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## CONNECTING LOGISTICS NETWORKS GLOBALLY VIA THE UN SINGLE WINDOW CONCEPT

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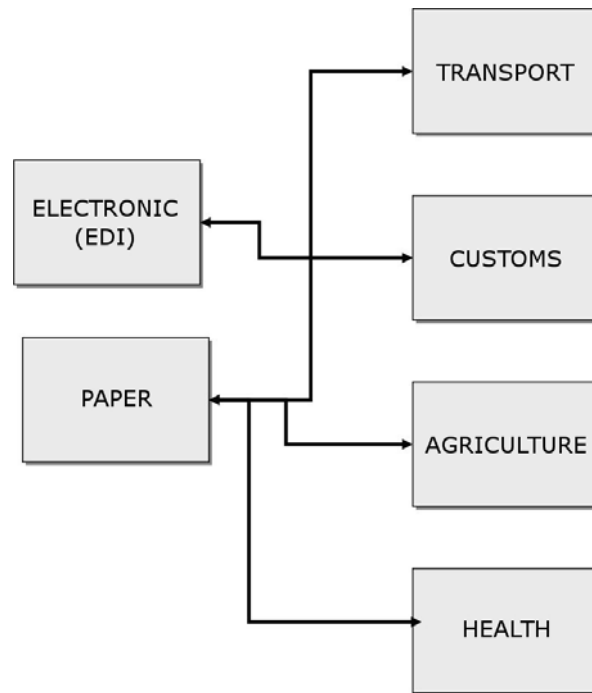
*The UN Single Window concept is a proven approach to facilitate cross border business including transport, customs and other government-related regulations by enabling seamless trade with a central IT platform, in a hub and spoke like system. Several approaches and implementations already exist, although one needs a proper planning for a further penetration worldwide. Enterprise Architecture Management (EAM) as a specialized IT strategy discipline can help to manage this complex challenge of integrating application landscapes into different existing UN integration frameworks.*

**Keywords:** *logistics networks, (UN) Single Window concept, cross border business, transport regulations, customs regulations, government regulations, seamless trade, EAM (Enterprise Architecture Management), Information Technology (IT) strategy, UN integration frameworks, international trade.*

In recent decades, the world has become increasingly globalized. Countries today are more connected than ever and rely heavily upon international trade of goods and services in order to function in an appropriate manner. Advanced communication networks seem to play an important role in this acceleration (Ardalan 2010). The results of international trade seem to be more positive than negative and evidence suggests that it has led to economic prosperity in many countries, subsequently resulting in an improved quality of life for its citizens which is stated also in recent relevant studies in that field (Sharmin and Rayhan 2011). Nonetheless other voices point out that potentially backsides, especially with respect to inequality could still exist (Baumann 2011). The United States, China and the European Union's 27 member states together account for billions of dollars in trade each year. According to the World Trade Organization, the EU exported 1.8 trillion USD worth of merchandise and imported nearly 2.0 trillion USD in 2010.

As trade between countries becomes a more integral part of the world economy, the need for fast and efficient methods of customs and security processes grows ever more crucial. While no one country operates under the exact same processes or policies, very few have streamlined practices when it comes to trade and customs regulations. It should be mentioned that globalization seems to have an additional impact, especially in the sovereignty domain of certain countries or economic unions, which might have derived from that, also an impact of customs regulations as such (Grinin 2012). In fact, in many countries, businesses who wish to involve themselves in international trade are required to submit documentation (manual, automated or a mix) to several regulatory bodies in order to legally conduct trade. This range of documentation, paperwork and procedures depends on a number of factors including the type of goods or merchandise

involved, their value and destination country. The result is what many businesses view as an inhibitive and stifling system that is overly complicated and slows the process of trade.



**Fig. 1. Current trade entities in various trading situations**

A recent survey conducted by the World Customs Organization (WCO) Compendium revealed that of 56 countries who participated in the survey, customs procedures involved on the average 15 separate agencies, with 96 % of reporting countries requiring at least 5 different regulatory bodies. From these findings, it is quite clear how the combination of paperwork and customs regulations can slow or even stifle overall economic prosperity at the macro level. At a more individual level, the regulations and documentation surrounding the import and export of goods can prevent companies from participating in international trade on the whole.

4 %	23 %	32 %	17 %	8 %	4 %	2 %	4 %	4 %	4 %
1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50

**Fig. 2. Number of government agencies involved in cross border transactions**

Source: Centre for Trade Facilitation and Electronic Business 2005.

