

Emerging Technologies and their Application in Customs Risk Management in the context of Cross-border Paperless Trade and Single Window Environment

*WCO-UNESCAP
5th UNNExT Masterclass: Facilitating Cross-border
Paperless Trade using emerging technologies
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OUTLINE

- Customs Risk Management
 - Definitions
 - Risk Management Process
 - Risk Assessment, Profiling and Targeting
 - Evolution of Customs Risk Management
- Emerging Technologies: Overview
 - Big Data
 - Data Mining and Predictive Analytics
 - Econometric/Statistical Modelling
 - Artificial Intelligence and Machine Learning
 - Cloud Computing
 - Blockchain
- Risk Management in the Context of Cross-border Paperless Trade and Single Window Environment
- Conclusions and Good Practices

CUSTOMS RISK MANAGEMENT

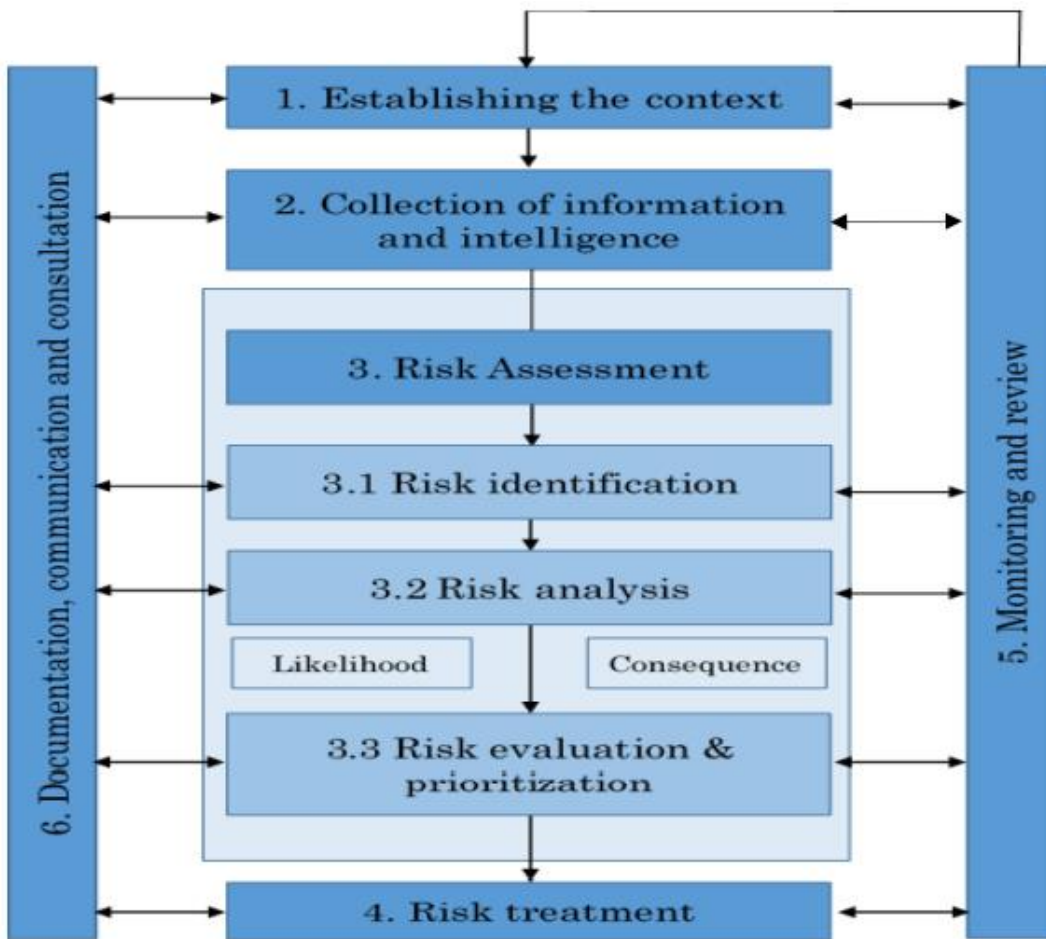
DEFINITIONS

- Risk Management: Coordinated activities by administrations to direct and control risk.
- Risk Assessment: Overall process of risk identification, risk analysis, risk evaluation and prioritization.
- Profiling: Description of any set of risks, including a predetermined combination of risk indicators, based on information which has been gathered, analyzed and categorized.
- Targeting: The selection for examination/audit of a certain consignment, passenger, means of transport, transaction or entity based on risk analysis, profiling, document review, observation and questioning techniques.

