Asia-Pacific
Economic Cooperation

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Study on Single Window Systems' International Interoperability: Key Issues for Its Implementation

APEC Policy Support Unit

August 2018

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Produced for:
Committee on Trade and Investment
Asia-Pacific Economic Cooperation

APEC#217-SE-01.31

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Acronym and Abbreviations

ABA	Australian Banking Association
ACCC	Australian Competition and Consumer Commission
ACDD	ASEAN Customs Declaration Document
AEO	Authorized Economic Operator
AIEX	Australian Institute of Export
AFIF	Australian Federation of International Forwarders
AHTN	ASEAN Harmonized Tariff Nomenclature
APEC	Asia Pacific Economic Cooperation
APN	National Port Authority
ASEAN	Association of South East Asian Nations
AME	ASEAN Member Economies
ASW	ASEAN Single Window
ATIGA	ASEAN Trade in Goods Agreement
CAF	Development Bank of Latin America
CAPEC	Council of Asia Pacific Express Couriers
CBFCA	Customs Brokers and Forwarders Council of Australia
CBRA	Cross Border Regulatory Agencies
CBSA	Canadian Border Services Agency
CBM	Coordinated Border Management
CEISA	Customs and Excise Information System and Automation
CIA	Certificate Issuing Agency
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CO	Certificate of Origin
DB	Doing Business (World Bank)
DFAT	Department of Foreign Affairs and Trade
DGT	Director General of Taxation
DIBP	Department of Immigration and Border Protection
EAC	East Africa Community
ECA	Export Council of Australia
EIF	European Interoperability Framework
EOI	Exchange of Information
ESB	Enterprise Service Bus
GDP	Gross Domestic Product
GVC	Global Value Chain
IBM	Integrated Border Management
ICA	Insurance Council of Australia
ICS	Integrated Cargo System
IDB	Inter-American Development Bank
IEEE	Institute of Electrical and Electronics Engineer
IMF	International Monetary Fund
INSW	Indonesia National Single Window
IOPACK	Interoperability Platform

ISRM	Integrated Single Risk Management
LAC	Latin America and Caribbean region
LARTAS	*Larangan dan Pembatasan* (in Bahasa Indonesia), meaning: Restriction and Prohibition provisions for traded goods
MIG	Message Implementation Guideline and Process Specification
MINCETUR	Ministry of Foreign Commerce and Tourism
MoU	Memorandum of Understanding
NSW	National Single Window
OCP	Operating Certification Procedure
OECD	Organization for Economic Cooperation and Development
OGA	Other Government Agencies
PA	Pacific Alliance
PLF	Protocol of Legal Framework
PPP	Purchasing Power Parity
RADDEx	Revenue Authorities Digital Data Exchange
REDVUCE	Inter-American Network of International Trade Single Windows
REC	Regional Economic Communities
REF	Regional Economic Forum
RTA	Regional Trade Agreement
RSW	Regional Single Window
SAL	Shipping Australia Limited
SCAROO	Sub-Committee of the Agreement of Rules of Origin
SCCP	Sub-Committee on Customs Procedures
SICEX	Sistema Integrado de Comercio Exterior
SPS	Sanitary and Phytosanitary
SSI	Single Stakeholder Information
STL	Secure Trade Lane
SUNAT	National Superintendence of Tributary Administration
SWI	Single Window Interoperability
SWSII	Single Window System International Interoperability
SWS	Single Window System
TFA	Trade Facilitation Agreement
USAID	United States Agency for International Development
UNECE	United Nations Economic Commission for Europe
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
US-ACTI	United States - Association of Southeast Asian Nations (ASEAN) Connectivity through Trade and Investment
VAT	Value Added Tax
VUCE	Ventanilla Unica de Comercio Exterior
VUCEM	Ventanilla Unica de Comercio Exterior Mexicano
WCO	World Customs Organization

WTO	World Trade Organization
XML	eXtensible Markup Language

Executive Summary

Digital trade has ushered in a new era of globalization and regional cooperation. Cross-border digital flows have grown nearly 50 times in the past decade and the trend is unrelenting. Winners of this new era are economies that take advantage of technology to simplify and expedite information flows between traders and international trade regulatory agencies through Single Window Systems (SWS).

There is a body of evidence, including the authors' assertions, that, each economy will have its own unique starting position in implementing SWS and SWS international interoperability (SWSII). And from each distinctive starting line, individual economies have to chart their own paths based on vision, political will, leadership, skills and experiences, legal readiness, technology and resources to name a few. Each economy will have its share of successes, and equally important, its own set of challenges. Notwithstanding, as most APEC economies have progressed with their SWS implementation over several years, there is collective recognition amongst members to ascend SWS to new heights; that is, to look beyond its borders and to promote SWSII to facilitate regional trade. In May 2016, APEC Ministers Responsible for Trade "welcome(d) the Initiative on Single Window Systems' International Interoperability" – a step towards digitally transforming regional trade amongst members.

Since 2005, economies have been working with intergovernmental bodies such as UN/CEFACT and WCO to discuss the establishment of common standards for interoperability of single windows. Ever since then, experts around the world have been working towards this goal.[1] Modestly, this study is APEC's contribution in advancing this growing body of knowledge on SWSII. This study was commissioned in early 2017 at a time when UN/CEFACT Recommendation No. 36 Single Window Interoperability was in its final draft. Global experiences and literature on SWSII was limited. Therefore, to strengthen the tenor of this study, a rapid survey was deployed amongst APEC members to do a self-assessment vis-à-vis Recommendation No. 36. Therefore, this study is a good accompaniment to Recommendation No. 36 and vice versa.

The paper at first sets the context of the study. We discuss the general framework of SWSII by introducing common concepts and the ten SWSII principles, the latter being uniquely formulated for this particular study. With only a handful Regional Single Window (RSW) implementations globally, we reviewed ASEAN, the Pacific Alliance and RADDEx by outlining common themes and translating them into lessons learned. We also showcase the single window journeys of three economies namely Australia[2], Indonesia and Peru. These economies are at different stages of their SWS and SWSII initiative, but yet demonstrate the benefits of effective, efficient and reduced cost of trade across the milieu. Lastly, we provide a summary of the survey conducted amongst APEC economies by polling and refreshing data points from the 2014 APEC Survey on Single Windows and Recommendation No. 36 as its basis. Insights from the survey showed that economies are at

[1] UNESCAP/UNCEFACT. 2005. Case Studies on Implementing a Single Window: to enhance the efficient exchange of information between trade and government.
[2] Australia is just starting its single window implementation under the Department of Home Affairs.

various stages of SWS implementation and that SWSII solutions must be architected to inculcate a climate of trust through consensus, agreement, security, privacy, confidentiality, harmonization and standardization.

Just like there is no one-size fits all to implementing SWS, the same appertains to achieving SWSII. It is a confluence of business drivers, legal and regulatory settings, governance and technology standards that defines the highly complex relationship of SWSII. Therefore, the study underscores the need for ongoing collaboration between economies, the need to establish a pragmatic working definition of "interoperability", determine how it can be achieved and sustained, and its progress evaluated based on a pre-defined performance criteria. As a possible next step, a "limited" pilot using blockchain technology to demonstrate trust, efficiency and effectiveness alongside usability and scalability is recommended.

Chapter 1: Introduction

A. Background

Single Window System for foreign trade (SWS) has been the key concept for trade facilitation at the border for these past decades. The concept of SWS is basically the idea of a single-entry point and single-submission[3] (or single interface), enabling traders to comply with regulatory requirements of export and import in a more efficient manner. Furthermore, SWS enables coordination and connection among different border government agencies ensuring that trade activities and transactions are safe, legitimate and seamless across trade and supply chains.

The advancement of Information and Communication Technology (ICT) has further pushed forward the development of SWS. With better software and hardware, data is being transferred and shared faster across different platforms and actors at a much higher degree of accuracy and reliability. With growth in trade and commerce accelerating while applying stress on customs and other cross border regulatory agencies (CBRA), ICT automation brings the opportunity to facilitate trade efficiently, improve the level of predictability, reduce the stress on its resources and manage risks. The World Bank has estimated that automating customs processes can save as much as $115 for each container[4]. Additionally, according to the Organization for Economic Cooperation and Development (OECD)[5], automating trade and customs processes would also reduce trade costs by 2.4% for low-income economies, 2.3% for upper middle-income economies and 2.1% for lower middle-income economies (and respectively 1.7%, 1.9% and 1.5% in a "limited" implementation scenario).

The Single Window Systems (SWS) vision in the 2007 Asia-Pacific Economic Cooperation (APEC) Sub-Committee on Customs Procedures (SCCP) Single Window Strategic Plan[6] emphasized the importance of international interoperability and the use of international standards and instruments to efficiently share information amongst member economies to facilitate trade and improve supply chain security. The APEC Single Window Implementation Guide (2009) highlighted that establishing links that enable seamless data sharing among SWS would also require sharing experiences among economies, particularly on single window business process and technical components as depicted in Figure 1 below.

[3] As mentioned in TFA Article 10 and UN/CEFACT Recommendation Number 33.
[4] See: http://www.dnb.com/content/dam/english/dnb-solutions/supply-management/db_global_trade_whitepaper.pdf. [last accessed 23 May 2018]
[5] See: http://www.oecd.org/tad/facilitation/OECD_Trade_Facilitation_Indicators_updated-flyer_October_2014.pdf. [last accessed 23 May 2018]
[6] APEC Sub-Committee on Customs Procedures. (2007). Working towards the implementation of Single Window within APEC Economies: Single Window Strategic Plan.

Figure 1. Single Window Business Processes and Technical Components

Source: APEC, 2009. Single Window Implementation Guide

In May 2016, APEC Ministers Responsible for Trade "welcome(d) the Initiative on Single Window Systems' International Interoperability which aims to foster the flow of goods, enhance supply chain security, reduce costs and provide quality and timely information on trade across borders and encourage(d) economies to begin discussions next year (i.e. 2017) on establishing pilot projects on voluntary basis."

The purpose of this study is to contribute to APEC economies' efforts to implement and achieve international interoperability of SWS in the region, and in the long run, establish a Regional Single Window (or RSW) to enhance trade facilitation, institutional connectivity as well as regional economic integration efforts. This study will also serve as a channel to promote discussions for establishing interoperability pilot projects on a voluntary basis amongst member economies.

B. Scope of the Study

Due to the number of single window terminologies being used interchangeably (and at times incorrectly), it is important to elucidate and explain how the term "single window" expression will be used throughout the paper.

For the purpose of this study, the term "single window" or sometimes referred to as "single electronic window", or "single window environment", or "international single window" or "single window system for foreign trade" relates to supporting international trade as well as cross border regulatory controls to facilitate trade. In this paper, the term "Single Window System" (SWS) is the information technology-based solution that facilitates trade.[7] Additionally, the term "National Single Window" (NSW) used in this paper is the information technology-based solution that provides trade and non-trade related services[8] between citizens, traders and governments of one

[7] For brevity and future reference, Single Window Systems for Foreign Trade will be referred to as "Single Window System".

[8] Non-trade related services may include immigration, passport, central bank and other national or municipal government services.

economy which can include a SWS. Therefore, a NSW can have a SWS, but a SWS is not a NSW. Unfortunately, based on literature review, these are the two "single window" terms that are often used interchangeably which can muddle the conversation.

In addition, the term "single window" could be a concept and not necessarily an information technology-based solution. Therefore, this paper is making the further distinction of "single window" as a trade facilitation idea and "Single Window System (SWS)" as an information technology system to enable trade facilitation services.

Lastly, the term Single Window Systems' International Interoperability (SWSII) focuses on building the capabilities between two or more economies to exchange trade data between two or more SWS.

The following are the scope of the study:

1. To identify best practices and main obstacles in implementing SWS´ international interoperability (SWSII) through economies' experiences.
2. To identify organizational, legal and technical conditions, benefits and difficulties for its implementation.
3. To review existing work of different international organizations.
4. To show the benefits and challenges of SWSII.
5. To establish general recommendations to overcome main obstacles for its implementation.

The outline of the study is as follows. **Chapter 2** will discuss the general concepts and principles of Single Window System International Interoperability (SWSII). **Chapter 3** will review the treatment of SWSII in existing trade agreements such as the Association of South East Asian Nations (ASEAN) and Pacific Alliance (PA). **Chapter 4** will spotlight case studies on Australia,[9] Indonesia and Peru on good practices and key challenges to achieving SWSII. **Chapter 5** will discuss the basic requirements to implement SWSII. **Chapter 6** will provide conclusions and recommendations.

9 Since Australia is still in the planning and development stages for their SWS initiative, Chapter 4 subsections on Business Framework, Technical Framework, Benefits Realized, Problems and Challenges and Lessons Learned was not included.

Chapter 2: General Framework of Single Window System International Interoperability: Concepts and Principles

A. Concepts of Single Window

At its most basic or general form, a Single Window System (SWS) could be defined as a facility that "would allow a business to submit all the data required by Government only once to fulfill regulatory requirements or to use government services"[10].

In Recommendation No. 33, United Nations Economic Commission for Europe (UNECE) (2005) defines SWS as "a facility that allows parties involved in trade and transport to lodge standardized information and documents with a single-entry point to fulfil all import, export, and transit-related regulatory requirements. If information is electronic, then individual data elements should only be submitted once".

World Customs Organization (WCO) expanded the SWS concept to provide further scope on the varied and loosely used terms with SWS by referring it as a 'Single Window Environment' with the following definition: "A Single Window Environment is a cross border, 'intelligent', facility that allows parties involved in trade and transport to lodge standardized information, mainly electronic, with a single entry point to fulfill all import, export and transit related regulatory requirements."[11] Further, WCO regarded SWS as a trade facilitative measure as it "permits the trader or transporter to submit all the data needed for determining admissibility of the goods in a standardized format only once to the authorities involved in border controls and at a single portal"[12].

Other definition from the Development Bank of Latin America (its Spanish acronym, CAF), defines single window as a "single installation (physical or virtual) for the exchange of information between merchants and the government which is oriented towards reducing not only the complexity but also the time and costs that international trade involves"[13]. Elorza V. (2012) further noted that single window model is not exclusively applicable to international foreign trade only but also to other form of services such as: Setting up a business; Investor protection; Issuing construction licenses; Tax payments; Employment; Contract compliance control; Property registry; Closing a company; Obtaining a loan. Koh (2011) mentioned several forms of 'limited' SWS such as: (i) Customs Single Window: provides a single interface between the trading community and the Customs Authority; (ii) Port Single Windows: a system which provides local level information about the vessel to the authorities on a port level, has Business to Local Government character; (iii) Subnational "Single Window": whereby the local trade community

[10] Ahn and Han. (2007). A Comparative Study on the Single Window between Korea and Singapore.
[11] See: http://www.wcoomd.org/en/topics/facilitation/activities-and-programmes/single-window/single-window.aspx. [last accessed 23 May 2018]
[12] See: http://www.wcoomd.org/~/media/wco/public/global/pdf/topics/facilitation/activities-and-programmes/tf-negociations/wco-docs/info-sheets-on-tf-measures/single-window-concept.pdf. [last accessed 23 May 2018]
13 Elorza V., J.C. (2012). International Trade Single Window: Requirements for a successful implementation in Latin America. *Public Policy and Productive Transformation Series No. 8/2012*. Corporacion Andina de Fomento (CAF). Retrieved from: http://scioteca.caf.com/bitstream/handle/123456789/363/caf_book_n_8_vuce_english.pdf?sequence=1&isAllowed=y [last accessed 23 May 2018]

and regulatory agencies can be grouped together at city or provincial level to establish a community-based trade "Single Window" system.

The latest single window definition from the World Bank, in the Doing Business (DB) 2017, defines a single window as "a system that receives trade-related information and disseminates it to all the relevant governmental authorities, thus systematically coordinating controls throughout trade processes". Furthermore, DB 2017 suggested that the concept of a "Single Window" has expanded the past decade to include the entire evolution of electronic systems, including customs automation, trade point portals, electronic data interchange techniques, agency-specific single window, national single windows, and even regional and global single windows.

In addition, the World Trade Organization (WTO) in the Trade Facilitation Agreement (TFA) defines SWS as a tool that enables traders to submit documentation and/or data requirements for importation, exportation, or transit of goods through a single-entry point to the participating authorities or agencies.

From the above several SWS definitions, it is clear that single window concepts have evolved over time. From a very 'basic' form of SWS, that only serves the purpose to fulfill regulatory requirements to a more sophisticated definition that includes trade facilitation objectives as well as other services to traders such as financial and logistics services. DB 2017 report highlights that "traders in economies with fully operational electronic systems (that allow for export and import customs declarations to be submitted and processed online) spend considerably less time on customs clearance".

WCO in their single window definition includes the word 'intelligent'. It is further explained in WCO (2011) that the term 'intelligent' implies that the SWS should not be just a data switch, a gateway to a set of facilities or just a unified access point through a web portal, but SWS should also act as a platform that could enable and provide shared services such as computation of duties/taxes and coordinated risk management to the users.

UNESCAP/UNECE (2012)[14] in their Planning and Implementation Guide offers the following concept of SWS evolution or incremental development levels:

- **Level 1: Paperless Customs** (Development of paperless customs declaration system)
- **Level 2: Regulatory Single Window** (Integration of paperless customs with other regulatory bodies issuing trade/import/export/transit-related permits and certificates, and other related documents)
- **Level 3: Port Single Window or B2B Port Community System** (Extension of the Single Window to serve entire trade and logistics communities within the airports, seaports and/or dry ports)
- **Level 4: Fully Integrated Single Window** (Creation of an integrated domestic logistics platform interlinking the administrations, companies and the service sectors to better manage the entire chain of import-export operations)

[14] United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) AND United Nations Economic Commission for Europe (UNECE). 2012. Single Window Planning and Implementation Guide.

- **Level 5: Cross-border Single Window Exchange Platform** (Interconnection and integration of NSWs into a bi-lateral or regional cross-border e-information exchange platform)

The above SWS evolution model started with a paperless customs system that connected traders and customs electronically. It then proceeded to evolve into an electronic exchange system that enables coordination among government agencies or authorities to allow electronic submission and approval of trade related permits and declarations. Under Level 3, the integration is moved to a higher level by involving private-sector logistics operators at major airports and seaports. For example, a port single window could connect to the electronic Customs declaration system enabling a single submission of data across transport and logistics chain. An example of a port SWS is the DAKOSY system in Germany in which the system provides an electronic document-exchange system for seaport operations. Level 4 extends the connections towards broader private sectors stakeholders such as banks, trade finances, cargo insurance companies, freight forwarders, ship agents and carriers. The Level 5 cross-border SWS platform involves the electronic exchanges of documents/certificates among different economies. See the diagram provided in Appendix A that best illustrates the 5 levels of evolution.

Examples of cross-border exchange include, but are not limited to:[15]

- Internet-based exchange of electronic sanitary and phytosanitary certificates for facilitating import and export between the New Zealand Ministry for Primary Industries and the Australian Department of Agriculture[16];
- The paperless or less-paper cross-border e-document exchange among ASEAN trade partners under the ASEAN SWS.

It is important to note that evolution is not linear. Driven by the economies' needs and regulatory priorities, economies may implement different levels of SWS in parallel or in cross-sequence.

UNESCAP/UNECE in their Single Window Planning and Implementation Guide (2012) further noted many economies were working towards cross-border information exchange among economies and the regional Single Window interconnection (level 5) to improve regional economic integration[17].

Chapter 4 will use the UNESCAP/UNECE (2012) evolutionary stage model as a reference on other economies' SWS implementation paths.

