



CIP | Inter-American
Committee on Ports

Inter-American Committee on Ports CIP OAS.



Risk Level Matrix.

User Manual.

With the collaboration of the company “Cuervo Consultores” from Mexico.



Risk Level Matrix Draft CIP OAS.

	Modelo de Analisis de Riesgos CIP-OEA					
MODELO DE EVALUACIÓN DE AMENAZAS						
Nivel de Riesgo:		<div><div></div> CRÍTICO</div> <div><div></div> IMPORTANTE</div> <div><div></div> SIGNIFICANTE</div> <div><div></div> BAJO</div>				
AMENAZAS/AMENAZAS	IMPACTO	PROBABILIDAD	NIVEL DE RIESGO SIN VULNERABILIDADES NI SALVAGUARDAS	VULNERABILIDADES	SALVAGUARDAS	NIVEL DE RIESGO FINAL
ROBO HORMIGA DE MERCANCIA CONTENARIZADA	BAJO	PROBABLE	12	REDUCIBLES	SUFICIENTES	9
POLIZONES AL INTERIOR DEL PUERTO	BAJO	PROBABLE	12	REDUCIBLES	SUFICIENTES	10,2
BLOQUEO VIA TERRESTRE AL ACCESO PRINCIPAL DEL RECINTO PORTUARIO	ALTO	PROBABLE	300	GRAVES	SUFICIENTES	375
ACCIDENTE POR MALA MANIOBRA CON UN CONTENEDOR	MEDIO	POSIBLE	30	REDUCIBLES	REGULARES	30
SOBREVUELO DE DRON NO AUTORIZADO AL INTERIOR DEL PUERTO	ALTO	PROBABLE	300	PREOCUPANTES	INSUFICIENTES	420
EXPLOSION EN UN BUQUE DURANTE LA MANIOBRA DE CARGA-DESCARGA DE MATERIAL PELIGROSO A GRANEL	MUY ALTO	PROBABLE	600	PREOCUPANTES	REGULARES	720
CORTE DE ENERGIA ELECTRICA TOTAL EN LAS INSTALACIONES PORTUARIAS	ALTO	POSIBLE	150	REDUCIBLES	SUFICIENTES	112,5
SEMBRADO DE CARGA ILICITA EN EL CASCO DE UN BUQUE DURANTE SU ESTADIA EN EL PUERTO	ALTO	POSIBLE	150	PREOCUPANTES	REGULARES	187,5
HUELGA DE LOS TRABAJADORES ENCARGADOS DE LA CARGA EN EL PUERTO	BAJO	POCO PROBABLE	20	POCOS	SUFICIENTES	12
BLOQUEO AL ACCESO INTERIOR DEL PUERTO POR PARTE DE PESCADORES LOCALES	MUY ALTO	PROBABLE	600	GRAVES	REGULARES	900

The MATRIX FOR RISK ANALYSIS MODEL presented was created and written by Dr. Noe Cuervo Vásquez from consulting and training company “Dr. Cuervo Consultores”. The Secretariat of the Inter-American Committee on Ports currently holds the rights for the use and dissemination of the MATRIX FOR RISK ANALYSIS.

The Matrix is a tool created in order to make quantitative assessments of possible risks presented during port operations. Solutions can be implemented to improve port safety and security based on the evaluations performed with the metrics it gives.

It is important to note that the cells in the spreadsheet possess the corresponding mathematical formula needed to calculate the risk levels. Therefore, it is advised not to modify them.

Executive summary.

The risk evaluation matrix presents the threat levels schematically: Red: **Critical**; Maroon: **Important**; Yellow: **Significant** and Green: **Low**.

- The **first** column provides potential risk events that may be encountered at ports.
- The **second** column demonstrates the impact level that can be caused by the events described in the **first** column.
- The **third** column approximates the likelihood of such events.
- The **fourth** column shows a numerical calculation of the potential damage incurred in a hypothetical scenario where there are no safety precautions.
- The **fifth** column shows vulnerabilities at distinct levels of each of the hypothetical events in the **first** column.
- The **sixth** column demonstrates an analysis of the resources available to safeguard against each of the hypothetical events in the **first** column.
- In the last column shows the overall threat level when adjusting for existing safeguards.

