain, change, extend or eliminate certain parameters.

One data element or a combination of data elements may be chosen to build a criteria.

Management of selection criteria will take place at central level, i. e. criteria to be used by all Customs offices in the country, or at local level for criteria used at individual offices.

Almost every data element in the declaration can be selected. Examples of selection parameters:

- importer/declarant;
• customs value;
• commodity code;
• means/mode of transport;
• country of origin/consignment;
• plus random check (e.g. every 20 declarations).

The selectivity module functions as a filter through which all declarations have to pass. If the data elements of the declaration correspond to those of the selectivity criteria, routing to documentary check, physical examination or flagging for post audit control is carried out.

Example: If the criteria is set to identify goods, say television sets Tariff Heading 85.28 with a particular origin e.g. Japan (country code JP), all declarations with country code JP and Tariff Heading No 85.28 will be selected for examination (yellow, red or blue) by the system. The number of declarations selected can be controlled through assignment of a percentage of "hits" to each channel.

Overriding a system selection will be allowed only under special circumstances, and only after instruction by the officer in charge. Such cases are recorded separately.

7.5 Organizational aspects of risk management integration

In 2011, the WCO published a study report on risk assessment/targeting centers. According to the study, targeting centers allow countries better:

• Management and fusion of information;
• Application of a nationally coordinated approach to risk assessment and targeting;
• Coordination of intelligence and operational activities;
• Ability to manage border risks holistically across the border.

All of the targeting centers objectives overlap with the objectives of integrated risk management.

7.6 The integrated risk management framework and the single window

Integrated risk management can be considered as a tool that builds on and further broadens the scope of Single Window, a system where trade-related information and/or documents need only be submitted once at a single entry point to fulfill all import, export and transit-related regulatory requirements. UN/CEFACT Recommendation 33 suggests that participating authorities and agencies should coordinate their respective controls through the Single Window and should consider providing facilitated for payment of relevant duties, taxes and fees.

The rationale for developing Single Window can be easily applied to integrated risk management. Similarly to how companies involved in international trade had to submit large volumes of information and documents through several different agencies, each with their own specific systems, after the implementation of the Single Window these companies often have to deal with import controls performed by several different agencies.

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agencies. Many of these controls are not proportionate to risks they were set out to address, due to the inefficiency of risk management infrastructure of regulatory agencies.

Integrated Risk Management can be perceived as an analogy to Single Window, whereby information about the incoming shipment needs only be processed by one integrated system which performs the assessment of all non-compliance risks within the responsibility of all regulatory agencies, according to the compliance rules and risk profiles developed by these agencies.

7.7. Project plan for building an integrated risk management system

Building an integrated risk-based import compliance system is a complex project from organizational, methodological and technological perspectives, which implementation will be highly dependent on the IT infrastructure and risk management maturity of the regulatory agencies involved. A structure of a project plan described in the following sections can be used as a basis for developing a project plan on a country level. The described project plan contains the following main phases:

- Setting the context;
- Building risk-based regulatory systems;
- Developing methodologies for the management of non-compliance risk within every regulatory agency;
- Building a risk assessment processes;

Setting the context

The objective of this phase is to build an organizational structure suitable for building an integrated risk management system. The phase contains the following tasks:

<table>
<thead>
<tr>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determining the Leading Agency and a project management committee.</td>
</tr>
<tr>
<td>Identifying regulatory agencies to participate in the system.</td>
</tr>
<tr>
<td>Building awareness in risk management: ensuring common understanding of terms, risk management objectives and processes.</td>
</tr>
<tr>
<td>Building a centralized risk management expertise.</td>
</tr>
<tr>
<td>Building appropriate IT infrastructure: data mining and data processing tools.</td>
</tr>
</tbody>
</table>

Building risk-based regulatory systems and import compliance frameworks

The objective of this phase is to ensure that import compliance frameworks are balanced with other elements of respective regulatory systems. Methodology for building risk-based regulatory systems is described in (UNECE, 2012b).

Developing methodologies for the management of non-compliance risk within participating regulatory agencies

The objective of this phase is to ensure development of standardized and proportionate compliance rules by every regulatory agency.

