

Data Analytics
How data analytics can simplify and facilitate trade
within the European Union

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1. Introduction

With the exponential growth and availability of data in recent years causing such a big phenomenon within the global trade community, how we capture data is becoming more important than ever before. There are various statements out there about data being “*the new oil, and like oil, data needs to be refined before it gets value*”. Having easy access to data has become essential in gaining more insight and visibility into the global trade supply chain in order to control and facilitate the movement of goods through the European Union. Due to the increasing rate and complexity at which the global trade environment is growing, both Customs and traders are being faced with more challenges than ever before and must take advantage of innovative and new technologies to gain insight into big data. The need for real time data is the key in been able to transform big data to identify opportunities, trends, detect errors and drive insights.

The refining and harmonisation of data work together hand in hand in the simplification and standardisation process in maintaining the highest levels of compliance and security within global trade. Developing agreed formats and standards in the exchanging of data will increase the efficiency of trade and enhance transparency between authorities and trusted traders. The World Customs Organisation (WCO) recommends that governments that are considering developing a single window environment should adopt its data harmonisation and standardisation process to meet the necessary requirements. The ultimate aim by following this process is to facilitate trade in reducing time and costs while also reducing potential risks and errors.

This paper examines the topic of data analytics and how it has become one of the key drivers in overcoming these challenges, how it can facilitate and simplify trade within the European Union (EU). It observes the various changes in legislation both primary and secondary legislation that has helped carve the path for the e-Customs environment moving away from the paper based environment and towards electronic based system with the ultimate aim of adapting the single window concept. It also explores which of the EU Member States are currently providing import / export data to organisations to enable them to run certain analytics on their import and export of goods.

2. General Overview

2.1 What is data analytics?

Data analytics is the process of obtaining raw data and examining that information in order to identify patterns and draw conclusions. It is obtaining data, reviewing the data, analysing it and pulling great insights out of that information to allow companies and organisations to make better, more effective business decisions and strategic business moves. The ever improving ability to mine information sources by utilising modern technology tools represents the big drivers in our industry today. Tasks that previously represented a huge investment of resources and time can now easily be completed to produce effective and dynamic results.

John Tukey¹ an American mathematician defined data analysis in 1961 as: “*Procedures for analyzing data, techniques for interpreting the results of such procedures, ways of planning*”

¹ Source John Tukey – The Future of Data Analysis – July 1961

the gathering of data to make its analysis easier, more precise or more accurate, and all the machinery and results of (mathematical) statistics which apply to analyzing data.

Authorities today are using data analytics and technology tools to identify trends, detecting errors in real time. They can collect transaction information to schedule risk based audits, all based on digital electronic filing. Having the ability to analyse data has gone from a nice to have to a need to have in order to be successful.

Data Analytics enables trade facilitations within the EU; it ensures that efficient global trading systems are exchanging data electronically. The United Nations Conference on Trade and Development (UNCTAD) estimates that *“the average customs transaction involves 20–30 different parties, 40 documents, 200 data elements (30 of which are repeated at least 30 times) and the re-keying of 60–70 per cent of all data at least once. With the lowering of tariffs across the globe, the cost of complying with customs formalities has been reported to exceed in many instances the cost of duties to be paid. In the modern business environment of just-in-time production and delivery, traders need fast and predictable release of goods²”*.

There are many forms of data analytics that are recognised today, the main three main categories are as follows:

2.1.1 Descriptive analytics “What has happened”

Descriptive analytics is about the past. Using raw data files, it describes the data to look at past transactions that have occurred. Past transactions can be a transaction that occurred one minute ago or a few years ago. Using key word analysis helps to identify opportunities, errors, and drive insights from the information which can in turn drive decisions.

A possible example of descriptive analytics in the trade industry would be error or fraud detection. Take a scenario where a company in the EU is importing a product from the US. The importer includes the incorrect classification of the product on the declaration thus resulting in zero duty paid. With descriptive analytics, an IT system (based on historic analysis) can come to the conclusion that the likelihood is that the submission is incorrect or false. The logic for determining that the submission is incorrect might be based on the historic data i.e., 99.9% of Customers from Industry “X”, that import product “Y”, from Country “Z” always pay 6% duty on that product. Obviously descriptive analytics won’t always be 100% accurate, but it can assist in making the needle a little bit bigger in the haystack.

2.1.2 Predictive analytics “What could happen”

Predictive analytics is about the future. It is the next step which uses historical information available from ERP systems to predict and understand the future based on probabilities. Governments are using this more often today, taking real time information to identify risks and prioritise potential audits. This leads to a more efficient, cost effective and speedier way to derive better insights to identify non-compliance activities.

A possible example of predictive analytics would be the analysis of imports into a country from a non-compliance point of view. With the vast amount of traders importing goods

² source: WTO policy paper on Trade facilitation

across borders, if all historical data was analysed it may be possible to identify trends to predict which traders are importing illegal goods. For example, shipping company A is importing goods into Port B using logistics company C every second week, there has been suspicious activity with this shipment of goods on previous occasions. This possible combination might enable customs to predict when, where and by who the next possible illegal import might take place thus allowing Customs to intercept the smuggling of illegal goods being imported.

2.1.3 Prescriptive analytics/ “What should we do”

Prescriptive Analytics provides advice based on predictions, this is the next stage moving on from predictive analytics and one that is relatively new since 2003. Prescriptive analytics relates to both descriptive and predictive, it not only tells you what has happened, and what is continuing to happen, but it also tells you what you can do about it and the impact of your decision option. Prescriptive analytics is to provide the best solution to anticipate the future based on the data obtained.

For example, take a logistical company shipping products from A to B. If the transportation vehicle breaks down and unable to carry on with the delivery of goods, with prescriptive analytics, an IT system should be able to combine input factors like distance, volume of goods being transported and identify the nearest transportation vehicle to take over the transportation of goods to its destination.

2.2 What is big data?

Big data is the term or buzzword that is used to describe large volumes of structured and unstructured data. The volume of data is continually growing, from the dawn of time to less than a decade ago mankind generated about 5 exabyte’s³ of data. In 2012, access to global data grew to 2.8 zettabyte’s⁴, which is 500 times more than all the data generated prior to 2003. By 2020 the total amount of data stored is expected to be 50 times larger than today. With new technologies, the ability of storing such big volumes of data has made it a lot easier for governments and traders to capture data.