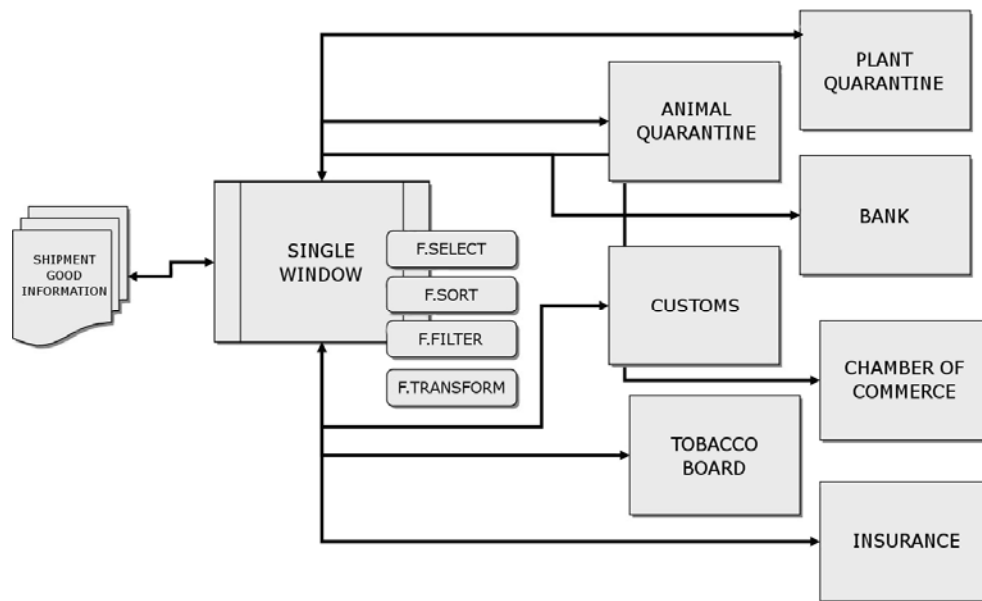
The UN Single Window concept was introduced in order to reduce the aforementioned issues and inefficiencies involved with the importing and exporting of goods. Backed by a number of international organizations including the United Nations Economic Commission for Europe (UNECE), the World Customs Organization (WCO) and the Association of Southeast Asian Nations (ASEAN), it is defined by the UNECE as:

A facility that allows parties involved in trade and transport to lodge standardized information and documents with a single entry point to fulfill all import, export, and transit-related regulatory requirements. If information is electronic then individual data elements should only be submitted once (GFP 2012, ASEAN 2007, APEC 2007).

As an organization dedicated to the facilitation of both trade and electronic business, the UNECE Centre for Trade Facilitation and Electronic Business (UNECE 2012) has been instrumental in researching the Single Window concept in depth as well as creating a set of recommendations for future implementation based on their findings (Centre for Trade Facilitation and Electronic Business 2005). Through a careful research and examination of existing implementations, the benefits of adopting a single window are clear. Both the public and private sectors have much to gain by this methodized streamlining of customs and trade regulations.

Governments stand to benefit from implementing a single window at a number of different levels. Any changes put in place would be in an effort to streamline and regulate processes across a number of agencies simultaneously. This consolidation and standardization can lead to reduced overheads and a reduction in process errors resulting in reduced risk. In addition, having all customs and trade information flowing through a single window will allow governments to monitor more easily what is coming in and out of the country. This is important not only for economic and statistics agencies who report on such matters, but also to the nation's security. Security agencies will be able to access all pertinent information about goods entering the country through the single window instead of being forced to collect information from a number of different departments, allowing security to move more swiftly and effectively.

Overall, the effect of a single window on a government is far reaching. Customs agencies, permit departments and trade monitoring agencies can work together under a standardized umbrella and works towards making customs procedures faster, safer and more efficient. These changes will propagate through the economy and allow business to engage in international trade more easily.



**Fig. 3. Single window meta concept**

As to the government, the private sector would benefit enormously from the use of a single window. Many scholars predict that it will eliminate or reduce the existing non-tariff related barriers to trade (Dobson 2010), thus lowering the costs of international trade. In addition, due to the standardization of required documentation as a part of the single window, businesses would no longer be required to expend as much energy and resources submitting and keeping up to date with paperwork from more than one agency. This process would be made much more efficient and all required documentation would go to one source, or window. The positive effects of a single window propagate even further to shipping and delivery companies, the banking and accounting industries, and eventually to consumers.

