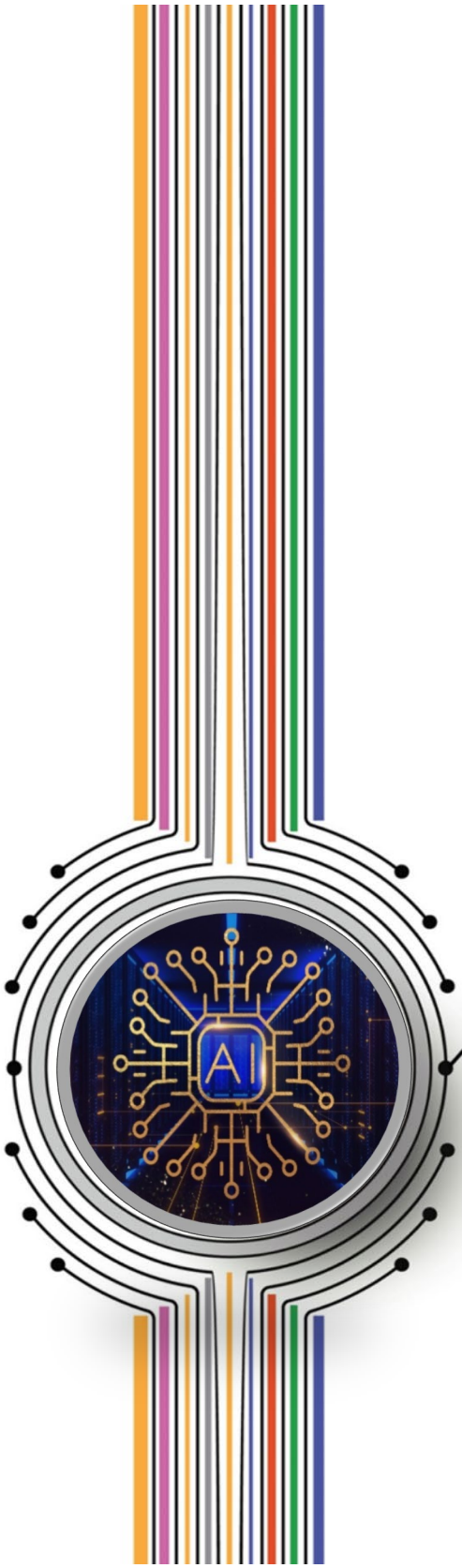

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White Paper

on the use of Artificial Intelligence in Trade Facilitation

February 2023

Note

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Simple, Transparent and Effective Processes for Global Commerce

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1. EXECUTIVE SUMMARY

Artificial intelligence (AI) is an enabling technology impacting the global economy and international trade. Combined with business-process-oriented automation and more efficient data flow exchanges, AI further promises to lift barriers to international trade, stimulate growth in global electronic commerce and allow for better predictions and associations to inform policy decisions.

Ethics and responsibility also play a key role in the design and implementation of AI systems. Ethical AI adheres to fundamental ethical guidelines such as accountability, transparency, privacy and data protection, lawfulness, fairness and non-discrimination. Responsible AI should avoid biases rooted in data and not discriminate against someone because of data attributes that are out of their control.

Many ethics and responsibility challenges present themselves in AI use cases. Data used in training AI models needs to be well sourced, designed, managed and protected. Managing and determining the truthfulness of the high influx of new, AI-generated data can pose a real challenge. Ultimately, AI has the potential to reshape the future workforce structure and impact the global economy through automation and robotization of repeatable routine tasks and processes.

Integrations and synergies are possible between AI and other emerging technologies such as IoT and blockchains. When AI uses blockchain data, the correctness and truthfulness of that data is guaranteed by the blockchain protocol. When AI is responsible for specific decision-making scenarios it can benefit from a complete record history, immutability, and other blockchain features. AI can also use data gathered and produced by networked IoT devices and can enable optimization, improve performance and provide additional business insight into IoT data.

In the supply chain, AI can be used in various scenarios: detecting anomalies, automating and optimizing business processes and physical processes such as route optimization, and extracting key information elements from both physical documents and electronic sources.

In e-commerce, AI can detect inaccurate data by analysing the description of the goods, the point of origin, the destination, and any other parameter that we want to function as a control parameter to avoid fraud and delays.

2. INTRODUCTION

The ongoing technological revolution is bringing new era of prospects where innovations and progress can fundamentally alter how we live and work together. Artificial intelligence (AI) belongs among the emerging and enabling technologies that have the potential to broadly impact and reshape the global economy and international trade across all its fields.

According to the PWC report[1], AI has the potential to add $15 trillion to the global economy by 2030. McKinsey's 2021 Global Survey on AI adoption shows it continues to grow, with 57 per cent of respondents in emerging economies reporting adoption, and the most common use cases in service operations, product and

[1] The 2017 PwC report on their Global Artificial Intelligence Study is available at https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html.

service development, marketing and sales, and risk modelling and analysis[2]. The Gartner organization forecasts that worldwide AI software market will reach $62B in 2022[3].

The United Nations Member State governments are already creating national strategies focused on AI. The repository that the Organisation for Economic Co-operation and Development (OECD) is maintaining contains, so far, over 700 AI-related policy initiatives from 60 different countries.[4]

The United Nations itself sees AI as a tremendous opportunity for sustainable development by bringing innovative solutions, improved risk assessment, better planning and faster knowledge sharing[5]. The United Nations Secretary-General's Strategy on New Technologies sees a future transformed by learning machines and artificial intelligence, edited genomes, autonomous cars, stateless currencies and new technologies that hold incredible promise for human welfare, but that can also lead to bigger disparities and worsen inequalities. Therefore, we must keep in mind and address the technology gap between countries with various levels of technological expertise.

The United Nation Centre for Trade Facilitation and Electronic Business (UN/CEFACT), with its history of working on key technologies that have impacted trade facilitation and e-business in the past, has AI as one of its fields of great interest. This is because business-process-oriented automation and more efficient data flow exchanges are continually revealing new ways to lift barriers to international trade and to spur the growth of global e-commerce.

3. WHAT IS ARTIFICIAL INTELLIGENCE?

"Artificial intelligence (AI) systems are software systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge or processing the information derived from this data, and deciding the best action(s) to take to achieve the given goal. AI systems can either use symbolic rules or learn a numeric model, and they can also adapt their behaviour by analysing how the environment is affected by their previous actions."[6]

Artificial intelligence can process a large amount of data and recognize patterns in it. Based on these patterns, AI algorithms can interpret the data or take some predefined action, such as to create predictions, classify data based on their features, or suggest or perform some automated action.

In its inner workings, the AI learning algorithm consumes data and uses this data to continuously retrain itself. It does this by creating a model to understand the data and its attributes, and then uses this model in future decisions. These models are then continuously reviewed, improved and adapted with more input data and production runs. This simulates learning behaviour, as we understand it from our human learning perspective.