<table>
<thead>
<tr>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing a list of products:</td>
</tr>
<tr>
<td>Defining a product</td>
</tr>
<tr>
<td>Gathering import compliance data and building a list of products</td>
</tr>
<tr>
<td>Evaluating the consequences of non-compliance of products within the scope:</td>
</tr>
<tr>
<td>Developing a list of technical factors</td>
</tr>
</tbody>
</table>
• Factors, increasing the consequences of an accident with a non-compliance product
• Factors, increasing the probability of an accident of a non-compliant product
• Factors, increasing the probability of non-compliance
• Evaluating products against each technical factor (relevant or not)
• Product ranking.
• Evaluating the probability of non-compliance
• Developing a list of probability factors
• Gathering basic import data
• Adding probability factors to the dataset
• Building risk profiles and compliance rules for evaluating the probability of non-compliance of an incoming shipment.
• Evaluating compliance rules based on both consequences and probability of non-compliance.
• Developing an import inspection policy based on compliance rules, including risk-based sampling.

Building a risk assessment process

The objective of this phase of the project is developing an IT and methodological infrastructure for performing the assessment of the incoming shipments with compliance rules of various regulatory agencies.

<table>
<thead>
<tr>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing IT infrastructure for applying compliance rules within a Leading agency.</td>
</tr>
<tr>
<td>Developing tools for processing data on incoming shipments according to the requirements of participating regulatory bodies.</td>
</tr>
<tr>
<td>Developing tools for applying the compliance rules.</td>
</tr>
</tbody>
</table>

Building an integrated system

<table>
<thead>
<tr>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building an integrated dataset at the Leading Agency.</td>
</tr>
<tr>
<td>Integrating compliance rules and performing an evaluation of an import compliance framework.</td>
</tr>
<tr>
<td>Running a pilot project: assessing the incoming shipments according to compliance rules of all regulatory authorities (without changes in inspections).</td>
</tr>
<tr>
<td>Full implementation (going live).</td>
</tr>
</tbody>
</table>
CHAPTER 8  THE IMPACT AND BENEFITS OF INTEGRATED RISK MANAGEMENT TO ECONOMIC OPERATORS

8.1 Reaping the benefits of compliance

One objective of risk management is to lower the cost for businesses when transacting with the government. The adoption of a risk management approach by government regulatory agencies presents tangible benefits to those involved in legal and legitimate trade. Businesses can best take advantage of this opportunity if their internal processes are geared to achieving better compliance with regulatory requirements.

Risk management creates client segmentation based on a company’s level of compliance with trade laws and regulations. The better the compliance history of a business entity, the less the chances of intervention at border points, which means cost and time saving for high performance firms. Economic operators with a consistent track record of compliance, and no major errors or anomalies in their declarations, receive predictable treatment and faster clearance.

Business may be offered further benefits like simplified procedures, periodic filing, and deferred payments. Many administrations have implemented schemes like “trusted traders” or “accredited clients”, which promote a culture of compliance and bring cost savings for businesses with a strong track record.

High performance businesses should adopt a risk management approach. An ITC publication A Practical Guide for SMEs – ISO 31000 Risk Management is a relevant document providing guidance for businesses on how to predict risks and putting in place systems to minimize negative consequences.

8.1.1 Active role of traders is critical in improving overall compliance

The business community is critical to improving overall trade compliance and it is crucial that economic operators understand their risks and responsibilities. An efficient and compliant import or export process means that all participants involved have a clear understanding of this, with processes that ensure that all reasonable standards and regulatory requirements are met.

Business enterprises should ensure in their internal processes that declaration requirements are carefully prepared, reviewed and monitored by all managers dealing with international trade matters. This safeguards their ability to engage in business transactions with government in a smooth, predictable manner.

Collaboration is win-win for regulators and trade

Regulatory administrations view legitimate traders as partners in the risk management and trade facilitation process. Good communication, consultation and co-operation between trading businesses and regulatory administrations are therefore vital to effectively balance control and trade facilitation. For regulatory agencies' administrations, collaboration will improve their knowledge of trading practices while greater familiarity with trends in international trade improves risk management.