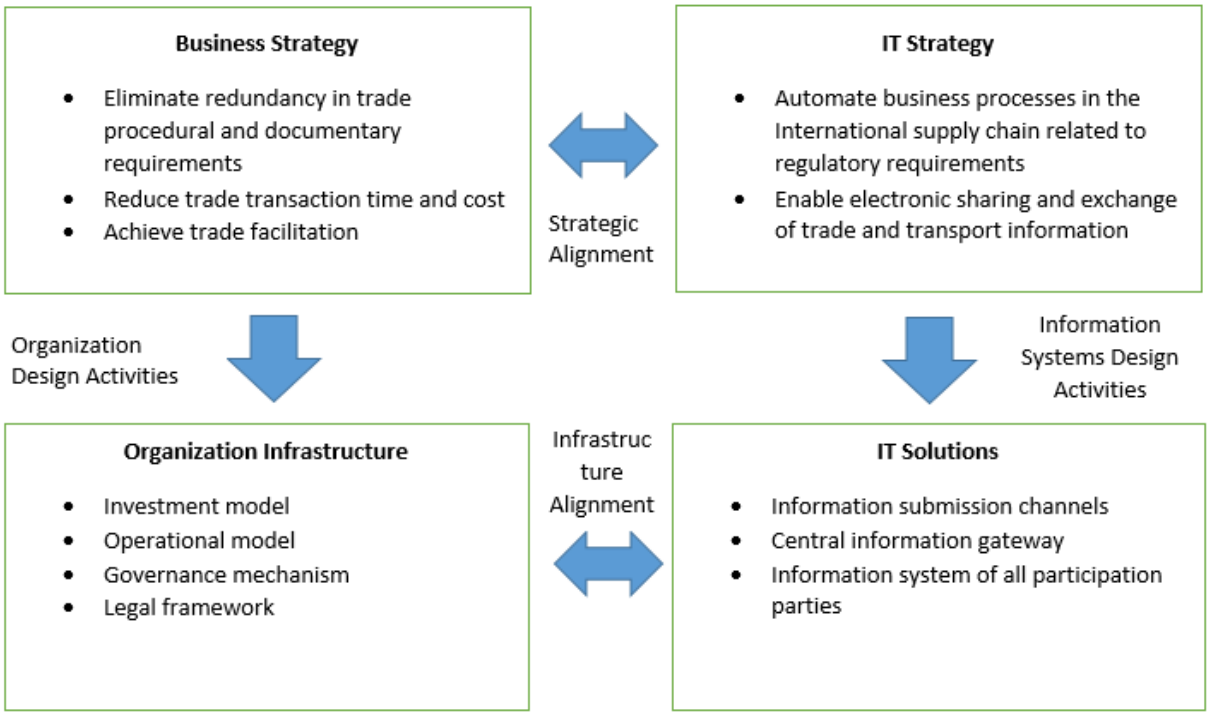
Together with Recommendation No 36 on Single Window Interoperability[18], which will be discussed in more detail in the next section, there are relevant (but very limited) studies and publications that are worthwhile to succinctly advance the understanding of the concept of SWS

[15] UNESCAP/UNECE. (2012). Single Window Planning and Implementation Guide.
[16] See: www.agriculture.gov.au/export/certificates/exdoc/developments. [last accessed: 11 May 2018].
[17] UNESCAP/UNECE (2012) defined regional single window as "A Single Window that is established between two or more economies."
[18] UN/CEFACT. Recommendation No. 36 on Single Window Interoperability.

in the context of international "interoperability" and trade facilitation. Firstly, Recommendation No. 33 in 2005 provided the following list of key factors in establishing a successful SWS: (1) Political will; (2) Strong Lead Agency; (3) Partnership between Government and Trade; (4) Establishment of Clear Project Boundaries and Objectives; (5) User Friendliness and Accessibility; (6) Legally-enabling Environment; (7) International Standards and Recommendations; (8) Identification of Possible Obstacles; (9) Financial Model; (10) Payment Possibility; (11) Promotion and Marketing; and (12) Communications Strategy.

Secondly, the Single Window Implementation Framework (SWIF) published by UNECE (2011) tried to decompose, structure and lay out the challenges that accompany a SWS implementation. SWIF highlighted two core alignment principles: (1) The alignment of business strategy and IT strategy; and (2) The systematic transformation of the pre-defined strategies into well-governed IT solutions. Figure 2 below provides the core alignment principles of SWIF.

Figure 2. Core alignment principles of SWIF



Source: UNECE (2011)

In addition, UNESCAP/UNECE (2012) in their Single Window Planning and Implementation Guide identified the following critical components for SWS development:

1. **Stakeholder Requirements Identification and Management:** needs and requirements of stakeholders must be identified and managed effectively.
2. **Stakeholder Collaborative Platform Establishment:** vision and value proposition, political will and the strategy must be well articulated, validated for its substantive value, and then securely mandated by the right authorities and sponsors.
3. **Single Window Vision Articulation:** establishment of a lead agency, inclusive

membership and participation and effective interagency collaborative platform and participation of the business community.

4. **Business Process Analysis and Simplification:** current business processes are analyzed, and target business process for easier and more compliance trading across borders are proposed, agreed upon and implemented.
5. **Data Harmonization and Documents Simplification:** analysis simplification and standardization of trade documents and trade data, development of data models and electronic documents and messages.
6. **Service Functions Design:** design, agree and develop services and functions provided by software applications of the SWS.
7. **Technical Architecture Establishment including Standards and Interoperability:** open and internationally recognized technical standards, interoperability and communication protocols must be adopted.
8. **Legal Infrastructure Institution:** enabling electronic transaction laws and related regulations to ensure the legitimacy, trust and confidence in electronic transactions must be institutionalized.
9. **Business and Governance Models Enforcement including Finance, Implementation and Operation Governance**: financial and business model decisions involving cost-benefit analysis, investment and operation cost, and the sustainability of SWS, including governance mechanism for monitoring, ensuring and enforcing the implementation and operation of SWS must be analyzed, designed and implemented.
10. **IT Infrastructure and Solutions Execution:** technology infrastructure, system and hardware development, software development, deployment and security are designed, implemented and executed.

Lastly, IDB (2010) provided the following essential elements and common impediments for Coordinated Border Management (CBM).

Table 1. Essential elements and common impediments for CBM

Essential Elements	Common Impediments[19]
• High-level political commitment • A sound legal basis to support interagency sharing of data and responsibility • The identification of the core border agencies • Agreement by those agencies on the common data to be collected and how it is made available • Creation and/or designation of an agency to take overall responsibility of coordination • The participation of mid-level managers in the decision-making process	• Resistance to change • Lack of good governance • Insufficient government support • Inadequate legal basis • Undetermined source of funding • Inefficient coordination • Unsustainable revenue flows • Employment volatility • Difficulties eliciting compliance • *Lack of project champion* • *Lack of common vision* • *Overly ambitious plan* • *Lack of donor coordination*

[19] The common impediments in italicize red has been added by the authors of this paper based on the author's experiences.

	• *Inadequate capacity by implementing agency* • *Inability to sustain after funding runs out*

Source: IDB (2010), adapted by Authors (2018) (in italics)

From the above-mentioned, several key factors could be highlighted. First, the importance of stakeholders' collaboration both among Other Government Agencies (OGAs) and with the private sectors. Second, the critical issue of aligning business strategy (and processes) with IT strategy. Third, the importance of data harmonization, standardization and documents simplification. Fourth, the importance of ensuring the legitimacy, trust and confidence in electronic transactions. Fifth, a strong business case to ensure sustainability. These are all foundational and fundamental to developing and enabling an effective and sustainable SWSII. Advances in ICT architecture and standards have introduced new models for IT systems to "interoperate" to achieve collaboration across domestic and transnational systems and bring potential transformative changes.

As the SWS concept emerges to become an enabling platform for trade facilitation to increase an economy's agility and competitiveness, the biggest challenges facing SWS today are the complexity and associated challenges to drive consistency in the myriad of transnational contexts and achieving regional or international-level "interoperability". The term "interoperability" will be further explained in the following section.

B. Concepts of Interoperability

There are various definitions for the term "interoperability", each of which highlight different ideas and perspectives. In broad terms, the European Interoperability Framework (EIF) states that interoperability can include several aspects: "to a network operator, it can mean the ability to inter-operate with other networks and provide seamless services to users; to a content provider or service provider, it can mean the ability to be able to run an application or services on any suitable platform; and, to the consumer, it can mean the ability ideally to obtain the relevant hardware device and begin to consume and pay for services, without having prior knowledge which services would be consumed, in a simple way".

EIF further defines interoperability as, "The ability of disparate and diverse organizations to interact towards mutually beneficial and agreed common goals, involving the sharing of information and knowledge among the organizations, through the business processes they support, by means of the exchange of data among their respective ICT systems." (WCO, 2011).

IDB (2010) proposes that interoperability could be also linked to Coordinated Border Management (CBM) or Integrated Border Management (IBM) due to their focus on increasing trade efficiency; in which "a primary phase of CBM consists of the collection of import and export-related data from different points into one central location where data can be analyzed and disseminated to any entity that has jurisdiction over border-related functions" (p.5).

UNESCAP/UNECE (2012) put the definition of interoperability as[20]: (1) The ability to share information and services; (2) The ability of two or more systems or components to exchange and use information; (3) The ability of systems to provide and receive services from other systems and to use the services so interchanged to enable them to operate effectively together. In simple terms, Institute of Electrical and Electronics Engineer (IEEE) defines interoperability as "the ability of two or more systems or components to exchange information and use the information that has been exchanged".

Chowdhury and Sadek (2003) explain there are three types of interoperability, namely: (1) domestic interoperability; (2) regional interoperability; and (3) international interoperability. Domestic interoperability suggests standard system interfaces within borders, while regional interoperability infers to systems that should interface within a region. International interoperability, on the other hand, is defined as systems that include sharing information across border.[21] Consequently, international interoperability also suggests "regional interoperability".

For this study, "interoperability'' as defined by Recommendation N° 36 UN/CEFACT (2017), is the "ability of two or more systems or components to exchange and use information across borders without additional effort on the part of the user".[22] Additionally, this aligns with the previous discussion on the notion of a 'Cross-border Single Window Exchange Platform' to facilitate intelligent and compliant trading across borders.

Looking at the above definition, for this study along with its intended scope, Single Window Interoperability (SWI) will focus on "international interoperability"[23] to support the 2007 APEC SCCP Single Window Strategic Plan's vision of a Regional Single Window (RSW) through *"international interoperability and the use of international standards and instruments to efficiently share information amongst member economies to facilitate trade and improve supply chain security".*

Without a well-understood framework for interoperability, the outcome often results in:

1. Continued national-centric and isolated business processes (e.g. random custom inspections, uncoordinated border management, unpredictable time for customs clearance, isolated tracking and enforcement procedures, etc.);
2. Inadequate foundation for harmonization of procedures, responses and nomenclature; and
3. Lack of standardization impeding effective exchange of digital information, resulting in inefficient trade and frustration amongst traders, authorities and stakeholders.

Together these outcomes compromise the ability of trading economies to facilitate the establishment of harmonized import, export and transit-related regulatory functions.

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[20] This definition is taken from TOGAF: http://pubs.opengroup.org/architecture/togaf9-doc/arch/chap03.html#tag_03_42. [last accessed 23 May 2018]
[21] Chowdhury and Sadek. (2003). Fundamentals of Intelligent Transportation Systems Planning.
[22] Adapted from the definition of "interoperability" provided by the Institute of Electrical and Electronics Engineers (IEEE) Standards Glossary, available at http://www.ieee.org [accessed 16 December 2016].
[23] Not to be mistaken for National Single Window (NSW).

It is worth mentioning that "interoperability" at its core is collaboration in action. It is a mandatory characteristic, in both business and technical terms, to facilitate effective trade across borders.

UN/CEFACT Recommendation No. 36 on Single Window Interoperability

To coincide with this study, on 23 January, 2017 the UN/CEFACT Recommendation No. 36: Single Window Interoperability (SWI) document was published and it was adopted on 3-4 April, 2017 by the UN/CEFACT Plenary. SWI is referred to as "the exchange of specified foreign trade-related information in a structured format between two or more Single Window systems in different economies."[24]

Recommendation No.36 succeeds two previous recommendations, Recommendation No. 34 about 'Data Simplification and Standardization for International Trade' and Recommendation No. 35 about 'Establishing a legal framework for international trade Single Window'. Recommendation No. 34 addresses the process of data harmonization by a 4-stage process (capture, define, analyze and reconciliation) to achieve the objective of a domestic simplified and standardized dataset. Recommendation No. 35 provides a checklist of legal issues[25]. Recommendation No. 35 suggests that there should be 'mutual recognition of electronic documents and data messages that may be exchanged among single window facilities' which may require harmonization of domestic laws that seems to be challenging considering the distinct characteristic of domestic laws in different economies[26]; particularly in treating electronic documents.

Recommendation No. 36 highlights the issues and consider some options for the establishment of SWI.[27] The document provides the following sets of recommendations:

1. **Identify and analyze the primary drivers** and needs for SWI;
2. Research and **examine the type of business processes** and information to be exchanged among SWS;
3. Consider the **most appropriate model/s of governance** for the proposed interoperability; and
4. Research all relevant multinational and bilateral trading agreements and arrangements **to ensure that specific protocols or legally binding obligations are considered** when developing a National Single Window (NSW) and interoperability with other NSWs.

Recommendation No. 36 further outlines the following business drivers of interoperability. This includes but is not limited to:

1. **Regional integration** for the simplification, modernization and harmonization of export and import processes.
2. **Trade facilitation** to allow economic operators, including small and medium sized companies, to comply with regulatory requirements to improve competitiveness in a global market.

[24] UN/CEFACT Recommendation No. 36: Single Window Interoperability.
[25] Pontén. (2011). Single Window – Best Practice and the Way Forward.
[26] Pugliatti. (2011). Cloud single window: legal implications of a new model of cross-border single window.
[27] Recommendation No. 36, however, does not define the technical specification standards for SWI.

3. **Risk analysis** to allow government agencies in the importing economy to assess any security, safety, fiscal or other risks in advance.
4. **Advanced security declarations** to reinforce the principle of risks by assessing the quality of data and act upon it as required.
5. **Infrastructure use planning** to accommodate the expected trade volumes.
6. **Combatting illicit activities** by forewarning the importing economy to ensure merchandise is appropriately inspected.

Recommendation No. 36 also acknowledges that there are different 'levels' or 'layers' of interoperability which include: the methodology for dataset creation, datasets, business processes and messaging. Using an analogy, interoperability could be viewed as a process of communication among different participants using a set of agreed dictionary, grammatical rules and syntax or language.

Without meaning to reproduce contents of Recommendation No. 36, this study will elaborate the concept of "interoperability" where needed. This chapter, specifically, will discuss the principles and concept of interoperability in the spirit of Recommendation No. 36.

Recommendation No. 36 has emphasized the importance of trade facilitation as one of the business needs of interoperability as well to note SWI as one of the key instruments for trade facilitation. Additionally, Recommendation No. 36 also stressed the importance of the use of recognized international standards as central to the function of interoperability and as an important trade facilitation tool.

C. Principles of Interoperability

"Principles" are guidelines based on successful implementation track records chosen to provide stronger linkage between individual decisions and the broader goals; and are applicable and independent of the specific decision. Best practices are then realized by employing good principles.

After critical analysis of published sources on SWS and reviewing what can possibly be considered general best practices for SWSII[28], there are ten (10) recurring and fundamental principles for SWSII to consider:

1. Autonomy
2. Responsiveness
3. Agreement
4. Consensus
5. Connectivity
6. Data flow, security, privacy and confidentiality
7. Data harmonization and standardization
8. Terminology
9. Upgrading IT infrastructure
10. Adoption of open standards

[28] The list is based on the preceding literature review as well as the authors' experience.

Each principle is described below in relation to trade facilitation and SWSII.

1. Autonomy

Each interoperating economy functions without having to know details about the internal mode of operations and the technology infrastructure of other members to seamlessly exchange digital information.[29] The principle of autonomy supports economies to maintain their sovereignty, diversity and uniqueness in complying to trade facilitation, revenue protection, domestic security and customs while enabling process integration and information sharing amongst trading partners.

2. Responsiveness

Based on the notion of "acting on demand" to respond to a request received efficiently through automation. As an example, interoperability exists between economies A and B if: Economy A can send its request to Economy B and the latter was able to receive that request; understand the request; and perform an action that corresponds to the action Economy A intended to see executed by Economy B. At the most ideal level, the need for systematic and predictable responsiveness would ultimately lead to automation.

3. Agreement

An existing understanding between two or more economies to follow a specific course of conduct on the exchange of information. Usually defined and governed by the technical conditions of the protocol agreement among economies, there must be an explicit and shared understanding among interoperating economies of expected output and outcomes. Clear agreement of interoperability will further strengthen the legal foundation or framework for SWS across economies[30]. In short, "Agreement" is a binding piece of written documentation in which economies agree on the technical conditions.

4. Consensus

This is a technical process to uphold stakeholder confidence by digitally seeking widespread agreement amongst interoperating economies to ensure that the information exchanged is in-context, accurate and locally validated. In turn, this empowers discretion in decision-making and follow-up action within interoperating economies to facilitate and complete transactions.

The term "consensus" is a technical term that require a level of commitment to process information when information is exchanged. For example, not all economies are willing to share information. In addition, some economies agree to exchange information, but with a set of pre-conditions. The principle of consensus is to seek widespread trust that once information is exchanged, economies will use the information judiciously and appropriately.

5. Connectivity

The capabilities of economies to interconnect SWS across transnational boundaries in a highly-

[29] McLinden et al. (2011) noted that "…a successful, fully functional single window needs an autonomous, neutral, objective body to represent and to mediate among government agencies and other public and private organizations."

[30] For example, the ASW protocol provided provisions for technical aspects and data/information highlighting principles of single submission, single and synchronous processing and single decision making.

secured manner. Ideally, connectivity should be established without requiring significant changes to the software applications of the SWS.

6. Data flow, security, privacy and confidentiality

Based on the underlying principle of trust, this includes conducting appropriate risk assessment activities prior to the set-up of interoperability functions and implementing the appropriate security measures. Interoperating economies will need to consider their own security policy and come to an agreement on a common policy for information exchanged. Interoperating economies will also need to ensure uniform levels of data privacy protection for individual, economic operators and government, including measures in which the data is to be used for purposes they were originally supplied. Confidentiality refers to the obligation of each interoperating economy, who have access to trade related information of other economies, to hold that information in confidence.[31]

7. Data harmonization and standardization[32]

UN/CEFACT defines data harmonization as an interactive process of capturing, defining, analyzing, reconciling government information requirements. Data standardization is the mapping of simplified data (i.e. minimum data set) to international standards allowing for more seamless interoperability across borders. Recommendation No. 33 stated that when implementing SWS, governments and trade are strongly encouraged to consider the use of existing recommendations, standards and tools that have been developed by intergovernmental agencies and international organizations. Additionally, UNESCAP/UNECE (2012) highlighted that common standards, data protocols and approaches are required to ensure data and procedural interoperability amongst the different IT platforms connected to the ecosystem of SWS.

8. Terminology

The consistent use of internationally recognized trade facilitation standard's terms and definitions, often used in combination with a data standard, aid in exchange and interpretation of data amongst interoperating economies.[33]

9. Upgrading Existing IT infrastructure

Advances in technology and the modernization efforts of governments have seen the ongoing upgrade of existing SWS with standards-driven technical and data interfaces enabling the realization of interoperability to exchange information among trading partners. [34] This also means there is a need to modernize existing IT infrastructure such as servers, workstations, devices and networks to take advantage of better and more reliable technology without compromising or requiring significant changes to the SWS applications.