(WCO Customs Risk Management Compendium)

CUSTOMS RISK MANAGEMENT

RISK MANAGEMENT PROCESS



1. Establishing the context
2. Collection of information and intelligence
3. Risk assessment
 - Risk identification
 - Risk analysis
 - Risk evaluation and prioritization
4. Risk treatment
5. Monitoring and review
6. Documentation, communication and consultation

(WCO Customs Risk Management Compendium)

CUSTOMS RISK MANAGEMENT

RISK ASSESSMENT, PROFILING AND TARGETING

Identify, analyse, evaluate and prioritise the risks



Collect data, analyse, and identify risk indicators



Develop profiles



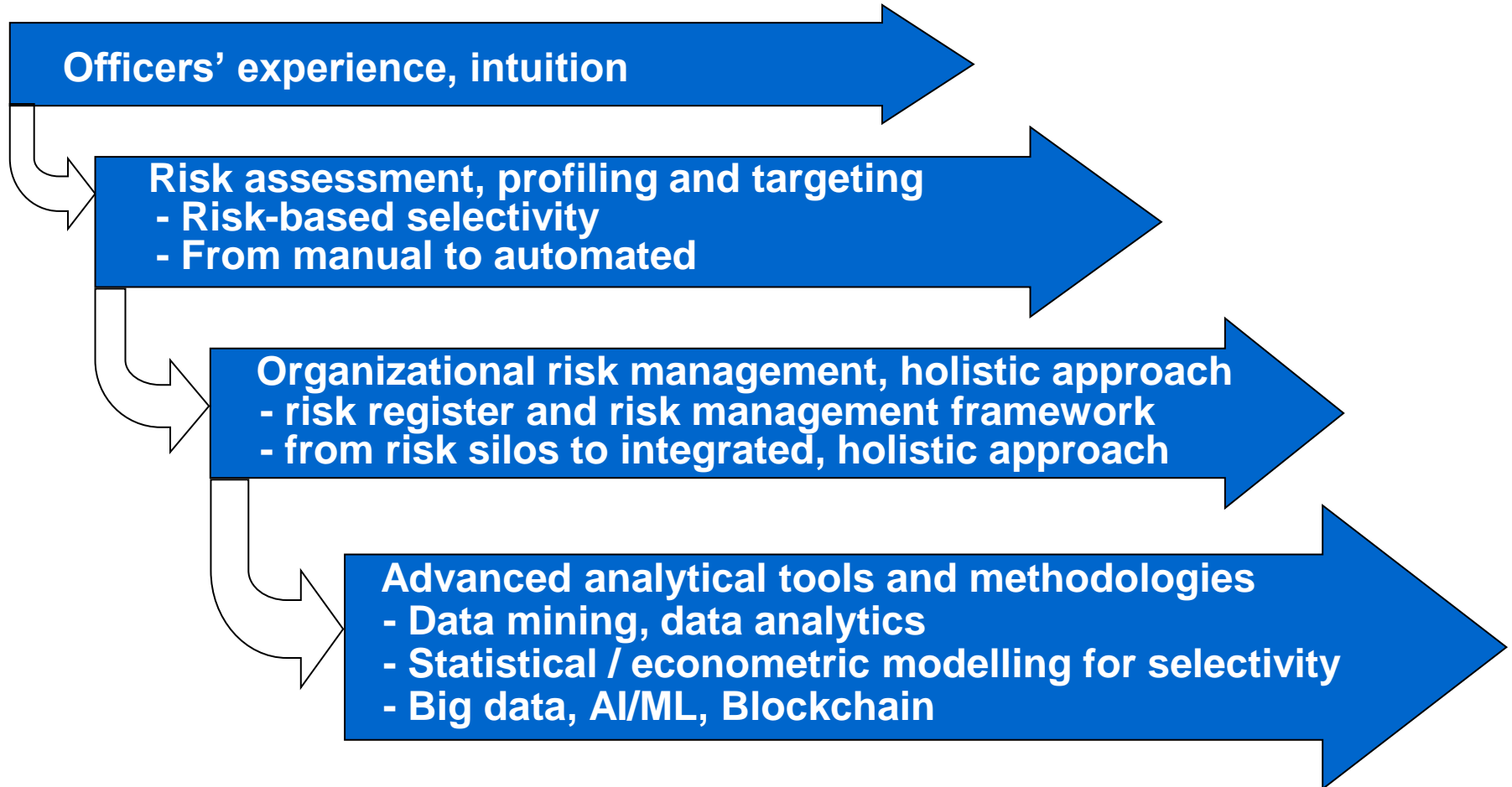
Selectivity/targeting



Monitor, review and update

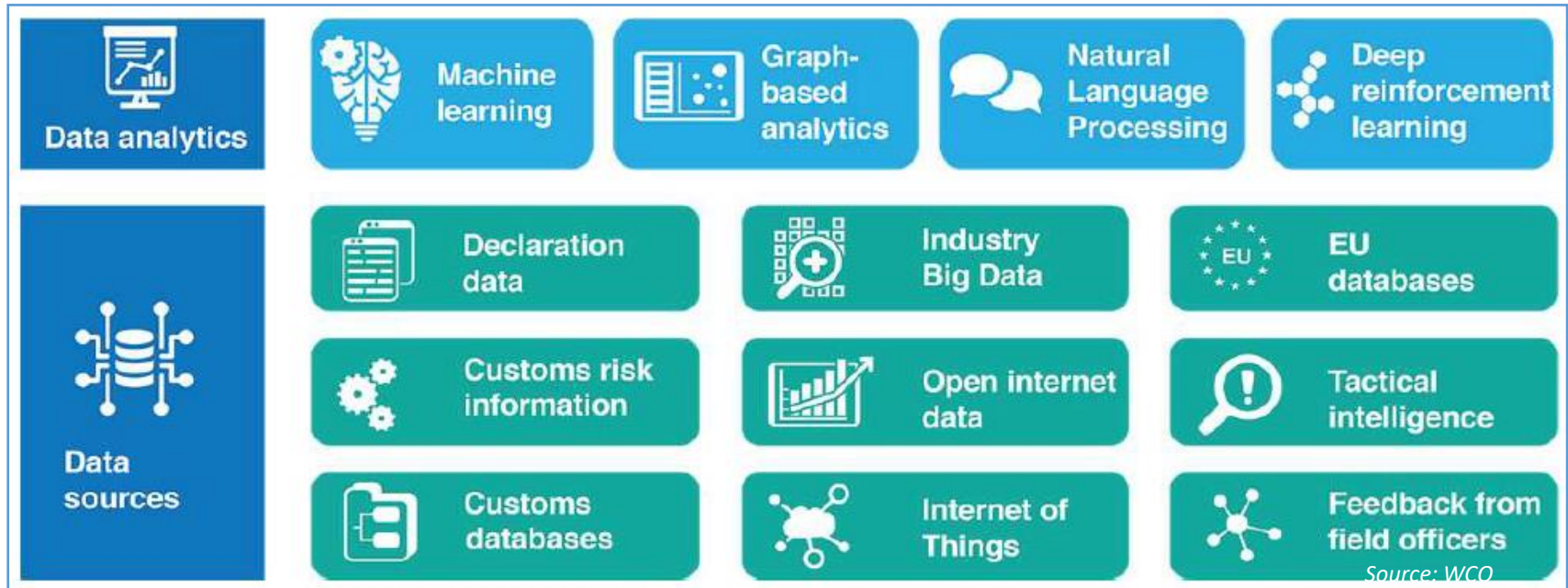
CUSTOMS RISK MANAGEMENT

EVOLUTION OF CUSTOMS RISK MANAGEMENT



EMERGING TECHNOLOGIES

OVERVIEW



- Big data, Data Mining
- Predictive Analytics
- Artificial Intelligence (AI), Machine Learning (ML), Deep Learning (ML)
- Blockchain

- Internet of Things (IoT)
- Biometrics, Facial Recognition
- Natural Language Processing
- Text Mining
- what else?