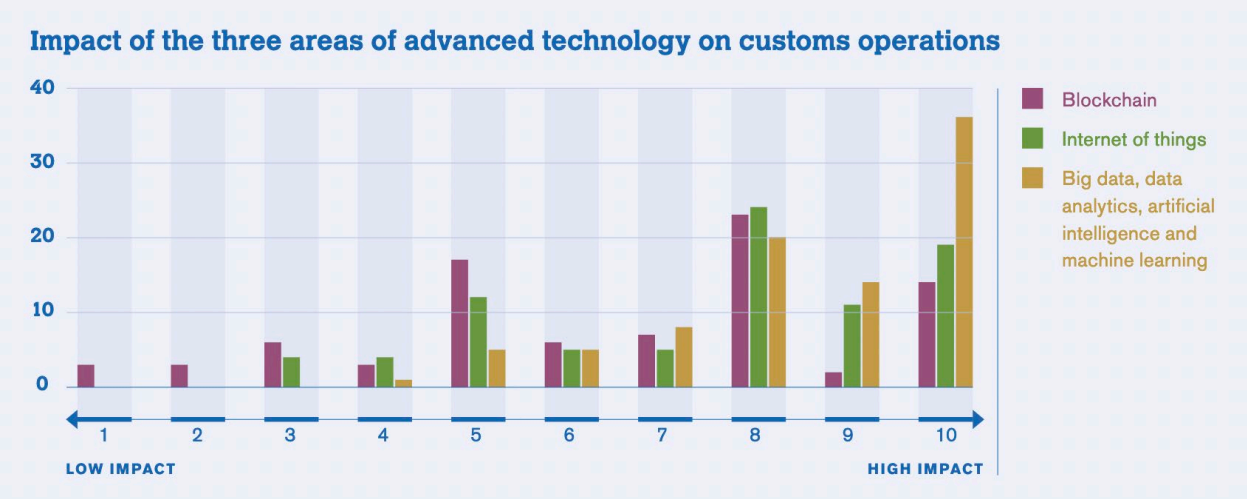
[2] See the McKinsey state of AI in 2021 survey, available at https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/global-survey-the-state-of-ai-in-2021.
[3] See Gartner 22 November 2021 press release, available at https://www.gartner.com/en/newsroom/press-releases/2021-11-22-gartner-forecasts-worldwide-artificial-intelligence-software-market-to-reach-62-billion-in-2022.
[4] The OECD live repository or AI strategies and policies is available at https://oecd.ai/en/dashboards.
[5] See the United Nations "Secretary General's Strategy on New Technologies" (2018), available at https://www.un.org/en/newtechnologies/images/pdf/SGs-Strategy-on-New-Technologies.pdf
[6] Samoili, S., López Cobo, et al., "AI Watch. Defining Artificial Intelligence. Towards an operational definition and taxonomy of artificial intelligence", EUR 30117 EN, Publications Office of the European Union, Luxembourg (2020).

When AI is asked to perform a task, it uses its previous experience-based model to perform a best guess in understanding the input data and to suggest or perform an action as an output.

4. ARTIFICIAL INTELLIGENCE FOR CROSS-BORDER TRADE

Interest in AI has been growing steadily since the beginning of the COVID-19 pandemic, specifically in how AI systems can improve the efficiency and robustness of the global supply chain and mitigate the risks that result from our reliance on it. The pandemic brought attention to the fact that the scope and potential for using AI to further facilitate cross-border trade is far greater than previously thought, and some international actors have already begun investigating and using this technology, particularly in the customs domain, for the enhancement and transparency of procedures and for better risk management and profiling.

Figure 1:
Impact of the three areas of advanced technology on customs areas[7]



The number of current and potential applications of AI in this context are many, and broadly belong to three categories:

4.1 COMPLIANCE

- Automation in post-clearance audits and controls;
- Detection of misuse of concessions (including tariff concession orders, by-laws, free trade agreements and origin masking);
- Compliance risk scoring in commercial and trade activities; and
- Detection of tariff misclassification and non-compliance with tariff advice.

[7] Source: World Trade Organization (WTO) and World Customs Organization (WCO), "The role of advanced technologies in cross-border trade: A customs perspective" (2022).
Available at https://www.wto.org/english/res_e/booksp_e/wcotech22_e.pdf.

4.2 MONITORING

- Enhancement of risk management processes (e.g., inspection results feedback loop, client segmentation, automatic assessment, upgrade of risk profiling);
- Monitoring of service delivery performance in real time; and
- Provision of historical insights into customs statistical information for future planning and forecasting.

4.3 DETECTION

- Detection of anomalies in high-revenue areas including excise equivalent goods (i.e., alcohol, tobacco and petroleum);
- Detection of dumping and countervailing anomalies;
- Detection of undervaluation and overvaluation anomalies;
- Detection of prohibited goods;
- Identification of low-value courier and postal shipments to improve risk assessment; and
- Identification of low-risk individuals at borders.

While the above applications are all promising in their capacity to strengthen cross-border trade operations, there are also a series of difficulties to overcome in order to benefit from the introduction of AI systems:

Data dependency for machine learning applications

Conventional machine learning algorithms need a vast amount of structured and labelled data to effectively learn to identify patterns and build accurate predictions. Although data is more and more available in the public domain, and is at the core of business activities, the organization of this data often lacks the necessary quality required by machine learning and training.

Lack of skilled staff

Artificial intelligence systems are relatively new and not many professionals have the skills necessary to successfully design and implement these systems in complex domains (such as cross-border trade). This challenge makes it difficult for organizations and businesses to figure out their requirements and to decide what is best when planning to introduce and sustain such technological change.

Complexity of software and infrastructure

Given how much AI solutions rely on data, organizations that lack the proper infrastructure for extensive data modelling and visualization will have a problem integrating AI systems into their workflow. Adopting AI in an organization will also mean employing a team of expert data scientists and specialized developers and having a digital infrastructure capable of performing AI training and monitoring with large volumes of data.

Lack of government strategy and legal clarity

AI systems consume and manipulate huge chunks of personal data, which will eventually generate predictions that might affect individuals on an international scale; this mean their behaviour and workflow must be

regulated. Unfortunately, governments are not yet delivering operational and legal frameworks to facilitate their adoption or clarifying all the grey zones existing today in the areas of cross-border trade.

Customs authorities are indeed aware of the obstacles to adopting these technologies. However, there seems to be a positive bias toward the use of AI in the customs domain, as the potential benefits will largely overcome these obstacles.

5. TRADE POLICIES ON ARTIFICIAL INTELLIGENCE

Economists have a long history of improving our understanding of the factors influencing trade and the consequences of the free flow of goods and services between countries. In recent years, many countries have been concerned about rising trade deficits and their implications for employment, production, prices and wages, so understanding and predicting future patterns in trade is a high priority. Traditional economic models can aim to be reliable predictors, but artificial intelligence (AI) techniques can allow for better predictions and associations to inform policy decisions. To date, data flows related to AI have been governed by World Trade Organization (WTO) rules that were drafted before the invention of the Internet.

Currently, we are in a phase of expansion where the scope of AI technologies is exploratory and market adoption is at an early stage. As the digital revolution accelerates, the competitive advantage of countries in the global economy will depend on sectors that develop AI.

A significant increase in productivity and economic growth from new product developments and improvements in the supply chain could compensate for the ageing population in developed countries. The development of these technologies unevenly affects countries around the world and a gap is appearing. Significant resources are necessary to make AI possible—data, algorithms, talent, expertise—and this fact can limit market concentration to some players. The largest companies and countries can amass the most data about consumers and have the resources to create specific AI.

