KEY FACTORS IN BUILDING AND IMPLEMENTING A SUCCESSFUL SINGLE WINDOW ENVIRONMENT

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ABSTRACT

Several governments worldwide have adopted the Single Window (SW) initiative as a national program of work since they recognize that SW is a crucial instrument to eliminate inefficiency and ineffectiveness in business and government procedures and document requirements along the international supply chain, to reduce trade transaction costs, and to improve border control, compliance, and security. SW systems are considered to be a mean to establish improved information sharing among government agencies and businesses involved in cross-border trade. A holistic and systematic framework for guiding the planning and implementation of the SW vision is recommended, an architecture-based approach called Single Window Implementation Framework (SWIF) guides policy managers and decision makers on how to systematically structure the challenges of SW implementation into less complicated and more manageable sub-components[1]. This paper will discuss challenges in SW environment implementation and it will describe the recommended SWIF, its scope and high-level architecture as well as its SWIF methodology and its phases.

Keywords: single window, trade facilitation, single window implementation framework, supply chain

INTRODUCTION

Governments and the import/export, shipping, logistics and transport communities have established an exhaustive, but by no means complete, range of agency and country-specific regulatory and operational requirements for international trade. Nevertheless, to date there has been limited coordination between these groups, both at the national and the international levels. As a result,

traders are faced with a confusing set of stringent, overlapping and onerous reporting requirements, often including redundant, repetitive and outdated or superseded regulations. These requirements come in the guise of forms, systems, data sets, data models, and electronic messages, not to mention personal voice communications, and unwritten, informal demands. Governments and trade have to develop and continuously maintain different systems to meet these myriad requirements. This adds onerous costs and overhead to all parties, both in terms of fiscal resources and the timeliness and accuracy of data. The problem has become more acute in recent years with the requirements for faster information delivery, often in advance of shipping, for security and other purposes, and the expanding requirements of data harmonization in international supply chains. The ability to handle data efficiently and swiftly has, in fact, become a key element in international competitiveness, especially in international supply chains[2].

A single window is designed to overcome this complex system of data submission and regulatory control. It is designed to sit at the national junction of national and international trade data exchange, thereby presenting a single point of access to all other relevant trade systems. While the primary objective is the single electronic submission of data, establishing a single window necessitates a major rationalization of current approaches and requirements to trade administration and operations, especially the reuse, and elimination of duplication, of existing data wherever possible, together with widespread e-Government applications and trade-related ministry and non-governmental organization (NGO) systems[2].

The objectives of this paper are:

1. Discuss the challenges in implementing single window environment.
2. Illustrate the Single Window Implementation Framework.
3. Determine the stakeholders' readiness factors for a successful single window implementation.

SINGLE WINDOW (SW)

Single Window Concept

As specified in UN/CEFACT Recommendation Number 33, the Single Window concept refers to a facility that allows parties involved in trade and transport to lodge standardized information and documents with a single entry point to fulfill all import, export, and transit-related regulatory requirements. If information is electronic, then individual data elements should only be submitted once[3].

Single Window Models

Figure 1 illustrates the three basic models for the SW which are[3]:

1. **A Single Authority** that receives information, either on paper or electronically, disseminates this information to all relevant governmental authorities, and co-ordinates controls to prevent undue hindrance in the logistical chain

2. **A Single Automated System** for the collection and dissemination of information (either public or private) that integrates the electronic collection, use, and dissemination (and storage) of data related to trade that crosses the border. There are various possibilities:
   - Integrated System: Data is processed through the system
   - Interfaced System (decentralized): Data is sent to the agency for processing.
   - A combination of i and ii.