Data is collected from a number of sources such as business transactions, social media and information retrieved from machine-to-machine data. Data also comes in various types of format, from structured data such as numeric data in databases to unstructured data such as text documents, email, audio, financial transactions etc.

Predictive analytics is relevant to big data, acting as an enabler by using the vast amount of historical data it can apply analytics to predict future events. Predictive analytics relies on close to real time data to be fully effective, this means getting the raw data in real-time, but also doing the analysis at very close to real-time as well. There are a number of data collection points within the lifecycle of trade which means the volumes are massive. In the past it was possible to read the data from these data points, but the data cleansing and analysis of the data might not be real time and this was a real challenge. This is where big data comes into play. Predictive analysis can be done on the fly as the events occur at real time, which is a huge improvement compared with the traditional data warehouse/relational

³ An exabyte (EB) is a large unit of computer data storage, two to the sixtieth power bytes

⁴ A zettabyte is a measure of storage capacity and is 2 to the 70th power bytes, also expressed as 10²¹ or 1 sextillion bytes

database approach. Big data systems like Hadoop allow this real time analysis of massive data volumes to take place at a significantly lower cost.

3.0 The background to trade data

The section below outlines the evolution of international trade transactions and how various forms of legislation has helped carve the path to enable the e-Customs world in which we live today.

3.1 History of trade

The history of trade dates all the way back to 300 BC to the ancient Mesopotamian time where traces of trade were first apparent on the seal of clay tablets evidencing that an exchange between parties of goods or services took place. The clay tablets symbolise that even back in ancient times, controls were in place when commodities were being traded between parties, the transaction was captured and data was recorded for commercial and recordkeeping purposes.

Throughout the middle ages and leading into the 21st century, trade significantly increased and continually evolved over time. Trading between countries grew which led to border protection on the import and export of goods between communities, levies were introduced by authorities on the importation of goods into a country in the form of customs duties and trading agreements between countries were established. The global trade landscape was changing at a fast pace and international trade became a key driver for economic growth and development on a global level.

As a result of this fast changing landscape the role of the customs authorities has changed significantly in recent times from its traditional role of the “gatekeeper”, collecting customs duties and other taxes to the role of “facilitator” which involved the monitoring and managing of international trade through the application of Customs laws, compliance and regulatory requirements. With this change came controls to ensure that goods were being imported / exported between territories in a secure, safe and well controlled environment. Data verification became a priority to ensure that all relevant information regarding trade flows was captured and stored.

3.2 How changes in legislation adapted the e-Customs environment

With the introduction of e-commerce in the 1980's and 1990's and the influx of new technology, data relating to the importing and exporting of goods was now being captured electronically. Information and Communication Technology (ICT) was advancing at a rapid pace and new customs systems were introduced to facilitate the import and export process in recording import and export transactions between countries.

3.2.1 Single Administration Document

The Single Administration Document (SAD)⁵ was introduced under the Council Regulation (EEC) No 1900/85 of 11 July 1985 which defined the common data elements to be used across the EU. The SAD replaced a multiple of different national forms and created a common data structure for all imports and exports across the EU.

⁵ Official Journal L 078 , 26/03/1991

3.2.2 Maastricht Treaty

In 1993, the treaty of Maastricht⁶ officially known as the Treaty on European Union (TEU) entered into force. In 2002, this brought the three pillars (Euratom, ECSC, EEC⁷) together under the one common “single market” known as the European Community (EC) which is known today as the European Union (EU) after the Lisbon Treaty entered into force in 2009. As with the EEC now known as the EU, the treaty had established a common trading policy between member states, all remaining tariff and trade barriers, as well as customs formalities, establishing the EU as a major trading block.

3.2.3 Community Customs Code

With EU member states now acting as one, the Community Customs Code⁸ was introduced to consolidate existing customs rules and facilitate trade with third countries. The code outlined the basic rules of common customs legislation covering various topics such as the valuation of goods, classification, country of origin while also providing rules on a number of customs procedures such as rules on transit within the community, the deferred payment scheme where customs duties could be deferred under special procedures/regimes and so forth. The Community Customs Code was designed to consolidate customs rules while also allowing an opportunity to simplify the existing rules.

Computerisation was essential in order to administer the customs rules set in place, this allowed common standards for the data exchange and electronic data transmission. EDIFACT⁹ (Electronic Data Exchange For Administration Commerce and Transport) was adopted in response to the Electronic Data Interchange (EDI) developments to facilitate the transmission of electronic data between various groups such as exporters, government agencies, manufactures, distributors and freight forwarders. The Customs Co-operation Council recommended that all members should adopt the WCO Mapping Guide for UN/EDIFACT messages as a standard reference document. This reference document would lead to the development of all Implementation guides utilised by Customs in exchanging data electronically between customs administrations and between customs administration and trade users.

3.2.4 Creating a paperless environment for Trade

With technology and systems advancing and processes improving, how data was being captured was moving more towards a paperless environment. The events of September 11th, 2001 led to global trade changing its protocols to strengthen and tighten security which resulted in new procedures for tracking, screening and inspecting goods upon import and before exporting goods. Before the events of 9/11, goods imported into territories were cleared after the goods arrived at the border, customs authorities reviewed the entry documentation at the time of importation and if it was required a physical inspection occurred. New security

⁶ OJ C 191 of 29.7.1992 - <http://eur-lex.europa.eu/>

⁷ Euratom (European Atomic Energy Community), ECSC (European Coal and Steel Community), EEC (European Economic Community)

⁸ Council Regulation (EEC) No 2913/92

⁹ EDIFACT (ISO 9735) is the international standard for electronic data interchange (EDI). The term stands for Electronic Data Interchange For Administration, Commerce and Transport.

programs were put in place which required exporters to provide customs authorities with relevant documentation in advance of their shipment to the importing country. Information Technology became a key driver in obtaining import and export data. This data became an integral part in analysing trade flows which allowed Customs to perform a risk assessment on the data received and determine if goods could be entered into a country or if they required a further inspection before admitting them into the importing country. To facilitate the advance information requirement and screening procedures, creating a paperless environment for the movement of goods was introduced.

In a communication¹⁰ issued from the Commission to the Council, the European Parliament and the European Economic and Social Committee it outlined the necessary actions in creating a paperless environment for Customs. Under the Modernised Customs Code, Article 74 outlines the electronic declaration and electronic exchange of data as the exception and paper-based declarations and the submission of paper documentation as the rule. Having data available electronically would ultimately improve security, creating a more predictable environment for both Customs and traders.