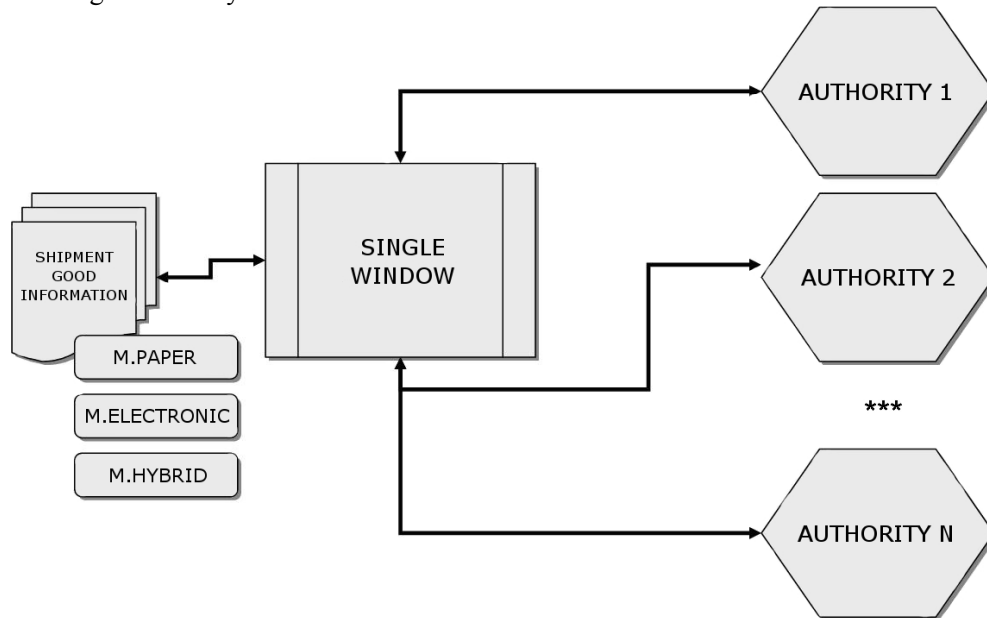
### **Technical Dimensions of a Single Window**

There does not exist single stringent set of specifications which outline the definition and a scope of a Single Window. Every country has developed its own processes regarding customs and trade and consequently, will require different solutions in order to achieve a single window. The UN/CEFACT has created a number of guidelines for single window created with a view to 'enhance the efficient exchange of information between trade and government' (Centre for Trade Facilitation and Electronic Business 2005). In these guidelines there are suggested three models for a single window – Single Authority, Single Automated System and Automated Information Transaction System.

#### *Single Authority*

In the Single Authority model, there is one body or agency that acts as a singular retainer for electronic or paper documentation related to a defined unique business function or service. Upon receiving documentation, this single retainer acts as an authority

and either manually or automatically files necessary paperwork and disseminates the required documentation to the respective agencies or authorities. As a part of its functionality, this singular authority should only disperse documentation once overviewed and formatted to the recipient's specifications. See Fig. 4 for an illustrated diagram of the Single Authority model.



**Fig. 4. Single Authority conception**

#### *Single Automated System*

The Single Automated System can take three forms – an Integrated System (illustrated below), an Interfaced System and a combination of integrated and interfaced systems. In all three forms, businesses submit all electronic information related to trade with other countries to a singular source which is either a public or private entity, or window. Here, the electronic information will be collected, integrated and stored. In the case of an integrated system, this central window not only receives information, but processes it as well. On the other hand, an interfaced system will send the formatted data to all the relevant agencies rather than process it itself. However, it is important to keep in mind that regardless of the type of Single Automated system, a user experience from the business or trader perspective does not change as in any scenario all necessary documentation is submitted electronically to one authority.