Many administrations maintain formal consultative committees with traders, carriers, agents, banks, port and airport operators and their representative organizations. The role of such committees typically includes the discussion of projected changes in control requirements, the identification of difficulties experienced by declarants in complying with actual or proposed procedures and arriving at mutually acceptable solutions. In

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129 “Periodic filing” and “deferred payments” are facilitative procedures that administrations extend to compliant, trusted traders. Periodic filing means allowing traders to make a periodic, consolidated declaration to cover all transactions over a given period in the past (such as the past 15 days or month), removing the need to file with each transaction. Deferred payment is a facilitative procedure extended only to authorized (trusted, compliant) operators to pay their duty and tax liabilities within x days of release of cargo. In the normal clearance lane, cargo is not released unless payment or securities, as the case may be, are deposited.

addition, certain administrations have introduced “client-coordinators” who maintain contact with individual companies to strengthen communication exchange.

Business representatives should play a positive and contributory role in these processes. There should be regular and continued collaboration at all levels; at local/regional level between officials of regulatory agencies and business and at national level between customs and other regulatory agencies, administrations, and business. Regular and frequent consultation with agencies is a means for businesses to familiarize themselves with the regulations and suggest alignments of policies and processes with business realities.

Stay informed

It is important that all interested persons are able to obtain information from customs about procedures and control requirements. Sources may include the customs tariff, official gazettes, bulletins and notices. Customs departments should ensure that these are readily available.

Having complete, accurate and timely information is important for managing compliance and preventing surprises and problems. Customs administrations are now using modern techniques to disseminate information, and such channels should be regularly and frequently utilized.

Government training organizations can be approached to implement training in specific areas, and seminars, workshops and training opportunities should be among the tools used.

Businesses should also subscribe to information channels that provide changes in operational procedures, like customs’ administrative notifications, public notices, standing orders and instructions – and keep an organized office library of all such documents. Having an updated copy of the Customs Act, tariffs, rules, regulations, and case laws, through subscriptions to legal gazettes, is also essential.

Watch for sector-specific regulatory changes

On occasion, in response to requests from businesses, or its own analysis, a government imposes duties like anti-dumping, safeguard and countervailing or regulatory duties.

Likewise, trade agreements are reviewed among countries and regional blocs. It is important that such updates, which can be garnered from the relevant information channels, are checked and verified. Information relevant to your sector, products or clients must be shared with all managers, staff and clients.

Support regulatory agencies with trusted and credible information

Co-operation is valuable for regulatory agencies seeking to combat illicit trade activities (e.g. drugs, fake products etc.). This is encouraged by national administrations through a range of Memoranda of Understanding (MOUs) between trade organizations, both at national and international levels. It should be supported by detailed guidelines, developed and disseminated in information exchange, training and communication arrangements appropriate to each sector.

MOUs are also concluded in customs-to-company memoranda and guidelines. This brings many benefits to both regulatory agencies and the trade organization; for regulatory agencies, they provide a further valuable source of information for risk management. In return, traders with a good record of co-operation can expect less intervention and interference from customs.

Provide evidence-based, quality inputs during policy changes

Government and customs departments generally invite suggestions from businesses before any major policy changes. Business can leverage this opportunity to provide useful and evidence-based information to government. Often, in developing countries, information provided by companies at these junctures is not supported by data and analysis. Business should develop this capacity and become credible partners in the policy consultation process.
Show due diligence in compliance procedures

Businesses are required to demonstrate due diligence in regulatory compliance procedures and should use all information channels to remain updated and ensure that all proper protocols (such as documentation requirements) are followed.

Government administrations are increasingly treating their clients on the basis of their profiles and compliance history. Even where customs audits are not yet advanced, evidence of errors or variance between declaration and customs assessments can be damaging. These can be prevented through greater due diligence.

When errors occur, it is important to determine the cause, and ensure that a process is in place to prevent it in future. It may be a staff training issue or a failure to receive updates on legal changes. It becomes more important when administrations are moving towards self-assessment and risk management-based approaches.