3. An automated Information Transaction System through which a trader can submit electronic trade declarations to the various authorities for processing and approval in a single application. In this approach, approvals are transmitted electronically from governmental authorities to the trader's computer.
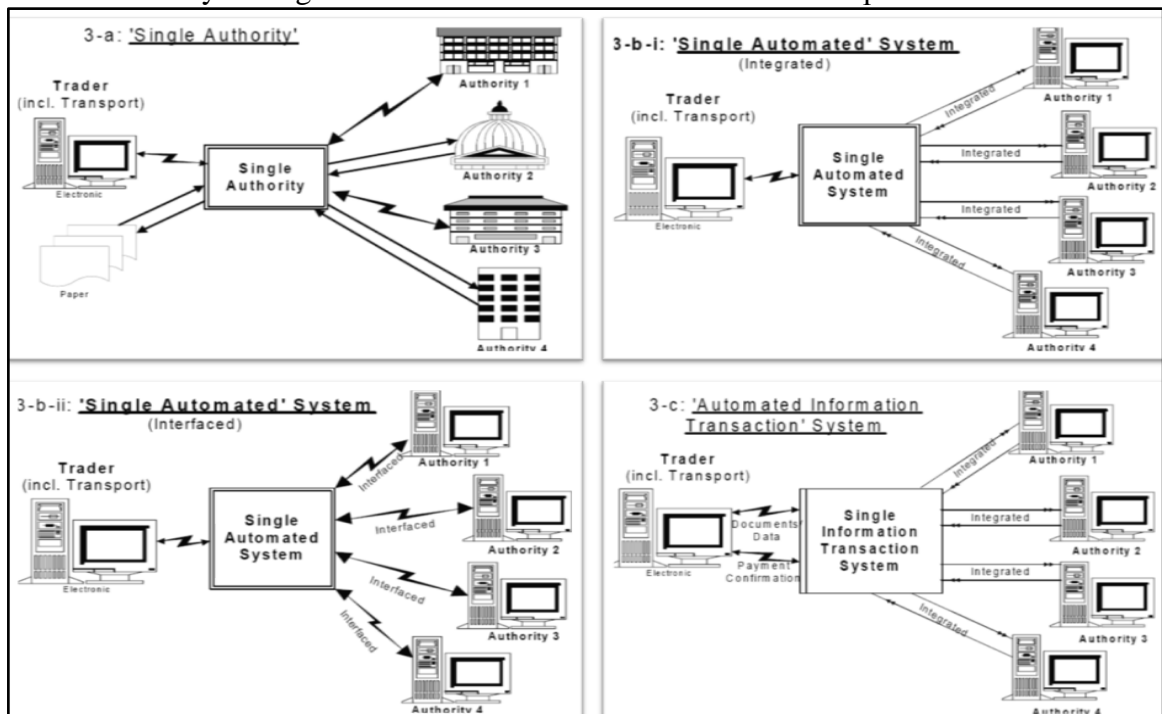

Figure 1.Single Window Models[3]

Single Window Operational Models

There is no unique model for a Single Window, as operators adopt their systems to specific national/regional conditions and requirements. In general, it has been noted that countries, due to their priorities and readiness, and their ability to engage key stakeholders, have implemented very different forms of Single Windows [3].

Single Window Benefits

A SW can simplify and facilitate to a considerable extent the process of providing and sharing the necessary information to fulfill trade-related regulatory requirements for both trader and authorities. These of such a system can result in improved efficiency and effectiveness of official controls and can reduce costs for both governments and traders due to better use of resources [3].

Benefits for government: A Single Window can lead to a better combination of existing governmental systems and processes, while at the same time promoting a more open and facilitative approach to the way in which governments operate and communicate with business. For example, as traders will submit all the required information and documents through a single entity, more effective systems can be established for a quicker and more accurate validation and distribution of this information to all relevant government agencies. This will also result in better co-ordination and co-operation between the governmental authorities involved in trade-related activities. Risk management techniques for control and enforcement purposes can also be enhanced through a SW facility that collects all data in a systematic way, resulting in more secure and efficient trade procedures. Further, the implementation of a payment system within a SW ensures rapid and accurate payment to governmental authorities and agencies for required duties and any other charges.

A SW that provides up-to-date information regarding tariff rates and other legal and procedural requirements will reduce any unintentional errors and increase trader compliance. In addition, the collection and co-ordination of the required information and trade documentation, through a SW will reduce the use of both human and financial resources, enabling governments to re-deploy resources previously used for administrative tasks to areas of greater concern and importance [3].

Benefits for trade: The main benefit for the trading community is that a SW can provide the trader with a single point for the one-time submission of all required information and documentation to all governmental agencies involved in export,

import or transit procedures. As the Single Window enables governments to process submitted information, documents and fees both faster and more accurately, traders should benefit from faster clearance and release times, enabling them to speed up the supply chain. In addition, the improved transparency and increased predictability can further reduce the potential for corrupt behavior from both the public and private sector. If the Single Window functions as a focal point for the access to updated information on current trade rules, regulations and compliance requirements, it will lower the administrative costs of trade transactions and encourage greater trader compliance[3].