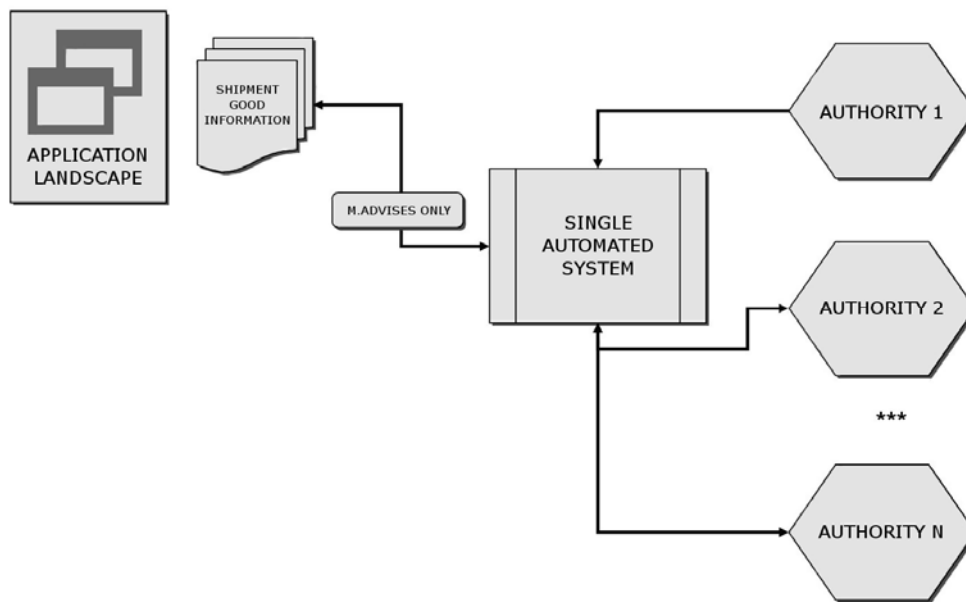


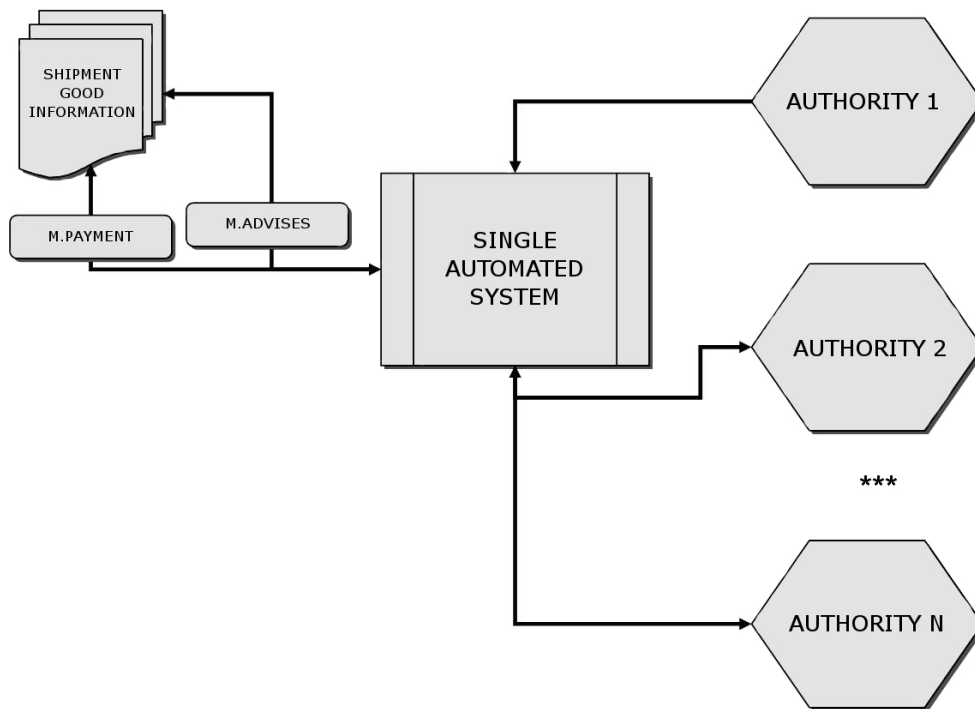
Fig. 5. Single Automated System conception

#### Automated Information Transaction System

The Automated Information Transaction System is the most complex single window model, but it also the most advantageous for businesses. In this model, entities involved in international trade are only required to submit electronic information through a singular application. This application contains in its application backend the integration with all concerning agencies and regulatory authorities. In many cases, custom fees, tariffs and taxes can also be calculated and integrated within this application allowing businesses not only to submit their information, but also make the necessary payments for their trades.

According to a survey conducted by the WCO Compendium, in 2011 only 33 per cent of participating customs administrations operated on a single window model, while the rest were still in the process of developing one. A breakdown of the survey results is as follows (Choi 2011):

- 4 % operate Single Window – Integrated Model;
- 7 % operate Single Window – Interfaced Model;
- 22 % operate Single Window – Hybrid Model;
- 13 % operate One-stop Service;
- 44 % operate Stand-alone system;
- 9 % operate other systems.



**Fig. 6. Conception Automated Information Transaction System**

### Single Window Case Studies

Several organizations began making strides towards achieving the Single Window concept in the 1990s, while many more started work in the last decade. Every country faced unique situations and goals which in turn led to various implementations of methods. It was clear through each case study, however, that there were certain common steps that each organization took in order to achieve their goals.

The first was clearly a preparation. Due to the scale of a single window project encompassing departments that involve customs, imports and exports, an enormous preparation process was required in order to achieve a proper foundation upon which to build a single window. The UNECE emphasizes the importance of choosing a suitable agency to lead all others in the single window effort. While this agency can be public or private, it is important to ensure that it has enough legal power and government funding to act as an effective leader.