Have pre-compliance processes and a "reasonable care" checklist

Governments expect declarants to use “reasonable care” in reporting classification (i.e. HS Codes), value, country of origin, and duty preference program. Regulatory agencies have the right to check up and ensure that traders are using such “reasonable care” as regards the accuracy of the above information.

Businesses may develop their own sector and process-specific checklists, to ensure reasonable care, e.g.:

- For classification (HS Code) use a credible system that provides tariff search and classification assistance;
- That quantity, unit of measurement, value and currency are correctly entered;
- That the correct procedures have been applied;
- That policy conditions are complied with.

It is important to have pre-filings (internal processes to validate the declaration against the original information and documents, before the declaration is actually filed and transmitted to the customs system) and robust internal review processes in place when providing information to government agencies. Inadvertent errors identified before agencies have noticed must be reported immediately. Re-filing a corrected version of an erroneous disclosure may reduce potential penalties from agencies.

Compliance can also be improved through better internal processes and controls, such as keeping a record of each import transmission, and its related customs messages and form images; reviewing each declaration or information before filing it to customs or other agencies; and ensuring a swift response to messages and information requests from customs or other agencies.

A ‘checklist’ will help improve compliance, and should contain items including the following:

All declarations and information submissions

- Review of all documentation and supporting documents for accuracy;
- Consistency in the same or similar transactions across ports and modes of transport;
- Appropriate adjustments or Prior Disclosures when errors are discovered before customs systems begin checking or initiating action.

Cargo and Goods Description and Tariff Classification

- Having procedures in place to ensure that you have full knowledge of the products you are importing, such as composition, country of origin, etc.;
- Properly describing the merchandise to the customs system according to the regulations in place;
- Ensuring that the correct tariff classification of goods is provided;
- Verifying whether your goods are eligible for specific duty free status.

**Valuation**

- Correct valuation method under GATT code - ensuring accuracy of your declared transaction value, according to customs requirements;
- Are your transactions between “related” parties, and if so, have you ensured you are declaring the correct values to customs?
- Assists, commissions, royalties, etc., declared as appropriate.

**Country of Origin / Marking / Quota**

- Reliable procedures in place to ensure that the country of origin is declared correctly on your entry;
- Country regulations may have special marking or labelling requirements, e.g. marking with the country of origin/manufacture;
- Processes established to determine and ensure that all necessary documentation is provided at time of entry.

**Intellectual Property Rights**

- Ensure that any trademark or copyright is not being violated.

**Have an internal audit focusing on regulatory compliance**

An internal audit will help identify risks and improve regulatory compliance in international trade transactions. Agencies conduct post-clearance audits to ensure that businesses that are subject to regulatory controls have fully complied with all relevant legislation and requirements. Legal and regulatory provisions generally specify what documentation or records should be maintained by businesses for audit purposes. Such requirements from customs, VAT or other agencies provide a good checklist for businesses preparing an internal audit plan.

Knowing your obligations as an auditee is important, and a regulatory agency audit is meant to ensure compliance in all areas. A list of factors audited follows:

- That all third country imports and exports are properly declared;
- That all goods entered to a Customs procedure are properly declared;
- That import and export prohibitions and restrictions (license, quota, CITES, etc.) are observed;
- That documentation declared is in accordance with the national legislation on valuation for purposes of customs declaration and other taxes (VAT or excise);
- That conditions of approval are observed, and all duties relating to diversions, home consumption, etc., are properly paid;
- That declarants are complying with their obligation to retain all supporting documents for the period as required by legislation in place;
- That operators using a Simplified Procedure are complying with the relevant conditions in each case and there is no abuse in their use of these facilities;
• That all excisable goods entered for operation are properly accounted for and all losses are genuine, properly recorded and maintained within allowable parameters;

• That all goods leaving tax or customs warehouses are accompanied by the correct documentation and covered by a guarantee or bond where applicable;

• That all goods removed from a warehouse under a duty-suspended procedure complete the declared procedure and are properly receipted;

• That all duties are properly calculated, covered by adequate deferred guarantees or bonds, and paid by the appropriate date.