Challenges in Implementation a Single Window

When it comes to SW implementation, governments often face complicated challenges. These challenges, as summarized in Figure2, concern not only the technicalities of the implementation, but also organizational, managerial, financial, legal, and political issues. A SW is about integrating data and business processes used by different stakeholders in different phases of the international supply chain. While integrating data requires the harmonization of their attributes such as definition, format, and position in the message with relevant international standards, integrating business processes may require changes and additions to laws and regulations. Because the integration is made possible by automation, new information systems that are capable of inter-operating with other information systems have to be developed. Legacy information systems that have been introduced by different stakeholders to support different business processes in different phases of the international supply chain have to be made interoperable with others[1].
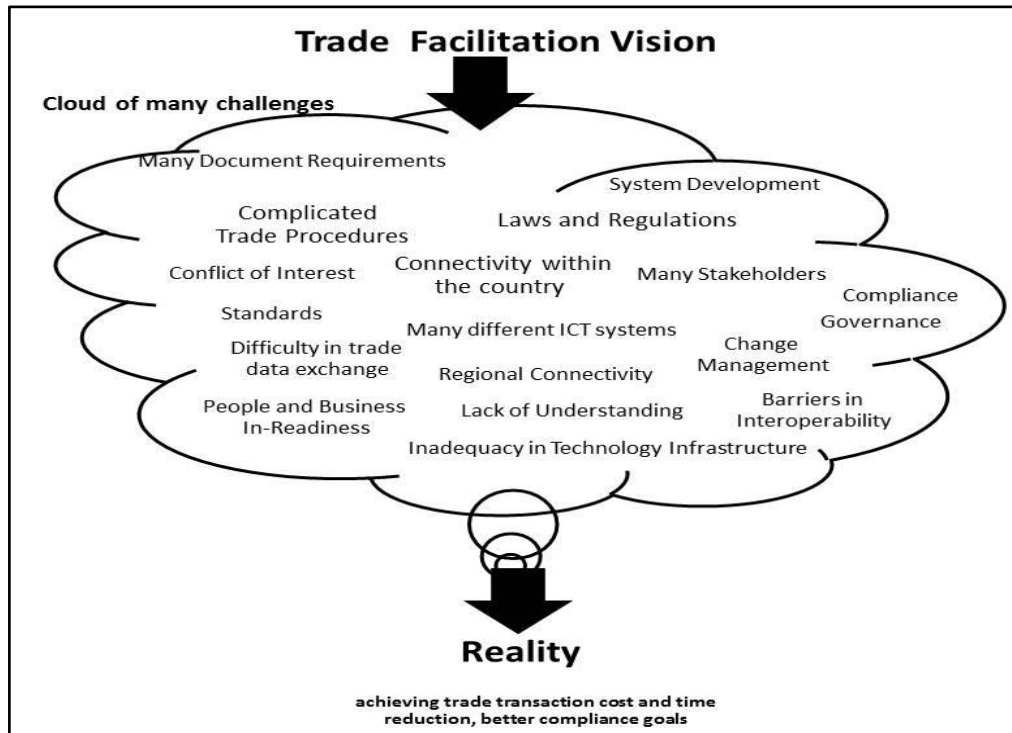
Figure 2. Challenges in Single Window implementation [1]

These challenges are often related to enterprise-wide concerns. They are typically issues that involve stakeholders from different organizations, different sectors of the economy, different industries, and different countries of similar or different regions who come together to collaboratively pursue a common goal of putting SW in place. Dealing with these challenges requires strong political will, long-term commitment and support from top management, a reliable institutional platform for collaboration, effective management of stakeholders' expectations and perceptions, workable business and architectural models, and necessary business and regulatory reforms. Even when these necessary conditions are in place, policy managers still need to develop a strategy transforming their vision into implementation. Therefore, a strategic and holistic framework that informs how these challenges can be systematically addressed is much needed so the Single Window Implementation Framework (SWIF) is introduced by United Nations Economic Commission For Europe.[1]

SINGLE WINDOW IMPLEMENTATION FRAMEWORK (SWIF)[1]

Key Components of Single Window Architecture

SWIF is a systematic architecture-based framework for guiding the Single Window planning and implementation into reality. SWIF adapts the concept of enterprise architecture and development methodology* to describe steps how to systematically derive the single window strategic architecture and the master plan for SW implementation. SWIF adopts enterprise architecture as conceptual and methodological framework. The merit of enterprise architecture in decomposing multi-facets of Single Window into hierarchical layers and components offers greater visibility to the implementation. The multi-facets of Single Window implementation include issues related to the management of stakeholders' expectations and viewpoints; the development of business vision; the transformation into architecture vision; the simplification of relevant business processes; the harmonization of data requirements; the identification of value propositions and corresponding services; and the establishment of IT and legal infrastructure. Given that the interrelationships among components in different level of architecture are crystallized, stakeholders' different viewpoints, needs, and requirements as addressed in visions, goals, and objectives that can be easily traced across artifacts produced in different phases of the implementation lifecycle.