Nomenclature.

Risk: The severity of an incident, the threat of the likelihood of its occurrence and the vulnerability incurred.

RISK: SEVERITY OF AN INCIDENT x THREAT LEVEL x VULNERABILITY.

Severity: Consequences of an incident. Measured in personal injury, cost to human life, financial damage or/and environmental damage.

Threat: Possibility of a protection incident occurring.

Vulnerability: Predisposition or susceptibility that an element has to be affected by an incident without prior safeguarding.




Step 1:

Possible events

On this field, the person in charge, should write down the threats they consider most relevant as the first step to perform a risk assessment.

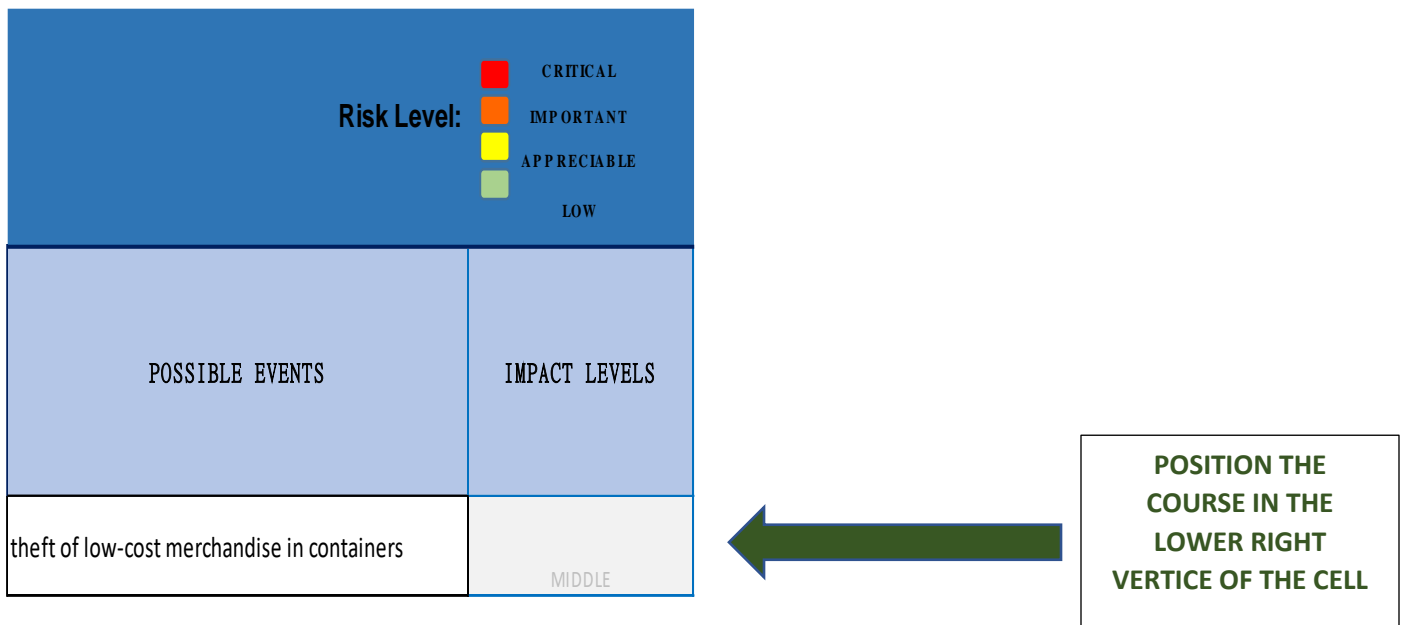
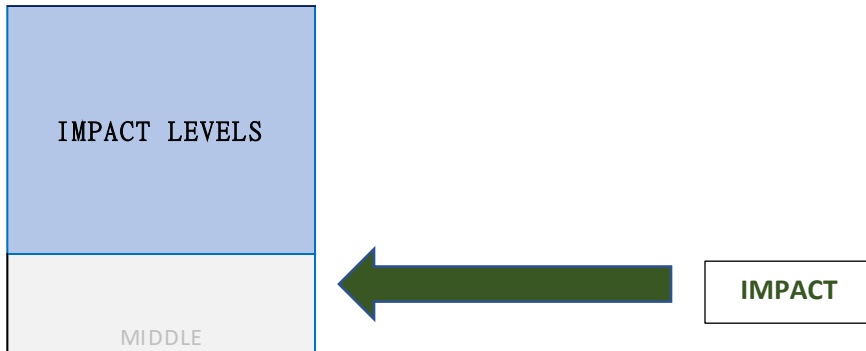
POSSIBLE EVENTS
theft of low-cost merchandise in containers
stowaways found in the port
blockage of port's main land entry point
accident due to the mishandling of a container
unauthorized drone flying over the port
explosion in a vessel during the onloading/offloading process of flammable bulk
power outage throughout port facilities
smuggled goods loaded on a vessel while docked
labor strike carried out by dockworkers, terminal operators, or stevedores
local fishermen blocking access to the port
hostage crisis