EMERGING TECHNOLOGIES

BIG DATA

Big data: enormous datasets, too big to analyse with traditional data management and processing tools

- Customs administrations create more and more data every day
- Manifest, declarations, AEO, PCA, examinations, seizures, etc
- Information from other national agencies, regional/international organizations
- Single window applications
- Public private partnership, MoU
- Open source information (!) etc.

Analysing data is getting more complicated

It is necessary to apply certain techniques for data analysis

EMERGING TECHNOLOGIES

DATA MINING and PREDICTIVE ANALYTICS

- Data mining on historical data is performed to discover anomalies that may indicate the presence of fraud
- Predictive analytics uses data patterns to make forward looking predictions
- Predictive models analyze historical data and predict how likely the same pattern is to reoccur in the future



EMERGING TECHNOLOGIES

ECONOMETRIC/STATISTICAL MODELLING

Econometric model specifies the statistical relationship between various variables. It is used by economists to forecast future developments.

ECONOMETRIC MODEL FOR CUSTOMS SELECTIVITY

“A powerful tool”, an illustration

VARIABLES

CUSTOMS	009
IMPORTER	4496250011
DECLARANT	0607
GOODS	8525801900
ORIGIN	112
COMPLIANCE	03
....	

RANKINGS

Customs =	7
Importer =	621
Declarant =	107
Goods =	99
Origin =	45
Compliance =	101
....	

COEFFICIENTS

β_1
β_2
β_3
β_4
β_5
.
β_n

EMERGING TECHNOLOGIES

ECONOMETRIC MODEL FOR CUSTOMS SELECTIVITY

Logistic regression is used: $p(y = 1/x) = \frac{1}{1+e^{-Z(x)}}$

in which: $X = \beta_1 1.7 + \beta_2 2.621 + \beta_3 1.07 + \beta_4 4.99 + \beta_5 5.45 + \beta_6 1.01$