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[31] ASEAN Single Window has emphasized this principle in the ASW pilot implementation phase.

[32] This is also discussed under UNECE/ UNCEFACT Recommendation No. 34 Data Simplification and Standardization for International Trade; UNNExT Data Harmonization and Modelling Guide; and WCO Data Model Single Window Data Harmonization.

[33] Recommendation No. 36 discuss this issue under 'layers' of interoperability.

[34] Recommendation No 36 mentioned that IT Service Providers can facilitate the process of SWI as they can offer IT services and participate in developing, implementing or updating digital infrastructure or services for private traders or administration.

10. Adoption of open standards

Standards are required for interoperability. To achieve interoperability, emphasis should be placed on an open architecture that is designed to allow components of the IT systems to be scalable, upgradable, integrable and replaceable based on international standards and protocol.[35]

[35] Recommendation No 36 mentioned that in order to ensure single window interoperability, the creation and development of Single Windows should be based on international recommendations and standards.

Chapter 3: Treatment of Single Window System International Interoperability in Trade Agreements

Starting with the rapid modernization of custom systems worldwide over twenty years ago, several economies have now started to expand their Custom SWS to include other government agencies (OGA) to create a SWS for foreign trade. As of 2013, over seventy economies have implemented a SWS for foreign trade. The notion of a "single window" platform has proven to become a strategic domestic catalyst to facilitate trade. In 2014, an estimated 89% of 107 economies made SWS a domestic priority.[36] By removing the administrative bottlenecks in the trade process, economies recognize that SWS can reduce the cost of trade and propel further economic growth.

Noteworthy to identify that SWS is becoming more common in developing economies as they use ICT to institute reforms and increase their global competitiveness, while the developed economies recognize that SWS could enhance efficiency of the trade services provided. To cite a few examples, the Kenya TradeNet System[37] has enabled traders who depend on East Africa's economic gateway seaport of Mombasa to track, clear and move goods across borders efficiently through a simplified cargo clearance process. This also provided hard saving to the Kenyan economy estimated at USD $150 million to USD $250 million over three years.[38] Singapore's TradeNet electronic system has managed to cut approval-processing time to a maximum of 10 minutes from a maximum of 2 days; in addition, more than 90% of customs and other declarations are done with automation[39]. This was done by effectively using technology to reengineer and improve trade regulations and processes (World Bank, 2013).

In 2014, the Rwanda Electronic Single Window reported results of reducing the time taken to clear goods from 58 hours to 23 hours in 2010. Furthermore, the estimated cost of a declaration for an AEO (Authorized Economic Operator) dropped from USD $350 to USD $4.50. Altogether, the expected return on investment based on savings is estimated at USD $18 million per year.[40] In their study, UNESCAP (2014) further noted that cross-border paperless trade could reduce export time from 24% to 44% and export cost from 17% to 31%.

On the other hand, Regional Single Window (RSW) experience is relatively small globally. Consequently, articles or published literatures about RSW models are scarce. However, Regional Economic Forums (REF) such as APEC continue to explore the use of SWS concepts. It is noteworthy to mention that Custom SWS systems, SWS for foreign trade and the broader NSW initiatives are just one of the many measures in trade agreements, that in general, are not mandatory and only require the members' best efforts in its implementation[41].

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[36] RedVUCE Single Window as a Trade Facilitation Tool Relevant aspects of the WTO TFA & Practical Experiences.
[37] It is also known as the Kenya National Electronic Single Window System.
[38] Kenyan Revenue Authority.
[39] See: http://reports.weforum.org/enabling-trade-catalysing-trade-facilitation-agreement-implementation-in-brazil/good-practices-around-the-globe-on-single-window-and-related-matters/. [last accessed 23 May 2018]
[40] See: https://www.trademarkea.com/news/electronic-single-window-system-enhances-transparency-in-trade/. [last accessed 23 May 2018]
[41] For example, TFA states related that Members shall, to the extent possible and practicable, use information technology to support the single window.

SWS for foreign trade, as one of trade facilitation measures, is included under regional trade agreements; particularly under "Formalities Connected with Importation, Exportation and Transit". However, the occurrence is relatively small. WTO (2015) noted that the occurrence of SWS under Regional Trade Agreements (RTAs) is only around 4.7%.[42]

The recently ratified Trade Facilitation Agreement (TFA), which entered into force on 22 February 2017, also contains a chapter on SWS in which article 10 of the Agreement stated that in cases where documentation and/or data requirements have already been received through the SWS, the same documentation and/or data requirements shall not be requested by other authorities or agencies as much as possible. SWSII will support the provision of the agreement on border agency cooperation, particularly on the aspect of alignment of procedures and formalities.[43] Recommendation No. 36 has also mentioned that the domestic trade facilitation bodies specified under the TFA may be considered as a viable governance model for interoperable SWS.

To review how the treatment of SWSII has been working in trade agreements, this section will review the collective experiences of three regional economic cooperation forums using RSW concepts to advance its objectives:

1. The Association of South East Asian Nations (ASEAN) that is currently running "limited" live operations[44] and best exemplifies a "distributed gateway model" for interoperability[45] where a 'gateway' is installed independently within its domestic network boundaries to interoperate with other ASEAN economies' gateways.
2. The Pacific Alliance (PA), which is currently at the pilot stage[46] and represents the "hybrid model" for interoperability that architecturally incorporates both a centralized and distributed configuration.
3. The Revenue Authorities Digital Data Exchange (RADDEx), which is an earlier example of an RSW that adopted a "centralized model" for interoperability

A. Association of South East Asian Nations (ASEAN)

The Association of South East Asian Nations (ASEAN) was established in August 1967 comprising of ten economies to promote intergovernmental cooperation and facilitate economic integration amongst its members. Member economies include Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam. One of ASEAN's objective is "To accelerate the economic growth, social progress and cultural development in the region … and to collaborate more effectively for the greater utilization of their agriculture and industries, the expansion of their trade, including the study of the problems of international commodity trade, the improvement of their transportation and communications

[42] SW as a trade facilitation measures could be defined as a single-entry point for traders to submit documentation to the participating authorities or agencies.
[43] Border agency cooperation provision is among the least notified TFA provisions under Category A commitments (WTO 2015).
[44] Ibid.
[45] ASEAN Single Window Hearing Survey in 2012 Issues to be Studied
[46] At the time this report was being written.

facilities and the raising of the living standards of their peoples …"[47]

With a total GDP of $7.6 trillion and an average GDP per capita of $12,160 (PPP), ASEAN represents the 6th economic power behind the United States, China, Japan, Germany and the United Kingdom with a combined population of nearly 625 million people.

The idea of an ASEAN Single Window (ASW) started in 2005 with the Agreement to Establish and Implement the ASEAN Single Window signed in Kuala Lumpur, 9 December 2005 (ASEAN, 2005).

The ASW is defined as follows "... a secured environment where National Single Windows (NSWs)[48] integrate and operate. The ASW constitutes a regional facility to enable a seamless, standardized and harmonized routing and communication of trade and customs-related information and data for customs clearance and release from and to NSWs. Trade and related customs data and information will stay within, and belong to respective Member States."

The 2005 agreement also sets out the objectives and principles; obligations; technical matters and monitoring mechanisms. Under objectives (article 3), the agreement was meant to provide the legal basis as well as in strengthening the coordination and partnership among customs administration, line ministries /agencies and economic operators. Article 4 of the agreement mentioned about the following principles of implementation: consistency, simplicity, transparency and efficiency. Under obligations (article 5) and technical matters (article 6), emphasis on using relevant internationally accepted standards was mentioned for ensuring effective implementation of ASW moving forward.

In 2006, the ASW protocol provided provisions for technical aspects which include documents and formalities (article 6) and data/information (article 7) highlighting the ASEAN Customs Declaration Document as well as the principles of single submission, single and synchronous processing and single decision making (ASEAN, 2006). This protocol also made references to secure infrastructure for both ASW and NSW implying it should include features of confidentiality, data integrity, authenticity and non-repudiation (article 8).

In 2011, the MoU (Memorandum of Understanding) of ASW implementation emphasized that ASW shall not maintain or retain any trade and related customs data or information that may be transmitted from or to ASW, including "for only transmission" or temporary purposes. However, ASW is allowed to maintain records of transmission of trade and related customs data or information. This is also known as the 'federated/regional approach' of ASW.

Having gone live on January 1, 2018, the ASW is now a functioning RSW whose first goal is to automate customs clearances and integrate the SW of ASEAN Member Economies to expedite the exchange of customs data for import and export of goods. Indonesia, Malaysia, Singapore, Thailand and Viet Nam can execute e-ATIGA Form D[49] and transact with other supporting

[47] See: http://asean.org/asean/about-asean/overview/. [last accessed 23 May 2018]
[48] Despite using the term NSW, the scope coverage and focus is on SWS for foreign trade.
[49] Preferential Certificate of Origin that is accepted as evidence of origin by preference-giving economies (member economies of ASEAN Trade in Goods Agreement, ATIGA) to obtain preferential treatment.

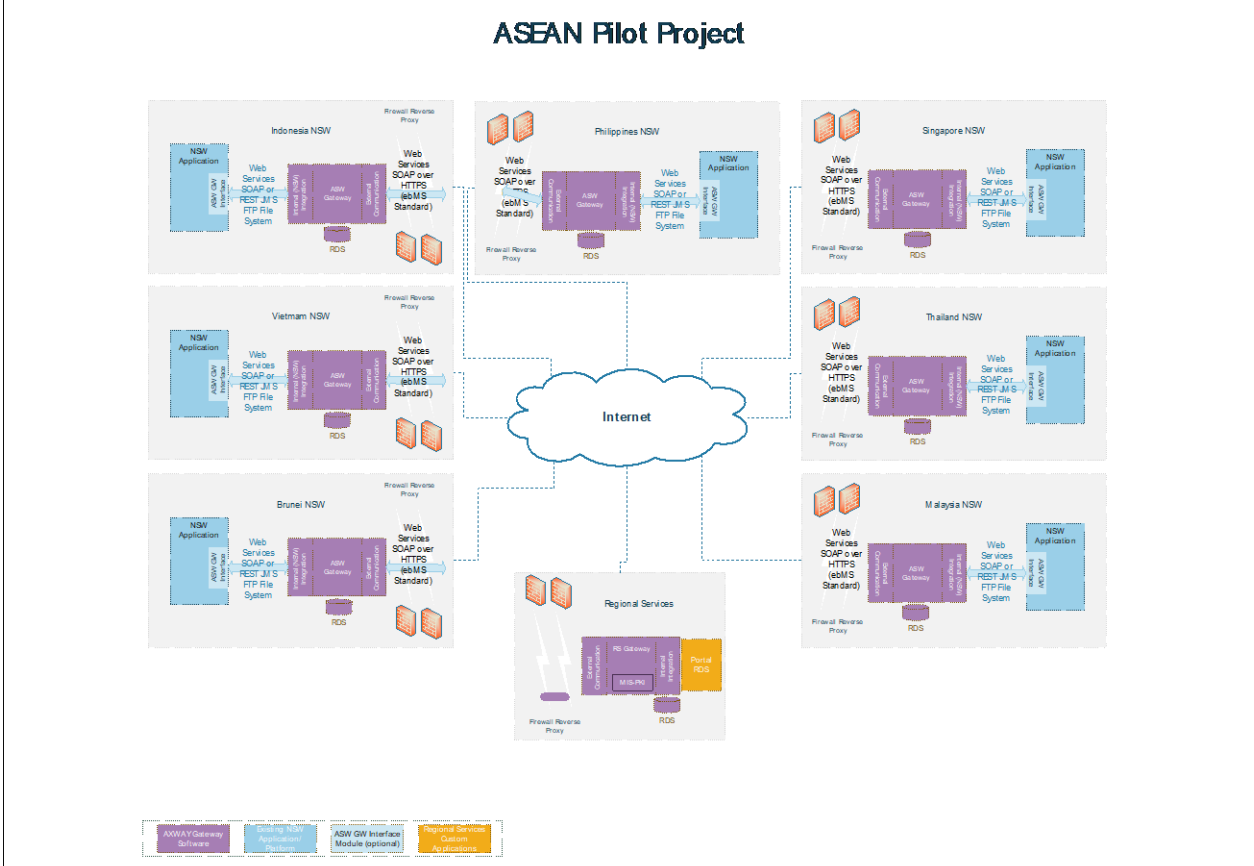
documents to reduce clearance times at the border[50].

Despite the launch of ASW, there is still the lingering challenge that many business stakeholders may not necessarily understand how exactly ASW could benefits their businesses. ASW website highlights the previous ASW Potential Impact Survey that revealed only 30% of the companies surveyed understand the concept of ASW and the benefits it brings. To date, US-ACTI (ASEAN Connectivity through Trade and Investment) continues to lend technical assistance, capacity building and support and expand the ASW to other member economies.

The ASW has been designed using the "distributed model" to ensure that the central server purely responsible for managing the communication hub of each economy does not retain, propagate or archive any trade or regulatory information.

Below is an architecture diagram of the ASW:

Figure 3. ASEAN Conceptual Architecture[51]



Source: Adapted by the consultant from various sources

[50] See: http://asw.asean.org/about-asw. [last accessed 23 May 2018]
[51] Adapted from: http://asw.asean.org/about-asw. [last accessed 23 May 2018]

B. Pacific Alliance

The Pacific Alliance (PA) is a regional integration initiative comprising of Chile, Colombia, Mexico and Peru, that seeks the free movement of goods, services, capital and people across borders. The regional integration agreement was negotiated in 2011 and the agreement came into force in May 2016. All member economies border the Pacific Ocean.

The goal of the PA is to increase "the free circulation of goods, services, capital, and people," while also providing a unified platform for deeper integration with the Asia-Pacific region[52]. The objectives of the PA are clearly stated as follows:

1. Build an area of deep economic integration to move gradually towards the free circulation of goods, services, capital and people.
2. Promote the growth, development and competitiveness of members´ economies.
3. Become a platform for political articulation, and economic and trade integration.

Aside for achieving commercial integration, the PA has developed a common and shared vision for developing best practices in tourism, intellectual property development, technology and innovation, mining, climate change, among others. With a total GDP of $3.6 trillion and an average GDP per capita of $16,759 (PPP), it represents the 8th economic power and the 8th export force worldwide. In the Latin America and Caribbean region (LAC), they account for 36% of the GDP and 58% of the total trade in the region. Combined population is approximately 207 million people[53].

The PA has success in advancing its interconnected SWS agenda in a relatively short period of time. It is attributed to the member economies' long history of accomplishments within their own jurisdictional single window initiatives. Citing examples of member economies track record, Peru's SWS known as Ventanilla Unica de Comercio Exterior (VUCE) was launched[54] in July 2010, and it has nearly tripled its traders to 24,000 and has resulted in a cumulative savings of USD $11 million in 2014.[55] In Mexico, the economy's SWS solution Ventanilla Unica de Comercio Exterior Mexicano (VUCEM) was launched in January 2012 resulting in further efficiencies such as processing over 22,000 invoices per day, reducing formalities by more than 90%, improving responsiveness from 15 – 20 days to 1 – 5 days and lowering customs clearance time by more than 10%. Chile's SWS, Sistema Integrado de Comercio Exterior (SICEX[56]), which was implemented in May 2013, has achieved domestic interoperability of eight agencies, including the National Customs Service, the Agriculture and Livestock Service, and the Institute of Public Health[57]. One of the early adopters of the "single window" concept, Colombia's SWS Ventanilla Unica de Comercio Exterior (VUCE) was first implemented in November 2006. It has streamlined 135 procedures and 35 forms needed for importing into just "one step" for traders, reduced the

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[52]Source: https://www.wilsoncenter.org/sites/default/files/pacific_alliance_ongoing_challenges_trade_integration.pdf. [last accessed 23 May 2018]

53 See: https://alianzapacifico.net/en/ and http://www.international.gc.ca/americas-ameriques/pacific_alliance_pacifique/index.aspx?lang=eng. [last accessed 23 May 2018]

54 Peru´s VUCE began operations in 2010.

55 Calculated based on a savings of USD $70 per transaction. (OECD/WTO 2015)

56 Integrated System of Foreign Trade.

57 OECD. (2016). Regulatory Policy in Chile: Government Capacity to Ensure High-Quality Regulation.

average response time of linked agencies by about 5 days and reduced 30% of time required to issue a license[58].

Another factor for the PA's progress is the active support of the Inter-American Development Bank's (IDB) regional forum for dialogue and cooperation called the Inter-American Network of International Trade Single Windows (REDVUCE)[59] which provides a strong catalyst for promoting regional integration. REDVUCE is also active in putting together public agencies and the private sector to design, develop and administer SWS for foreign trade in the Americas.

The PA prioritized the need to implement a "single window" with the focus of reducing customs clearance times and to streamline processes and costs for imports and exports. The Trade Facilitation Chapter of the Protocol of Pacific Alliance Agreement, Annex 5.9 of the Foreign Trade Single Window states that "Parties shall implement and improve their Foreign Trade Single Windows (hereinafter VUCE) to streamline and facilitate trade, and they shall ensure their interoperability, in order, to exchange information to ease trade and enabling parties to verify information of foreign trade operations."[60]

Based on the intent put forth in the framework on Paragraph 5 on Annex 5.9 (Protocol PA), the following conditions have been established:

1. SWS will be the only channel of interoperability for trade related documents or information delivered by parties;
2. SWS interoperability must secure the availability of documents and information in accordance with the operations' conditions set forth by parties;
3. Each SWS must exchange information with foreign trade systems as appropriate in its territory, to facilitate the entry and departure of goods; and
4. SWS must have IT capabilities to allow for the transfer of information electronically among the parties.

The following documents have been exchanged so far:[61]

1. Sanitary and Phytosanitary (SPS)[62]
2. Certificates of Origin

The PA framework and all its member economies have adopted a hybrid model (a combination of centralized and distributed model) meaning that each economy has its own Interoperability Platform (IOPACK) for exchanging trade information and documents. A central server is required for hosting mostly non-confidential and non-sensitive data for transactional record keeping purposes and systems monitoring.