POSSIBLE EVENTS

Step 2:

Impact:



The **IMPACT LEVELS** column demonstrates the approximate level of damage that an event described in the previous column would have. The person can choose between the following, which are:

Very high

High

Medium

Low

Very low

When the **IMPACT LEVEL** is selected according to the above scale, the color and numerical grade assigned in the columns that indicate **“RISK LEVEL WITHOUT VULNERABILITIES OR SAFEGUARD”** and **“TOTAL RISK LEVEL”** change depending on the level of impact considered.

POSSIBLE EVENTS	IMPACT LEVELS	PROBABILITY LEVELS	RISK LEVEL WITH NO PRIOR SAFEGUARDING OR VULNERABILITES	VULNERABILITES	SAFEGUARDS AVAILABLE	TOTAL RISK LEVEL
theft of low-cost merchandise in containers	MIDDLE	VERY RARE	10	REGULAR	NULL	10

If the level of impact changes, the score and color of the risk levels will change alongside it.

POSSIBLE EVENTS	IMPACT LEVELS	PROBABILITY LEVELS	RISK LEVEL WITH NO PRIOR SAFEGUARDING OR VULNERABILITES	VULNERABILITES	SAFEGUARDS AVAILABLE	TOTAL RISK LEVEL
theft of low-cost merchandise in containers	VERY HIGH	VERY RARE	100	REGULAR	NULL	100

STEP 3:
Probability

PROBABILITY LEVELS
VERY RARE
POSSIBLE
POSSIBLE
POSSIBLE
LIKELY

←

PROBABILITY

<div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div> <div>CRITICAL</div> <div>IMPORTANT</div> <div>APPRECIABLE</div> <div>LOW</div> </div> </div>				
POSSIBLE EVENTS	IMPACT LEVELS	PROBABILITY LEVELS		
theft of low-cost merchandise in containers	MIDDLE	VERY RARE		
stowaways found in the port	LOW	POSSIBLE		
blockage of port's main land entry point	MIDDLE	POSSIBLE		
accident due to the mishandling of a container	MIDDLE	POSSIBLE		
unauthorized drone flying over the port	HIGH	LIKELY		



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Clicking on the **PROBABILITY** icon, the likelihood that the threats may occur at the ports are displayed. The option will allow the person to select between:

Practically Safe

Likely

Possible

Uncertain

Rare

The color and numerical grade assigned in the columns that indicate **"RISK LEVEL WITHOUT VULNERABILITIES OR SAFEGUARDS"** and **"TOTAL RISK LEVEL"** change depending on the level of impact considered.