After a leading agency is chosen, it becomes crucial to set the requirements. It is important to identify early which processes, organization units and cross-organisational counterparts in related agencies should be integrated into the system's initial release. Each of these bodies should define its own requirements and only after this phase is completed there should begin the feasibility assessment and initial design work.

*Variations in Single Window Implementation*

The UNECE has revealed through study and survey of the countries that have or are in the process of introducing a single window, that there is a wide range of options in reference to the methods in which these systems are set up. For instance, while nations such as Finland and the United States fund the development of a single window through their government, other single window systems, including the one in Germany, are paid by the private sector (Butterly n.d.). The country of Mauritius, which will be further discussed, received funding from both the public and private sectors.

Countries also vary in the way in which the single window is used. It is mandatory in some countries (Finland, Senegal, Mauritius), while intended to be voluntary in others (Germany, Sweden). Additionally, Germany, Senegal, Malaysia and a few other nations charge for use of their single window system. Each nation inevitably runs into challenges when implementing new systems, though these can vary as well. The countries such as the United States that have a complex and long-existing infrastructure to handle the trade, find it difficult to make the transition from older legal systems to a single window. Other nations find it difficult to get support from all participating agencies, while others run into problems finding initial funding and development power for the project (Butterly n.d.). The UNECE emphasizes the importance, but not the necessity of technology in single window development. Though it is really advantageous to incorporate computerized and automated processes within the single window, the overall methodology can be executed manually in cases where funds for technology cannot be secured (Centre for Trade Facilitation and Electronic Business 2005).

*Mauritius*

Mauritius, despite having an economy ranked 128<sup>th</sup> in the world (CIA 2011), was one of the first countries to have an information transaction system, proving that existing economic wealth is not a prerequisite to implementing a Single Window system. Through a corporation called Mauritius Network Services Ltd., consisting of public and private sector representatives combined with outsourced technical assistance, the TradeNet application was developed.

TradeNet is a completely proprietary electronic data interchange (EDI) application designed to receive information from IT applications including content related to customs, imports, exports, duties and tariffs. Since the launch of the program in 1994, businesses are able to submit all their information electronically through TradeNet as well as to make bank payments in the system in order to pay for any necessary duties, taxes or tariffs.

According to UN/CEFACT, 'it is estimated that TradeNet has decreased the average clearance time of goods from about 4 hours to around 15 minutes for non-litigious declarations, with estimated savings of around 1 % of GDP' (Centre for Trade Facilitation and Electronic Business 2005). Thus, it is no surprise then, that Mauritius is bucking the trend in Africa and has been on the receiving end of consistent economic growth over the last 15 years. Global investment and exports seem to have increased and the countries could experience therefore a possible healthier distribution of wealth. The success of the single window in Mauritius has attracted attention of other African countries such as Uganda and Rwanda, both of which are in



the development stages of a Single Window system (Hitimana 2012; TradeMark East Africa 2012).

#### *Sweden*

As a part of an ongoing initiative to provide more government transparency to its citizens, Sweden created a single window system known as the Virtual Customs Office (VCO), which is aimed at electronic processing of customs declaration as well as import and export licenses. The single window incorporates a large number of national organizations including the Swedish Customs Authority, Swedish Board of Agriculture, National Board of Trade, The National Inspectorate of Strategic Products, Swedish Police and The National Tax Administration and Statistics of Sweden (Centre for Trade Facilitation and Electronic Business 2005).

The VCO aims at providing a user-friendly service to traders in an attempt to make the filling customs declarations and import/export licenses as simple as possible. Integrated into the virtual office are real-time updates of taxes, tariff codes and duties, which traders can receive either via email or SMS. Fully financed by the Swedish government, a survey of VCO users revealed that 80 % of traders saved time, 54 % saved money as a direct result of using the system, 72 % believed it provided increased flexibility, and 65 % thought the quality and speed of served had improved (*Ibid.*).

#### *The Netherlands*

Air cargo handled through Schiphol Airport in the Netherlands is processed through a single window system headed by the customs department. Called VIPPROG, the Netherlands' single window is integrated with a private documentation system called Cargonaut, which handles cargo manifest paperwork. The government pays Cargonaut in order to maintain and have access to relevant records (Centre for Trade Facilitation and Electronic Business 2005).