The enterprise architecture approach of SWIF provides a framework to structure the different aspects of Single Window implementation into hierarchical layers, to identify the projects to develop the SW components, and to manage the SW implementation process. It suggests the decomposition of SW implementation challenges into ten major components, where each component deals with a set of related issues relevant to different viewpoints. To manage and implement the SW vision for better, faster, and cheaper trading across borders, an understanding of the current conditions of these components is necessary. The ten components are:

1- Stakeholder Requirements Identification and Management;
2- Single Window Vision Articulation;
3- Stakeholder Collaborative Platform Establishment;
4- Business Process Analysis and Simplification;
5- Data Harmonization and Documents Simplification;
6- Service Functions Design (or called Application Architecture Design);
7- Technical Architecture Establishment including Standards and interoperability;
8- Legal Infrastructure Institution;

9- Business and Governance Models Enforcement including Finance, Implementation andOperation Governance; and
10- IT Infrastructure and Solutions Execution.

Component No. 1: Stakeholder Requirements Identification and Management:

Needs and requirements of stakeholders must be identified and managed effectively. Stakeholders include policymakers, government administrations, private-sector participants, and citizens that have stakes in cross-border trade. In the course of establishing the SW environment, all stakeholders' needs and requirements must be explicitly identified, negotiated, agreed, and fed into all development phases of the SW.

Component No. 2: Single Window Vision Articulation:

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. The SW vision must be proposed, agreed, and articulated by high-level policy managers. The continuity of strong political will of the government and the business community to implement a SW is one of the most critical factors for the success of the project.

The availability and adequacy of resources to establish a SW is often directly related to the level of political will and commitment to the project. Therefore, sustained support from high-level policymakers is extremely important for a long-term project such as a SW. Establishing the necessary political will is the foundation stone on which all the other success factors rest. Obtaining this political will requires dissemination of clear information on vision, objectives, and value propositions including implications, benefits, and possible obstacles.

Component No. 3: Stakeholder Collaborative Platform Establishment:

Establishment of a lead agency, inclusive membership and participation, and effective interagency collaborative platform and participation of the business community. Apart from the need for political will, the project will need a strong, resourceful, and empowered lead organization to launch and see through its various phases. This organization must have the appropriate political support, legal authority, human and financial resources, and links with other relevant government agencies and the business communities. In addition, it is essential to have a strong individual within the organization who will be the project "champion."

Component No. 4 : Business Process Analysis and Simplification:

Current business processes are analyzed and target/proposed business processes for easier and more compliance trading across borders are proposed, agreed upon and implemented. Business Process Analysis (BPA) is the first step towards automating processes and documents. It includes the systematic analysis of the procedures and information flows in cross-border trade, an analysis of their weak points and delays, recommendations for improvement, and a description of the business processes and information flows after the improvement.

The proposed future procedures should be well documented, simplified, faster, and more secure. This is a precondition for the introduction of electronic-based transactions with electronic documents submission, automatic information exchange, and information management through the SW.

Component No. 5: Document Simplification and Data Harmonization:

Analysis, simplification, and standardization of trade documents and trade data, development of data models, and electronic documents and messages Simplifying and harmonizing trade documents and data can significantly reduce time and costs of international transactions. Simplification of the trade documents includes an analysis of whether document is really needed to perform a given business process and whether several distinct trade documents with a similar function can be combined into one single document.

Document alignment is the standardization of the information in the trade documents to international terms and descriptions, the use of international code lists such as country and currency codes for the information, and the alignment of the layout of the trade document to international standards.

Data harmonization is the analysis of information in a set of trade documents to identify those information objects which are shared between government agencies. It leads to the use of common definitions (semantic) for the information objects which are recorded in a data dictionary. The definitions are from the viewpoint of business domain managers. The data model presents a holistic view that is processed by the different agencies and private sector companies that participate in the SW.