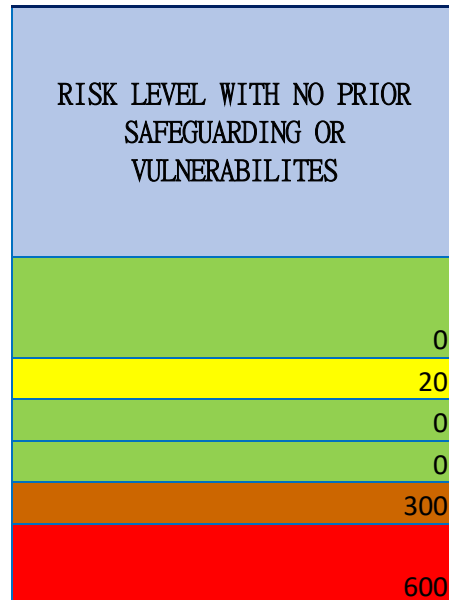
<div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div> <div>CRITICAL</div> <div>IMPORTANT</div> <div>APPRECIABLE</div> <div>LOW</div> </div> </div> <div>THREAT ASSESSMENT MODEL</div>						
POSSIBLE EVENTS	IMPACT LEVELS	PROBABILITY LEVELS	RISK LEVEL WITH NO PRIOR SAFEGUARDING OR VULNERABILITES	VULNERABILITES	SAFEGUARDS AVAILABLE	TOTAL RISK LEVEL
theft of low-cost merchandise in containers	MIDDLE	VERY RARE	0	REGULAR	NULL	
stowaways found in the port	LOW	POSSIBLE	6	FEW RISKS	SATISFACTORY SAFEGUARDS	4.5

If the probability level is changed, the score and/or color of the risk levels will automatically change.

<div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div> <div>CRITICAL</div> <div>IMPORTANT</div> <div>APPRECIABLE</div> <div>LOW</div> </div> </div> <div>THREAT ASSESSMENT MODEL</div>						
POSSIBLE EVENTS	IMPACT LEVELS	PROBABILITY LEVELS	RISK LEVEL WITH NO PRIOR SAFEGUARDING OR VULNERABILITES	VULNERABILITES	SAFEGUARDS AVAILABLE	TOTAL RISK LEVEL
theft of low-cost merchandise in containers	MIDDLE	VERY RARE	0	REGULAR	NULL	
stowaways found in the port	LOW	PRACTICALLY SAFE	20	FEW RISKS	SATISFACTORY SAFEGUARDS	15

STEP 4:

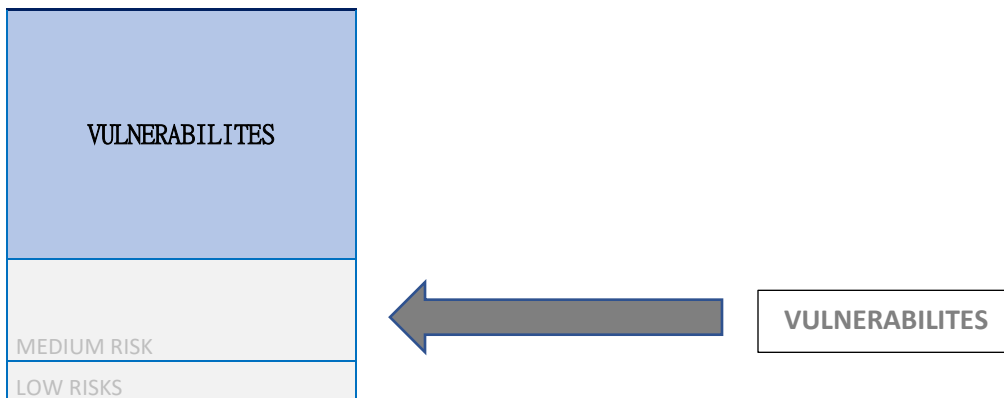
Risk level without vulnerabilities or safeguards.



Here, the person can visualize the level or risk in case of a damaging incident occurring without prior safeguarding or assessment of vulnerabilities. The person can also assign a numerical grade and color according to the risk/impact level in case the aforementioned situation was to occur.