**Continuous training of staff and managers**

A key to increasing compliance is to ensure a trained and professional workforce. Business should remain in touch with customs training organizations which can help organize up-skilling programmes for their community. For the new staff, always organize orientation exercises. A proper take-over process should also be in place when staff is replaced.

Personnel involved must understand the cost of non-compliance. It is important that staff working on preparing and handling documentation and records for filing to customs or tax authorities are not only well-trained in their job but are also sensitive to the implications of making errors and how much it can cost to their company or clients, in terms of delays, penalties and compliance rating.

**Use sound documentation practices**

An organized and complete documentation process is the best protection to ensure that risk management continues to be in place even when an important staff member is leaving the organization.

With regard to transactions filed with customs agencies, always ensure that the organization knows the legal requirements regarding the time period necessary for retaining records for government audit purpose.

**Utilize available channels for Advance Rulings and reviews**

Many administrations have some form of advance ruling process in place. Whether that ruling is binding or not, it provides information and clarity to the requester. It is important that such processes are utilized whenever in doubt or need clarification.

**Have a documented compliance plan**

For larger businesses, it is important to have a documented compliance strategy. For SMEs, this may not be feasible, but even for these, certain processes and checklists for internal controls should be developed.

The compliance plan may include:

• Definition of who is responsible for compliance, for each part of your import or export process;

• Enhanced accountability;

• Provision of safeguards and controls to ensure consistent processing and decision-making;

• Communication of “red flags” that require additional transaction scrutiny;

• Tools and training to ensure employees are following compliance procedures.
Know the parties with whom you are doing business

Border agency risk management systems evaluate risks on your business transactions. The system takes into account the profile of participating parties such as the carrier, custodian, agents, and even shippers, manufacturers and other parties on the other side of the border. It is important that as an importer or exporter you select a customs broker or agent who is professional and has a good reputation.

One of the least understood aspects of exporting is the need to verify the final user and destination of your products. It is essential to ensure that your goods or merchandise are not sold on to a sanctioned entity or country or repurposed by a sanctioned party. Therefore, you need to know not only the country and the entity to which you sell, but also that entity’s likely customers for your products.

The Departments of Commerce, State and the Treasury should manage lists of prohibited entities, individuals and countries. It is your company’s responsibility to know all parties involved in or with your transaction, such as shipping companies, freight forwarders, insurance brokers and end users, and whether they are included on this list.

These government lists of sanctioned countries and entities can change daily, so it is important to check them at each stage of your transaction — from beginning to end. To help comply with these requirements, you may wish to consult your legal advisers on terms to include in your sales agreement.

Make use of accredited and compliant-operator schemes

Many administrations have accredited parties or client processes, and eligibility criteria are notified. Such accredited clients have tangible benefits, in terms of ease and predictability of their business transactions with border agency system.

Since the adoption of the SAFE Framework (WCO Framework of Standards to Secure and Facilitate Global Trade) in June 2005, several countries have introduced AEO (Authorized Economic Operator) or AEO-type programmes. The benefits that these programmes entail for accredited AEOs include:

- Mutual recognition of AEO status by customs administrations;
- Expedited processing and release of shipments, supported by regular “time required for release” studies;
- Financial guarantee waivers, reductions or rebates;
- Notification of intention to release prior to goods’ arrival i.e. pre-clearance;
- Pre-qualification for simplified procedures, including possibilities for a single-step process, or a two-step process for release/clearance purposes, according to the importer’s preference;
- Establishment of economic operator-based profiles, and audit-based controls, as opposed to transaction-based controls;
- Priority of inspection and use of non-intrusive inspection equipment whenever physical examination is required;
- Priority customs’ processing during a period of elevated threat conditions;
- Priority treatment in post-incident resumptions and trade recovery programmes;

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• They are a significant factor in determining the administrative settlement of a customs offence (consistent with Annex H, Chapter 1, Standard 23 and Standard 3.39 of the RKC);
• Self-assessment when customs automated systems are not functioning;
• An option to provide a reduced standard data-set for security risk assessment purposes.
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