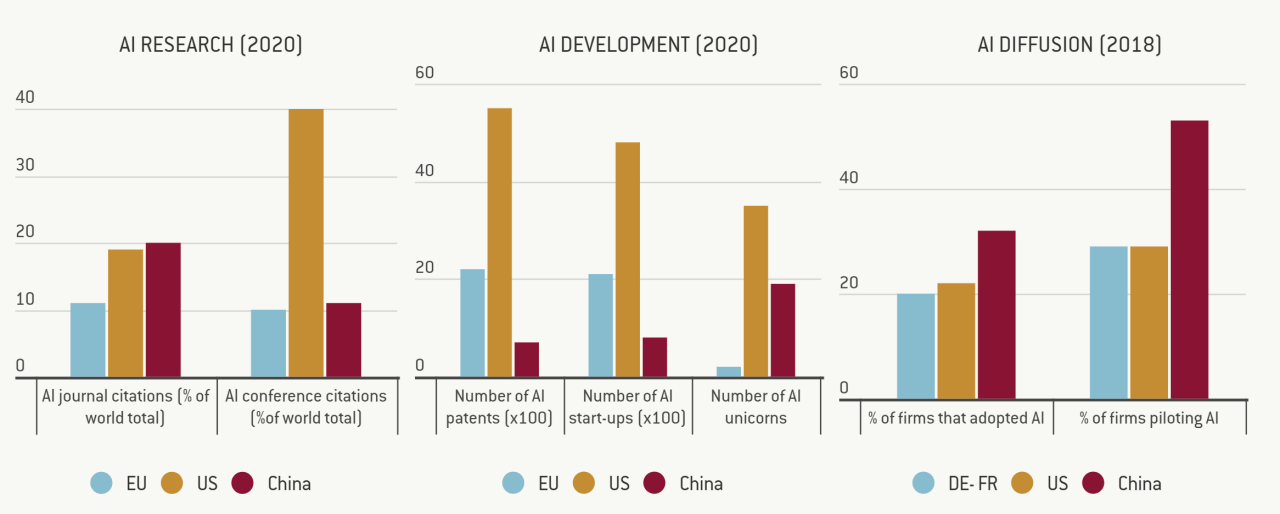
There is an ongoing global race between companies and countries to develop AI technologies but rival national interests can lead to competition instead of a unified plan. Today, trade policymakers in Europe and North America are working to link AI to trade with explicit language in bilateral and regional trade agreements.[8] They hope these unified efforts will result in three outputs:

- The free flow of information across borders;
- Large markets to help train AI systems; and
- The ability to limit cross-border data flows in order to protect citizens from potential harm.

Figure 2, below, shows that European countries are currently behind their American and Chinese counterparts in AI research and development and that AI technologies and market penetration are far from mature.

[8] An example is the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), formerly known as the TPP.

Figure 2:
Comparing outcomes for AI success in the EU, the US and China[9]



6. ETHICAL AND RESPONSIBLE ARTIFICIAL INTELLIGENCE

The rapid development of AI in trade facilitation is redefining the status quo. As AI facilitates the development of new business models in trade, in value chains, and reduces geographical barriers, the question remains, what principles at present ensure that AI systems do what they're supposed to do and act ethically and responsibly?

We broadly understand ethics as the rational and systematic study of the standards for what is right and wrong. Drawing on the concept of ethics from a utilitarian, rights, and virtue-based perspective—that also encompasses broader social and political themes—ethical AI (EAI) considers the psychological, social and political impacts of AI. Psychological impacts refer to mental autonomy, protection from undue manipulation and the right to know when one is interacting with a non-human agent; Social impacts relate to issues of justice and fairness (both procedural and substantive) as well as environmental concerns; and political impacts refer to democratic processes and the economy.

Responsible artificial intelligence (RAI) is viewed as an approach that considers the ethical, moral, legal, cultural and socioeconomic consequences of the development and deployment of AI systems.

In the book *Responsible AI*, the authors state the following:

The goals of responsible AI are manifold. It should be able to [make] decisions that reward users based on their achievements (approve credit for someone with good income and credit history) and should not discriminate against someone because of data attributes that are out of the user's control (e.g., reject credit for someone with good income and credit who lives in an otherwise poorer neighbourhood). It should be usable in a system built for the future with high levels of fairness and freedom from bias and yet should allow positive discrimination to correct the wrongs of the past. These requirements can be contradictory […]. As the awareness is rising around creating responsible AI products, the actual implementations and the regulatory requirements, if any, are still catching up. In April 2020, the US Federal Trade Commission, in their blog titled

[9] Source: Bruegel.org, https://www.bruegel.org/blog-post/triple-constraint-artificial-intelligence-advancement-europe. Bruegel is a European think tank that specializes in economics.

'Using Artificial Intelligence and Algorithms', discussed why an algorithm needs to be transparent and discrimination-free. But transparency alone is not sufficient [unless it is accompanied by an explanation]; for example, a 3-digit credit score is not helpful for the user unless it also tells them why they have a certain score and the actions that will help them improve the score. The transparency alone hides more than it reveals. The 'Ethics guidelines for trustworthy AI', as published by the European Union in 2019[10], goes further and has defined a much wider framework. [11]

Interestingly, there is a growing consensus that responsible artificial intelligence principles be centred on interpretability, robustness and security, accountability, auditability and transparency, data privacy and protection, human agency, fairness, safety and lawfulness. These nine principles are as follows:

- **Interpretability**: Automated predictions and decision-making can improve lives in several ways, but we, as humans, must understand the process and the decision that results. Interpretability is crucial in order to be able to question, understand and trust AI systems. Interpretability reflects our domain knowledge and societal values, provides us with better means of designing, developing and debugging models and helps to ensure that AI systems are working as intended.

- **Robustness and security**: These terms imply the prevention of harm and the existence of preventative mechanisms to risk. AI systems provide robust performance and are generally safe to use because they involve little to no human interaction. Robustness is important when considering how the system responds to changes in the environment, fault implementation or unexpected input. Security is key to the entire life cycle of the system because it ensures that the system does not pose an unreasonable safety risk or make unfavourable decisions, intentionally or unintentionally.

- **Accountability**: Responsible AI must be able to justify its decisions and actions to users, partners and others who interact with the system. Decisions, the criteria that the decisions are based on, and the decision algorithm itself, must represent moral values and social norms. Accountability is established in an AI system when each guiding action has an accompanying explanation.

- **Auditability and transparency**: Auditability and transparency are essential in order to understand, describe, inspect or review the mechanism by which an AI system makes decisions and learns from its environment. Inferences, in the form of metrics to assess the use and outcomes of the model, are critical to objectively evaluate or probe what data was used to build the model, what the derived variables are, whether the model is fully explainable, and whether it contains any bias.