Component No. 6: Service functions designs (or Application Architecture Design):

Design, agree and develop services and functions provided by software applications of the SW Service functions design is often also referred to as

application architecture design. It provides a blueprint for describing services and functions of the SW software systems. This blueprint includes the different sub-systems and components of the software solution, their interactions, and their relationships to the core business processes of the government agencies and business users.

Component No. 7: Technical Architecture Establishment Including Standards and Interoperability:

Open and internationally recognized technical standards, interoperability and communication protocols must be adopted. The success of a SW greatly depends on the ability of its components to exchange information with each other electronically. Document simplification and data harmonization already provide an important standardization component. Common standards, data protocols, and approaches are required to ensure data and procedural interoperability between the different IT platforms connected to the SW. This requires agreements on standards for communication protocols, security, authentication and electronic information structures such as semantic standards, data models, and message structures.

Component No. 8: Legal Infrastructure Institution:

Enabling electronic transaction laws and related regulations to ensure the legitimacy, trust and confidence in electronic transactions must be institutionalized. Establishing the necessary legal environment is a prerequisite for SW implementation. Related laws and legal restrictions must be identified and carefully analyzed. For example, changes in legislation can sometimes be required in order to facilitate electronic data submission/exchange and/or an electronic signature system. Restrictions concerning the sharing of information among authorities and agencies and organizational arrangements for the operation of a SW may need to be resolved. Also, the legal issues involved in delegating power and authority to a lead agency need some analysis and appropriate resolution.

The legalization of electronic documents and data exchange needs to be established. Many economies with SW facilities have enacted several related laws and regulations, e.g., Electronic Transaction Law, Digital Signature Law, Computer Crime Law, and Data Privacy Law.

Component No. 9 Business and Governance Models Enforcement:

Financial and business model decisions involving cost-benefit analysis, investment and operation cost, and the sustainability of SW, including governance mechanism for monitoring, ensuring and enforcing the implementation and

operation of SW systems must be analyzed, designed, and implemented. The financial and business model must support sustained operation of the SW at the required service level. Relevant issues include proper mode of investment, analysis of appropriate funding models and investors (e.g., options of investment by public sector only, private sector only, or joint public and private partnership, or international organizations), fees for services, decision on the agencies providing the services and their managerial and institutional structure, estimation of budget, and overall benefits to be arising from investment on the national and regional levels. A mechanism must be created for monitoring the implementation, deployment, and operation of the SW and its subcomponents to ensure the successful establishment and conformance with the agreed requirements, policies, and plans.

Component 10: Information Technology Infrastructure and Solutions Execution:

Technology infrastructure, system and hardware development, software development, deployment and security are designed, implemented, and executed. Technology architecture describes the software and hardware development and deployment for the systems described in the Application Architecture. The technology architecture includes a detailed and technical description of business processes, electronic data and documents, and application services of the future SW platform. Policy managers and policy decision makers may not deal in many details with the complex issues of designing and implementing the IT infrastructure and software systems. Usually this task is left to highly specialized IT solution providers.

By addressing the above ten components and their inter-relationships, the trade facilitation vision can be transformed systematically into reality through the use of Single Window with lower risks and higher rate of success.

SWIF Methodology

A well-known standard to design Enterprise Architectures is The Open Group Application Framework(TOGAF) (The Open Group, 2009). As TOGAF Enterprise Architectures can describe the information technology aspects of a system as well as the policy and organizational components of the information system, it provides a well-adapted concept to describe the Architecture of a Single Window project.

The Architecture Development Method (ADM) is a component of TOGAF that explains how the different components of the Enterprise Architecture are developed. The SWIF presented in this report is an adaptation of this Architecture Development Method of TOGAF to the specific requirements and features of Single Window projects. SWIF applies the principles of ADM to describe steps how to derive the SW architecture and the master plan for SW implementation.

The SWIF also provides policy managers with guidelines in:
1. Formulating visions and policies that address the need for Single Window implementation;
2. Identifying performance measures;
3. Systematically decomposing and structuring challenges that accompany the implementation of SW;
4. Planning and governing the overall implementation of Single Window by providing the foundation for developing the national Single Window Master Plan.

The SWIF recommends implementing the project by establishing a development cycle, concentrating around the 10 components described in the previous section. SWIF explains how these 10 components can be developed. This cycle is graphically shown in Figure 3. It consists of the same 10 components as discussed above, and an additional preliminary component that describes the start of the SW project idea. Table 1 below lists the different objectives, activities, and outputs for each SWIF component. It summarizes key objectives, activities and deliverables/expected outputs in the development of each component. All of those objectives and outputs are not necessarily implemented by policy managers but by specialists in different areas. It is however, the policy managers' responsibility to commission each of these activities to experts with the relevant skills and to monitor progress and ensure compliance with relevant policy directives, the SW Master Plan, and recommendations. The managers need to understand the activities and outputs and why they are important. They will not necessarily know about the "how-to" which normally can be led by specialists.