3.2.5 e-Europe Action plan

The e-Europe action plan¹¹ focused on Member States increasing efficiency of customs procedures and controls electronically. Due to the increased volume in international trade, customs authorities were faced with higher demands, businesses were expecting an efficient service for their shipments, and faster clearance times were required to avoid a backlog of shipments to be cleared upon import. Using paper documents to declare goods was becoming time consuming, costly and most importantly it was becoming inefficient and ineffective not only Customs and traders, but for the European Union as a trading community. Having a single point of entry to lodge declarations was becoming an essential part of the import / export process in order to meet compliance standards, reduce clearance times and simplify procedures so that traders would only have to provide the data as a one stop shop. It will also help to reduce costs especially for the Economic Operators.

3.2.6 e-Customs Decision

Following on from the 2003 communication from the commission on creating a simple and paperless environment the objective from the European Commission was to set up a secure, integrated, interoperable, and accessible customs system¹². The e-Customs Decision¹³ was connected with the initiative on delivering an interoperable pan-European customs system allowing the exchange of data to be harmonised across Member States. The e-Customs project facilitated import and export procedures with the aim to reduce costs, increase clearance times whilst ensuring correct duties were been paid. It also looked at the flow of data between parties involved and the ability to re-use this data as needed. Article 1 of the e-Customs decision stated that

¹⁰ See Communication from the Commission to the Council, the European Parliament and the Economic and Social Committee concerning a strategy for a Customs Union, COM(2001) 51 final, 08.02.2001. [COM(2003) 452 final - Official Journal C 96 of 21.04.2004].

¹¹ COM(2003) 567

¹² No 70/2008/EC of the European Parliament and the Council of 15 January 2008 on a paperless environment for customs and trade [Official Journal L 23/21 of 26.1.2008].

¹³ Decision No 70/2008/EC of the European Parliament and the Council of 15 January 2008 on a paperless environment for customs and trade [Official Journal L 23/21 of 26.1.2008]

“The Commission and the Member States shall set up secure, integrated, interoperable and accessible electronic customs systems for the exchange of data contained in customs declarations, documents accompanying customs declarations and certificates and the exchange of other relevant information. The Commission and the Member States shall provide the structure and means for the operation of those electronic customs systems.”

The Multi-Annual Strategic Plan (MASP¹⁴), a management and planning tool, which has been drawn up by the European Commission in accordance with article 8(2) of the e-Customs decision¹⁵, outlines a number of projects which relate to the e-Customs project including ECS phase 2, ICS, AEO/EORI and NCTS phase 4. The MASP will provide a common understanding of the EU projects which relate to electronic customs systems which I will explain in more detail further on.

3.2.7 Modernised Customs Code

To reflect changes in the e-Customs environment, the CCC was updated in 2008 into the Modernised Customs Code (MCC¹⁶) to provide the legal basis for procedures based on electronic data processing techniques while the e-Customs decision identifies the system to be developed.

The Modernised Customs Code simplified current customs procedures by reducing the procedures to make it easier to keep tracking goods. The MCC moved towards a more advanced IT system based on the initiative of the e-Customs Decision on a ‘paperless environment for customs and trade’ with the main objective to introduce the electronic lodging of customs declarations and accompanying documents as the rule.

The MCC addressed the following¹⁷:

- *Streamline and reduce the number of customs procedures and make it easier to keep track of goods*
- *Ensure the progressive computerisation of all customs formalities, with a view to a completely ‘paperless environment for customs and trade’, (whose development will be supported and framed by the e-customs Decision No 70/2008/EC of the Parliament and of the Council, adopted on 15 January 2008. IP/07/1893) by`*
- *Introducing the electronic lodging of customs declarations and accompanying documents as the rule;*
- *Providing for the exchange of electronic information between the national customs, and with other competent authorities;*
- *Promote the concept of "centralised clearance", under which authorised traders will be able to declare goods electronically and pay their customs duties at the place where they are established, irrespective of the Member State through which the goods will be brought in or out of the EU customs territory or in which they will be consumed.*

¹⁴ MASP is based on the current budget proposal to be considered under the Customs 2020 program, however, if the approved budget is lower than expected, then the MASP will need be updated accordingly

¹⁵ Decision No 70/2008/EC of the European Parliament and of the Council of 15 January 2008 on a paperless customs environment for customs and trade, OJ 2008, N° L23, p. 21

¹⁶ Regulation (EC) No. 450/2008 of the European Parliament and of the Council of 23 April 2008 laying down the Community Customs Code (Modernised Customs Code) [Official Journal L 145 of 04.06.2008].

¹⁷ http://europa.eu/rapid/press-release_MEMO-08-101_en.htm?locale=en

- *Offer bases for the development of the 'Single Window' and 'One-Stop-Shop' concepts, under which economic operators give information on goods to only one contact point ('Single Window' concept), even if the data should reach different administrations/agencies, so that controls on them for various purposes (customs, sanitary,...) are performed at the same time and at the same place ('one-stop-shop' concept).*
- *Streamline and harmonise further the customs guarantee systems*

It will be seen later in this study that a new Union Customs Code (UCC) is being introduced that will further integrate IT systems and customs procedures across the EU.

4.0 How Data Analytics can facilitate global trade?

4.1 How big data can facilitate trade?

Over the last decade, the volume of trade both on an import and export level has continually increased across the EU. Even with the effect of the financial crisis in 2009 and the ensuing knock on in the international exchange of goods, this was relatively short-lived and the level of trade returned to an even greater level than before. This increase in the volume of trading between countries led to the European Unions need to better facilitate and encourage the flow of goods across its external borders.