- **Data privacy and protection**: These are concepts, reminiscent of general privacy guidelines, that ensure AI systems are safe and equitable. These guidelines ensure the responsible use of data using a data protection framework. The objective of privacy and security in AI systems is similar to a non-AI system and encompasses the entire life cycle, including the privacy and security of insights, decisions, actions and outcomes of the AI system. In the book *Responsible AI,* the authors write, that the risks "…are not limited to potential hacks where data is accessed for nefarious purposes". Sensitive data can cause the models to learn and employ biased relationships. There are also risks and liabilities associated with private information being available to teams working with the data. The authors state, "to mitigate these risks, the approach should be to enhance the privacy of the data as soon as

[10] European Union, "Ethics guidelines for trustworthy AI", presented by the High-Level Expert Group on AI (2019). Available at https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai.
[11] Agarwal S., Mishra S., *Responsible AI*, Springer, Cham (2021) https://doi.org/10.1007/978-3-030-76860-7_1.

[possible] in data pipeline. If the data is made private before it gets into [the] datastore, any downstream consumers will not be able to access the private information."[12]

- **Human agency**: This empowers human beings, allowing them to make informed decisions that are moral and principled and do not contravene the fundamental rights of other beings.
- **Fairness**: The development, deployment and use of AI systems, models and machine learning algorithms must be fair, devoid of unfair bias, prejudice and discrimination and accessible by all.
- **Lawfulness**: This is the provision that AI systems be developed and used in accordance with local, national and international laws, as applicable.

Despite the existence of responsible AI principles, the question remains—who is responsible for the consequences resulting from the misuse of an AI system? Other key questions are, who is responsible for the actions of an AI system? Is it the developer/maintainer, intellectual property owner, end users, the owner of the data used for its training, the AI itself? Is the answer to this question the same for all AI or might it differ, for example, for systems capable of learning and adapting their behaviour? Given that AI enables society to automate more tasks to a larger extent than before, are those who benefit or profit from its advances also responsible for any harms occurring from its use? Can these questions be answered by ethics or responsibility?

In recent years, "…private companies, research institutions and public sector organizations have issued principles and guidelines for ethical artificial intelligence (EAI), yet [despite an apparent agreement that AI should be ethical] there is debate about both what constitutes 'ethical AI' and which ethical requirements, technical standards and best practices are needed for its realization."[13]

We live in a world where machines and algorithms are increasingly giving recommendations, indexing, and tagging content based on our observed interests, performing trades, scheduling the movement of goods via the supply chain, generating reviews, analysing our food choices and creating recipes (through smart refrigerators) and, most recently, driving us around in autonomous (self-driving) vehicles. Many ethical questions arise from the control we give to AI to direct our daily lives and livelihood. Consider the following:

- In March 2016, Microsoft released a chatbot named Tay who could interact and learn from real users on social platforms. Soon Tay was exposed to nasty tweets and ended up becoming mean and racist on her own.[14]
- In March 2018, an Uber self-driving vehicle killed a pedestrian.[15] Who is responsible: the distracted driver, the pedestrian, Uber, the developers who wrote the code, a sensor manufacturer? It's unrealistic to expect AI systems to be perfect, but determining liability isn't trivial.
- In 2015, Amazon found that their machine-learning-driven recruiting tool was showing bias against women applicants. They ended up scrapping the tool.[16]

[12] Ibid.
[13] Jobin, A., Ienca, M. and Vayena, E. "The global landscape of AI ethics guidelines". *Nature Machine Intelligence*, 1(9), pp.389-399 (2019).
[14] BBC News, "Tay: Microsoft issues apology over racist chatbot fiasco", 25 March 2016.
[15] The New York Times, "Self-Driving Uber Car Kills Pedestrian", 19 March 2018.
[16] BBC News, "Amazon scrapped 'sexist AI' tool", 10 October 2018.

- The Bank of America's Countrywide Financial business agreed to pay a record fine of $335 million to settle discrimination charges when around 200,000 qualified African American and Hispanic borrowers were charged with higher rates solely because of their race or national origin.[17]
- In 2019, the Apple Card's algorithm gave a lower credit limit to women as compared to men.[18]
- In 2015, Google's photo recognition AI misidentified some people of colour as primates.[19]

Promoters of the technology advocate AI as a welcome disruptor that could bring about a global revolution, but the ethical considerations raised by AI are numerous.

The World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), which is an advisory body and forum of reflection that was set up by UNESCO in 1998, issued a report on robotics ethicsin 2017[20]. The report details seven important ethical principles and values: human dignity, the values of autonomy and privacy, the do-no-harm principle, the principle of responsibility, and values of beneficence and justice. Artificial intelligence applications often have unforeseen consequences because of the newness and the rapid evolution of the technology. These issues are common and can arise from "rushed development, a lack of technical understanding, improper quality assurance and testing, among other factors".[21]

Ethical AI is often indistinguishable from responsible AI as both seek to produce AI systems with good intentions. At the organizational and governance level, several private businesses, NGOs, and international standards bodies are working on ethical and responsible AI principles and frameworks. What is necessary now is for a harmonization of EAI and RAI as a comprehensive framework that prioritizes good governance and respect for the societal and environmental concerns of customers.

It is generally agreed that AI ethics, responsibility, and human-rights-based approaches should be built into every AI system, application or model at the design stage. The effective application of EAI (and RAI) requires a continuously iterative methodology that reinforces ethical and responsible AI principles at every stage of the AI system life cycle from pilot to production. When applied to AI modelling, these EAI (and RAI) concepts result in the following:

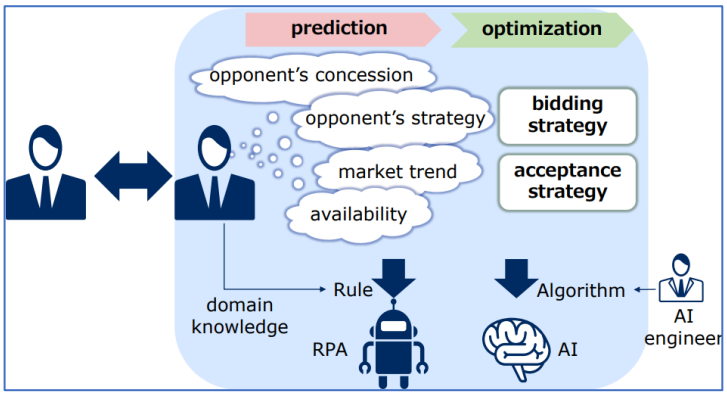
- A strong, mandated governance structure that includes all the tools necessary to manage the process, perform continuous audits and gather performance metrics;
- The creation of appropriate training models that will highlight any preserved bias, safety or human risk and contain other risk prevention and compliance measures; and
- The development of bespoke AI support tools.

The international trade sector has begun to rapidly adopt the use of ethical AI in international trade negotiations (using e-negotiation). With so much data being generated about trading patterns, customer trends, logistics and the global supply chain, there is ample opportunity to improve trade processes using AI. However, AI algorithms should mapped to the five fundamental activities of ISO/IEC 15944-1: planning, identification, negotiation, actualization and post-actualization. Strategies for bidding and acceptance should

[17] BBC News, "Bank of America fined $335m for minority discrimination", 21 December 2011.
[18] BBC News, "Apple's 'sexist' credit card investigated by US regulator", 11 November 2019.
[19] BBC News, "Google apologises for Photos app's racist blunder", 1 July 2015.
[20] COMEST and UNESCO, "Report of COMEST on robotics ethics" (14 September 2017).
Available at https://unesdoc.unesco.org/ark:/48223/pf0000253952.
[21] Eitel-Porter, R., "Beyond the promise: implementing ethical AI", *AI Ethics* 1, 73–80 (2021).
Available at https://doi.org/10.1007/s43681-020-00011-6.

also be part of AI algorithms. This should be done in such a way to reduce human intervention and to create a transparent and fair process: an ethical e-negotiation framework.