58 World Bank Doing Business Report (2014).

59 See: www.redvuce.org. [last accessed 23 May 2018]

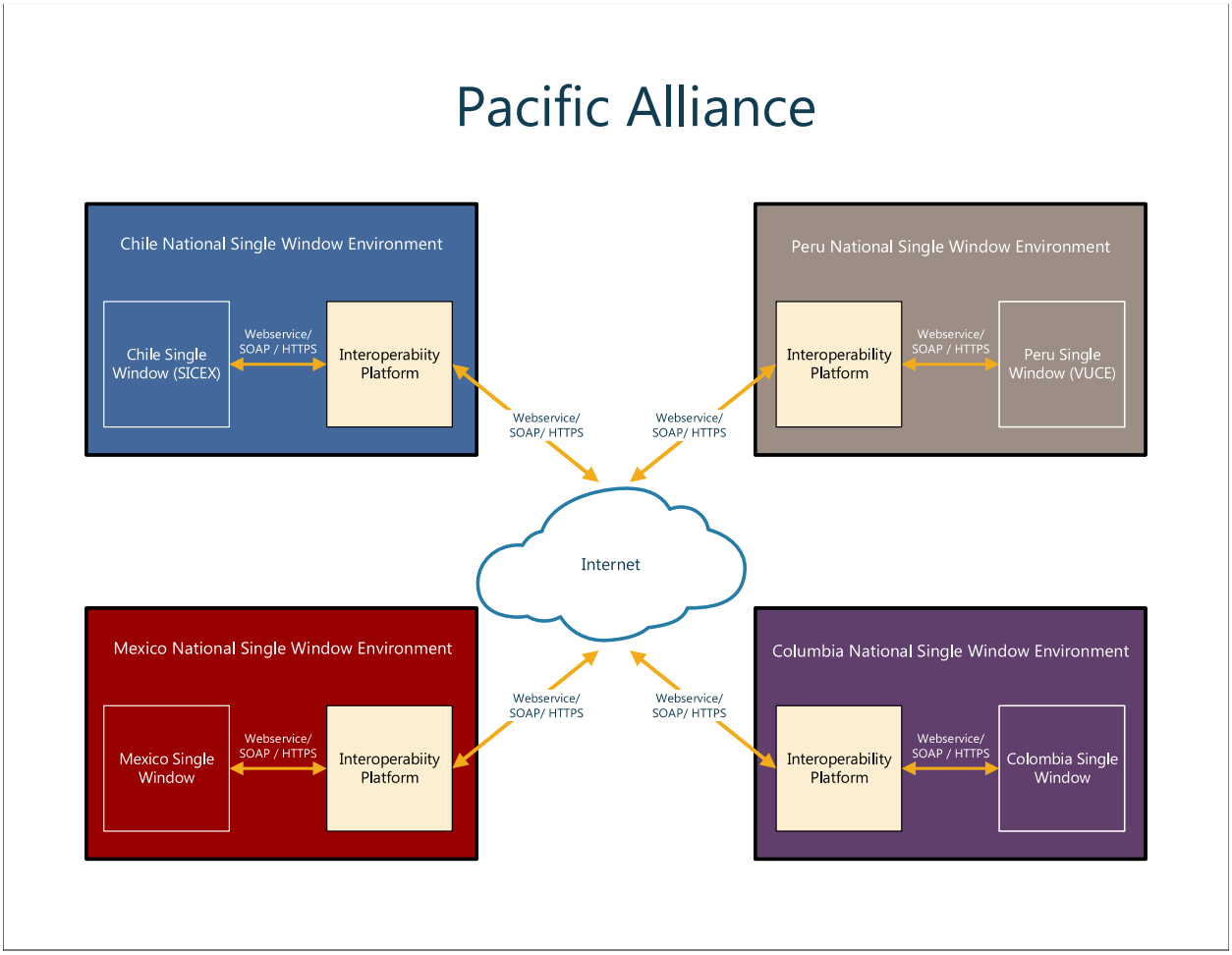
60 See: http://www.acuerdoscomerciales.gob.pe/images/stories/alianza/espanol/05_FC_FINAL.pdf. [last accessed 23 May 2018]

61 Garcia-Godos. (2016). Single Window Interoperability Agreement.

62 Consignments meet phytosanitary (regarding plants) import requirements.

The diagram below shows the architectural diagram of the PA:

Figure 4. Pacific Alliance Conceptual Architecture[63]



Source: Adapted by the consultant from various sources

C. Revenue Authorities Digital Data Exchange

Founded in 1967, the East Africa Community (EAC) is a Regional Economic Community (REC) composed of six economies: Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda. With a combined population of 169 million, the EAC has a total GDP of USD $146 billion and an average GDP per capita of USD $919 (PPP). It represents the 57th economic power as a single entity.

In 2004, the EAC formed a Customs Union to ensure member economies have a common tariff on goods originating from non-member economies and free of customs duties on goods originating from within its member economies. Furthermore, it was agreed amongst member economies that

[63] Adapted from Koh, J. (2014). Single Windows and Regional Interoperability.

destination levy VAT and excise duties are to be applied on goods originating from non-member economies in transit or re-exported to member economies to protect loss of revenue during the movement of goods.[64]

Officially launched on October 2007 after a two-year pilot, the Revenue Authorities Digital Data Exchange (RADDEx) is an information exchange platform for customs and transit data. Currently on its second version (i.e. RADDEx 2.0), it is operational in Burundi, Kenya, Rwanda, Tanzania and Uganda and has expanded to include business functions and technical improvements, including transport logistics, and near real-time transmission of customs information and support documents to authorized government agencies, economic operators and other private sector users.

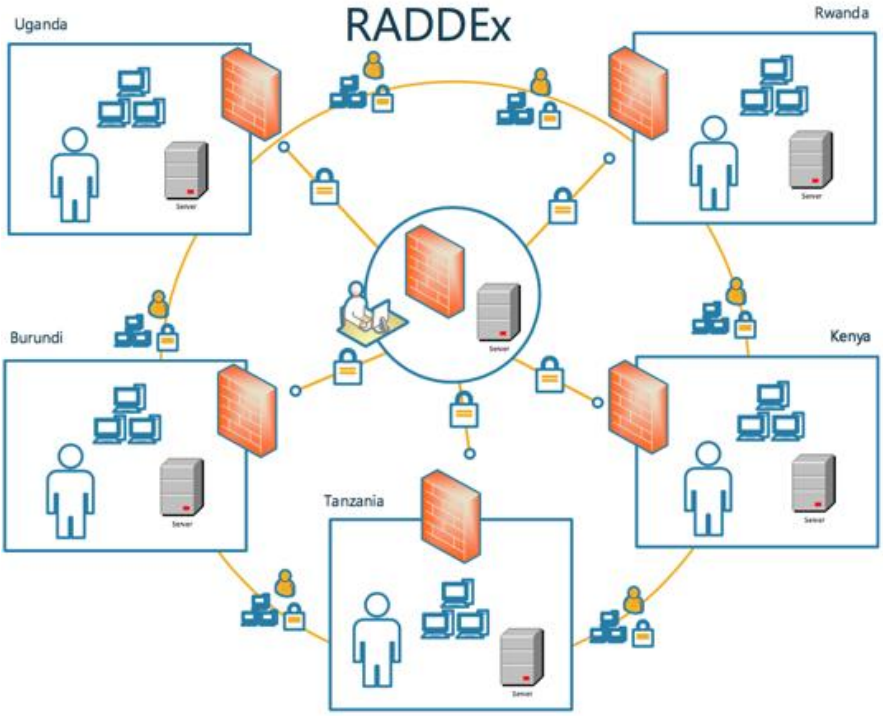
According to some reports, the clearing process of RADDEx 2.0 is expected to save private sector transports over USD $50 million per year directly attributed to reducing transit time at the borders[65] by mitigating inefficient paperwork through automation, advancing notification of goods at border points, item level tracking and streamlined transit documents. The number of fraudulent declarations and corruption will also be significantly reduced.

RADDEX 2.0 is architecturally designed as a centralized model where all member economies adhere to technical conditions of the SWS. The servers located in each economy are called "satellites" and communicate only with the central server and not with each other. The central server is located at the East African Community headquarters in Arusha, Tanzania.

Below is the architectural diagram of RADDEx.

[64] Due to substantial revenue loss because goods in transit disappeared without duties and taxes being paid.
[65] Extrapolated and based on forecast from the 2013 World Bank analysis of total cost of delays per 24 hours for every loaded truck is approximately USD $384.

Figure 5: RADDEx Conceptual Architecture[66]



Source: Adapted by the consultant from various sources

D. Lessons Learned

The journey towards implementing RSW systems or similar interconnected SWS across different geographical regions have uncovered a few valuable lessons learned. This includes, but is not limited to:

1. **Governance and business model of regional cooperation.** The business and operating model, and how this would be managed through a governance and regional structure, had to be clear from the outset. Emphasis should be on streamlining processes within and across customs and other trade regulatory bodies ensuring integrity, validity and security of data being transmitted across different SWS. To cite an example, not only were the PA economies clear on their mandate, but more importantly, they understood the need to establish working groups at all levels including harmonization of data and establishing proper business rules for information exchange prior to automating.

[66] Adapted from: Smith, M. (2014). Strategy for a Centralized ICT Platform for the Single Customs Territory (2014). Retrieved from: https://d3n8a8pro7vhmx.cloudfront.net/eatradehub/pages/633/attachments/original/1430922241/SCT_ICT_Strategy_July2014.pdf?1430922241. [last accessed 23 May 2018]

2. **State of readiness of IT infrastructure.** Depending on how ambitious and innovative the technology solution of the RSW platform, some economies may not necessarily have the proper IT infrastructure to support the initiative. This includes emerging technologies such as the highly consensus driven blockchain solution, which is not yet mature nor ready for primetime, but are designed to be tamper proof and transformational to create trust in the end-to-end processes. However, infrastructure readiness delays can happen at the most basic and elemental level. For example, some economies in ASEAN require upgrades to its core IT operations and basic infrastructure to comply with security and interoperability requirements causing delays to participate in the interoperability.
3. **Level of maturity of domestic policies and legislation.** The need for collaborating and maintaining high level dialogues to shape regulatory and policy reforms, including laws and regulations favorable to information exchange. This also includes reviewing any gaps in security, privacy and confidentiality laws. In ASEAN, an ASW Steering Committee (Director-level) was established to promote dialogues and information exchange of domestic policies in relations to the construction of ASW. To support the Steering Committee, two Working Group-level meetings were also created, namely ASW Working Group on Legal and Regulatory Matters and ASW Working Group on Technical Matters.[67]
4. **Degree of trust among participants**. Exchanging information is only useful if one party can truly rely on the information provided from another party, or information can be exchanged with full trust to be used for its intended purpose. Therefore, at its very core, regional cooperation and integration is all about trust in regulatory compliance, transparency secure access, privacy and a competitive marketplace.
5. **Human resource constraints on institutional arrangements.** Commitments for staffing from customs agencies and other OGA may be difficult to achieve given limited time and resources to dedicate to the SWS and SWSII initiatives. This is particularly true in economies that continue to go through "change fatigue" due to protracted cycles of innovation and modernization of their own domestic and inter-agency systems. This is in line with the survey conducted by the WCO (2011) which expressed budget and human resource constraints as some of the problems that hinder development of single window.[68]
6. **Financial constraints**. Limited financial resources and competing priorities in many economies have made it difficult to meet their commitments to the RSW initiative. Just like past SWS implementation, in order to obtain the proper funding and secure domestic support for participating in a RSW, a cost benefit analysis with clear investment schedules for scalable and sustainable implementation must be established right from the very beginning.
7. **Different levels of domestic OGA-linkages.** There are many economies whose SWS are at different stages of maturity that could be due to the underlying strengths (and weakness) and the numbers of key inter-agency linkages required to establish a working SWS ecosystem. ASEAN best reflect the heterogeneity of inter-agency linkages across its member economies. For example, the degree and maturity of integration among key inter-agencies in Singapore may not be the same in economies such as Myanmar that is still defining and evolving its inter-agency linkages. In addition, the number of inter-agency

[67] See: http://www.unescap.org/sites/default/files/12%20-%20ASEAN%20Single%20Window.pdf. [last accessed 23 May 2018]
[68] Choi. (2011). A Survey of Single Window Implementation. WCO Research Paper No. 17.

linkages involved in trade regulatory functions may be less in Thailand as compared to that of the Philippines.

8. **Lead implementing agency.** Customs, in many case, have taken on the leadership role in establishing the SWS. However, the drive for RSW, and in return SWSII, most of the time does not fall with Customs but rests with other trade regulatory agencies or foreign affairs and trade ministries responsible for RTAs or implementation of multilateral agreements such as the TFA.
9. **Limited capacity and knowledge constraints**. Every economy will always have pockets of capacity gaps, which need to be identified immediately and filled with qualified resources. Furthermore, the false attitude that these "soft" key areas are less important than the technology to make interoperability a reality must not be overlooked. These include critical-to-know skills such as change management, business process management and analysis, project management and program management.
10. **Localization of information**. Multi-lingual support continues to be a challenge. In addition, appropriate translation and contextual use within the context of confidentiality and privacy agreement is required. Therefore, disambiguating languages when exchanging information is critical to address the localization of information.[69] This has been cited as a chronic problem with China and its trading partners such as Mongolia and the Kyrgyz Republic when exchanging information such as e-manifests.[70]

As part of the study, a survey will be deployed to provide a dipstick assessment of members' key issues, problems and priorities around SWSII, along with highlighting additional lessons learned and broadly recognizing the benefits and difficulties of achieving interoperability.

[69] This includes using a standard language, enriched user design interface and possibly standards such as I18N.

[70] Regional Improvement of Border Services (RIBS) and PRC-Mongolia Joint Customs Control. See: Department of Customs Control and Inspection.
(2012). Retrieved from: https://www.carecprogram.org/uploads/004_103_209_PRC-Mongolia-Joint-Custom-Control-PRC.pdf. [last accessed 25 June 2018]

Chapter 4: Case Studies of Single Window Interoperability: good practices and key challenges

A. AUSTRALIA

Overview

According to a 2017 UNESCAP Trade Facilitation and Paperless Trade Implementation Survey[71], Australia scored 91.4%, one of the highest in the world and the highest in the Asia-Pacific region. The survey found that Australia has fully implemented the following measures under the Cross-Border Paperless Trade categories: (i) Laws and regulations for electronic transactions; (ii) Recognized certification authority; and (iii) Traders apply for letters of credit electronically from banks or insurers without lodging paper-based documents. Since Australia is at present working on various facets of their SWS concurrently which includes customs and paperless automation, integration to other trade-involved regulatory agencies and the private sector's IT systems, its evolution path is non-linear based on the "Single Window Planning and Implementation Guide" (UNECE/ UNESCAP, 2012 see Appendix A). Australia has a long history of engaging in bilateral and multilateral discussions about trade-related cross-border electronic data exchange, and the economy's own SWS for foreign trade is now under development. A number of key concerns including scope of coverage, the scope of regulatory requirements and how to address pain points experienced by the trading community and citing the rigidity in government processes[72] have been identified – all common and familiar challenges faced by economies when developing their SWS initiatives.

In 2004, Australia introduced the Integrated Cargo System (ICS) to report the movement of cargo to customs and to strengthen the automated data feeds exchanged between customs and several other Australian Government agencies (McLinden et al., 2011)[73]. ICS provides a single window for the reporting, risk assessment, payment of duties, taxes and charges and clearance of all goods crossing the Australian border.

Economy Profile

Australia's population was estimated at 24.7 million at the end of 2017[74] and its GDP is measured at AUD 1.69 trillion (USD 1.25 trillion)[75]. GDP grew by 2.5% in 2016, however forecasts expected a drop in the growth rate in 2017 before picking up in the following year[76]. The main industries of Australia are services, mining, construction, agriculture and manufacturing. The government's

[71] See: https://unnext.unescap.org/AP-TFSurvey2017/index.html. [last accessed 23 May 2018]
[72] KPMG. (2016). Australian Business Register. Domestic Single Window Study.
[73] McLinden, Gerard; Fanta, Enrique; Widdowson, David; Doyle, Tom. 2011. Border Management Modernization. World Bank.
[74] Australian Bureau of Statistics (ABS), Demographic Statistics, Dec 2017 at: http://www.abs.gov.au/ausstats/abs@.nsf/mf/3101.0. [last accessed 26 June 2018]
[75] ABS, Key Economic Indicators 2018, at: http://www.abs.gov.au/AUSSTATS/abs@.nsf/mf/1345.0. [last accessed 26 June 2018]
[76] Based on IMF data.

total taxation revenue was AUD 488 billion in 2016-17[77].

Ranked 22nd out of 138 economies, Australia remains in the top quartile across the Global Competitiveness Index (GCI) (World Economic Forum, 2017). However, the Australian economy faces continuing challenges in the areas of innovation, business sophistication and goods-to-market efficiency and consequently Australia has continued to lose ground in these areas to the best performers in the GCI for the past three years.

The taxation system is made up of 125 taxes which are collected by the Australian Taxation Office (ATO) under the supervision of the Treasurer. The Treasury is the main policy agency which predicts and analyses policy issues, and responds to changing circumstances by understanding the positions of all affected parties.[78] To ensure cooperation, the ATO engages with industry and groups with allied interests like the Australian Banking Association (ABA), Insurance Council of Australia (ICA) and the Tax Practitioner Board (OECD, 2013)[79].

Trade Profile

Table 3 lists the main import and export partners of Australia in 2016. China was both its main importer and exporter of merchandise accounting for 23.4% and 31.6% respectively. EU accounted for another 19.3% of the imports while Japan made up 13.9% of the exports. 79% of Australia's exports and 72% of its imports were from APEC economies in 2016 (StatsAPEC)[80].

Table 3. Current main trading partners

Imports		Exports	
Economy	**2016 (%)**	**Economy**	**2016 (%)**
China	23.4	China	31.6
EU	19.3	Japan	13.9
USA	11.5	EU	7.5
Japan	7.7	Korea	6.7
Thailand	5.7	USA	4.6
Other	32.5	Other	35.6

Source: WTO

Table 4 presents the top commodity groups imported and exported by Australia in 2016-17[81]. Manufactures was the most imported commodity accounting for 77.4% (AUD 204.4 billion) of total commodity imports. On the other hand, fuels and minerals accounted for 58.4% (AUD 169.9 billion) of commodity exports.

[77] ABS, Taxation Revenue, at: http://www.abs.gov.au/ausstats/abs@.nsf/mf/5506.0. [last accessed 26 June 2018]
[78] See: https://www.taxinstitute.com.au/files/dmfile/Institutional_Framework_of_Taxation_in_Australia.pdf. [last accessed 23 May 2018]
[79] See: http://www.oecd.org/ctp/crime/effective-inter-agency-co-operation-in-fighting-tax-crimes-and-other-financial-crimes-second-edition.pdf. [last accessed 23 May 2018]
[80] See: http://statistics.apec.org/index.php/apec_psu/index_noflash. [last accessed 23 May 2018]
[81] See: Composition of Trade Australia, 2016-17 (DFAT). Available at http://dfat.gov.au/about-us/publications/Documents/cot-2016-17.pdf. [last accessed 23 May 2018]

Table 4: Top imports and exports, 2016-17

Imports		Exports	
Commodity groups	**2016-17 (%)**	**Commodity groups**	**2016-17 (%)**
Manufactures	77.4	Fuels and minerals	58.4
Fuels and minerals	10.7	Manufactures	15.1
Food (processed and unprocessed)	6.9	Food (processed and unprocessed)	14.8
Other	4.3	Other (including gold)	8.7

Source: Department of Foreign Affairs and Trade

Australia signed a Free Trade Agreement with Peru in February 2018 and has several trade expansion plans in the future, such as an FTA with the EU and plans to expand its FTA with Singapore. A report published by Chartered Accountants in 2017 projected a growth in trade over the next five years in Australia with services exports becoming more important. Digitalization has encouraged expansion of platforms and international trade among businesses and individuals. It was noted in 2014 that sellers on eBay Australia sold 78% of their products overseas while only 6% of retail businesses did the same (Chartered Accountants, 2017)[82].

History, Evolution and Scope of Single Window System (SWS) and Single Windows' International Interoperability (SWSII)

The Australian Border Force within the Home Affairs portfolio operates the ICS. The ICS, which was implemented in 2004, is a software application that delivers a stand-alone system for Customs clearance. It provides a single window for the reporting, risk assessment, payment of duties, taxes and charges, and clearance of all goods crossing the Australian border. The ICS communicates with a number of Australian government departments and agencies: Australian Taxation Office; the Department of Agriculture and Water Resources; Department of Industry Innovation and Science; Australian Bureau of Statistics; and the Reserve Bank of Australia.

The World Bank's Ease of Doing Business Report (2017) noted the following (p.81)[83]:

> "The Australian single window connects customs authorities, quarantine authorities and meat producers. These actors work closely throughout the production and trade processes, conducting sanitary inspections and issuing sanitary certificates."

The Department of Home Affairs (Home Affairs) is developing a trade modernization agenda, including a single window system for cross-border trade (Department of Home Affairs, 2018). Legal, policy, operational and technology frameworks across impacted regulatory agencies will need to be considered in design and development of a SWS.