This equation may result in: $1 / 1+e^{-Z(x)} = 0.754$

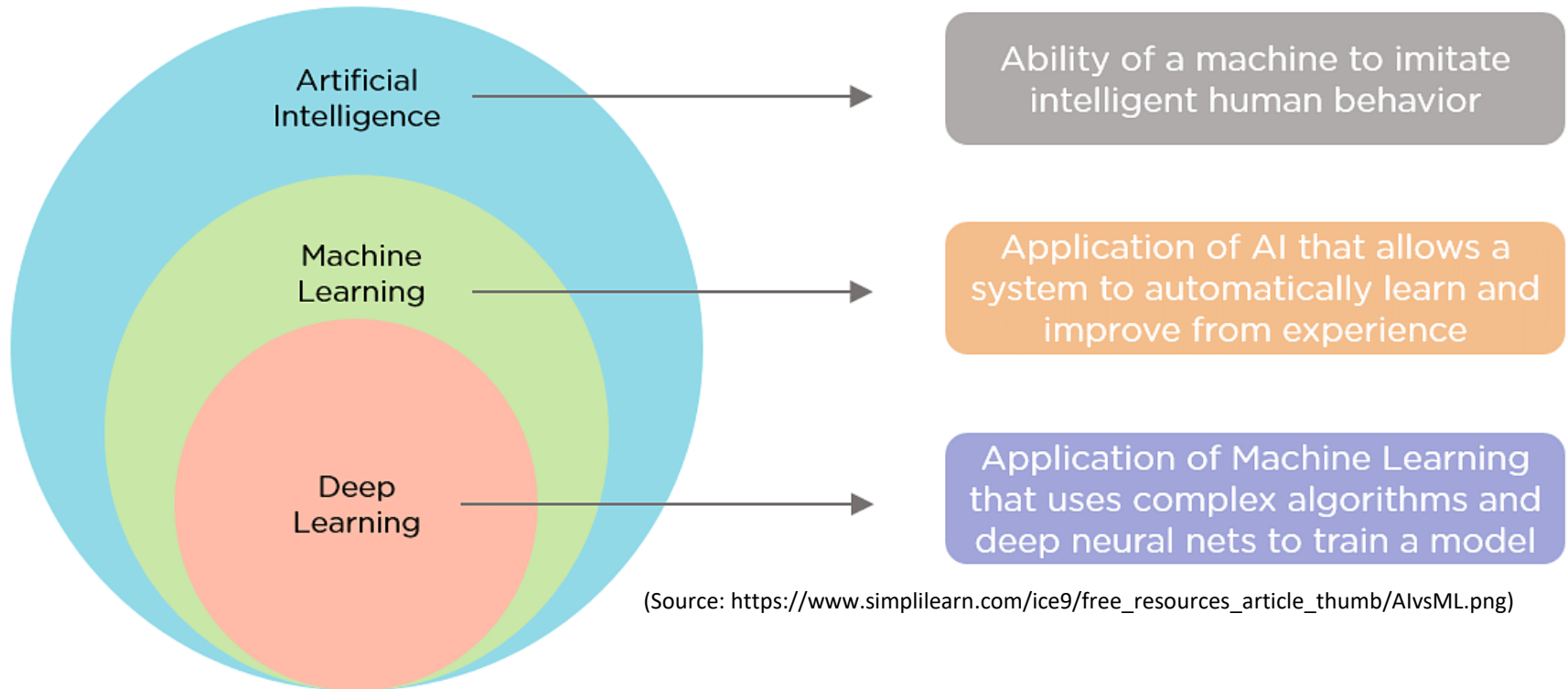
Result of the logistic regression is a value between 0 and 1. The highest values indicate higher risk levels.

0.00 - 0.60	GREEN
0.61 - 0.80	YELLOW
0.81 - 1.00	RED

**This operation will be classified as
YELLOW CHANNEL**

EMERGING TECHNOLOGIES

ARTIFICIAL INTELLIGENCE, MACHINE LEARNING (AI/ML)



Types of ML: Supervised learning, Unsupervised learning, Reinforcement learning

EMERGING TECHNOLOGIES

ARTIFICIAL INTELLIGENCE, MACHINE LEARNING (AI/ML)

AI IN CUSTOMS:

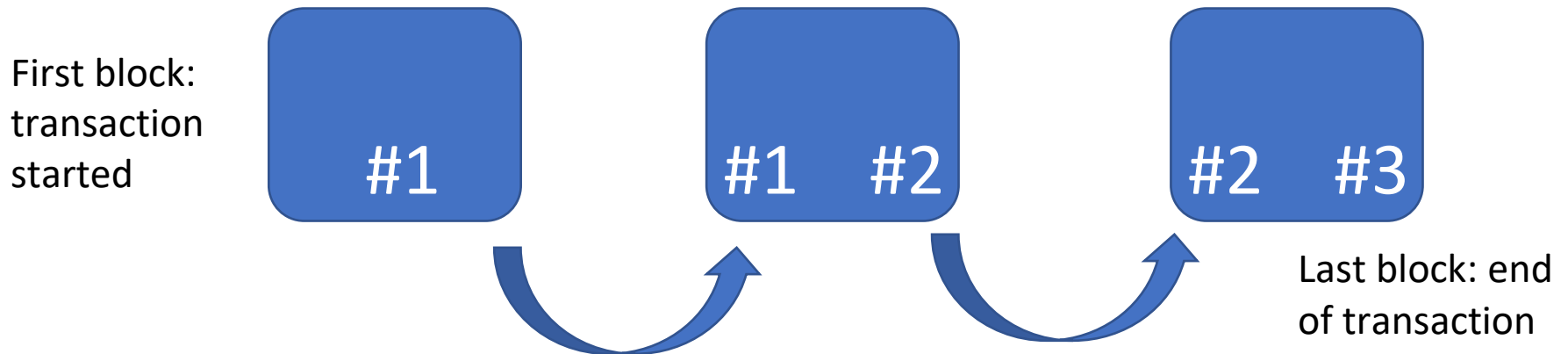
- To discover anomalies/possible frauds by analyzing huge amount of data in seconds –AI/ML based targeting
- Commodity classification (HS) –Deep learning
- X-ray Image analysis –automated processing of images and recognizing objects
- Revenue collection considerations -to ensure duties and taxes are accurately calculated and collected
- PCA –AI/ML assisted case management
- Face recognition for passenger processing
- Natural Language Processing (text mining, structure data suitable for analysis)
- Cargo tracking, geodata analytics