Figure 3:
AI Negotiator (Sugamata & Nakadi, 2021)



Artificial intelligence can be applied to virtually any human endeavour where decision making is involved. The integration of AI into socioeconomic frameworks like trade facilitation poses unique challenges as these industries are highly regulated. From a cross-trade perspective, regulatory decisions concerning the operation of AI within societies will constitute multiple challenges. Issues like non-tariff measures will impact market access for the hyper-specialized AI applications that are being used by multiple supply chain providers.

The multilateral trade system has some experience addressing issues arising from the introduction of new technologies, including the range of considerations bearing on risk tolerance such as available scientific evidence, the factors to be considered in assessing risk, the role of international standards in establishing acceptable levels of risk, the invocation of the precautionary principle, and even providing flexibility for differences in consumer tastes and preferences with regard to risk (e.g. political choice, including involvement of civil society). Recently, in an effort to address new ethical challenges posed by AI, 193 member countries of United Nations Educational, Scientific and Cultural Organization (UNESCO) adopted the Recommendation on the Ethics of Artificial Intelligence[22], which contains a global normative framework that gives countries the responsibility to apply it at their level.

7. CHALLENGES AND RISKS IN THE USE OF ARTIFICIAL INTELLIGENCE

Artificial intelligence still faces a great challenge as technology and machine algorithms still lack human qualities such as critical thinking, emotions, intuition, creativity, and ethical principles to distinguish between right and wrong. AI applications rely heavily on the data they use for training and reference and this introduces new risks to our already heavily digitized environments.

Biases and prejudice in data quality: Data is the essence of AI and its performance; therefore, the data quality needs to go through high scrutiny to avoid unethical outcomes in AI applications. Some data sets and business contexts can contain data sets that inherit human biases—typically gender, race, and not containing rare and underrepresented records. Additional control mechanisms must be developed and applied when AI is using

[22] UNESCO, Draft Text of the Recommendation on the Ethics of Artificial Intelligence (SHS/IGM-AIETHICS/2021/JUN/3 Rev.2), 25 June 2021. Available at https://unesdoc.unesco.org/ark:/48223/pf0000377897.

data from external sources and environments because even a small number of actors with malevolent intentions can cause AI to learn antisocial patterns.

Transparency: To avoid data biases, data sets used for AI training always need to have a clear origin and a transparent source and methodology under which they are produced. These AI models also need to be clearly explainable in their outcomes and any decisions that may result.

Privacy: Data used in AI applications needs to respect user privacy in several ways: through data consent, where data can only be used with the consent of its owner; data persistence, where data can be only be used and kept for the duration needed in the consented scope; data repurposing, where data can be used only for the purposes to which consent was given; and it must be protected from data spillovers, where data are collected *en masse* from sources not originally consented for collection.

Security: With more digitization, AI can pose a new threat to existing security methods that safeguard systems and countries against attacks. Safety-critical applications (where human and real-world external assets can come to harm, such as in the case of autonomous driving, automated transportation, or healthcare equipment) needs to be not only protected against external attack but also against critical mistakes that can originate from wrong or misunderstood inputs.

Inequality: Successful AI applications also have the potential to broaden inequalities inside societies and between them. One of the implications of AI is the elimination or lowering of wages for already low-income jobs and the increase of income inequality within economies. Successful AI applications can also result in a significant advantage in the market; it can create monopolies, secure dominant positions and even influence the global geopolitical landscape.

Blurring lines between real and fake: With advances in AI applications, an additional challenge is to recognize the difference between truthful and falsified information such as deepfake audio visuals, fake news, non-existent personal communication bots and falsified data sets.

Impact on jobs and reshaping workforce structure: Together with robotization, AI can perform and even outperform human labour, typically in repeatable, predictable, manual tasks; this can eliminate some of these jobs completely (retail, inventory management, logistics, inspection, etc.) and alter the jobs that contain routine, cognitive and physical activity.

All these challenges and risks need to be taken into consideration during the development of regulatory policy and any guidance or standardization materials, but also during the development of AI applications themselves.

8. USE OF BLOCKCHAIN TECHNOLOGY AND INTERNET OF THINGS (SUCH AS SMART CONTAINER SYSTEMS) WITH ARTIFICIAL INTELLIGENCE

Using blockchains to trace products is especially promising for certain industries, including temperature-sensitive pharmaceutical and healthcare products, cold food products, high-value fashion and other regulated product industries.

There are certain benefits to using blockchain technology for global supply chain management, such as the ability to manage and track the timing of raw materials and subcomponents in the production process. Supply chain management systems may be configured to monitor and generate notifications and scheduling updates, based on updates to the blockchain, to help manufacturers and distributors with production and distribution timing and cost projections.

Tracing challenges and blockchain solutions

- **Unintegrated legacy digital systems:** Even if a company already uses a digital system for tracking products, that system may not integrate with the different digital systems used by other members of the applicable supply chain. Helpfully, blockchain solutions can lie on top of these enterprise applications and provide the connection between them. Blockchains can be integrated with enterprise resource planning systems, customer relationship management systems, warehouse management systems and manufacturing execution systems to increase transparency in the supply chain and reduce the cost of tracking products and running reports.

- **Inconsistent and duplicated records**: Because companies in the supply chain tend to keep their own records using centralized databases, these companies frequently have duplicate copies of, or inconsistent records relating to, the same transaction. In contrast, blockchains store information on an immutable, decentralized ledger, accessible by all members of the supply chain. This structure allows all members of the supply chain to have eyes on the same data and to have confidence that the data is accurate. Ultimately, companies can use blockchain solutions to reduce the costs associated with reconciling records across the supply chain.

- **Root cause determinations**: In order to identify product shortages and defects, companies typically audit supply chain partners. However, while auditing helps determine if a problem exists, it is less adept at determining the root cause of that problem. For instance, an audit of inventory held by a warehouse could reveal a missing product, but the audit may not reveal the reason the product went missing. Did a stocker misplace the product after it arrived at the warehouse? Did a warehouse employee make an error in tracking product quantities? Having all members of a supply chain participate in a blockchain solution would assist in determining the root cause because the blockchain process affixes a timestamp to every transaction entered onto the blockchain and the transaction history is immutable. Blockchain technology can automatically provide visibility into all stages of the supply chain, allowing for decreases in labour-intensive, in-person auditing costs.