Step 5:

Vulnerability



<div> <div> <div></div> <div></div> <div></div> <div></div> </div> <div> <div>CRITICAL</div> <div>IMPORTANT</div> <div>APPRECIABLE</div> <div>LOW</div> </div> </div> <div>THREAT ASSESSMENT MODEL</div>				
POSSIBLE EVENTS	IMPACT LEVELS	PROBABILITY LEVELS	RISK LEVEL WITH NO PRIOR SAFEGUARDING OR VULNERABILITIES	VULNERABILITIES
theft of low-cost merchandise in containers	MIDDLE	VERY RARE	0	MEDIUM RISK
stowaways found in the port	LOW	PRACTICALLY SAFE	20	LOW RISKS
blockage of port's main land entry point	HIGH	POSSIBLE	150	MEDIUM RISK

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The **VULNERABILITY** icon classifies the threats according to the insecurity a port has in response to a threat. The person can choose between the following:

Note: If the port is more sensitive to a particular risk, the scale increases, and vice-versa.

Very high risk.

High risk.

Medium risk.

Low risks.

Very low risk.

The color and numerical grade assigned in the columns that indicate **“RISK LEVEL WITHOUT VULNERABILITIES OR SAFEGUARDS”** and **“TOTAL RISK LEVEL”** change depending on the level of vulnerability.

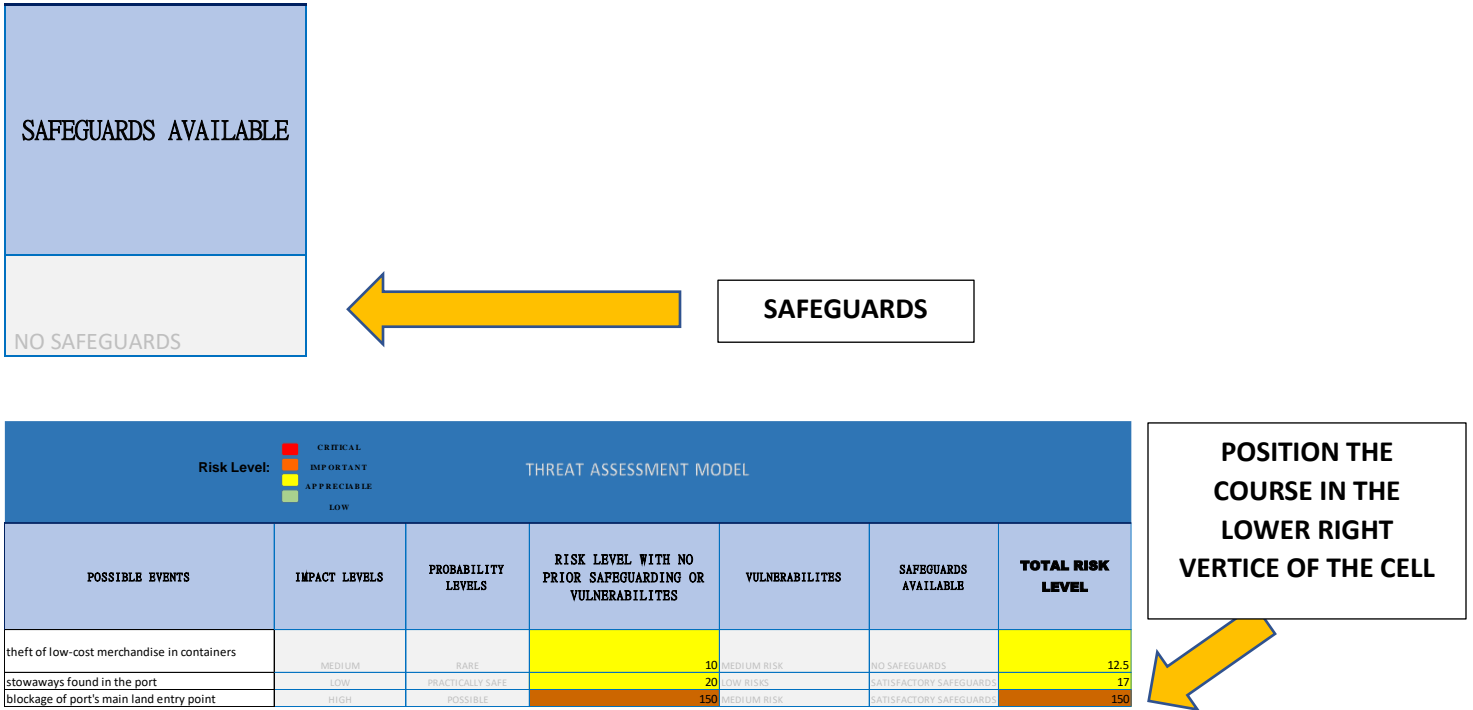
POSSIBLE EVENTS	IMPACT LEVELS	PROBABILITY LEVELS	RISK LEVEL WITH NO PRIOR SAFEGUARDING OR VULNERABILITIES	VULNERABILITIES	SAFEGUARDS AVAILABLE	TOTAL RISK LEVEL
theft of low-cost merchandise in containers	MEDIUM	RARE	10	MEDIUM RISK	NO SAFEGUARDS	12.5
stowaways found in the port	LOW	PRACTICALLY SAFE	20	LOW RISKS	SATISFACTORY SAFEGUARDS	17
blockage of port's main land entry point	HIGH	POSSIBLE	150	MEDIUM RISK	SATISFACTORY SAFEGUARDS	150
accident due to the mishandling of a container	MEDIUM	POSSIBLE	30	MEDIUM RISK	INSUFFICIENT SAFEGUARDS	30
unauthorized drone flying over the port	HIGH	LIKELY	300	VERY HIGH	INSUFFICIENT SAFEGUARDS	300
explosion in a vessel during the unloading/offloading process of flammable bulk	VERY HIGH	LIKELY	600	VERY HIGH	NO SAFEGUARDS	600