In a communication from the European Commission which provides an overview of just how big trade is across the EU, it states that¹⁸ *“international co-operation is a key strategic element of EU customs policy. Multilaterally, for example in the context of the World Customs Organisation and the World Trade Organization, the EU promotes the development and implementation of international standards, notably in the area of security, trade facilitation and customs simplification. Bilaterally, the EU aim has been to work actively with the main trading partners to address the customs related challenges, for example on trade facilitation, rules of origin, IPR enforcement, supply chain security and the fight against fraud. In providing these services, EU customs handle 17% of world trade, over 2 billion tonnes of goods a year with a value of 3300 billion EUR. Between 2004 and 2010, despite the impact of the financial crisis, the value of EU external trade has grown by almost 50%¹⁹. The EU is at the centre of global trade and supply chain logistics, and is the number one trading partner for the United States, China and Russia. More than 90% (8.4 billion tons of merchandise) of trade is carried by sea, of which more than 20% is unloaded in Europe. The EU has over 250 international airports. The eastern land border runs to almost 10,000 km with 133 commercial road and rail entry points. Taking into account the entire EU external border (land, air, sea) there are in total more than 1.000 customs offices of entry.*

In 2011, EU customs processed 36 million pre-arrival cargo declarations, 140 million import declarations, 96 million export declarations and 9 million transit declarations. These figures represent an average of 8.9 declarations per second handled by the Member States’ customs administrations. They made available around 16.6 billion EUR to the EU budget, i.e. approximately 13% of the EU budget.”¹⁹ It is the European Commission’s responsibility to ensure that EU policy and legislation are not only applied correctly, but that this is done uniformly across the EU.

Big data provides the technology to capture all import / export declarations. With trading volumes increasing, so will the amount of data that will need to be captured. Big data technology will allow the global industry to have the scalability to capture this data.

4.2 How is import / export data captured?

In order to understand how data analytics can benefit trade, we firstly need to understand how import / export data is captured in the world today. When a shipment is being imported into a

¹⁸ Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee on the State of the Customs Union – Brussels, 21/12/2012. - EU webpage –: http://europa.eu/pol/cust/index_en.htm.

¹⁹ External and intra EU trade, A statistical yearbook, data 1958-2010, p. 16. Study on the Evaluation of the Customs Union (Specific Contract No. 13 implementing Framework Contract No. TAXUD/2010/CC/101) Final report 23 of 228

country it undergoes various customs formalities by either the importer or his/her agent. Goods are declared using the Single Administrative Document (SAD) which is lodged electronically on the relevant customs system before the arrival of goods in the importing country. The electronic data transfer captures important information about the importing shipment such as the Commodity Code (also known as Tariff Heading, Tariff Code, Classification Code or Harmonisation (HS) Code and the Customs Procedure Code. The Commodity Code which is a ten digit number provides the description of the product being shipped while the customs procedures code describes the procedure and/or regime under which the goods are being imported.

Other important data elements which are captured on the SAD are as follows:

- Importing country / business unit
- Ship from name / DUNS
- Ship to name / DUNS/plant code
- Part #
- Description
- Quantity
- Value
- Country of origin
- Country of export
- HS Code
- Free trade agreement status
- Amount of duty paid
- Mode of transportation
- Category (Prod/P&A/VEH/M&E)
- Entry/invoice detail
- Import related taxes and fees

Having the ability to capture all of these unique data elements leads to greater insights and benefits for both Customs and traders. On implementing regulation 2286/2003 on the modernization of data collection, the legislation of data requirements reduced simplifying the import / export process.

4.3 How data can facilitate trade from a governmental perspective?

With the sheer volume of goods being imported and exported to and from the EU, Customs are dealing with a mass amount of customs declarations and are unable to review every declaration for clearance, therefore, it relies on the data that is provided on the SAD.

With the effect of the e-Customs decision in moving towards a paperless environment, most Member States have moved towards the electronic use of providing their import and export declarations. Customs are relying heavily on import / export information to identify trends, track shipments, detect errors, and identify non-compliance of the movement of goods in real time. This information all begins with data, having accessing to import / export data provides insight into the physical flow of goods being shipped from source to destination which in turn allowed Customs to perform various in-depth analyses.

4.3.1 Identifying trends

Customs authorities face a number of challenges in supervising the cross border movement of goods to ensure all regulatory requirements are met while also ensuring that clearance times are kept to a minimum to prevent the backlog of goods entering into the country. By bringing all the data together from the entire logistic chain, Customs can obtain accurate pictures enabling them to identify trends understanding who does what along the chain. Data from trusted traders such as Authorised Economic Operators (AEO)²⁰ can be treated as reliable data, allowing goods to be cleared immediately without inspection,

Identifying trends can warn customs authorities of suspicious activities which can lead to detecting fraud, smuggling of goods and identifying counterfeit goods. Doing this manually is time consuming and can result in errors, advanced data analytics such as predictive analytics can enable Customs to risk rank import and export transactions and create risk scores in real time, eliminating trustworthy traders while predicating and preventing fraudulent shipments cracking down on crime. Using such technologies can identify and prioritise risk based audits based on the data information.

4.3.2 Detecting errors

One of the main responsibilities of the customs authorities is the collection of duties and other taxes. Data Analytics can assist Customs in identifying errors such as valuation errors, incorrect classification, incorrect quantity and incorrect country of origin which could lead to different preferential rates thus determining the duty amount to be paid.

Where customs authorities detect false declarations, errors or omissions, they make the necessary adjustments and communicate these errors to the debtors. In detecting such errors Customs can protect EU and Member States revenue by enforcing fines, penalties (civil or criminal).

4.3.3 Supply chain security

With such complex supply chains in existence today, having access to trade data allows both Customs and traders to have insight into supply chain activities to protect itself against terrorism, piracy and theft. The e-Europe action plan changed how global trade shipped goods throughout its supply chain, strengthening security to protect oneself against dangerous attacks or harmful products. The WCO²¹ approved the revised Kyoto Convention²² on the Simplification and Harmonisation of Customs Procedures and introduced a new set of protocols for Cargo Security called the Framework of Standards to Secure and Facilitate Trade (SAFE) (WCO 2006). The WCO customs to customs network uses automated techniques to screen high-risk cargo while the customs to business network partnership sets up procedures to pre-certify shippers through an Authorised Economic Program (AEO program).

²⁰ An Authorized Economic Operator (AEO) is defined by the WCO SAFE Framework of Standards as a party involved in the international movement of goods, in whatever function, that has been approved by, or on behalf of, a national Customs administration as complying with WCO or equivalent supply chain security standards

²¹ The World Customs Organization is an independent intergovernmental body whose mission is to enhance the effectiveness and efficiency of customs administrations. With over 90 member countries, it is the only intergovernmental worldwide organization competent in customs matters

²² The revised Kyoto Convention, which was drafted in June 1999 and entered into force in February 2006, is an updated version of the International Convention on the Simplification and Harmonization of Customs Procedures (Kyoto Convention) of 1974. As of January 2007, 52 countries were parties to the agreement.