Several recommendations have been made to implement a SWS like the ECA Trade Policy

[82] See: https://www.charteredaccountantsanz.com/news-and-analysis/insights/future-inc/future-of-trade. [last accessed 23 May 2018]
[83] World Bank. (2017). Doing Business 2017: Equal Opportunity for All. Washington, DC: World Bank.

Recommendations 2015/16[84] and the 2017 Trade Policy Recommendation (ECA)[85]. Supporting studies have been conducted as well, such as, the study on Domestic Single Window and International Single Window conducted by the partnership of the then Department of Immigration and Border Protection (DIBP), the Department of Foreign Affairs and Trade (DFAT) and Standard Business Reporting (Standard Business Reporting, n.d.)[86].

Australia is also working on initiatives to test how cross-border data exchanges can streamline trade. In February 2017, the Australian and New Zealand Prime Ministers jointly announced the trial of a Secure Trade Lane (STL) for containerized trans-Tasman sea cargo. The Secure Trade Lane uses or leverages off the supply chain security ensured by the Mutual Recognition Arrangement (MRA) in order to further facilitate trade between Authorized Economic Operators in each Party. The Proof of Concept trial uses digital information sent by an exporter in one economy (an 'Authorized Economic Operator' in Australia or New Zealand) to streamline the border clearance processes in the other economy. Home Affairs is currently working with New Zealand to progress the STL into its next trial phase[87].

Legal Framework

While scoring favorably under the cross-border paperless trade section in the UNESCAP Trade Facilitation and Paperless Trade Implementation Survey (2017), Australia could still improve on the following measures: (i) engagement in trade-related cross-border electronic data exchange; and (ii) electronic exchange of Sanitary & Phytosanitary certificate. The UNESCAP survey noted that these two measures are only 'partially implemented'[88].

Furthermore, it has been cited in the Domestic Single Window study that there are significant regulatory burdens and inflexibilities associated with trade documentation and information flows (KPMG, 2016)[89] such as duplication a number of documentation requirements being considered too onerous (e.g. certificates of origin, health declarations). Additionally, the study also mentioned about the pace of information flow within and between Departments and other entities delaying the completion of trade documentation.

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[84] See: http://www.export.org.au/trade-policy/ECA-Trade-Policy-Recommendations-2015_16.pdf. [last accessed 23 May 2018]
[85] See: http://www.export.org.au/publications/trade-policy-recommendations-4-0-2017. [last accessed 23 May 2018]
[86] See: http://www.sbr.gov.au/about-sbr/news/reports/single-window-feasibility-study-reports. [last accessed 23 May 2018]
[87] See: https://www.intermedium.com.au/article/lead-new-system-modernise-trans-tasman-trade. [last accessed 25 June 2018]
[88] UNESCAP (2017) mentioned that a measure is considered to be partially implemented if at least one of the following is true: (1) the trade facilitation measure is not in full compliance with commonly accepted international standards, recommendations and conventions; (2) the economy is still in the process of rolling out the implementation of measure; (3) the measure is practiced on an unsustainable, short-term or ad-hoc basis; (4) the measure is not implemented in all targeted locations (such as key border crossing stations); or (5) not all targeted stakeholders are fully involved.
[89] See: http://www.sbr.gov.au/__data/assets/file/0007/45169/KPMG_ABR_Domestic-Single-Window-Study_Final-Report_Client-Copy_22-December-2016.pdf. [last accessed 23 May 2018]

Potential Benefits

A study by KPMG (2016) lists the following potential benefits of having a SWS in Australia:

1. Reduction in costs of providing information resulting in lower cost per consignment which will improve price productivity.
2. Reduction in average processing times will reduce the risk of transporting perishable and time sensitive goods and improve the integration of the Global Value Chain (GVCs).
3. Increased service predictability will also be beneficial in the trade of perishable goods and strengthen the integration of the GVCs.
4. Reduction in cost of identifying domestic regulatory requirements will reduce barriers to trading, benefitting exporter and importers trading lower volumes and new traders.
5. Reduction in cost of identifying international regulatory requirements will also similarly be a one-off benefit of reduced barriers to trading.

It has also been cited that, at its most advanced, Australia's SWS may have the potential to remove the need for government reporting since information could be obtained from pre-defined points along the domestic supply chain (Department of Home Affairs, 2018).

Challenges faced by SWSII

Since Australia has not evolved its single window under the umbrella of a domestic mandate, it is difficult to ascertain the challenges that lie ahead and whether the benefits expected will be realized. Possible challenges that lie ahead include the need for significant inter-agency upgrades and modernization amongst government IT systems to establish a proper, integrated and fully functional regulatory compliant SWS environment. The Department of Home Affairs noted that developing a single window would require reform of the legislative, regulatory, technical and operational processes supporting cross-border trade.

Notwithstanding, however, Australia has a strong basis on which to improve its competitive standing in establishing a SWS. Based on the recent APEC Survey on Single Window Interoperability, Australia is planning a leapfrog strategy to ensure a robust architecture, proper integration with other regulatory agencies, and domestic and transnational interoperability. This could include the use of blockchain technology to adhere to the principle of "consensus" – one of ten APEC's Principle of Interoperability – to underpin the design of Australia's future SWS solution. In addition, Home Affairs also recognized that automation is not in itself a solution. Eliminating inefficiencies and ineffectiveness amongst inter-agency and government-industry interaction and the need to further strengthen interoperability was also identified as a critical success factor. This includes addressing legislative alignments, streamlined business processes, data harmonization and technical compliance.

Future Plans

The newly established Department of Home Affairs is currently looking at options to create a SWS for cross-border trade in Australia. The department recognizes the existence of red tape and duplication across government agencies and finds digitization and automation to be useful in

streamlining and harmonizing the processes (Coyne, 2018).[90]

As part of its modernization plans, the Department of Home Affairs is committed to exploring new and innovative ways that technology might be used to facilitate trade. An example of an emerging technology that could be integrated into the future trade ecosystem is blockchain. Home Affairs is currently assessing how to leverage information that could be held on trade blockchains, including those developed commercially. It expects blockchain technology to provide the following benefits in an international trade context (Department of Home Affairs, 2018):

1. Reduced trade documentation, processing costs and delays due to errors in physically moving documents.
2. Increased visibility of goods as they move through the supply chain.
3. Real time visibility of the supply chain, leading to improvements in information availability and hence safety, security and efficiency.
4. Accelerated process transactions and formations of new transactional relationships.

B. INDONESIA

Overview

Based on the five Evolutionary Stages "Single Window Planning and Implementation Guide" (UNECE/ UNESCAP, 2012 see Appendix A), the SWS for foreign trade for Indonesia (officially called the Indonesia National Single Window (INSW) is at stage 'E'. The INSW has been able to exchange data of Certificate of Origin (CO) - Form D electronically (e-Form D) with some ASEAN Member Economies (namely Singapore, Malaysia, Thailand and Viet Nam) under the ASEAN Single Window (ASW) platform. The real-time data exchange of e-Form D was in place since March 2017 and the utilization of the document for tariff preference claim became operational in January 2018. Nevertheless, Indonesia is continuously developing and improving services for the earlier stages (A to D).

The 2017 UNESCAP Trade Facilitation and Paperless Trade Implementation Survey shows room for improvement for Indonesia in the areas of (i) cross border paperless trade, and (ii) institutional arrangement and cooperation. Indonesia's overall score is 62.37%, still notably lower than its other Southeast Asian counterparts like Malaysia (81%), Singapore (90%), Thailand (81%) and Philippines (70%) (UNESCAP, 2017).

Currently, the following functions or services are provided by the INSW system:

1. Provide reference information on Restriction and Prohibition provisions (*LARTAS*) as well as export / import licenses.
2. Validation and reconciliation of export / import license with Import Declaration (PIB) / Export Declaration (PEB) data for customs clearance purposes.
3. Provide Dwelling Time Dashboard to monitor the movement of goods in the port from

[90] See: https://www.itnews.com.au/news/home-affairs-plots-a-single-digital-window-for-australias-international-trade-484531. [last accessed 23 May 2018]

stacking until gate-out.

4. Provide single submission platform as a single entry to submit application for export/import licencing and declaration (piloting phase).
5. Provide a Single Stakeholder Information platform (SSI) that contains a single profile of importer that can be used as a reference for integrating risk management processes among Ministries / Agencies.
6. Exchange e-Form D data among ASEAN Member Economies.

There are currently 18 Ministries / Licensing Agencies whose systems have been integrated with the INSW system, as illustrated in the graphic below:

Figure 6. Indonesian National Single Window

No	Government Agencies	Final Licensing	Recommendation
1	Ministry of Trade	✓	
2	Fishery Quarantine	✓	
3	Animal & Plant Quarantine	✓	
4	Food & Drugs Control	✓	
5	Ministry of Industry		✓
6	Ministry of Energy	✓	✓
7	Nuclear Control NA	✓	✓
8	Ministry of Env. & Forestry	✓	✓
9	Ministry of ICT	✓	
10	Ministry of Agriculture	✓	✓
11	Ministry of Health	✓	
12	National Police	✓	
13	Ministry of Defense		✓
14	Ministry of Transportation	✓	
15	Central Bank (BI)		✓
16	Customs (DGCE)	--	--

Source: INSW (2017)

The INSW system is mandatorily implemented in 21 Customs Offices in Indonesia, namely: *Tanjung Priok* Port of Jakarta, *Tanjung Perak* Surabaya, *Tanjung Emas* Semarang, Belawan, Medan, Palembang, Pangkal Pinang, Dumai, Lampung, Merak, Denpasar, Bitung, Balikpapan, Samarinda, Banjarmasin, Bandung, Dry-Port Cikarang, Soekarno-Hatta Airport Jakarta, Halim Perdana Kusuma Jakarta, Kuala Namu Medan, and Juanda Surabaya.

The current INSW system has been able to serve more than 92% of the total domestic export and import transactions. Operationally, the INSW system is managed by the National Single Window Agency (LNSW – *Lembaga National Single Window*), a non-structural unit under the Minister of Finance. The INSW system is owned by LNSW where its operations are implemented by third party service providers within a managed service framework under the full supervision of LNSW. Managed service budget for FY 2018 reached Rp 6.8 billion (around USD 483,000). This budget not only covers the interoperability costs of INSW systems with other systems, but also for the management of its core INSW functions, including but not limited to document validation and reconciliation of export/import license with customs declaration documents. There is also a budget

for the purpose of exchanging customs related data valued at Rp 76.7 billion (around USD 5.4 million in 2018). This budget is used for the service of sending electronic customs declaration documents from traders to the INSW system.

Economy Profile

Indonesia is home to a population of 258 million people (2016) and is the largest economy in Southeast Asia with a GDP of USD 932.5 billion in 2016. The economy grew by 5% from 2015 and is expected to achieve a growth rate of 5.1% in 2017[91]. Manufacturing, agriculture, mining and petroleum are the main industries fuelling this economy. The government revenue is Rp 1,778,188 billion (2016), accounting for 14.3% of GDP[92].

Taxation of individuals and corporations is determined by residency in Indonesia. Types of income taxes include (i) Corporate Income Tax, (ii) Individual Income Tax, (iii) Withholding Tax on employees' remuneration, and (iv) Withholding Tax on various payments to third parties. In addition, there is also t

he Value Added Tax and Luxury Goods Sales Tax, and Land and /or Building Tax (Deloitte, 2016)[93].

The Director General of Taxation (DGT) is in charge of tax audits and objections. A system has been in place since 2013 to improve the cooperation between government agencies by providing data to complement the internal data collected by the DGT. In addition, Indonesia has sought to adopt the international Exchange of Information (EOI) agreements and aims to implement the automatic EOI by 2018 (Oxford Business Group)[94].

Trade profile

Table 5 shows the main trading partners of Indonesia. In 2016, China was Indonesia's largest import and export partner of merchandise trade, accounting for 22.7% of imports and 11.6% of exports. Singapore and Japan accounted for a combined 20.3% of imports into Indonesia. As for exports, USA and Japan accounted for 11.2% and 11.1% respectively. In 2016, 70% of Indonesia's exports and 78% of its imports were from APEC economies (StatsAPEC).

[91] Based on IMF data.
[92] Ibid.

[93] See: https://www2.deloitte.com/content/dam/Deloitte/id/Documents/tax/id-tax-indonesian-tax-guide-english-2016.pdf. [last accessed 17 July 2018]

[94] See: https://oxfordbusinessgroup.com/overview/paying-your-dues-breakdown-regulations-governing-tax-system. [last accessed 17 July 2018]

Table 5. Current main trading partners

Imports		Exports	
Economy	**2016 (%)**	**Economy**	**2016 (%)**
China	22.7	China	11.6
Singapore	10.7	USA	11.2
Japan	9.6	Japan	11.1
EU	7.9	EU	10
Thailand	6.4	Singapore	7.8
Other	42.7	Other	48.2

Source: WTO

The main commodity groups imported and exported by Indonesia in 2015 are listed in table 6. Manufactures is the largest commodity group imported into and exported out of the economy, accounting for 65.1% and 44.1% respectively. Fuels and mining products are the second most imported (20.9%) and exported commodity group (28.6%).

Table 6. Top imports and exports

Imports		Exports	
Commodity groups	**2015 (%)**	**Commodity groups**	**2015 (%)**
Manufactures	65.1	Manufactures	44.1
Fuels and mining products	20.9	Fuels and mining products	28.6
Agricultural products	12.9	Agricultural products	26.5
Other	1.1	Other	0.9

Source: WTO

Future trade expansion plans involve talks with Peru, Kenya, South Africa, Mozambique and Morocco, and on an economic partnership agreement with the Gulf Cooperation Council. In addition, Indonesia also plans to undertake FTA negotiations with Canada and members of ASEAN.[95]

History, Evolution and Scope of Single Window System (SWS) and Single Windows' International Interoperability (SWSII)

The development of the INSW system is a follow up of the ASEAN Leaders Declaration of Bali Concord II in 2003 and the ASW Agreement that was signed by ASEAN Finance Ministers in 2005.

The INSW system began its pilot initiative in November 2007 at *Tanjung Priok* Port for import transactions. In 2007, the National Single Window (NSW) Preparation Team was established under the Coordinating Ministry of Economic Affairs where Minister of Finance was appointed as its chair. The team also launched the NSW Blue Print in 2007. The mandatory implementation of INSW System began in 2010, where it only covered import transactions in five main customs offices, namely: *Tanjung Priok* Port of Jakarta, *Tanjung Perak* Surabaya, *Tanjung Emas* Semarang, Sukarno-Hatta Airport and Halim Perdana Kusuma Airport Jakarta. Thus, in the initial stage, the development of the INSW System, in terms of policy, was driven by the Coordinating

[95] The Jakarta Post. 2018. Retrieved from: http://www.thejakartapost.com/news/2018/01/04/ri-to-start-trade-talks-to-boost-exports.html. [last accessed 23 May 2018]

Ministry for Economic Affairs; while, in terms of operation, it was managed by the Ministry of Finance, in this case the Directorate General of Customs and Excise.

Furthermore, the INSW system has been gradually developed and mandatorily applied to export and import transactions at 21 customs and excise service offices. Institutionally, starting in 2016, the management of the INSW system shifted from the NSW Preparation Team to the PP-INSW (INSW Operating Agency) of Ministry of Finance. In May 2018, the Government of Indonesia decided to strengthen the role of PP INSW and changed its name to LNSW. Starting in 2017, the INSW system has been able to interoperate with other ASEAN Member Economies' NSW system through a live data exchange of e-Form D.

Legal Framework

There are several regulations that served as the legal basis for INSW system, including but not limited to:

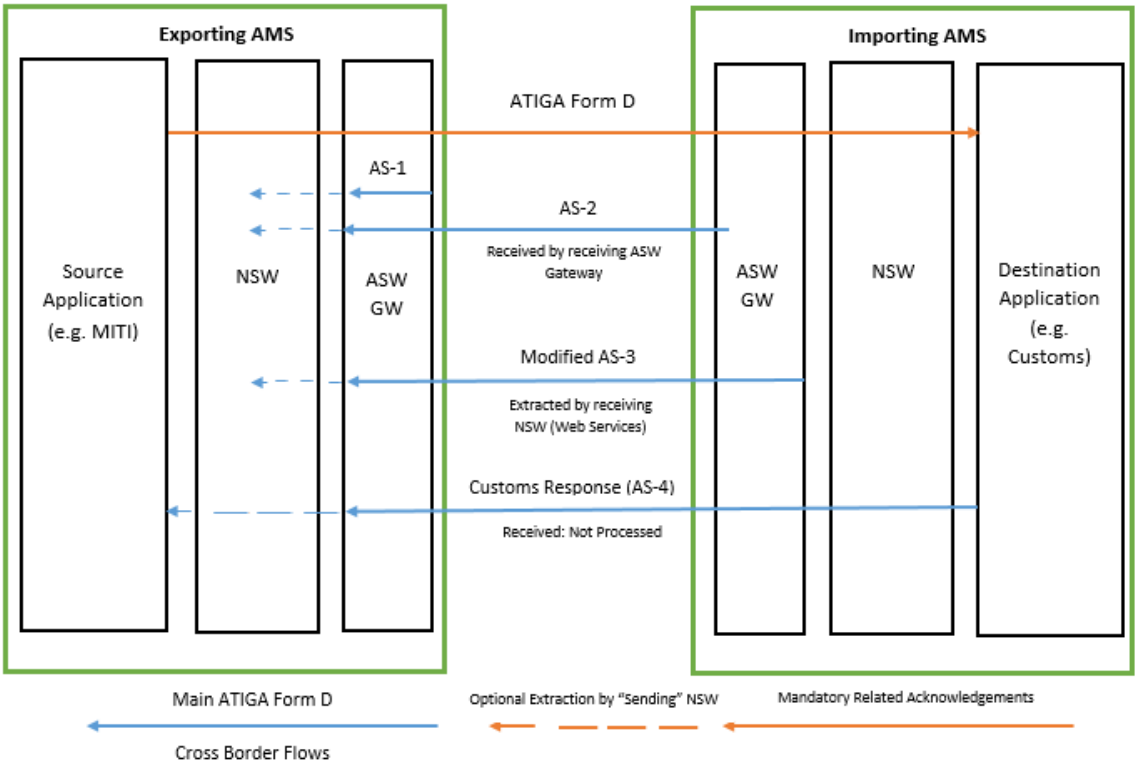
1. Presidential Regulation No. 10/2008 concerning the Use of Electronic System in the Framework of Indonesia National Single Window, as amended by Presidential Regulation No. 35 of 2012.
2. Presidential Regulation No. 76/2014 on INSW Operating Agency (*Pengelola Portal* INSW).
3. Presidential Regulation No 44/2018 on Indonesia National Single Window that establishes the National Single Window Agency (LNSW or *Lembaga* National Single Window). The LNSW is established to improve the transparency, consistency and efficiency of export and import processes.

Meanwhile, the implementation of ASW as a form of SWSII application uses Presidential Regulation No. 52 of 2017 on Ratification of Protocol on the Legal Framework to Implement the ASEAN Single Window (ASW). In this protocol, the following issues have been regulated: Information Security and Confidentiality, Integrity of Data, Data Retention Requirements, Protection of Intellectual Property Rights and Data Ownership, Legal effects of Electronic Documents, Data and Information, Liability Related to the ASW, and Dispute Settlement. As part of its protocol implementation, the LNSW conducts security assessments routinely each year to ensure compliance amongst participating agencies and further minimize possible vulnerabilities of the INSW systems to intrusions that can interfere with data integrity and cause other security threats.