If the Vulnerability level is changed, the score and/or color of the risk levels will automatically change.

POSSIBLE EVENTS	IMPACT LEVELS	PROBABILITY LEVELS	RISK LEVEL WITH NO PRIOR SAFEGUARDING OR VULNERABILITIES	VULNERABILITIES	SAFEGUARDS AVAILABLE	TOTAL RISK LEVEL
theft of low-cost merchandise in containers	MEDIUM	RARE	10	MEDIUM RISK	NO SAFEGUARDS	12.5
stowaways found in the port	LOW	PRACTICALLY SAFE	20	LOW RISKS	SATISFACTORY SAFEGUARDS	17
blockage of port's main land entry point	HIGH	POSSIBLE	150	MEDIUM RISK	SATISFACTORY SAFEGUARDS	150
accident due to the mishandling of a container	MEDIUM	POSSIBLE	30	MEDIUM RISK	SATISFACTORY SAFEGUARDS	30
unauthorized drone flying over the port	HIGH	LIKELY	300	VERY HIGH	INSUFFICIENT SAFEGUARDS	300
explosion in a vessel during the unloading/offloading process of flammable bulk	VERY HIGH	LIKELY	600	VERY HIGH	NO SAFEGUARDS	600

Step 6:

Safeguards:



The person can classify the safeguards available in the port for each hypothetical threat. The person can choose between the following:

- Many Safeguards
- Sufficient Safeguards
- Satisfactory Safeguards
- Insufficient Safeguards
- No Safeguards

The color and numerical grade assigned in the columns that indicate “**RISK LEVEL WITHOUT VULNERABILITIES OR SAFEGUARDS**” and “**TOTAL RISK LEVEL**” change depending on the safeguards available.

<div> <div> <div></div> CRITICAL <div></div> IMPORTANT <div></div> APPRECIABLE <div></div> LOW </div> <div>THREAT ASSESSMENT MODEL</div> </div>						
POSSIBLE EVENTS	IMPACT LEVELS	PROBABILITY LEVELS	RISK LEVEL WITH NO PRIOR SAFEGUARDING OR VULNERABILITIES	VULNERABILITIES	SAFEGUARDS AVAILABLE	TOTAL RISK LEVEL
theft of low-cost merchandise in containers	MEDIUM	RARE	10	MEDIUM RISK	NO SAFEGUARDS	12.5
stowaways found in the port	LOW	PRACTICALLY SAFE	20	LOW RISKS	SATISFACTORY SAFEGUARDS	17
blockage of port's main land entry point	HIGH	POSSIBLE	150	MEDIUM RISK	SATISFACTORY SAFEGUARDS	150
accident due to the mishandling of a container	MEDIUM	POSSIBLE	30	MEDIUM RISK	SATISFACTORY SAFEGUARDS	30
unauthorized drone flying over the port	HIGH	LIKELY	300	HEAVY RISK	INSUFFICIENT SAFEGUARDS	270

If the Safeguards level is changed, the score and/or color of the risk levels will automatically change.