9. ARTIFICIAL INTELLIGENCE IN THE SUPPLY CHAIN

The problem: synchronizing the supply chain and looking for efficiencies

Figure 4:
The complex and fragmented process of global trade

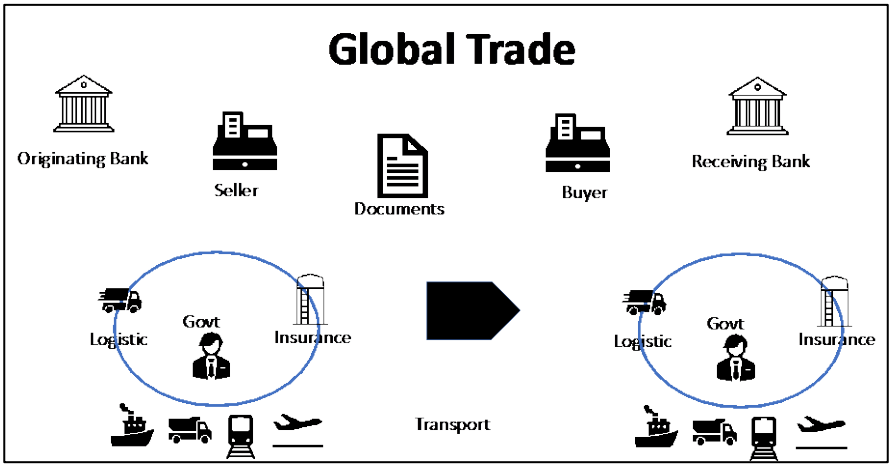
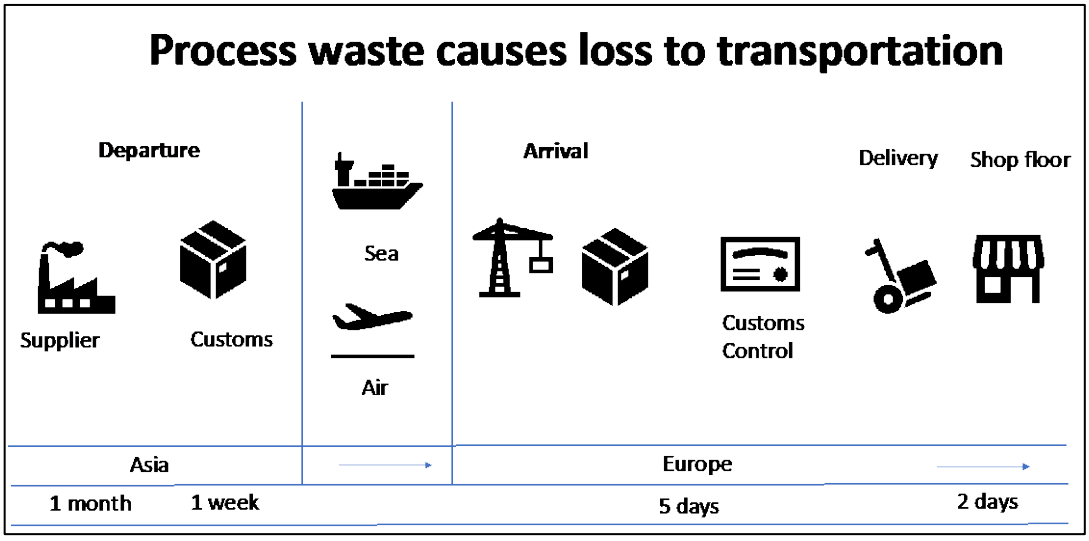


Figure 5:
Process waste contribution on the transportation costs



Global trade is complex, fragmented and inefficient. It is necessary to create transparency and trace all the steps in the supply chain in order to validate the logistics process. This is a complicated process that needs to occur in order to make technology simpler and to make it accessible to all types of organizations. Global trade is a very traditional and inefficient process that is handled locally, mostly by small companies.

A collaborative, open and secure platform for a global, interoperable and independent environment that serves all the actors in the supply chain will be the solution. Beyond blockchain-based software, AI, machine learning and other technologies can be used to streamline and add value to the international trade ecosystem. The technology, once developed, should be available and accessible without licences, without complicated integrations and without forcing users to work with a specific service provider. It should be an open and independent platform that enables collaboration between all actors in the supply chain and is able to digitize documents and generate smart contracts validated by blockchain technology. Once documents are secured and immutable, users should be able to combine different technologies such as AI or machine learning to maximize the benefits.

Developments based on blockchain technology and artificial intelligence can be used to make international trade easy and accessible to all types of organizations and actors involved in the supply chain, automating processes and ensuring the security and traceability of goods. This process could reduce the time spent on each file by about 80 per cent[23] by enabling the pre-visualization of the documentation associated with the operation, reducing errors and avoiding the transport physical documentation.

Some advantages of an AI based system are as follows:

- Reduction of the time spent per file by more than 80 per cent;
- Streamlined customs procedures;
- Reduction of errors in procedures;

[23] Source: Multiple platform sources

- Creation of centralized repositories of information and documentation associated with the files, accessible even years after the file has been closed (the data is the property of the client);
- Drastic reduction in the use of paper, eliminating the need for its physical storage;
- Automation of interactions between all participants in international trade operations;
- Synchronization with other management systems through an API that allows bi-directional automation of data; and
- Immediate access to file information from anywhere with just an internet connection, even from mobile devices and smartphones.

Sustainability is a must, and AI, blockchain technology and machine learning can help to achieve this goal. Collaboration is the key to sustainability. The digitization of procedures and the unification of actors considerably reduces the environmental impact of the shipping logistics process.

A shipment can involve 20 to 50 procedures, including interactions with banks, insurance companies, warehouses, inspectors, etc. It is necessary to eliminate the frequent use of manual processes using paper, fax, courier services, etc., and the lack of coordination between the various actors and their IT systems.

Some platforms have been created to streamline processes related to the shipment of goods through the digitalization and connectivity of all actors in the supply chain. These processes eliminate paper and replace travel by generating globally visible and incorruptible digital documents. They bring transparency to manual processes, security by using unique codes generated by blockchain technology, and synchronization to the entire supply chain.

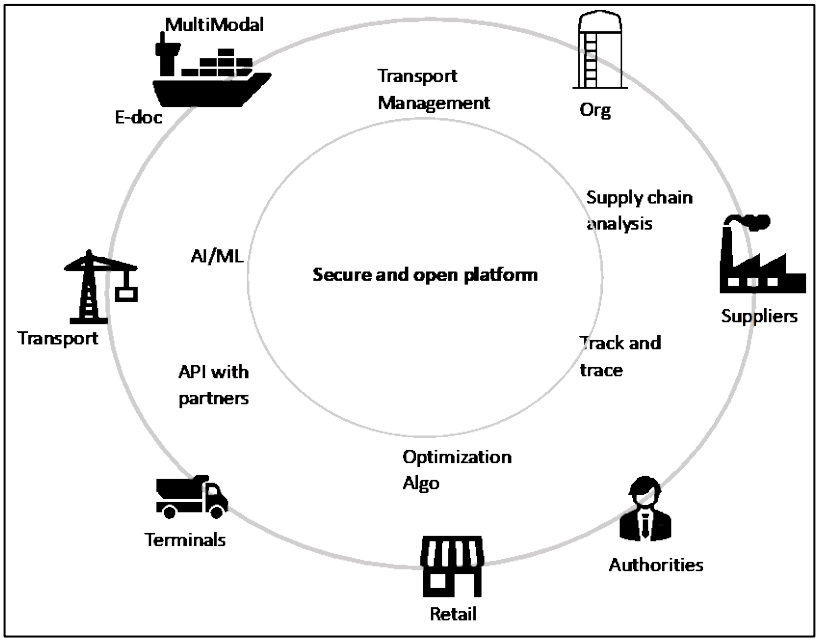
Such platforms reduce the time spent on each file by 80 per cent by allowing users to pre-visualize the documentation associated with an operation, thereby minimizing human errors and avoiding the transport of physical documentation. The efficiency achieved by using these technologies has a direct impact on the carbon footprint associated with the transport of goods.