Electronic data became an important part in analysing trade flows; advanced IT systems were now able to identify suspicious or abnormal movement of goods between communities. The availability of such data led to the discovery of a bomb which was contained inside a printer cartridge. The container carrying the printer was been shipped from Yemen to the US and was intercepted en-route during its stop-over in the United Kingdom. Intelligence was able to identify that the cargo was suspicious due to the nature of the goods being shipped, Yemen was not seen as a natural provider of office supplies to the location destined in Chicago, US. The names of which the package was being shipped to was identified as the names of historical figures, this information raised alarm bells leading the US authorities to inform British military and police about the package which was due to land, including details of the shipment including the precise AWB number of the package, with this the package was removed and examined where they found the package to contain explosive material.

Because they had access to import declarations of all traders, the customs authorities can use advanced analytic techniques (like “peer group analysis”) which they could not previously do using paper and relying on human based processes.

4.4 How data can facilitate trade from a trader’s perspective?

Most companies / organisations currently do not know what their global duty bill is. By collecting import / export data, traders have an immediate insight into how much their company spends on customs duties on a global and on a country basis. By analysing their trade flows, companies can have full visibility, can quantify their total duty and in addition can identify cost saving opportunities such as regimes, the best use of free trade agreements²³ (FTA) such as goods coming from FTA countries with no FTA preference claimed or where goods are routed through a third country causing loss of an FTA preference. With the ability to analyse ones data, traders can zoom into their global landscape by business, geography and even product group to identify patterns and opportunities.

The benefits of advanced analytics

- Quantitative, risk-based approach to compliance monitoring
- Enables periodic monitoring to detect errors early on before they become systemic
- Additional capability that enhances compliance management activities
- Internal control testing – evaluate the sufficiency of process controls and identify additional (more specialised) process controls
- Evaluate the effectiveness of compliance audits
- Free up current resources to work on business support or other more value-added activities
- Tap into and access an experienced knowledge pool to provide insights and assist with process if possible
- Improve the predictability of duty spend
- Improve compliance, operational efficiency

²³ FTAs are designed to reduce the barriers to trade between two or more countries, which are in place to help protect local markets and industries.

5.0 What initiatives / international standards are available to support data analytics from an EU and Global Level?

5.1 The WCO Data Model

The WCO Data Model, an initiative of the World Customs Organisation was adopted in response to the G7's effort to simplify and standardise data requirements in order to optimise the electronic exchange of data. Based on the Kyoto Convention the WCO Data Model is a set of harmonised data requirements used by importers, exporters, transportation providers and government agencies to meet the needs of cross-border regulatory agencies such as Customs, controlling export, import and transit transactions.

The WCO Data Model includes data sets for various customs procedures along with information for cross-border release and clearance. The WCO model has gone through a number of versions, the latest version no.3 which addresses the single window concept along with Customs, Transport, Food Safety, Environment and Agriculture. It promotes the concept of the "single submission of data" information that is submitted just once which can be obtained by the relevant parties at the earliest point in time of the supply chain. The WCO data model is consistent with other international standards such as the United Trade Data Elements Directory (UNTDDED).

5.1.1 EU Adoption of the WCO data model²⁴

The users of the WCO Data Model include WCO Members of industry and trade, international organisations concerned with Trade Facilitations and data standards. Those countries who adopt the WCO Data Model will benefit trade by reducing the cost of documentation and the time taken to fulfil regulatory procedures. As of 2014, almost two thirds of WCO member countries have stated they were in the process of adopting or reviewing the WCO data model which is driving countries towards the harmonisation of data across borders in the aim of a single window. The table below provides you with an outline of those EU Member States and their current status in relation to the WCO Data Model.

Country Customs Website Address	Name of automated clearance system	Year of WCO Accession	Status of Adoption of WCO Model
Austria www.bmf.gv.at	E-Zoll	1953	n/a
Belgium fiscus.fgov.be	PLDA (Paperless Douanes et Accises)	1952	Mapped to version 3.0
Bulgaria www.customs.bg	BICIS (Bulgarian Integrated Customs Information System)	1973	Mapped to version 3.0
Cyprus	THESEAS (Customs and Excise Electronic Systems)	1967	n/a

²⁴ Source WCO - http://www.wcoomd.org/en/topics/facilitation/instrument-and-tools/tools/~/_media/WCO/Public/Global/PDF/Topics/Facilitation/Instruments%20and%20Tools/Tools/Data%20Model/Globla%20adoption%20of%20the%20WCO%20DATA%20MODEL_EN.aspx

www.mof.gov.cy/ce			
Croatia	NCTS (New Computerised Transit System)	1993	n/a
www.carina.hr			
Czech Republic	AIS (Automated Import System); ECS (Export Control System)	1993	n/a
www.celnisprava.cz			
Denmark	Toldsystemet	1952	Mapped to version 3.0
www.skat.dk			
Estonia	COMPLEX	1992	Mapped to version 3.0
www.emta.ee			
Finland	ITU (Integrated Clearance System)	1961	Work is ongoing to assess the alignment with the WCO Data Model. Secretariat does not have details.
www.tulli.fi			
France	DELTA	1952	Mapped to version 3.0
www.douane.gouv.fr			
Germany	ATLAS (Automatisiertes Tarif- und Lokales Zoll-Abwicklungssystem)	1952	Work carried out during G7 work. Presently stated to be not fully aligned with WCO Data Model
www.zoll.de			
Greece	ICIS-net	1952	n/a
www.gsis.gov.gr			
Hungary	AIS HU (Automated Import System Hungary); AES HU (Automated Export System Hungary)	1968	n/a
www.nav.gov.hu			
Ireland	AEP (Automated Entry Processing)	1952	Produced specifications based on WCO DM Version 2.0 in 2008.
www.revenue.ie			
Italy	AIDA (Integrated Automation Customs Excises)	1952	Work carried out during G7 work. Presently stated to be not fully aligned with WCO Data Model
www.agenziadogane.monopoli.gov.it			
Latvia	ASYCUDA ++; Export Control System	1992	Mapped to Version 3.0. As of April 2014 ASYCUDA++ will be replaced by the Electronic Customs Data Processing System.
www.vid.gov.lv			
Lithuania	MDAS (Customs Declaration Processing System); NTKS (National Transit Control System)	1992	Mapped to Version 3.0
www.lrmuitine.lt			
Luxembourg	PLDA (Paperless douanes et accises)	1953	n/a
www.etat.lu/DO			
Malta	Customs Electronic System	1968	n.a
www.maltacustoms.gov.mt			
Netherlands	DMS, DMF / MSW 3.4	1953	Earlier projects (DMF) based on DM Version 1.1 and presently Declaration Management System (DMS) and Maritime Single Window based on Version 3.2./3.5.
www.douane.nl			
Poland	ECS, ICS, NCTS, CELINA	1974	Work underway in using WCO Data Model version 3.4
www.mf.gov.pl			
Portugal	STADA	1953	n/a