Business Framework

Indonesia has succeeded to exchange e-Form D data amongst ASEAN Member Economies, therefore demonstrating implementation of SWSII in Indonesia under the ASW information exchange platform. The business process of exchanging e-Form D is illustrated as follows:

Figure 7. ASW business process (exchange e-Form D)



Source: ASEAN Secretariat, adapted by authors

e-Form D (i.e. principle of data harmonization and standardization) is issued by the "Certificate Issuing Agency (CIA)" system of the exporter economy and then delivered to the importer economy through its SWS and ASW Gateway. e-Form is accepted by the customs of importer economy after going through the ASW Gateway and SWS of the exporter economy. The process of granting preferred tariff using e-Form D is done by the Customs system after e-Form D has been received by the importing economy's ASW Gateway, channeled to its SWS and then routed to Customs (i.e. principle of responsiveness). The SWS system validates the transmitted (send and receive) e-Form D data leaving the Customs system completely independent and autonomous (i.e. principle of autonomy).

Besides the INSW, other IT systems deployed to interface with the ASW are the e-SKA (electronic certificate of origin) and Inatrade systems from the Ministry of Trade as the CIA; while the CEISA Directorate General of Customs and Excise is the "Receiving Authority". Indonesia's ASW Gateway application and the INSW system are managed by LNSW.

The INSW system is entirely funded by government budget. Operationally, LNSW manages the relationship with INSW stakeholders. However, should certain policy issues arise between Ministries or Agencies that cannot be resolved by LNSW, those issues will be raised at the level of the Steering Committee chaired by the Coordinating Minister for Economic Affairs.

Technical Framework

Each ASEAN Member Economy is responsible for the SWS and ASW Gateway in each economy. The ASW Gateway was developed with common enterprise interoperability standards and has a 'point to point' characteristic in which the configuration is adjusted according to the documents to be exchanged. The ASW was developed with reference to Recommendation 35 UN / CEFACT.

Meanwhile, domestically, LNSW is currently developing the second generation of the INSW system (INSW Gen-2) that will improve and expand the current coverage of INSW system services. The new system aims to provide real time import and export data and to allow better integration and improvement of inter-ministerial/institutional business processes (from licensing to realization) and seamless management of the flow of goods.[96]

For interoperability between domestic Ministries' systems in Indonesia, INSW establishes data communication standards including the standards on message structure, message platform as well as data communication mechanisms. INSW also provides a dedicated line for data communication with the domestic Ministries or Agencies that have the highest transaction volumes with INSW. INSW also undertakes technical assistance to each Ministry or Agency that are integrated with INSW in preparation of the in-house system within each Ministry or Agency according to the ICT standards set by INSW.

Jones (2016) mentioned the following key characteristics of the ASW architecture (page 208-209):

1. The architecture model agreed upon by all NSWs and ASEAN senior executives was to have a direct exchange of data between economies, but there would be a regional service.
2. The regional service is a server that monitors the exchange of data and ensures data integrity. Standardized regional data aligns to the ASW environment so it can feed the economy codes into the system, hence enabling the system to recognize data elements coming from the region.
3. The data exchange is bilateral, but monitored at the regional level, so the architecture is a strength.
4. The Organization for the Advancement of Structured Information Standards is the international standard used to facilitate standards for XML protocols between the ASW closed networks and the private business networks.
5. The basis of the ASEAN data sets was the WCO data model Version 3.4 to harmonize the exchange of trade data that support expandability and scalability.
6. ASW applied an SQL database to route key data elements to the corresponding agencies for permits and customs to minimize processing time and garner customer support.

Potential Benefits

ASEAN Member Economies had agreed that the analysis to measure ASW implementation

[96] Coordinating Ministry for Economic Affairs, Retrieved from: https://ekon.go.id/berita/view/pemerintah-kembangkan.2366.html. [last accessed 23 May 2018]

benefits will be made after ASW exchanges at least two documents and five other economies have joined. An ASW baseline study is currently underway to identify ASW's Key Performance Indicator (KPI) as a basis for ASW benefits analysis. It is expected that the implementation of e-Form D through the ASW will reduce the risk of invalid Form D Certificate of Origin (CO) which can adversely impact government revenue. In addition, the implementation of e-Form D will also accelerate the customs clearance process and accelerate the dwell time as targeted by the Indonesian government. The implementation of e-Form D can also reduce trade transaction costs (reducing hardcopy document delivery costs) which in turn will ultimately maintain and strengthen the competitiveness of domestic logistics costs.

INSW has tried to estimate the benefits from the logistic cost saving after the implementation of ASW (using e-Form D). The benefits of ASW are derived from two key components:

1. Document Courier Cost: Courier Cost of sending hardcopies of ATIGA Form D amongst ASW members.
    - Assuming the courier cost of each ATIGA Form D (including insurance) document is 50 USD, and the statistically recorded document exchange per year is 80,000 documents under ASW; the total cost saving is calculated to be 80.000 X 50 USD = **4 million USD**
2. Container Storage Cost: Container Storage Cost is reduced as follows:
    - Assuming Port Storage Cost per day is 20 USD and the average container dwelling period waiting for the hardcopy of ATIGA Form D to be received by customs = 7 days; the total cost saving for this item is 80,000 container X 140 USD = **11.2 million USD**

Based on the above calculations, the potential for total savings or benefits after ASW implementation, through the use of e-Form D, would be equal to approximately **15.2 million USD** per year (in the case of Indonesia).

Challenges faced by SWSII

In the early stages, Indonesia's SWSII succeeded in exchanging e-Form D data under the ASW framework. The process for this exchange has taken a significantly long time considering that ASW negotiations had been initiated in 2005. While each ASEAN economy participating in the ASW were re-engineering and reforming legislation, significant time was also spent in negotiating and deciding on a common ASW architecture and in the configuring and deploying the ASW solution. The ASW also faced several legal challenges, especially for the ratification process of the Protocol of Legal Framework to Implement ASW (PLF) that took considerable time. Finally, it was agreed that the ASW will be an enabling environment for data and information exchange between member economies. Each participating members' ASW servers are located in their own respective economy, while the ASW regional server only stores reference data and is hosted at the ASEAN Secretariat.

Technically, the most crucial challenge in implementing single window systems' interoperability (SWSII) amongst ASEAN Member Economies has been related to harmonization of data structure and process flow since each economy has its own SWS. Therefore, it took multiple meetings to draft and agree on the Message Implementation Guideline and Process Specification (MIG), that

became the guideline for each economy to adjust its SWS to interoperate. Since the business process of supporting the e-Form D implementation also involves the Customs system as the receiving authority and the Ministry of Trade system as the issuing agency, the collaborative exercise of drafting the MIG also needs strong inter-agency commitment, engagement and coordination.

Some technical issues have emerged in the early stage of e-Form D implementation. Issues were mostly promulgated by trade partner lodging complaints on the quality and completeness of the e-Form D data. In response to this issue, LNSW has asserted the importance of effective communication among related agencies.

There are also challenges related to the subsequent procedures of exchanging e-Form D. Currently, the ASW does not provide procedures to submit queries, cancellations, and replacements of e-Form. A temporary fix for this is to use e-mail. In addition, the existing Operating Certification Procedure (OCP) does not cover cancellation and replacement procedures. Query procedure is already included in the OCP, but procedural steps and arrangements could be further improved since it still involves manual procedures of having to retroactively check for documents and artifacts related to the CO Form D. In response to this issue, Indonesia has initiated a proposal to include query, cancellation and replacement in the amendment of OCP that is currently being discussed in the Sub-Committee of the Agreement of Rules of Origin (SCAROO).

There are also challenges relating to legal and domestic coordination in Indonesia. Granting preferential treatment using the e-Form D should have started on 1st of January 2018. However, since the PMK 229 / PMK.04 / 2017[97] (Ministerial Regulation) as the legal basis for the implementation of e-Form D was only valid starting in 28th of January 2018, the implementation of the e-Form D was delayed; whereas the ability to transact real-time data exchange of e-Form D has already been in operation since March 2017. There was nearly a one-year delay between the technical capabilities and the legal basis to start exchanging information.

Additional challenges include some of the ASEAN Member Economies who had difficulties in issuing a fully paperless ATIGA e-Form D, disrupting the automation flow for seamless paperless processing.

Lessons Learned

Indonesia's participation in the ASW has introduced opportunities for the economy to benefit from smoother flows of cross-border paperless trade. Indonesia's SWSII has successfully exchanged e-Form D data despite technical and legal challenges in its early stages. One of the most prominent challenges to attaining interoperability concerned the harmonization of data structure and process flows amongst the SWS of the ASEAN Member Economies. In addition, the legal challenges for the ratification of the Protocol of Legal Framework to Implement ASW resulted in delays in the implementation of the e-Form D. LNSW identified the importance of effective communication

[97] The Ministerial Regulation of PMK229/PMK.04/2017 legally grants preferential treatment of using e-Form D (instead of the hardcopy Form D) as regulated under the Operational Certification Procedures (OCP) ASEAN Trade in Goods Agreement. This Ministerial Regulation is required for Customs to accept the submission e-Form D as a replacement for the hardcopy.

and coordination in ensuring harmonization, hence resulting in the eventual successful implementation of the e-Form D.

There are considerable benefits expected for Indonesia from the implementation of ASW through the use of e-Form D, including low risk of invalid certification, acceleration of customs processes, lower dwelling time, and reduced transaction costs. INSW estimated logistical cost savings from using the e-Form D to be about 15.2 million USD through lower document courier and container storage costs.

Future Plans

With a strong commitment to regional integration and trade, Indonesia will be actively involved in future deployments of ASW. Architected and designed to adopt, adapt and implement common standards and frameworks such as the ASEAN Harmonized Tariff Nomenclature (AHTN 2017), the INSW provided the coordinating structure needed to align AHTN 2017 business processes and data. The ASW enabled the adoption of a unified catalogue and tariff amongst participating ASEAN economies, including the use of harmonized codes and description of goods, and synchronizing of explanatory notes among others.

At the time of this study, plans for the next generation of INSW features include (among others):

1. A Single Submission System (SSM) to allow traders to process all the necessary permits and documentation through the INSW system.
2. Additional electronic document exchange including the ASEAN Customs Declaration Document (ACDD), Sanitary and Phytosanitary (SPS), Certificate of Health and transportation related documents.
3. An Integrated Single Risk Management (ISRM) solution.
4. Creation of an integrated domestic logistics platform that integrates with present trade formalities handled by the INSW.

Additionally, INSW is currently exploring the application of 'blockchain' in implementing the SW in order to improve data transparency, security and consistency.[98] In blockchain, all transactions among stakeholders are being consensually shared, with the keys to its success is in establishing stakeholder 'trust' (i.e. principle of consensus).

C. PERU

Overview

Although still a work-in-progress, Peru is at stages 'B', 'C' and 'E' of the Evolutionary Stages based on the "Single Window Planning and Implementation Guide" (UNECE/ UNESCAP, 2012 see Appendix A). Peru is an active contributor to the Pacific Alliance (PA) trade bloc which

[98] Presentation by Mr. Muwasiq Noor, Deputy Head, Operation and Development, Indonesia National Single Window Operating Agency. Capacity Building Workshop on Cross-border Paperless Trade Facilitation: Implications of Emerging Technologies, 21 and 23 March 2018, United Nations Conference Centre, Bangkok.

established a regional electronic exchange platform among its members' VUCEs (*Ventanilla Única de Comercio Exterior*) to "interoperate" and carry out international trade.

Starting initially as a regulatory single window system in 2010, Peru's VUCE started integrating government agencies and regulatory authorities. More recently, VUCE included the National Superintendence of Tributary Administration [99] (SUNAT, by its Spanish acronym). Beyond border clearance mechanisms and providing a more coordinated approach to incorporating trade processes, the digital platform now enables partner economies to also exchange harmonized phytosanitary certificates when trading agricultural products with other Pacific Alliance members (Chile, Colombia and Mexico).

In the 2017 UNESCAP Trade Facilitation and Paperless Trade Implementation Survey, Peru scored an overall 77.42%. The survey identified the economy's VUCE to be only partially implemented, which implies that Peru's VUCE may be at different evolutionary stages and not entirely paperless at varying protocol stages. Peru's overall score is relatively lower than its other Pacific Alliance counterparts: Chile (80%), Colombia (82%) and Mexico (89%) (UNESCAP, 2017). According to the UNESCAP Survey, Peru has implemented the following measures under the Cross-Border Paperless Trade category: (i) Laws and regulations for electronic transactions (fully implemented); (ii) Engagement in trade-related cross-border electronic data exchange (partially implemented); (iii) Traders apply for letters of credit electronically from banks or insurers without lodging paper-based documents (partially implemented); and (iv) Electronic exchange of Sanitary & Phyto-Sanitary Certificate (partially implemented) (UNESCAP, 2017).

Peru's VUCE has three main components as described below (OECD & WTO, 2015):

1. Restricted goods: 15 public entities are involved in enabling exporters and importers to carry out certain procedures like applying for permits, certificates and authorizations for entry, exit and transit of restricted goods via the internet. Some of the goods included are vegetables, animals, medicine, toys and telecommunications.
2. Origin: 19 public and private entities are in charge of the issuance and management of qualified preferential origin certificates, the issuance of duplicates, and the replacement or cancellation of these certificates.
3. Port: seven public entities are involved in the administrative management of procedures related to the reception, stay and dispatch of ships to ports in the economy, and to port services.

The Peruvian VUCE is managed by a special committee led by the Ministry of Foreign Commerce and Tourism (MINCETUR), along with 26 other entities. This include six public sector agencies, nine foreign trade business associations and a port manager.

[99] The inclusion of SUNAT is currently in progress. The integration is focused on including the Imports for Consumption Regime (Customs Declaration of Goods "DAM") through VUCE to engage other OGA regulating restricted goods. The Documents of Authorization issued by the OGA are then submitted to the Custom Administration System.

Economy Profile

In 2017, Peru was home to 32 million people and generated a GDP of USD 192 billion in 2015 which grew by 3.9% the following year. The economy's GDP is predicted to have a lower growth rate at 2.6% in 2017 before projecting to rise again by 3.7% in 2018[100]. Peru's main industries are mining, tourism, agriculture and fishing. The government earned USD 37 billion in revenue in 2016, accounting for 18.6% of the GDP[101]. Agriculture accounts for 7.5% of the GDP and employs 7.1% of the workforce; while industry accounts for 36.3% of the GDP and 17.4% of the workforce. Services accounts for 58.1% of the GDP. Tourism employs nearly 7% of the workforce and its share in GDP is approximately 7.7%.

Ranked 67th of 138 economies on the Global Competitiveness Index (World Economic Forum, 2017), Peru is in the top-quartile in the financial market development and macroeconomic environment but in the lower half-quartile for technological readiness and innovation.

The Peruvian tax regime comprises of six types of taxes: a) Income Tax, b) Value added Tax, c) Temporary Net Assets Tax, d) Customs Duties, e) Municipal Taxes, and f) Other taxes like the Financial Transaction Tax and Social contributions (Deloitte, 2014). The system is managed by SUNAT which operates as a semi-autonomous authority under the Ministry of Finance. Peru's ratio of active taxpayers to staff of 691 is significantly below the regional average of 982 and in-line with the world average of 677 (Paniagua & Kamenov, 2014).

To ensure and strengthen cooperation, SUNAT exchanges information with public and private organizations through covenants. It is also in agreement to conduct operations to prevent tax evasion and money laundering through regular exchange of information and staff training (OECD, 2013).

Trade Profile

Peru has been a member of the WTO since 1995. Currently, Peru has 19 trade agreements in force covering 95% of its exports. With economic leadership aspirations, Peru is seeking to position itself as a regional hub for trade between Latin America and the APEC economies.

The main import and export partners of Peru in 2016 are listed in Table 7. China, the United States and the European Union are the three main trading partners, together accounting for over 50% of imports and exports. About half of this is made up by China with 22.8% of imports and 23.5% of exports. It is noteworthy that in 2016, 65% of Peru's imports and 61% of its exports were from APEC economies (StatsAPEC).

[100] Based on IMF data.
[101] Ibid.

Table 7. Current main trading partners

Imports		Exports	
Economy	**2016 (%)**	**Economy**	**2016 (%)**
China	22.8	China	23.5
USA	19.6	USA	17.3
EU	12.1	EU	15.3
Brazil	5.9	Switzerland	7.1
Mexico	4.6	Canada	4.7
Other	35	Other	32.1

Source: WTO

Table 8 shows the commodity groups that comprise a significant portion of trade. Manufactures account for bulk of imports at 76.1% while fuels and mining products make up for almost half of exports at 46.4%.

Table 8. Top imports and exports

Imports		Exports	
Commodity groups	**2015 (%)**	**Commodity groups**	**2015 (%)**
Manufactures	76.1	Fuels and mining products	46.4
Agricultural products	12.5	Agricultural products	22.4
Fuels and mining products	11.4	Manufactures	12
Other	0	Other	19.3

Source: WTO

Several trade expansion plans are in the pipeline for Peru. It is expecting to sign an ambitious trade deal with Australia covering goods, services and investments. The signing of an agreement between the two economies will help to reduce plausible barriers in the Pacific region after the United States' withdrawal from the Trans Pacific Partnership (TPP). Peru is also in talks with India to sign an FTA focusing on the trade of medicines and pharmaceuticals. The economy is expected to sign an agreement with Turkey by mid-2018 as well (Lazareff, 2017).[102]

History, Evolution and Scope of Single Window System (SWS) and Single Windows' International Interoperability (SWSII)

The development of VUCE was a consequence of the National Strategy Export Plan 2003-2013 aimed to develop an export culture and improve trade facilitation, the UN/CEFACT 2005's call to governments to implement SWS, and APEC's call to action to prioritize development of a single window to facilitate foreign trade (VUCE). As a result, in 2006, MINCETUR began to study other economies' SWS experiences. Following the development of a model for VUCE in 2007, Peru's SWS for foreign trade was launched in 2010 (OECD, 2015)[103]. It was implemented with the aim to take advantage of existing trade agreements and to improve connectivity mainly through better access to ICT.

[102] See: https://www.bizlatinhub.com/free-trade-agreements-in-peru/. [last accessed 23 May 2018]
[103]See:https://www.oecd.org/aidfortrade/casestories/CaseStory2015_112_Peru_Communications_EnglishVersion.pdf. [last accessed 17 July 2018]

VUCE is an integrated system enabling the management of required procedures to allow entry, exit and transit of goods through electronic means. A Special Committee presided by MINCETUR was formed to enable its implementation (OECD, 2015).

In 2010, with the initial participation of six government agencies, VUCE started operations with the Restricted Goods Component, allowing users to obtain permits, certificates, licenses, authorizations and other authorizations for entry, transit and departure of restricted goods by electronic means. This includes food, medicines, animals, plants, telecommunication equipment, toys, etc. Today, the Restricted Goods Component of VUCE allows the issuance of permits, certificates and licenses of 15 government agencies.

In 2012, Chile, Colombia, Mexico and Peru signed an agreement to establish the Pacific Alliance (PA). Within this framework, the member economies signed the Additional Protocol of the Framework Agreement for the Pacific Alliance in 2014, which entered into force on 1st of May 2016. Not only did member economies acknowledge that their own instances of VUCE are a valuable trade facilitation tool, they also recognized that their SWS can be much more effective and synergized if it advocates further reforms, collaborates on trade outcomes with its PA members, and improves coordinated border management with their neighbors. Therefore, member economies introduced the term "single window interoperability" in the agreement. The term "interoperability" in this agreement means "the ability of the systems to enable electronic exchange of information, aligned to internationally accepted standards", making VUCEs a consistent and reliable channel for information exchange of foreign trade documents amongst member economies.