EMERGING TECHNOLOGIES

BLOCKCHAIN

- The block will receive the hash of previous block as well
- First block will contain one hash while following ones contain two
- In the network each user will have/receive the same blocks

SIMPLIFIED EXAMPLE:



EMERGING TECHNOLOGIES

BLOCKCHAIN IN CUSTOMS

- BlockchainGov, TRICK, BLOCKCHAINSOCIETY projects by the EU
- A blockchain PoC was conducted under the Australia–Singapore Digital Economy Agreement to achieve document interoperability for paperless cross-border trade.
- China and Singapore customs authorities are developing an international trade single window blockchain to exchange information on clearance, and logistics and cargo status to improve the port business environment and trade facilitation.
- Hong Kong, China customs is conducting a PoC study in applying blockchain to a licence management system.
- The customs authority of Indonesia aims to use blockchain and the TradeLens platform to simplify the exchange of goods, automate documentation and increase cooperation and communication.
- Malaysia, A pilot project for AEOs is in a preliminary study phase.

Source: WCO/WTO

EMERGING TECHNOLOGIES

CLOUD COMPUTING

- Traditional way: hardware and software in a computer. Access data and programs within the computer / server.
- Cloud computing: data and programs are outside of computer. Data and programs are stored in the cloud (cloud -> remote)
- Renting/buying enough capacity from cloud server providers (private, public, hybrid cloud)
- Examples:
 - Document sharing options
 - Social networking and telecom services
 - Online streaming services

Advantages vs Disadvantages

EMERGING TECHNOLOGIES

CLOUD COMPUTING IN CUSTOMS

- Cloud computing is a key enabler for digital government
- Adoption of cloud computing still faces barriers in the public sector.
- However, some Customs and public administrations already mitigated most of their systems to clouds considering advantages.
- There is a great potential to utilize cloud computing for Customs administrations.

RISK MANAGEMENT, CROSS-BORDER PAPERLESS TRADE, SINGLE WINDOW

CUSTOMS AUTHORITIES AND OTHER CROSS-BORDER REGULATORY AGENCIES (CBRAs)

- Customs
- Plant & Animal Quarantine Agencies
- Sanitary & Phytosanitary Inspection Agencies
- Food Safety Agencies
- Border Policing
- Transport departments

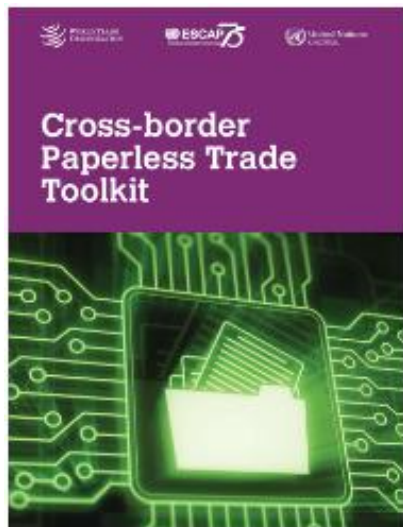
Risks that require regulatory intervention

- Customs and security risks
- Product non-compliance risks
- Sanitary and phytosanitary risks

Trade Facilitation
Cross-border Paperless Trade
Coordinated Border Management, Single Window
Integrated Risk Management, National Targeting Center