In this situation, the customs department acts as the leading agency in the single window initiative and they process all paperwork in the form of a single automated (integrated) system. Here all cargo is given a risk assessment and depending on the results, any risk factors are sent to one or more of the corresponding agencies. The system is designed to integrate with the customs department and ten other agencies including immigration, and various health and agriculture offices (*Ibid.*). If any of these agencies wish to further inspect the cargo, the customs department arranges an inspection appointment, where any and all interested agencies can examine the cargo during a certain scheduled time. This ensures that all goods can be checked at once, accelerating the time in which cargo is generally processed through the airport while at the same time mitigating risks.

#### *The United States of America*

In the United States of America, there is a large concerted effort to implement and utilize a single window integrated with many of the country's government agencies in order to improve the trade process. The United States is one of the largest importers in the world and exports quite a bit as well with a combined total of three trillion USD worth of merchandise coming in and out of the country in 2011 (GFP 2012). As a result, the country has set up a group known as the International Trade Data System (ITDS),

aimed at establishing a 'single window through which the data required by government agencies for international trade transactions may be submitted' (ITDS 2012). By implementing a secure government-wide system to collect, store, integrate and disseminate information related to trade, the ITDS hopes to reduce public and private sector overhead, comply more easily with a number of government requirements, and improve national security allowing multiple agencies to have access to pertinent information (*Ibid.*).

In the United States there seem to be more than a hundred agencies who require access to trade documentation (*Ibid.*). The ITDS has the monumental task of setting up a system whereby members of the trade and transportation communities are required to submit relevant documentation through a secure EDI only once, leaving the single window to take care of the rest. Much like VIPPROG in Schiphol Airport, the goal is to have the single window perform a security and risk assessment, then forward on the findings to any government agencies who are qualified to further assess compliance or security risk.

Still in the process of development, it is hoped that the country will benefit from this new system in a number of ways. Though providing efficient means of transporting goods across the country's boundaries will no doubt reduce overheads for both the government and private businesses, one of the most important goals is to increase government compliance and security. Storing and handling all data under a central hub or single window will facilitate the sharing of information between government agencies, allowing them to collaborate on security and compliance efforts.

### **Enterprise Architecture Management (EAM) as an IT discipline**

The more or less new discipline of Enterprise Architecture Management (EAM) as partially a discipline of the organization studies and IT can be described on the basis of two partial entities, which are already indicated by the combination of words.

#### *Conceptual and historical dimension of the term EAM*

An enterprise is an activity that contains a well-defined target. Currently, this can mean a large number of organizations and suborganizations, which pursue a common target or produce a common result. An enterprise can thus mean anything – from a big group to a state or public institution – in practice, also summarized into holdings, trusts, and other divisionally separated legal forms. Thus, they also have several Enterprise Architectures. An enterprise in this context can also be an Extended Enterprise, which includes all the partners, suppliers, and clients of the actual business in its value-added or administration chain into its own IT-based value added. The business architecture within the framework of Information Technology (IT) describes the interaction of the elements of information technology and the business activities within the business. It distinguishes above all due to the sub-elements, for example, the information architecture or the software architecture with a global view on the role of information technology within an organization. The official definition of the term architecture according to the ANSI/IEEE standard 1471–2000 in the IT environment is:

An architecture is the fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution.

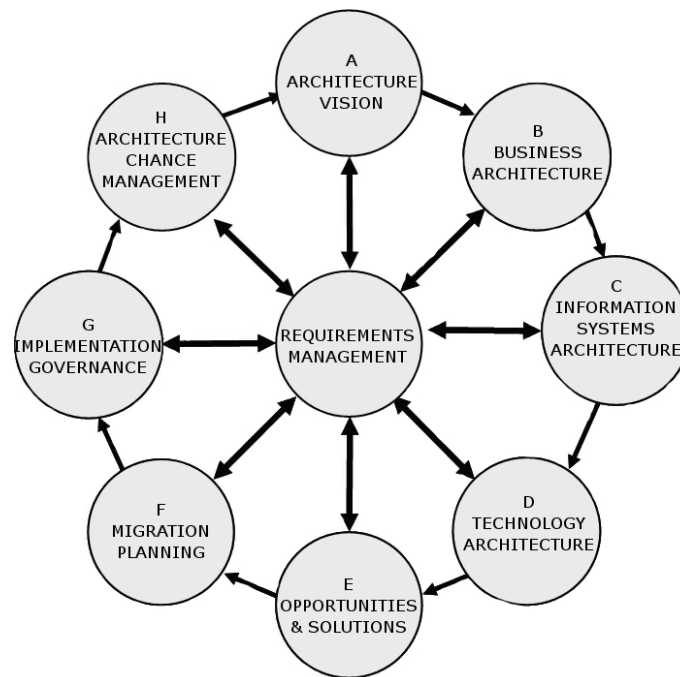
The definition used, however, is narrower: an architecture is a formal description of a system, a detailed plan of the system and its components, the structure of the components, their mutual effects, their principles and guidelines, which control their draft, their development, and their implementation. In larger groups, several different Enterprise Architectures can exist at the same time. However, in all cases, an Enterprise Architecture includes several technical systems. The enlarged concept of Enterprise Architecture dates from the 1980s. One of the leaders of the architecture movement, John Zachman, saw the value of the use of an abstract architecture for the integration of systems and their components. Zachman developed the analogies in the field of traditional construction architecture and later used concepts from the airplane industry in order to cover the business process aspects in his framework. Since then, a number of frameworks have been published, which all aim at describing a business in a structural way (Zachmann 2008).