In 2013, Peru launched two new Components of VUCE: the Origin Component and the Port Component. The Origin Component allows exporters to comply with the administrative formalities and procedures related to eligibility and issue of certificates of origin. The Port Component of VUCE handles the administrative procedures related to the receiving, stay and clearance of vessels in the ports of the economy, and other procedures related to port services.

By 2015, there were over 270 administrative procedures integrated from 15 different government agencies.

In 2016, VUCE started the implementation of the international interoperability with other SWS within the framework of the PA[104] Agreement. Interoperability between VUCE and the Peruvian Customs Clearance System of the National Superintendence of Customs and Tax Administration (SUNAT) was implemented by focusing on imports for consumption regime. The Customs Declaration of Goods (DAM by its Spanish acronym) for import is interchanged through VUCE with other government agencies (OGA) involved in the Restricted Goods Component. The authorizations that are issued by OGA are interchanged with SUNAT[105].

[104] The Pacific Alliance is formed by Chile, Colombia, Mexico and Peru.

[105] Currently in progress and focuses on Imports for Consumption Regime (Customs Declaration of Goods "DAM"), so the DAM is interchanged through VUCE to the OGA involved in Restricted Good Component, and the Documents of Authorization that are issued by OGA involved in Restricted Good Component are interchanged with Custom Administration System.

According to a case study report by WTO, the creation of Peru's VUCE integrated 82 procedures (see Table 9) involving seven institutions. The Lima Chamber of Commerce noted a 5% reduction in costs and a 25% reduction in time due to the integration. Savings were estimated at almost USD 5 million each for both the private and public sectors.

Table 9. Integrated procedures under each institution

Entity	RM 137-2010 19.07.2010	RM 233-2010 17.11.2010	RM 261-2010 31.12.2010	RM 037-2011 16.02.2011	Total
DIGESA	12	6	1		19
MTC	7				7
PRODUCE	1				1
SENASA		1			1
ITP		10			10
DIGEMID		3	20	21	44
TOTAL	20	20	21	21	82

Source: MINCETUR

DIGESA = General Directorate of Environmental Health; SENASA = National Service of Agricultural Sanitation; ITP = Fishing Technological Institute; DIGEMID = General Directorate of Medicine and Drugs

The costs for the implementation of VUCE was funded by MINCETUR. The Government of Peru also received technical assistance from the European Union, the Development Bank of Latin America (CAF), U.S. Agency for International Development (USAID), and the Inter-American Development Bank (IDB).

The VUCE 2007-2011 implementation investment was approximately USD 2 million and cost of maintenance and operations is estimated at USD 1.5 million p.a., of which USD 0.5 million is fixed annual cost. Approximately USD 1 million are variable expenses for improving, adding additional functionalities and capacity building. With SWSII as part of Peru's commitment to the PA, future investment is estimated to reach USD 5 million with annual maintenance and operating costs of USD 3 million.

Presently VUCE is used only for international maritime transport. In addition, it operates for the issuance of Certificates of Origin of Preferential Type and for the procedures related to the control of the goods that are intended for import or export.

Legal Framework

Peru's legal environment provides the impetus to drive necessary government reforms and to establish a SWS to support trade facilitation. According to legislation, VUCE's core basis is to establish an integrated system that allows parties involved in trade and international transportation to manage, through electronic means, the procedures required by the competent authorities for the entry, transit, and departure of goods in Peru.

There are several regulations forming the basis for VUCE. Some of which include, but is not limited to:

1. Supreme Decree No. 165-2006-MEF, granting status by law to the creation of a single window for foreign trade, through the Supplementary Provision of Legislative Decree No.

1036 under the administration and maintenance of the Ministry of Trade and Tourism (MINCETUR). Specifically, it is to be managed by the Vice Ministry of Foreign Trade.
2. Legislative Decree 1211 endorsed measures aimed at integrating public services and encouraging the exchange of information through a single window. It determined the rules for implementing a single window, for exchanging information between parties and for interoperability instruments. The decree also stated that the adoption of relevant technologies can occur over time (OECD, 2016).
3. Law No. 28977 enabled the formation of the Special Committee to oversee the implementation and functioning of VUCE (OECD, 2015). The Committee is comprised of 27 institutions: 17 from the public sector, nine business associations for foreign trade and one port administrator.
4. Digital Certificates and Signatures Law No. 27269 provides the legal status to digital or advanced electronic signatures. For digital certificates to be recognized, certain standards need to be met by the certification provider.

Business Framework

Fully government funded, MINCETUR leads the initiative having the responsibility for the overall policy of VUCE and the role of technical coordinator of the Origin Component. Meanwhile, SUNAT has the role of technical coordinator of the Restricted Goods Component, while the National Port Authority (APN by its Spanish acronym) has the role of technical coordinator of the Port Component.

Peru follows the Single Automated System model, meaning that VUCE is an integrated system that allows all parties involved in trade and transport to lodge documents and information to fulfill import, transit and export regulatory requirements in digital form. VUCE operates on a 24/7 basis.

Technical Framework

Under the Pacific Alliance Agreement, Single Window Systems' International Interoperability (SWSII) protocol, uses a peer-to-peer model. Which means that each member economy has its own interoperability platform that allows them to send and receive information without using a centralized system.

Unlike the ASEAN Single Window (ASW) or RADDEx, , the Pacific Alliance member economies adopted a hybrid model - meaning that each economy has its own Interoperability Platform (IOPACK) for exchanging trade information and documents. Peru's IOPACK consists of technology stack composed of web servers (Apache HTTP Server), JBoss Application Server and Fuse Enterprise Service Bus (ESB), which all runs under the Red Hat Enterprise Linux operating environment.

Regarding documents that will be exchanged through each IOPACK, all PA member economies agreed to use the UN/CEFACT Core Component Library for structuring documents using XML. Adoption of standards has also been a prime concern, such as the use of Food and Agriculture (FAO)'s International Standards for Phytosanitary measures and UNECE's Recommendation No. 20 regarding units of measure for the use of phytosanitary certificates amongst PA members and

non-members.

Potential Benefits

In 2015, Peru's VUCE had 15 participating agencies and 31,000 registered users. It covered 273 administrative processes and reduced time spent on such procedures by 30% each year. Savings through reduced travel, time and paper resulted in decreased costs of USD 50 million. Furthermore, Peru expects to reduce the number of days required to carry out international trade procedures from 8.4 in 2014 to 6.4 in 2021, along with other significant reductions in logistical costs (OECD & WTO, 2017). Today, there are over 50,000 users of VUCE with all public entities in foreign trade and transportation participating. The procedures most often carried out in VUCE are related to the agricultural sector followed by the fishing sector.

To date, VUCE using its interoperability platform with PA member economies has processed approximately 1,000 phytosanitary certificates. In general, the electronic transmissions have reduced costs and time for the economy. It is expected that eventually all the documents necessary for trade operations will be added into the PA SWSII framework.

Challenges faced by SWSII

While applauding VUCE's success at achieving its goals, the Inter-American Development Bank (IDB) noted a lack of formalities incorporated into the system. It also recognized harmonization amongst the electronic platforms of other governments as a challenge to VUCE (OECD, 2016). Three improvement areas were identified, namely (OECD, 2016):

1. Time and cost optimization
2. Completion of protocols required to release permits
3. Prevention of duplicity of information

An OECD presentation at the "Public Private Dialogue in Trade Facilitation" in Buenos Aires (2016)[106] noted several challenges as listed below:

1. Peru needed strengthening compared to other Latin American economies with regards to 'institutional aspect and scope', particularly in including all agencies in its single window, and in implementing mechanisms to co-ordinate controls and inspections, amongst others.
2. There was little room for dematerialization of the border process, and data requirements and structure were not harmonized across all entities especially those not yet included in VUCE.
3. With regards to the 'technological architecture', Peru is under-resourced in comparison to other Latin American members. It lacked the mechanisms to secure identification and authentication in the single window, and it did not have a large share of agencies with IT systems capable of exchanging data electronically.

[106] See: OECD (2016) presentation at http://redvuce.org/docs/OECD_Argentina2016.pdf. [last accessed 17 July 2018]

4. Interoperability in Peru also needed improvement. There was in general a lack of alignment of procedures, data requirements and other formalities between agencies and partner economies.

It was a challenge for PA members to install and configure the appropriate technological infrastructure on which the IOPACK would function. Furthermore, economies faced several legal challenges, such as the recognition of electronic documents and signatures and the unsupportive existence of legal gaps. For example, there were technical difficulties in issuing the phytosanitary certificate. Therefore, the National Service for Safety and Quality of Food and Agriculture (SENASA, by its Spanish acronym) had to work with MINCETUR to implement e-signature; since authenticating digital messages or documents had not been adopted government-wide in Peru.

Peru has made significant strides in maturing its SWS environment. As VUCE continually evolves through the ongoing introduction of new technology, including function and scalability, compatibility and interoperability, inherent challenges will be inevitably encountered. The points described above are emblematic in most SWS implementations globally and reveal not only the prototypical challenges encountered in the quality of data interchanged between economic partners, but also in the quality of process interchange definitions and the need to strengthen security compliance acceptable to its domestic and transnational trading partners. As RSW systems are always iterative in their development to react faster to dynamic trading conditions, these concerns are exacerbated even further due to the complexities and soft dependencies on economic partners to fulfill a transaction. As the proverbial saying goes, “A chain is only as strong as its weakest link”.

Therefore, Peru’s invaluable experience demonstrates that the SWS architecture is multi-phased, iterative, progressive and non-linear. Evolving VUCE’s architecture to align with APEC’s 10 Principles of Interoperability, will provide an environment conducive to SWSII, and in the long run, regional integration goals.

Lessons Learned

The introduction of internal and cross-border regulatory business processes changes and the use of technology as an enabler will continue to be a challenging initiative for Peru. However, there are valuable experiences gained and lessons learned from Peru which can be carried forward in strengthening its regional single window initiative through the Pacific Alliance and potentially other trading partners and regional trading blocs. These include, but are not limited to:

1. **Development of a baseline for trade procedures.** Starting in 2007, Peru made a deliberate decision to baseline all import and export procedures along with continually benchmarking the value of trade-related and administrative processes against international models and practices.
2. **Strong legal and regulatory support**. The legal foundation to drive broad institutional reform and the establishment of VUCE is supported by law. Under Law No. 28977 and with the support of the Court, a Special Commission was established in which collaboration

amongst stakeholders is made mandatory and legitimizes the technical contents required for institutionalizing VUCE.

3. **Capacity building**. Intensive training nation-wide across 12 cities in the use of VUCE. Close to 1,000 public officials across various agencies along with private sector representatives (e.g. importers, exporters, custom agents and other foreign trade operators) completed a comprehensive training program that included the context, objectives, principles, legal framework, benefits, processing cycle, traceability of procedures and other technical use.
4. **Strong commitment.** Well-founded commitment by member economies and the IDB to interoperability.
5. **Different levels of readiness.** Peruvian government agencies and other member economies were at different levels of technological readiness causing delays on the overall project.
6. **Lack of human resources.** Qualified people are always needed to implement a highly complex IT system.

Future Plans

Peru is working towards the improvement of its SWS by expanding its scope to cover all operations in the commerce chain through the implementation of its next version of VUCE. VUCE's ongoing work to improve Foreign Trade Facilitation Services, known as "VUCE's Second Stage", involves the development of new components and the improvement of existing ones.

At the time of this study, plans for the next generation of VUCE features include, among others:

1. Port community system.
2. Platform to handle operations for Free Trade Zones.
3. Risk Management Platform.
4. Logistic Platform.
5. Trade information portal.
6. Platform to support small to medium companies manage trade operations.
7. Strengthening international interoperability.
8. Platform to integrate the regulation of foreign trade.
9. e-learning platform, to implement tools for Business Intelligence, big data, CRM (Customer Relationship Management) and open government.

The ecosystem of VUCE's Second Stage will include: importers, exporters, government agencies, trade service providers, foreign government agencies and all stakeholders involved in trade. PA member economies will also introduce customs declaration to be exchanged to improve efficiency, risks and security.

D. SYNTHESIS

The three case studies were developed to provide "real-life" and a deeper understanding of the issues in implementing SWSII. It is evident that all economies have a different starting position with the development of their SWS; it is also equally true that most economies differ in their

developmental stages of a SWS. There are, however, some common lessons that can be drawn.

On the one hand, Indonesia and Peru have garnered more success in implementing a SWSII primarily as part of the agenda of their respective regional pacts: ASEAN and Pacific Alliance. Australia on the other hand, despite having a more favorable trade environment, has implemented SWS only partially.

Benefits of SWSII

The three economies have acknowledged some form of benefits from a SWS that is internationally interoperable. This has been demonstrated either in the form of measures aimed at making the current systems more interoperable or through the sponsoring of studies, to recognize best practices and scope for implementation, as in the case of Australia.

OECD and WTO noted wide participation in the Peruvian VUCE leading to 30% reduction in time spent on administrative processes per year and savings of USD 50 million through reduced travel, time and paper. Peru expects to further decrease the number of days to carry out international trade procedures from 8.4 in 2014 to 6.4 in 2021, as well as forecasts a significant reduction in logistic costs during the same period. The evaluation study of the ASEAN Single Window is still underway, however, Indonesia expects reduction in risk of invalid CO Form D, acceleration of the customs clearance process and reduced dwelling time leading to greater efficiency. The use of the e-Form D is also expected to reduce trade transaction costs by eliminating the need to deliver hardcopy documents. Most of these benefits have also been recognized by the Australian case study, such as, improved services predictability, and lower costs in providing information and processing goods. There will also be a lower cost for new traders in identifying domestic or international regulatory requirements.

Challenges faced

One of the main challenges for the three economies is attaining interoperability by ensuring coordination and harmonization of standards, data, and IT systems. Most economies have first developed their National Single Windows “NSW” (or also synonymously called the Single Window System “SWS” for foreign trade) following which they have coordinated with other trading partners to form the RSW such as the ASEAN Single Window (ASW) or Pacific Alliance (PA). However, harmonizing across all aspects of the milieu is not easy. This can be due to differences in legal and regulatory frameworks, trade procedures, inter-agency collaboration, data standards, data collection systems and other factors. Peru’s VUCE recognized harmonization among the electronic platforms as a challenge. An OECD study of VUCE also noted a general lack of alignment of procedures, data requirements and other formalities between the agencies and partner economies. Indonesia identified domestic coordination as a challenge to be addressed. Due to the lack of coordination, it expected a delay in the implementation of live data exchange of the e-Form D. The Australian Home Affairs also seeks to address legislative alignments, data harmonization and technical compliance in pursuing its aim to implement a SWS. According to the UNESCAP 2017 survey on trade facilitation, all the three economies are lacking in the area of ‘institutional arrangement and cooperation’.

Another challenge is inadequate technological architecture. Australia and Peru noted the need to modernize the IT systems used by their agencies to allow for the electronic exchange of data. Peru was found to be particularly lacking in this respect compared to other LAC economies. Australia regarded it as an important aspect that needs improvement before the development of an operable SWS and eventually, an NSW. Indonesia also saw the development of the ASW architecture as a long process which among other things will need to work on setting and deploying regional servers.

Technology and Business Framework

The ASW Gateway was developed with common enterprise interoperability standards and has a 'Point to Point' characteristic in which the configuration is adjusted according to the documents to be exchanged. Under the Pacific Alliance Agreement, the single window system international interoperability (SWSII) protocol uses a peer-to-peer model. This means that each member economy has its own interoperability platform that allows them to send and receive information without using a centralized system.

Unlike the ASEAN Single Window (ASW), the Pacific Alliance (PA) member economies adopted a hybrid model - meaning that each economy has its own Interoperability Platform (IOPACK) for exchanging trade information and documents.

ASW currently exchanges Certificate of Origin document (e-Form D) as most businesses are eager to get tariff benefits from ASEAN, while PA started with exchanging phytosanitary certificates amongst Pacific Alliance members. Therefore, just like each economy, each region has their own sets of priorities and implementation roadmaps.

Lessons learned

From the case studies, some key learnings can be derived to ensure interoperability. These are:

1. Coordination among local agencies to prevent duplication and loss of time due to repeated or omitted tasks.
2. Improvement of IT systems to keep up with the requirements for the electronic exchange of data.
3. Harmonization with international standards and regulations to enable efficient sharing and comparison of information.

In general, there is a push to develop SWS among the economies to benefit from lower costs, and greater efficiency and coordination in the trade of goods and services. However, there is also wide spread recognition of the challenges that are being faced, such as, the lack of harmonization of standards, data and procedures and inadequate technological architecture. The three economies have future plans to address these challenges and improve international interoperability.

Chapter 5: APEC Survey on Single Window Interoperability: basic requirements to implement SWSII

A survey was conducted as part of this study to ascertain the level APEC economies are at with their SWS initiative. The survey not only identifies how economies are faring in response to the four recommendations outlined in Recommendation No. 36,[107] but it also serves as a refresh to a subset of questions asked in the 2014 APEC Survey on Single Windows to identify the progress made in the last three years -- particularly in relation to achieving interoperability. The survey results also capture member economies' perceptions on the principles of Single Window System International Interoperability (SWSII) to establish a reality check. Fourteen economies responded to the survey and provided preliminary insights into the current situation.

The key findings of the survey are divided into five sections as follows: (i) Drive for SWSII; (ii) Possible levels of interoperability; (iii) Interoperability legal framework; (iv) Prioritized principles for SWSII and (v) the Bottom-line.

1. Drive for SWSII

SWSII in APEC is intended to support trade facilitation through smoother customs and border procedures. It also supports existing regional integration priorities of APEC like the SCFAP II.[108] Based on survey results, (i) regional integration and (ii) trade facilitation have been considered as the two main motivations for economies to pursue SWSII.

2. Possible levels of interoperability

Achieving interoperability requires three technical ingredients, namely: terminology, minimum data sets,[109] and standards. However, there is the challenge of achieving semantic interoperability[110] namely due to cultural, linguistic, social and economic barriers to data sharing. Furthermore, since standards are not enforceable, vendors have developed their own derivatives of interoperability standards to differentiate their product solutions and services to lock-in user loyalty. Since the value of an interoperability standard only increases as the number of vendors supporting it and its user base increases (known as the Metcalf Law), vendor-owned derivative standards make interoperability problematic. Therefore, the real value of interoperability does not come from the unique features of the vendor's solution embodying the standard, but from the value of the "standards-based services" that ubiquitously

[107] The four recommendations from Recommendation No. 36 are summarized as follows: (1) Identify and analyze the primary drivers and needs for Single Window Interoperability; (2) Research and examine the type of business processes and information to be exchanged between Single Windows; (3) Consider the most appropriate model(s) of governance for the proposed interoperability; and (4) Research all relevant multinational and bilateral trading agreements and arrangements to ensure that specific protocols or legally binding obligations are considered when developing a National Single Window and interoperability with other National Single Windows.

[108] SCFAP stands for Supply-Chain Connectivity Framework Action Plan II (2017 – 2020).

[109] Unlike maximum data sets which is a complete product set, the minimum data set is based on proper subsets. It is meant for a specific purpose and cannot be re-used in other contexts.

[110] Semantic interoperability refers to ensuring exchanged information is precise, preserved and understood by all parties.

spans the network of users and array of SWS in different economies.

Achieving semantic interoperability requires agreed processes. However, it is critical from the outset to establish the terminology, data (and its metadata) and standards first, followed by the business processes that will be processing the data to ensure the precise meaning of exchanged information is understood, processed and well-preserved throughout exchanges between economies. Unless there is a radical change in business rules, data structures and data governance, data models do not typically change as often as business processes to execute business transactions. This is why it is recommended to focus on the data model first. This approach is a departure from methods recommended in other SWS studies in which business process re-engineering is typically conducted first before anything else.