portaldasfinancas.gov.pt			
Romania www.customs.ro	ECS; NCTS; RCDPS	1969	n/a
Slovakia www.financnasprava.sk	ISST (Integrated System for Tariff Administration)	1993	Work in relation to adoption underway to Version 3.0.
Slovenia www.carina.gov.si	SICIS (Slovenian Customs Information System)	1992	Mapped to Version 3.0.
Spain www.agenciatributaria.es	EDI (Electronic Data Interchange) System	1952	n/a
Sweden www.tullverket.se	TDS (Tulldatasystem)	1952	n/a
United Kingdom www.hmrc.gov.uk	CHIEF (Customs Handling of Imports and Exports Freight)	1952	In progress or completed

With almost two thirds of WCO member states already adopted or in the process of adopting the WCO data model, we expect to even more countries that will move towards the WCO data model soon.

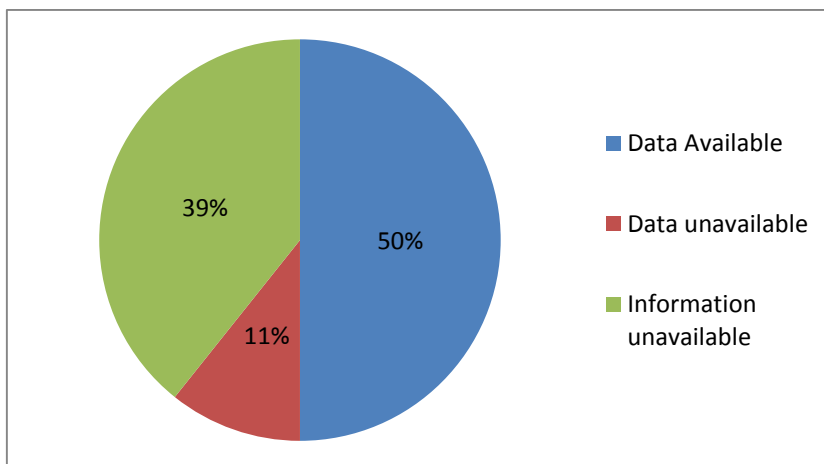
6.0 Desk based research on which Member States provided high quality import / export data upon request

With the availability of high quality data, traders and businesses are recognising the need to obtain their import and export flow of goods to gain better insight to their supply chain. Larger organisations are looking to data analytics to drive actionable insights, improve business performance, drive better decision making and improve risk management such as the following:

- Visibility to Global duty costs at a strategic and an operational level
- Ability to identify potential opportunities for savings, special regimes, programs etc
- Ability to model Free Trade agreement opportunities
- Support in risk assessment and compliance
- Identify valuation and classification risks
- Identify anomalies in import GST/VAT payments
- Manage brokers, lead times, clearance times etc.

With EU Member States adopting the WCO Model, I wanted to ascertain which Member States are currently providing high quality import / export data upon request from local companies. For my primary research I identified which Member States are currently providing high quality import / export data upon request. The results are as follows:

6.1 Import / export data available from Member States



Of the 50% of Member states that resulted in been able to provide import / export data, I observed at the following areas:

- The process in obtaining data;
- How many years back a company could obtain their data, from when the request was lodged;
- How long it would take to obtain this data, and;

- What information (data fields) the authorities were able to provide. For my main data fields I used the UN's data guidelines²⁵ as my reference, which are listed as follows:
 - Reference Number
 - Consignor / Exporter
 - Consignee
 - Delivery address
 - Country whence consigned
 - Country of origin
 - Country of destination
 - Number of packages
 - Description of goods
 - Commodity number
 - Gross weight
 - Customs value
 - Place of issue
 - Date of issue

The results are as follows:

²⁵ http://www.unece.org/fileadmin/DAM/cefact/recommendations/rec01/rec01_ecetr270.pdf

6.1.1 Does customs authorities provide historical data at the entry level? If yes, what is the process in obtaining import / export data?

Country	Response
Belgium	Yes
Bulgaria	Yes – through Customs Agency Headquarters
Denmark	Generally it is not possible to obtain this information directly from the customs authorities; however, if one has a contact person working at the authorities this person may be helpful.
Finland	Yes
Greece	Yes - Besides, following the enforcement of the electronic system for the submission of the customs declaration, said data are easily retrievable through ICISNET as well (for exports as of 2012 and for imports as of 2013).
Hungary	Yes, two ways seem to be possible: a) if a representative of the company has access to the government web account of the company via which portal the tax and customs tasks of the company can be managed electronically, then the representative can download customs related information of the company in electronic format without the necessity to contact the customs authority. b) in lack of access to the government portal of the company a written data request should be submitted to the competent customs authority.
Ireland	Yes – by letter of submission to Automated Entry Processing (AEP) Bureau
Latvia	Yes
Lithuania	Yes
Netherlands	Yes - From 2015 the new import computer system (AGS) is used. From this system you cannot obtain historical information. You can only ask in advance to provide a declarant or importer with import data. This overview of filed declarations can be applied for via: NHD.vergunningen@belastingdienst.nl .
Poland	Yes, there is a special analytical unit of customs authorities (CAAC) which provides aggregated data on imports / exports of particular products in values and volume within defined thresholds.
Portugal	Yes
Spain	Yes, through the Tax Agency Web Page
Sweden	Yes this is possible. Request is sent to customs office and internally forwarded to customs audit team that extracts the data and sends as an Excel file to client on CDROM (not by email)
United Kingdom	Yes - formal hardcopy application form to HMRC (Her Majesty's Revenue and Customs)