<div> <div> <div></div> CRITICAL <div></div> IMPORTANT <div></div> APPRECIABLE <div></div> LOW </div> <div>THREAT ASSESSMENT MODEL</div> </div>						
POSSIBLE EVENTS	IMPACT LEVELS	PROBABILITY LEVELS	RISK LEVEL WITH NO PRIOR SAFEGUARDING OR VULNERABILITIES	VULNERABILITIES	SAFEGUARDS AVAILABLE	TOTAL RISK LEVEL
theft of low-cost merchandise in containers	MEDIUM	RARE	10	MEDIUM RISK	NO SAFEGUARDS	12.5
stowaways found in the port	LOW	PRACTICALLY SAFE	20	LOW RISKS	SATISFACTORY SAFEGUARDS	17
blockage of port's main land entry point	HIGH	POSSIBLE	150	MEDIUM RISK	SATISFACTORY SAFEGUARDS	150
accident due to the mishandling of a container	MEDIUM	POSSIBLE	30	MEDIUM RISK	SATISFACTORY SAFEGUARDS	30
unauthorized drone flying over the port	HIGH	LIKELY	300	HEAVY RISK	INSUFFICIENT SAFEGUARDS	75

Step 7:

The total risk level

TOTAL RISK LEVEL	
	12.5
	17
	150
	30
	75
	600
	135

Event: theft of low-cost merchandise in containers

	RISK LEVEL MATRIX					
<div><div><div></div>CRITICAL</div><div><div></div>IMPORTANT</div><div><div></div>APPRECIABLE</div><div><div></div>LOW</div></div> <div>Risk Level:</div> <div>THREAT ASSESSMENT MODEL</div>						
POSSIBLE EVENTS	IMPACT LEVELS	PROBABILITY LEVELS	RISK LEVEL WITH NO PRIOR SAFEGUARDING OR VULNERABILITES	VULNERABILITES	SAFEGUARDS AVAILABLE	TOTAL RISK LEVEL
theft of low-cost merchandise in containers	MEDIUM	RARE	10	MEDIUM RISK	NO SAFEGUARDS	12.5
stowaways found in the port	LOW	PRACTICALLY SAFE	20	LOW RISKS	SATISFACTORY SAFEGUARDS	17
blockage of port's main land entry point	HIGH	POSSIBLE	150	MEDIUM RISK	SATISFACTORY SAFEGUARDS	150
accident due to the mishandling of a container	MEDIUM	POSSIBLE	30	MEDIUM RISK	SATISFACTORY SAFEGUARDS	30
unauthorized drone flying over the port	HIGH	LIKELY	300	HEAVY RISK	MANY SAFEGUARDS	75
explosion in a vessel during the onloading/offloading process of flammable bulk	VERY HIGH	LIKELY	600	VERY LOW RISK	NO SAFEGUARDS	600
power outage throughout port facilities	HIGH	POSSIBLE	150	REGULAR RISK	INSUFFICIENT SAFEGUARDS	135
smuggled goods loaded on a vessel while docked	HIGH	POSSIBLE	150	HEAVY RISK	SATISFACTORY SAFEGUARDS	112.5

Here we present the final result achieved for each **"ANTAGONISMS / THREATS"** exposed at the discretion of the person who used or manipulated said model; finally obtaining in quantitative and measurable result in order to be analyzed in conjunction with the possible threats that could arise in a port, what impact of affectation if it happens, taking into account the statistics or possibility that these occur and know if with their defenses, training, training, human and material resources how much to counteract said threats.

For any questions or advice please contact cip@oas.org.