#### *Architecture frameworks as an auxiliary*

An Architecture Framework divides a complex task of the IT architecture management into several partial layers, which can be described separately to partially reduce complexity. Each partial layer (Layers) should be specified in the Meta model of the Framework. An approach is the ISO standard 15704, which defines general demands towards the company architecture. In this standard, the architecture is considered as a description of the fundamental structure of the system parts and the links between the individual subsystems.

#### **The Relationship between the Single Window Concept and Enterprise Architecture**

The goal of a single window system for trade is to consolidate existing processes and simplify existing procedures. When incorporating technology, this concept aligns itself well to enterprise architecture, which is defined as ‘the process of translating business vision and strategy into effective enterprise change by creating, communicating and improving the key requirements, principles and models that describe the enterprise's future state and enable its evolution’ (Gartner 2012).



**Fig. 7. TOGAF model**

#### *SWIF and TOGAF ADM*

In fact, the UNECE has created a framework meant to assist in the creation of a single window called the Single Window Implementation Framework (SWIF). It is based very heavily upon an existing standardized enterprise architecture framework known as The Open Group Architecture Framework (TOGAF) and its Architecture Development Method (ADM), which has evolved from initial work performed by the US Department of Defense. The figure above (Zachmann 2008) illustrates the core entities of the TOGAF model.

#### *Overview of SWIF Methodology*

SWIF is divided into a preliminary stage and additional eight phases, each consisting of a defined set of objectives, activities and outputs/results. Designed to be a dynamic and iterative process, these phases together are intended to outline the general steps necessary to establishing and maintaining an EA-based Single Window System.

#### ***Phase A: Architecture Vision***

This is the highest-level phase, where the project can be identified through broad definitions. The keys in this phase are to identify stakeholders. As the Single Window concept pertains to customs and trade, there are four categories of stakeholders – Authority, Supplier, Customer, and Intermediary. These refer to relevant government agencies, exporters, importers, and auxiliary parties such as financial and shipping institutions respectively (van Stijn *et al.* 2011).

Once all the stakeholders are identified, the goals of this phase are to create a very broad overview of the requirements of the stakeholders, and establish key performance indicators for the project.

#### ***Phase B: Business Architecture***

Much of the work that goes into streamlining processes occurs in Phase B. In this phase, existing business processes are examined and weaknesses identified. Functions which can be automated or consolidated should also be identified.

#### ***Phase C: Information Systems Architecture***

This is the first phase which heavily involves IT. One of its main goals is to harmonize data, which will be a key component to facilitate future modifications and scalability. Standardized data allows for increased interoperability between business processes, allowing for more transparency and ease of use. A data model should be designed in this phase, incorporating all consolidated and streamlined business processes (Phase B), along with any data which will be utilized.

#### ***Phases D–H***

Phase D deals with obtaining, designing and/or modifying any hardware or software required to implement the new business processes. In the next phase, a plan should be put in place for ‘implementing, deploying and operating the Single Window’ (van Stijn *et al.* 2011). Phase F involves the final preparations required to ensure that all the sub-systems in place fulfill the requirements of the original high-level plan. The last two phases entail the implementation of a monitoring system and identifying ways to improve the system.

Throughout each of the phases, the management of requirements should be always kept in mind. It is important to ensure that all the work going towards the implementation of the enterprise structure does not ever stray from the business requirement established during the preliminary phase and Phase A.

The trade industry is very dynamic and experiences constant changes in regulations, duties and tariffs as a result of a various factors. Therefore, a single window system must be designed to be alterable, dynamic and growth scalable. The TOGAF ADM and SWIF account for the dynamic nature business in the design of their methodology. The previously described phases are intended to work in a cyclical format on several different levels. The framework is flexible enough to support the cycling of a single phase, between phases and around the entire ADM itself, allowing for changes, new initiatives and sub projects to be implemented during the life of the single window. This dynamic capability combined with the properties of enterprise architecture will ensure fewer faults associated with updates to regulations or tariffs, resulting in a more secure trade industry and lower overheads.