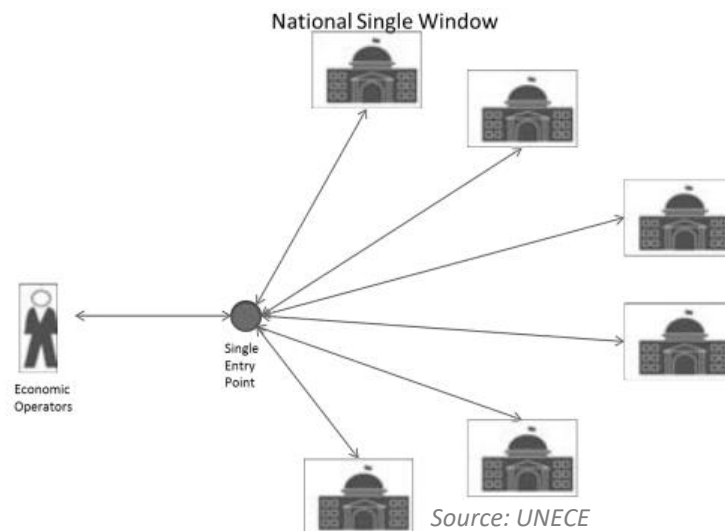
RISK MANAGEMENT, CROSS-BORDER PAPERLESS TRADE, SINGLE WINDOW

CROSS-BORDER PAPERLESS TRADE



Source: WTO

SINGLE WINDOW



Trade digitalisation

Electronic documents

Cross-border paperless trade and national single window systems

Challenges: political will, legal requirements, technical requirements

Cross-Border Paperless Trade toolkit: UNESCAP, UNCITRAL, WTO

Single window guides: UNECE, UNESCAP, WCO

RISK MANAGEMENT, CROSS-BORDER PAPERLESS TRADE, SINGLE WINDOW

INTEGRATED RISK MANAGEMENT IN A SINGLE WINDOW (SW) ENVIRONMENT

- Single Window is an important trade facilitation measure with an effective risk management system
- There should be close cooperation between all involved agencies
- Data harmonization and information exchange
- Enhanced focus on “high-risk” movements of goods and passengers
- Enhancement of use of data for risk management
- Risks would be managed in a comprehensive manner through an integrated system
- Better resource allocation, Expedited clearance lowers costs

Risk analysis: X Separate
 ✓ Joint
e.g. National Targeting Center

Examination of goods
 X Separate
 ✓ Joint

Reduced release times, lower transaction costs, enhanced trade facilitation

CONCLUSIONS & GOOD PRACTICES

DATA and DATA QUALITY ARE CRUCIAL

- In order to implement all these new technologies, data especially quality data is the key

COOPERATION AND INFORMATION EXCHANGE

- Another key element is Cooperation and Information Exchange
- Establish well functioning cooperation and information exchange among relevant agencies
- Intra-agency, inter-agency, international cooperation

CONCLUSIONS & GOOD PRACTICES

RISK MANAGEMENT ESSENTIALS -1

- Holistic approach
- Legislation
- Organizational arrangements
- Risk Management implementation
- Human resource and training
- Technology and equipment (NII, hand-held devices etc.)
- Integrate emerging technologies (e.g. AI/ML, data mining, Econometric Model for Selectivity)
- Other programs to support risk management (AEO, PCA etc.)

CONCLUSIONS & GOOD PRACTICES

RISK MANAGEMENT ESSENTIALS -2

- Information, Database, Data Quality
- Risk Assessment, Profiling and Targeting
- Compliance Management, Trusted Traders and Trader Segmentation
- Post Seizure Analysis, Mirror Analysis, Sectoral Trend Analysis
- Advance cargo and passenger information (ACI, PLACI, API/PNR)
- Performance Measurement (i.e. TRS, revenue, seizures, etc.)

CONCLUSIONS & GOOD PRACTICES

WHAT ELSE TO CONSIDER

- How to access data
- How best to collect data
- How to ensure data quality
- How to ensure personal data protection
- How best to analyze data
- How best to encourage data sharing

Search for good practices
Seek for assistance

GOOD PRACTICE

NEW TECHNOLOGIES IN CUSTOMS INNOVATION: KOREA CUSTOMS

A short video will be played (9 min.)

THANK YOU FOR YOUR ATTENTION

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