A key feature of these platforms is the flow of information (esp. international trade) that brings transparency to various procedures, especially customs procedures. The combination of technologies like AI and blockchain give the power of transparency and immutability. For cross-border operations, this is a must if we want to streamline the processes and increase trust and reduce fraud.

Soon there will be various platforms for multimodal transport control, sustainable packaging, calculation and optimization of routes to save CO_2, etc., based on these technologies.

In addition to using AI for route optimization, platforms will leverage 5G connectivity and satellites to control goods and visually trace shipments on a map using a geolocation system. This will enable the traceability of goods in environments that were not possible before.

Figure 6:
Multimodal Platform - Business Model



10. ARTIFICIAL INTELLIGENCE IN E-COMMERCE

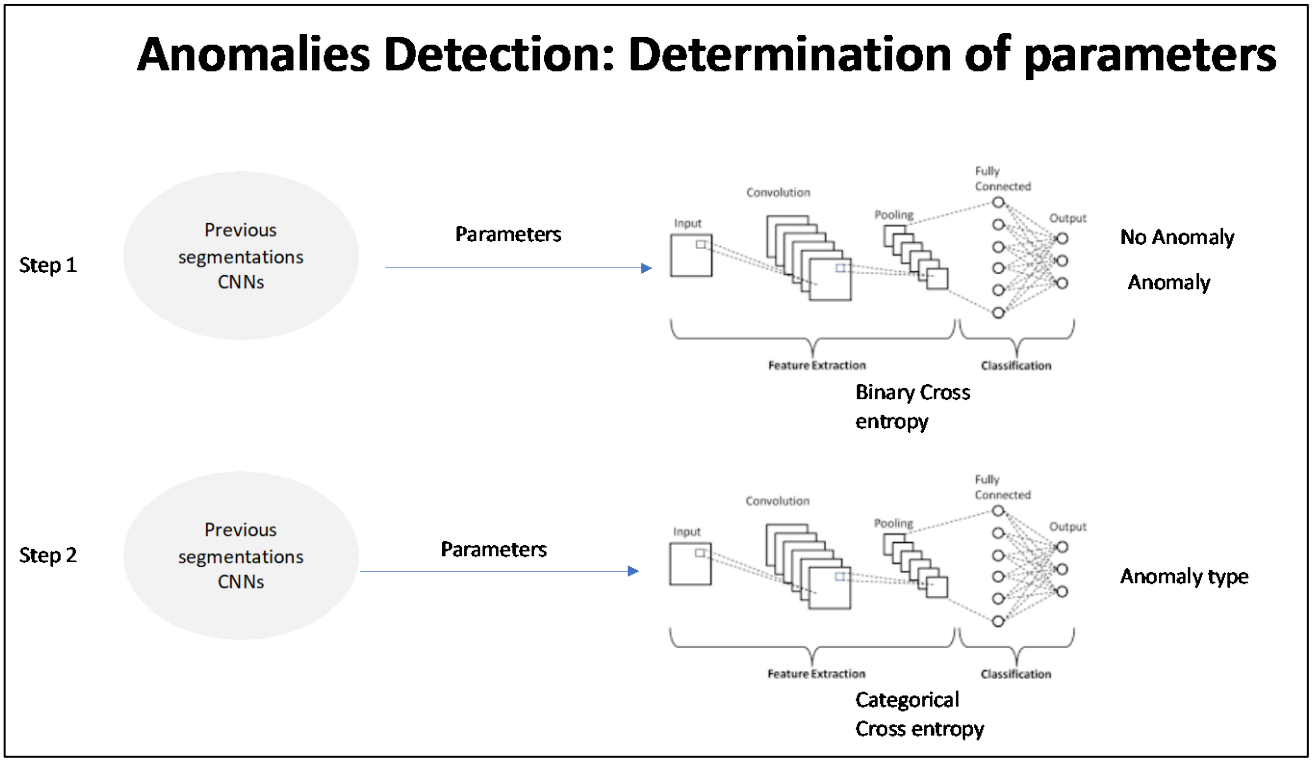
10.1 HOW CAN AI HELP IN CROSS-BORDER TRADE?

Artificial intelligence can significantly help in the control of international trade shipments, especially in the case of border control of goods. The following are two of the most significant use cases for AI that can help all stakeholders save time and money, avoid fraud and streamline cross-border processes:

10.2 DETECTING ANOMALIES

One of the potential applications is the detection of anomalies (see figure below). Detection of inaccurate data is done by analysing the documents provided using neural networks, whether in manifests or customs declarations.

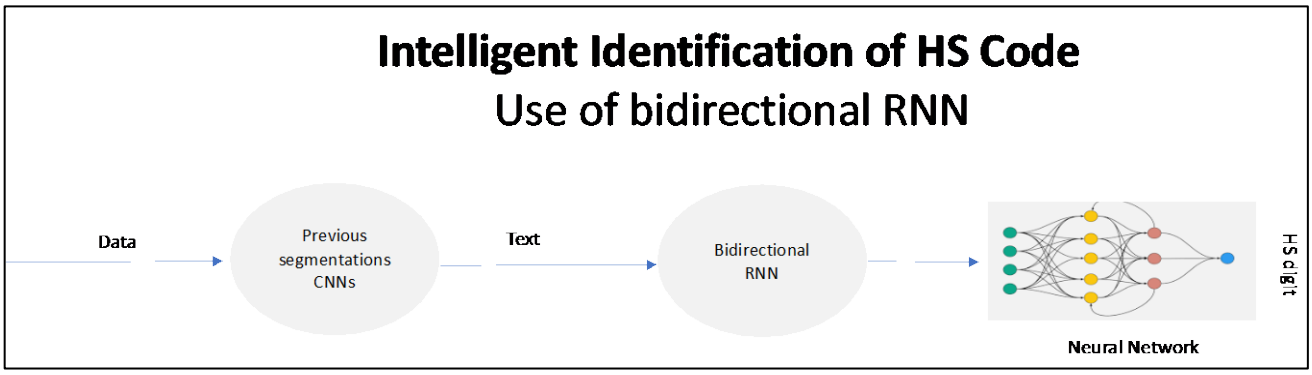
Figure 7:
Two-step Anomalies Detection process



10.3 HS CODE SUGGESTIONS

Artificial intelligence can also be used to generate HS code suggestions by analysing the description of the goods, the point of origin, destination and any other parameter that we want to function as a control parameter. This can help to avoid fraud and prevent delays due to bad HS classification. Automation of the computation of applicable, accurate, real-time customs duties and taxes will be a big step forward for global trade. Another use case might be an automatic check for the documents associated with a shipment's customs requirements prior to the arrival of the goods at the border.