6.1.2 How many years back are you able to request a copy of import / export data?

Country	If yes, how far does it go back
Belgium	In principle since PLDA (Paperless Customs and Excise) is launched in Belgium (2010).
Bulgaria	No limitation. Information can be provided for as far back as the administration keeps the data
Denmark	Depends on the case
Finland	We assume that years.
Greece	There is no time limitation specified, however the older the entries, the harder and more uncertain it would be to obtain the requested data. However, please note that the relevant files would be kept at the customs office for a period between 3-5 years (or even up to 15 under specific conditions).
Hungary	8 years--based on the verbal information received from the customs officers
Ireland	3 years
Latvia	No definite time is set in legislation, however according to customs authorities practice 10-20 years.
Lithuania	No limitation is explicitly determined
Netherlands	The new system (AGS) will only be able to provide you with data from mid-2014 – should you require data previous to this you can request if from the old system.
Poland	There is no time limitation specified, however CAAC was set up in 2004 and it may be harder to obtain data prior to 2004.
Portugal	It depends on the grounds for the request and the availability of the Customs services.
Spain	The status of limitation is 3 years for customs duties and 4 years for import VAT. However, the information is normally available within a period of 6 years
Sweden	3 years in general
United Kingdom	At least for the last 3 years.

6.1.3 What is the average timeframe to obtain data from the authorities once a request is submitted?

Country	Response
Belgium	Approximately 1 week after submission
Bulgaria	Depends on how detailed and how far back the request goes. Normally, 15-30 days.
Denmark	Depends on the contact person working within the customs authorities
Finland	Approximately 2-3 weeks
Greece	The timeframe to the data would depend on the volume and the year to which they concern.
Hungary	In case of written requests, 30 days that can be extended with additional 30 days. In case of using the web account, theoretically within some minutes or hours.
Ireland	Approximately 3-4 weeks
Latvia	Approximately two weeks for request via letter . Instantly for request via customs authorities electronic system.
Lithuania	Up to 10 business days
Netherlands	Generally 1-3 weeks, depending on the request
Poland	Usually a couple of weeks, depending on the scope of request.
Portugal	It depends on the extension and complexity of the request. As a general rule, the public administration must answer the requests within 10 working days.
Spain	The data is shown immediately on the Webpage
Sweden	One day to three weeks depending on the method used
United Kingdom	1 month from application - after that it will be provided continuous on a monthly basis

6.1.4 Are all the main data fields listed above available upon request?

Country	Response
Belgium	We assume that all the fields are available
Bulgaria	Yes-all fields listed are provided
Denmark	All the information stated in SAD
Finland	We assume that all fields are available.
Greece	Yes, but depending on the level of information requested, the timeframe to obtain the data could be increased.
Hungary	Theoretically yes, but the range of the provided data can depend on the decision of customs authority (different customs officers provide different answers for this question).
Ireland	Detailed data is available as entered within the AEP system
Latvia	Yes, all the named fields are available.
Lithuania	All information stated in import/export declarations is available.
Netherlands	All required fields are available
Poland	Fields available: Year, month, CN code, country of dispatch, country of origin, country of destination, net weight, volume in another unit, statistical value in PLN, statistical value in USD, statistical value in EUR, code of customs procedure, kind of transaction, mean of transport, delivery terms, list of entities.
Portugal	The application must specify the fields for which the information is requested.
Spain	Only the main data can be obtained.
Sweden	All fields which are in the SAD (single Administrative Document) i.e import/export declaration.
United Kingdom	All fields are available

The results of my research showed that approximately 50% of Member States made import / export data available to companies and third parties. With the concept of the single window this percentage should increase so that all member states should be able to provide such data to companies upon request.

7.0 Future legislation changes that will impact on data analytics

7.1 Union Customs Code (UCC)

The Union Customs Code (UCC)²⁶ which was adopted on 9 October 2013, will replace the CCC in the form of the main act and its associated Delegated Acts and Implementing Acts which will take effect across all Member States from 1 May 2016. The UCC which will serve as the new framework regulation governing the customs rules of the European Union which will introduce a number of new changes, including the modernisation of rules and procedures for Customs throughout the EU.

The upcoming UCC will have a positive impact for data analytics as it will focus on the exchange of information between customs authorities and between customs authorities and economic operators. This exchange of information will be made using electronic data processing techniques. Under article 16 and 280 of Regulation (EU) No. 952/2013, a work programme will be drawn up by the Commission²⁷ which will relate to the development and deployment of the electronic systems. This workplan which will be based on the existing IT planning document known as the multi-annual strategic plan (MASP)²⁸ will provide a timeline for the update and creation of electronic customs systems until the end of 2020. It will support the development of the electronic systems required by Article 6(1) and govern the setting up of transitional periods as referred to in Article 278 of the UCC.

Article 6 (1) of the UCC outlines the obligations for customs authorities and economic operators (IT national and external domain) as follows:

“All exchanges of information, such as declarations, applications or decisions, between customs authorities and between economic operators and customs authorities, and the storage of such information, as required under the customs legislation, shall be made using electronic data-processing techniques.”

Article 16(1) of the UCC: cooperation between Member States and Commission states

“Member States shall cooperate with the Commission to develop, maintain and employ electronic systems for the exchange of information between customs authorities and with the Commission and for the storage of such information, in accordance with the Code.”

²⁶ Union Customs Code (UCC) Regulation 952/2013 of the European Parliament and the Council of 09 October 2013 laying down the Union Customs Code. Art. 6.

²⁷ Commission Implementing Decision No 2014/255/EU of 29 April 2014 establishing the Work Programme for the Union Customs Code (OJ L 134, 07.05.2014, p. 46)

²⁸ multi-annual strategic plan ('MASP'), which is drawn up in accordance with Decision No 70/2008/EC of the European Parliament and of the Council (2) and in particular Article 4 and Article 8(2) thereof. MASP, with its legal basis in the e-Customs Decision, contains more detailed information about projects and covers non-UCC projects such as COPIS, infrastructure projects, international projects etc.

7.1.1 Overview of the work program (for the Union Customs Code)

Article 278 of the UCC establishes that all UCC related EIS shall be operational by the end of 2020

Below is an overview of the work programme²⁹, which outlines the list of projects, required for the application of the code along with its legal base, key milestone and target date for deployment. The work programme along with the MASP are due to be updated on an annual basis.