Terminology standards

As for terminology standards and to ensure common use of language, the survey indicates that most APEC economies follow internationally recognized standards. Only 2 of 14 economies have not harmonized data based on international standards; while 9 out of 11 economies use WCO DM v3.4 or earlier. Nearly all use multiple data models from other recognized industry-standards body from either WCO, UNTDED, UN/ EDIFACT, UN/ CEFACT.

Minimum data set standards

In gauging the use of minimum harmonized information for cross border information exchange, only 4 economies have indicated the use of CCTS 2.01[111] or similar while 2 are still in the planning stages. Published by UN/ CEFACT, CCTS 2.01 is a methodology for developing a common set of semantic building blocks that represent the general types of business data in use today and for the creation of new business vocabularies and the restructuring of existing business vocabularies. Out of the 14, 8 economies did not provide information on whether they have developed minimum datasets using CCTS 2.01 (or similar), but some have expressed the use of workarounds to meet its bilateral or regional technical conditions for information exchange.

Messaging standards

All 14 economies have mature technical standards for interoperability as they all use XML.[112] Some economies use EDIFACT to exchange harmonized data under bilateral arrangements. Most economies are strengthening their technical information exchange capabilities by upgrading their systems to use Webservices and IBM MQ[113] for robustness.

Business process management standards

Eight out of 14 economies use UN/ CEFACT business modelling tools (UMM i.e. UML)[114] to

[111] Core Component of Technical Standards

[112] XML = is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable.

[113] Formerly known as IBM Websphere MQ.

[114] UMM = UN/ CEFACT Modelling Methodology; UML = Unified Modelling Language. It is a modelling language intended to provide a standard way to visualize the design of a system.

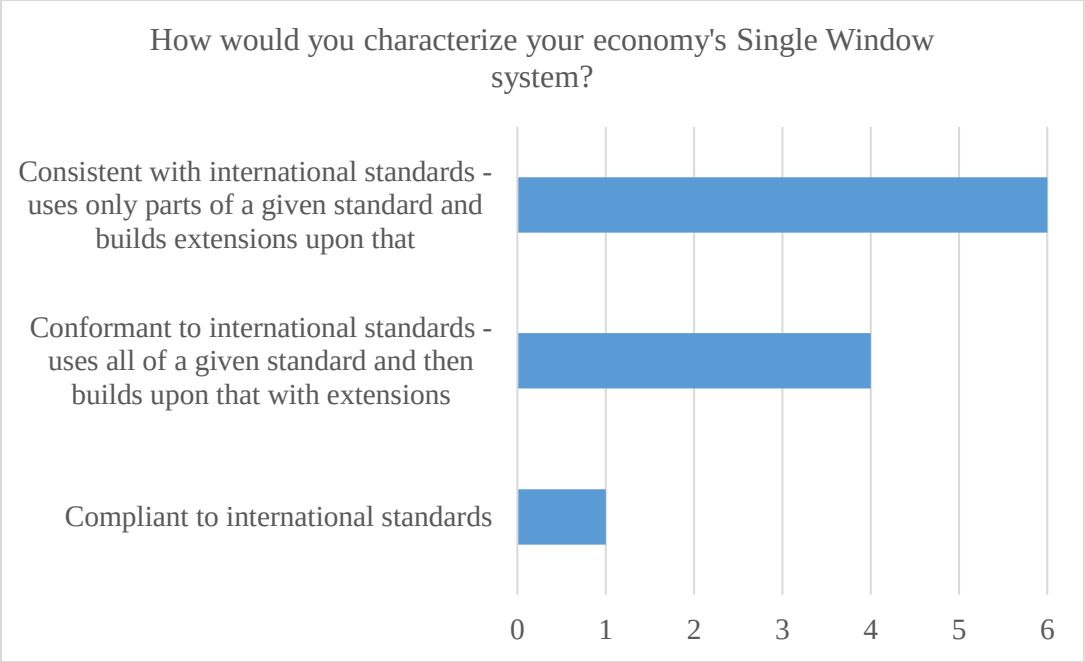
document their Business Requirements Specification. Several international projects in collaboration with standards body such as ebXML and ebMOU are placing considerable effort to ensure standardization for global interoperability.

Compliance, conformance or consistence to standards

Explosive modernization and upgrades of Customs systems in the past 20 years along with implementation of SWS have created a logical disintermediation from industry standards that were also evolving in parallel. Although standards are important for reliable interoperability, they are not enforceable. The more variant technical specifications to meet (i.e. meeting standards), the costlier it is to implement the SWS, and in turn, the higher the burden to maintain the various components that make up the system. This often translates to less reliable, and more often, expensive exchange of information (due to the possible need for additional software, hardware configuration, etc.) in an RSW environment.

Therefore, when surveying the characteristics of SWS to be either compliant, conformant or consistent amongst economies, the results are as follows:

Figure 8. Characterization of economy's SWS (Survey Results)



Source: Survey conducted by authors

Six out of 14 economies are consistent, meaning their SWS only partially satisfies specified sets of technical interoperability requirements. Four out of 15 are conformant meaning their single window environment satisfy a specified set of technical interoperability requirements, but any extensions (i.e. program code or data model) may not follow a reference standard. Only 1 economy expressed they are fully compliant and satisfy all sets of technical interoperability requirements.

Given consistency and conformance variations amongst economies, it is imperative that each economy's SWS is architected to be scalable and extensible to meet tomorrows' RSW interoperability requirements.

3. Interoperability legal framework

Legal principles related to SWSII need to be implemented in all participating economies to enable interoperability. Content and legal aspects will vary amongst economies.

Based on the survey, it would appear most of the relevant legal underpinnings are in place. Despite international law on cooperation between economies, specific laws on international data exchange is not well developed particularly on cross-border regulatory interoperability of SWS and therefore much more work will need to be done. There is a need for further development in the areas of competition law, dispute resolution, liability issues and jurisdiction. Furthermore, different economies are at different stages on privacy, security and confidentiality treatment of data generated and data exchanged for international trade transactions. Table 10 provides the breakdown.

Table 10. Issues addressed in economy's legal framework (Survey Results)

Issues addressed in legal framework	No. and share of economies	
Identification, authentication and authorization procedures	57.1%	8
Ownership of data	57.1%	8
Accuracy and integrity of data	57.1%	8
Data retention, archive and audit trails	57.1%	8
Privacy and protection for commercial information	50%	7
Right to obtain data from the Single Window	50%	7
Liability issues	42.9%	6
Jurisdiction	42.9%	6
Intellectual property and database ownership	42.9%	6
Dispute resolution	28.6%	4
Not applicable- No legal framework has been developed	21.4%	3
Competition law	7.1%	1
Other	7.1%	1
Not available	7.1%	1

Source: Survey conducted by authors

Mapping the survey results to Recommendation No. 36, it would appear that all economies have a legal framework that is structured to support mutual interest and benefit to all parties and to warrant accessibility and availability of data, and accuracy and completeness of information. However,

much more work is needed to ensure timely submission of information, that information exchanged should be used for limited specified purpose, exchange of information is based on international standards and that information exchanged is conducted on a non-profit basis.

4. Prioritized Principles for SWSII

"Principles" are guidelines based on successful implementation track record chosen to provide stronger linkage between individual decisions and the broader goals; and are applicable and independent of the specific decision. Best practices are then realized by employing good principles.

The survey finds that the top three principles prioritized by the 14 economies are: Consensus, Agreement and Security/Confidentiality. The bottom three include terminology, IT Infrastructure and Autonomy. The middle three principles include Connectivity, Responsiveness and Adoption of Open Standards. The complete result is provided in the following table. Based on the principles prioritized, the top, middle and bottom can be grouped under a unifying and common theme of trust, ubiquity and others.

Table 11: Prioritized Principles for SWSII

Principles Prioritized	Themes
Top 3: Consensus Agreement Security, privacy and confidentiality/ Data harmonization and standardization	**Creating a Climate of Trust** - Leap of faith in the system - Integrity and trust to minimize bureaucracy - Achieved through standardization, technology and effective policy
Mid 3: Connectivity Responsiveness Adoption of open standards	**Advancing Ubiquity** - Anytime, everywhere - Drive towards decentralization, multiple access and real-time requirements (in turn demanding more trust)
Bottom 3: Terminology Building on existing IT infrastructure Autonomy	**Others** - Need for common understanding and language to define data and metadata - Ability to scale while protecting IT investment - Maintaining domestic / internal sovereignty while enabling transnational integration and information sharing

Source: Survey conducted by authors

5. Bottom-line: basic requirements to implement SWSII

Interoperability, like open systems, unlocks the door for integration and innovation. However, the survey proves that interoperability is a complex, dynamic concept along a wide spectrum of possibilities. Based on the study, interoperability is not straightforward. As there are no perfectly aligned incentive structures or laws, most economies in the survey have adopted a nuanced view as demonstrated on how economies adhere to standards and therefore, will take the path that works for them and their SWS strategy.

There is no "one-size" fits all to achieving interoperability. Economies will have a different starting position towards achieving interoperability, and consequently, have to blaze different paths. No paths are ever similar. Given APEC's drive for SWSII amongst member economies, the study underscores the need for ongoing collaboration between economies, the need to provide a pragmatic working definition of "interoperability", determine how it can be achieved and sustained, and evaluate progress based on pre-defined performance criteria established from the outset. A "limited" pilot to demonstrate trust, efficiency and effectiveness alongside usability and scalability could be recommended.

In summary, technical messaging standard is mature; terminology is evolving; and mutually agreed on Minimum Answer Dataset generation needs further development. There is a need to establish SWSII information architecture (harmonized data) first, followed by its associated business process and enabling technology components.

Additionally, APEC economies need to develop actions or solutions that foster trust and a secure environment under these three areas:

1. **Integration of security, privacy and risk management.** Ensuring there is an integration of responsibilities, accountabilities and controls amongst economies participating in SWSII by ensuring proper laws, policies and procedures are harmonized regarding security, data privacy and risk response. For example, ensuring data exchanges is used properly by economies to manage privacy concerns.
2. **Development of effective policies.** Need for policies that enable economies to react quickly to changing market, regulatory and technical conditions. For example, different types of vulnerabilities can lead to security breach events. Therefore, economies will have to constantly develop effective policies based on changing conditions.
3. **Enable solutions that build or instill trust.** This could be done through application of the latest security technology and controls or authentication. For example, economies must replicate the updated security controls across all instances of interoperability to ensure transactions are not compromised. Also, much beyond technology solutions, there is a need to have a robust legal framework to address cross-border regulatory interoperability of single window systems.

Chapter 6: Conclusions and Recommendations

The primary aim of this study is to identify key issues for implementing SWSII, and in turn, to formulate a consistent set of implementation best practices. To date, there are only a handful of RSW implementations globally to draw guidance and lessons learned. Most, if not all, remain in their infancy with SWSII as economies wrestle to discover what works for them to achieve regional integration, while balancing domestic constraints, resources and priorities. Nonetheless, current efforts from the study have produced several insights, some of which are highly actionable while some remain at a level of abstraction that requires further analysis. Wide variations in conditions and constraints amongst participating economies make the concept of applying best practices extremely complex.

The survey concluded that successful interoperability is only achieved when the following levels of interoperability are seriously considered by all stakeholders: (i) the technical, (ii) the information, (iii) the processes and (iv) the legal. Interoperability, like open systems, unlocks the door for integration and innovation. However, the survey also proved that interoperability is a complex, dynamic concept along a wide spectrum of possibilities. Based on the study, interoperability is not straightforward. As there are no perfectly aligned incentive structures or laws, most economies in the survey have adopted a nuanced view as demonstrated by how economies adhere to standards and take the path that works for them and their SWS and SWSII strategies. One recommendation is to apply the following ten Principles as they manifest themselves to achieving SWSII best practices:

1. **Autonomy** – each operating economy functions without having to know details about other members to seamlessly exchange digital information.
2. **Responsiveness** – 'acting on demand' to respond to a request received efficiently through automation.
3. **Agreement** – existing understanding among two or more economies to follow a specific course of conduct on the exchange of information.
4. **Consensus** – technical process to uphold confidence by digitally seeking widespread agreement amongst interoperating economies.
5. **Connectivity** – capabilities of economies to interconnect SWS across transnational boundaries in a highly-secured manner.
6. **Data flow, security, privacy, and confidentiality** – based on trust, this include conducting appropriate risk assessment activities prior to the set-up of interoperability functions.
7. **Data harmonization and standardization** – interactive process of capturing, defining, analyzing, reconciling government information requirements.
8. **Terminology** – the consistent use of internationally recognized trade facilitation standards terms and definition.
9. **Upgrading existing IT infrastructure** – advances in technology and the modernization efforts of governments.
10. **Adoption of open standards** – emphasis placed on an open architecture based on international standards and protocol.

From the case study, some general requirements can be derived to ensure interoperability. These include, but are not limited to:

1. Coordination among local agencies to prevent duplication and loss of time due to repetition or omission of tasks.
2. Harmonization with international standards and regulations to enable efficient sharing and comparison of information.
3. Continuous improvement of IT systems to keep up with the requirements for the electronic exchange of data.

The regulatory framework should be flexible in order to take into account the constant changes and improvements in technology. Hadfield (2017) has noted that conventional approaches to producing regulation are increasingly unable to cope with the levels of complexity and scale of some new technologies.

Regional integration through SWSII is a journey with asymmetric outcomes and its own operating tempo. APEC SCCP Single Window Strategic Plan and Roadmap in 2007 emphasized the following components of International Interoperability: (i) adoption of international standards and instruments; (ii) cohort of international expertise, and (iii) experience sharing. The ASW enabled the adoption of a unified catalogue and tariff amongst participating ASEAN economies, including the use of harmonized codes and description of goods, and synchronizing of explanatory notes among others. The term "single window interoperability" in the Pacific Alliance (PA) Agreement means "the ability of the systems to enable electronic exchange of information, aligned to internationally accepted standards". Both ASW and PA have recognized the critical role of international standards in achieving interoperability among their member economies and have worked towards their incorporation. The progress of ASW and PA in achieving SWSII has been made possible by the large potential gains to traders and governments. Some of these benefits are yet to be realized and may even be further expanded as the digital economy grows. Further APEC studies should be conducted to better define the contours and understand the potential benefits and challenges in developing SWSII.

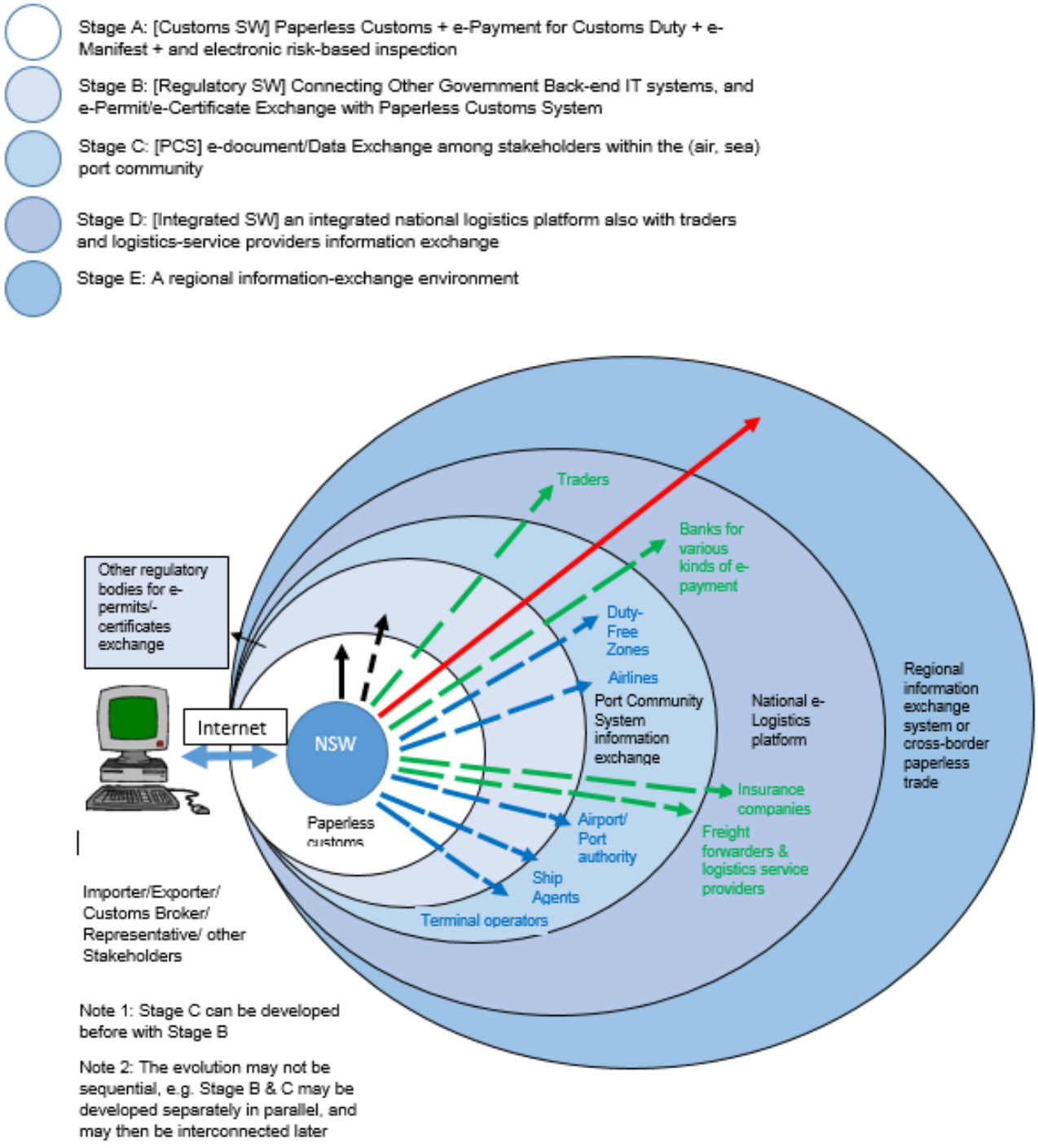
It is worthy of note that regional harmonization efforts, posed at times by competitive regional endeavors, can exacerbate the challenges of SWSII even further. From Canada's experience, the Canadian Border Services Agency (CBSA) has been actively engaged in discussions regarding a North American Regional Single Window System which conceivably may require interoperating with other RSWs such as the PA or APEC's to avoid duplicating systems and creating unwanted information silos. Coordination between different regional models is a challenge. However, with some forward planning and the adoption of standards, the possibility of global consistency and SWSII is possible.

In general, the case studies highlighted the push to develop SWSII among the economies to benefit from lower costs, and greater efficiency and coordination in the trade of goods and services. However, there is also wide spread recognition of the challenges faced, such as, the lack of harmonization of standards, data and procedures, and the need for a more adaptive architecture.

The three economies, Australia, Indonesia and Peru, have future plans to address these challenges and improve international interoperability.

In conclusion, there is no “one-size” fits all to achieving interoperability. Given APEC’s drive for SWSII amongst its member economies, the study underscores the need for ongoing collaboration between economies, the need to provide a pragmatic working definition of “interoperability”, determine how it can be achieved and sustained, and evaluate progress based on pre-defined performance criteria established from the outset. As a possible next step, a “limited” pilot using blockchain technology to demonstrate trust, efficiency and effectiveness alongside usability and scalability is recommended. Additionally, further case studies highlighting the potential benefits and challenges on SWSII implementation will be useful in encouraging wider adoption of SWSII as well as experience sharing among APEC member economies.

APPENDIX A: 5 Evolutionary Stages Single Window Planning and Implementation Guide



Source: UNESCAP/UNECE. (2012).

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