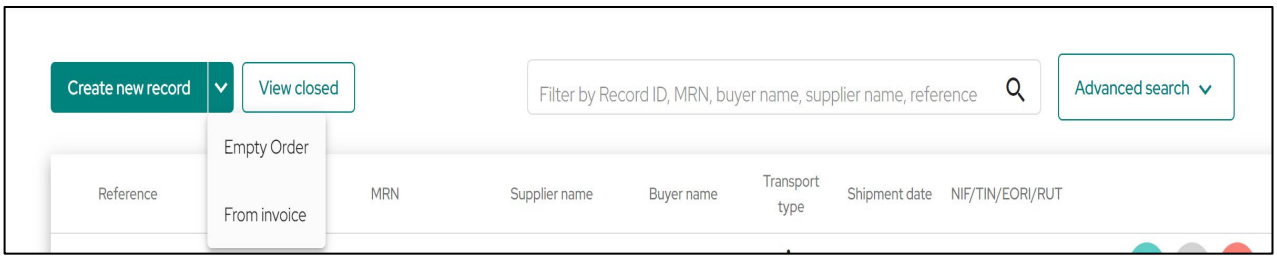
Figure 8:
Intelligent identification of Harmonized System (HS) code



Artificial intelligence can be applied at numerous points in the supply chain, not only to automate repetitive tasks but also to perform tasks more efficiently.

One of the uses within these platforms is to create shipments simply based on an invoice. A neural network analyses the invoice data and opens the file, identifying the importer, exporter, value of the goods, origin, destination, etc. As it is a neural network, it learns as it is used, so it improves its accuracy over time.

Figure 9:
Illustration showing shipment tracking



Another use is the prediction of the next actions within a shipment, based on networks. It provides the customer with suggestions for efficient next steps in the process; for example, if a shipment is already at its destination, it might suggest that delivery be arranged. AI can also suggest the best routes for last-mile delivery, provide the most efficient way to store goods inside a vehicle, tell if your shipment is insurable, etc. The possibilities are endless.

11. GLOSSARY

Phrase	Acronym	Definition	Source
AI systems		The real-world applications and use cases for AI	
Artificial intelligence	AI	The theory and development of computer systems/algorithms that can perform tasks and make decisions normally requiring human intelligence such as visual perception, speech recognition, decision-making, operating huge databases and translation between languages[24]. Articles 7 and 10 of the WTO Trade Facilitation Agreement (TFA) contain provisions, the implementation of which can be supported by making use of data analysis and artificial intelligence (AI). Specific measures where AI could be applied are risk management, separation of release from clearance, audits, facilitation measures for authorized operators and the analysis of release times beyond the simple "average" that needs to be published[25].	
Blockchain technology		Also known as distributed ledger technology (DLT), blockchains are a technology that have the potential to deliver significant improvements and automation in the trust that underlies almost every action and data exchange in international trade.[26]	
Blockchain solutions		Real-world applications and use cases for blockchain technology	

[24] UNECE, *Trade Facilitation Terms: An English-Russian-Chinese Glossary* (Revised third edition) (2019).
[25] UNCTAD, "Intelligent trade and technologies: Preparing for the trade facilitation of the future", UNCTAD article (12 December 2017). Available at https://unctad.org/news/intelligent-trade-and-technologies-preparing-trade-facilitation-future.
[26] UNECE, *Trade Facilitation Terms (2019).*

Phrase	Acronym	Definition	Source
Customer relationship management	CRM	Customer relationship management (CRM) is a technology for managing all of a company's relationships and interactions with customers and potential customers. The goal is simple: Improve business relationships to grow your business. A CRM system helps companies stay connected to customers, streamline processes, and improve profitability. When people talk about CRM, they are usually referring to a CRM system—a tool that helps with contact management, sales management, agent productivity and more. CRM tools can now be used to manage customer relationships across the entire customer life cycle, spanning marketing, sales, digital commerce and customer service interactions.[27]	
Deepfake		Deepfakes (a portmanteau, combining the terms "deep learning" and "fake") are synthetic media in which a person in an existing image or video is replaced with someone else's likeness. While the act of faking content is not new, deepfakes leverage powerful techniques from machine learning and artificial intelligence to manipulate or generate visual and audio content with a high potential to deceive.[28]	
Electronic commerce (e-commerce)		Online initiation of transactions/shipments, destined to consumers (commercial and non-commercial). Often referred to simply as e-commerce, the term is used to describe business that is conducted over the Internet using any of the applications that rely on the Internet, such as email, instant messaging, virtual shopping carts, web services, UDDI, FTP and EDI, among others. Electronic commerce can be between two businesses transmitting funds, goods, services and/or data or between a business and a customer.[29]	

[27] Source: https://www.salesforce.com/crm/what-is-crm/.
[28] Source: Wikipedia
[29] UNECE, *Trade Facilitation Terms (2019).*

Phrase	Acronym	Definition	Source
Ethical AI	EAI	Ethical AI is artificial intelligence that adheres to well-defined ethical guidelines regarding fundamental values, including such things as individual rights, privacy, non-discrimination and non-manipulation. Ethical AI places fundamental importance on ethical considerations in determining legitimate and illegitimate uses of AI. Organizations that apply ethical AI have clearly stated policies and well-defined review processes to ensure adherence to these guidelines.[30]	
Inconsistent and duplicate records		Duplicate copies of, or inconsistent records relating to the same transaction.	
Internet of things	IoT	Networks of sensors or smart devices that are connected to the Internet and generate a stream of data[31]	
Responsible artificial intelligence	RAI	Responsible artificial intelligence (AI) is an approach that aims to consider the ethical, moral, and social consequences during the development and deployment of AI systems.[32]	
Root cause determinations		The method that is used to determine the root cause of a problem.	
Supply chain management	SCM	SCM plans and manages the supply chain (i.e. the entire production and distribution process of a product from its raw materials to the final sale). The supply chain usually includes third parties like suppliers, wholesalers or intermediaries, which are frequently located in different countries. Thus, efficient inter-country SCM crucially depends on simplified and standardized border-crossing procedures. Optimizing the supply chain can result in substantial cost reductions, can boost the competitiveness of firms.[33]	
Unintegrated legacy digital systems		Systems not integrated with the different digital systems used by other members of the applicable supply chain.	

[30] C3.ai glossary, "What is ethical AI?".
[31] UNECE, *Trade Facilitation Terms (2019).*
[32] Virginia Dignum, *Responsible Artificial Intelligence: How to Develop and Use AI in a Responsible Way*, Springer International Publishing, 2019.
[33] UNECE, *Trade Facilitation Terms (2019).*

Phrase	Acronym	Definition	Source
		A warehouse management system (WMS) is a software solution that offers visibility into a business's entire inventory and manages supply chain fulfilment operations from the distribution centre to the store shelf.	
Warehouse management systems	WMS	Warehouse management (WMS) solutions additionally enable companies to maximize their labour and space utilization and equipment investments by coordinating and optimizing resource usage and material flows. Specifically, WMS systems are designed to support the needs of an entire global supply chain, including distribution, manufacturing, asset-intensive and service businesses.[34]	

[34] Oracle.com, "What Is a Warehouse Management System (WMS)?"