UCC Project and related Electronic System	Legal Base	Target start date
Registered Exporter System (REX)	Article 6(1), 16 and 64 of Regulation (EU) No 952/2013 laying down the Union Customs Code	1.1.2017
UCC BTI/Surveillance 2+	Article 6(1), 16, 22, 23 26, 27, 28, 33 and 34 of Regulation (EU) No 952/2013 laying down the Union Customs Code	1.3.2017 (phase 1) 1.10.2018 (phase 2)
UCC Customs Decisions	Article 6(1), 16, 22, 23, 26, 27 and 28 of Regulation (EU) No 952/2013 laying down the Union Customs Code	2.10.2017
Direct trader access to the European Information Systems	Article 6(1) and 16 of Regulation (EU) No 952/2013 laying down the Union Customs Code	2.10.2017
UCC Proof of Union Status (PoUS)	Article 6(1), 16 and 153 of Regulation (EU) No 952/2013 laying down the Union Customs Code	2.10.2017
UCC Authorised Economic Operators (AEO) update	Article 6(1), 16, 22, 23, 26, 27, 28, 38 and 39 of Regulation (EU) No 952/2013 laying down the Union Customs Code	1.3.2018
UCC Surveillance 3	Article 6(1), 16 and 56(5) of Regulation (EU) No 952/2013 laying down the Union Customs Code	1.10.2018
UCC New Computerised Transit System (NCTS) update	Article 6(1), 16 and 226 - 236 of Regulation (EU) No 952/2013 laying down the Union Customs Code	1.10.2018
UCC Automated Export System (AES)	Article 6(1), 16, 179 and 263 - 276 of Regulation (EU) No 952/2013 laying down the Union Customs Code	1.3.2019
UCC Information Sheets (INF) for Special Procedures	Article 6(1), 16, 215, 237 - 242 and 250 - 262 of Regulation (EU) No 952/2013 laying down the Union Customs Code	1.10.2019
UCC Special Procedures	Article 6(1), 16, 215, 237 - 242 and 250 - 262 of Regulation (EU) No 952/2013 laying down the Union Customs Code	1.10.2019

²⁹ Source: COMMISSION IMPLEMENTING DECISION of 29 April 2014 establishing the Work Programme for the Union Customs Code (2014/255/EU) - <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32014D0255>

UCC Notification of Arrival, Presentation Notification and Temporary Storage	Article 6(1), 16 and 133 - 152 of Regulation (EU) No 952/2013 laying down the Union Customs Code	2.3.2020
UCC Centralised Clearance for Import (CCI)	Article 6(1), 16 and 179 of Regulation (EU) No 952/2013 laying down the Union Customs Code	1.10.2020
UCC Guarantee Management (GUM)	Article 6(1), 16 and 89 - 100 of Regulation (EU) No 952/2013 laying down the Union Customs Code	2.3.2020
UCC Safety and Security and Risk Management	Article 6(1), 16, 46 and 127 - 132 of the Regulation (EU) No 952/2013 laying down the Union Customs Code	To be defined in the next version of the work programme based on the Roadmap (2)
UCC Classification (CLASS)	Article 6(1), 16(1) and 57 of Regulation (EU) No 952/2013 laying down the Union Customs Code	To be defined in the next version of the work programme

8.0 Conclusion

Throughout this study I have examined how data analytics can help simplify and facilitate trade within the European Community. I explored the background of trade data and how the various forms of legislation have helped carved the path to the e-Customs world we live in today. I looked at the various forms of analytics and how they have come to play an integral part in how trade data is been captured, stored and analysed to provide greater insights to the global trade community.

The importance of having access to data plays a critical role in facilitating trade for both governments and traders. It will allow in-depth analysis in analysing trade flows enabling operational efficiency while improving compliance. It will continue to monitor and protect the global trade community, detecting errors while reducing time and costs for Customs and traders.

The benefit of standardising and harmonising data for governments will have a positive impact, improving compliance, adapt risk management techniques and avoid revenue loss. For traders it will reduce cost and time as it will avoid traders having to lodge the same declaration multiple times to various agencies thus leading to faster clearance times. The concept of the single window aims to simplify information between governments and traders allowing traders to submit their information once as a one stop shop. By having a centralised system this will allow traders to access their import / export data for all member states. As you have seen from my desk based research, only 50% of member states are currently providing import / export data to traders, by implementing the single window concept the hope is to increase the availability of data within the EU which will be an added benefit to traders. The availability of such data will increase transparency for each member state although it will face a number of challenges both from a political and from a technology standpoint.

Although the EU has significantly moved forward and adopted the e-Customs paperless environment, the next step is the ultimate aim is to have all 28 member states aligned so that all import / export declarations are submitted electronically through one interface. Programs such as the single window concept will play an important role in the modernising of facilitating and simplifying trade within the EU.

Literature list

- COUNCIL REGULATION (EEC) No 2913/92 of 12 October 1992 establishing the Community Customs Code - <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1992R2913:20070101:en:PDF>
- Council Resolution of 5 December 2003 on creating a simple and paperless environment for customs and trade - 2003/C 305/01) – <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:l11019a>
- Regulation (EC) No 450/2008 of the European Parliament and of the Council of 23 April 2008 laying down the Community Customs Code (Modernised Customs Code) [Official Journal L 145, 4.6.2008]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:145:0001:0064:En:PDF>
- e-Customs Decision No. 70/2008/EC of the European Parliament and of the Council of 15 January 2008 on a paperless environment for customs and trade. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:023:0021:0026:en:PDF>
- Communication from the Commission to the Council, The European Parliament and the European Economic and Social Committee - A simple and paperless environment for Customs and Trade [http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52003DC0452\(01\)](http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52003DC0452(01))
- Union Customs Code (952/2013) in 2013; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:269:0001:0101:EN:PDF>
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- <http://www.wcoomd.org/>
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- http://www.wcoomd.org/en/topics/facilitation/resources/~/_media/70998C307D3C47C996DB047B664B92AE.ashx
- <http://ec.europa.eu/eurostat/documents/3888793/6182577/KS-TC-14-009-EN-N.pdf/fc46caf3-5c6d-4359-af64-af0a0952e231>
- http://ec.europa.eu/taxation_customs/resources/documents/taxation/tax_cooperation/fiscalis_programme/legal_texts_docs/customs_2020_regulation.pdf
- http://europa.eu/rapid/press-release_IP-14-936_en.htm
- <https://ec.europa.eu/jrc/en/news/customs-risk-management-transport-logistics-data-improve-shipping-containers-analysis>