#### ***Integrating Security into a Single Window System***

Security is an important factor in international trade and any new system put in place to facilitate the processing of goods across national boundaries should not compromise a country's security. Due to the structure of SWIF, in which harmonized data and business processes allow for an easier propagation of necessary modifications and alterations

throughout the system, adding security features to a single window more easily executed.

Single windows designed through the SWIF benefit from having data, business processes and documentation in a standardized format. This clear, hierarchical structure reduces the possibilities of data security issues that can arise from having a group of separate legacy systems. Furthermore, the adoption of security standards such as ISO 28000 and BS 7799 (as recommended by UNECE) are made easier due to the simplified architecture created through SWIF.

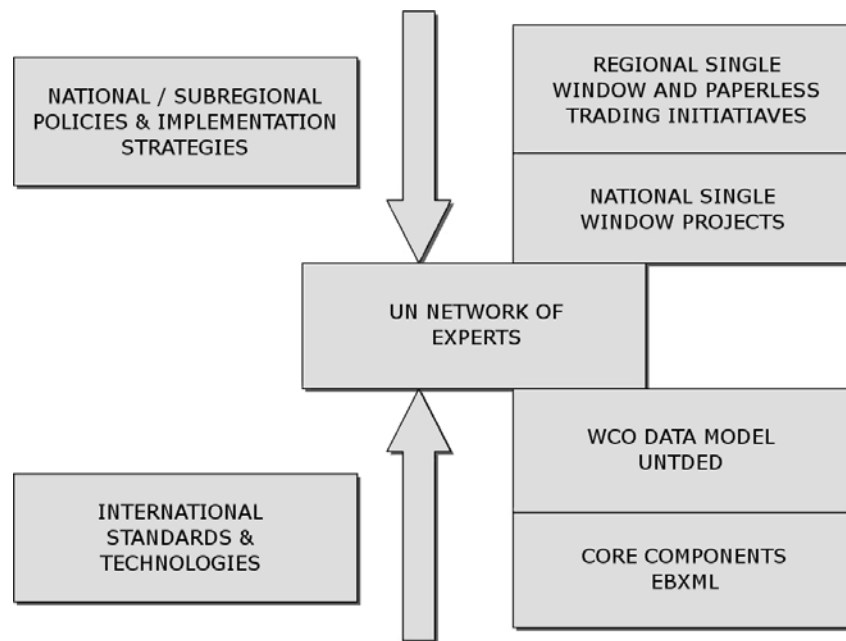
On the user-end, countries which already employ a Single Window system use a number of techniques to secure their application(s). Amongst the most common security implementations are a PIN/Password system, Public Key Infrastructure (PKI), Authentication Tokens, Biometrics and Smartcards (Choi 2011). Additionally, in most countries they protect raw data through an additional level of security incorporated during the implementation of the architecture. As a result, other government agencies are not able to access any raw data. Instead, they rely upon the single window to provide them with the processed information, thus reducing the exposure of raw information.

Of course, these security features are all additional to the more secure borders created by the single window itself. The window is responsible for receiving all the data and information associated with customs and trades, which should provide it with all the tools necessary to assess risk (ITDS, Centre for Trade Facilitation and Electronic Business). This is in stark opposition to many existing border control methods when several departments are responsible for different pieces of information, making risk assessments more difficult.

### **Conclusion**

The Single Window concept as proposed by the UNECE is beneficial to the world economy and security in a number of ways. Its structure, mainly drawn from an existing approach to enterprise architecture, is aimed at simplifying customs procedures while at the same time improving security techniques. No doubt, a streamlined method of international trade requires less time to bring imported goods to the market, which will be very much appreciated by business.

Case studies performed on the countries already benefiting from a single window system have received overwhelmingly positive reviews from the private sector. The single windows not only decrease the amount of time needed to clear goods, but also saves business money by reducing overheads. From a public sector perspective, the ability to update duties and tariffs through a single window has been shown in countries such as Mauritius to increase revenue from foreign trade. Governments are also on the receiving end of steep overhead reductions, which is typical for organizations converting from legacy to enterprise architecture systems. Citizens, too, have much to gain from the single window as the ripple effects of this implementation are widespread. Mauritius is a prime example of a country which has transformed itself from a localized agricultural economy into a significant member of the world trading community.



**Fig. 8. UN Single Window Implementation Roadmap**

The UN Single Window concept could therefore be a next logical step in trade globalization. It will help facilitate international trade, enable governments to give businesses an opportunity to reduce their overheads and simplify international shipments while at the same time keeping borders secure and documentation updated and in check.

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