SWIF phases

SWIF adapts the process for developing enterprise architecture as outlined in the TOGAF Architecture Development Method (ADM). A full cycle of the SWIF Methodology consists of a number of phases, as illustrated in Figure 3.Each phase addresses different architecture domains. Each phase has a set of specified objectives and deliverables which are implemented through a set of activities (see Table 1). These activities and the deliverables of the phases provide the managerial tools and the artifacts required plan the SW project, to develop the components of the Single Window and ensure project control, ongoing support and smooth operation.
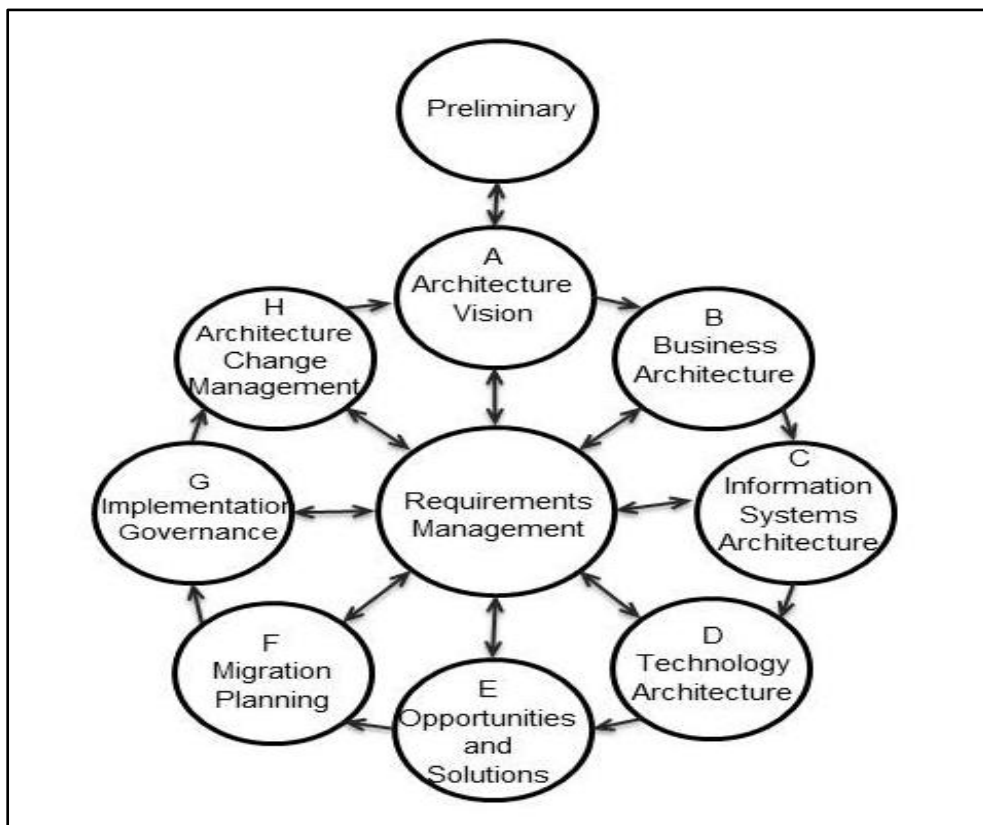
Figure 3.SWIF Phases

Table1. SWIF Phases, key objectives, activities and deliverables/expected outputs

Phase	Objective	Activity	Results/Outputs
Preliminary Phase	• Identify the rationale for the Single Window implementation • Justify the implementation	• Make use of existing facts and figures on benefits of trade and transport facilitation and Single Window • Draw on relevant policy directives and recommendations of international and regional forums • Obtain initial political will and commitment for Single Window implementation	• Top level mandate to develop a Single Window System, for example a formal decision of Prime Minister, President or Cabinet • Identification of key benefits of the Single Window • Top level performance indicators for Single Window • Lead agency appointed to develop the Architecture Vision
Phase A: Architecture Vision	• Create joint vision, strategy, objectives, and goals of the Single Window • Establish necessary environment for stakeholders' coordination and collaboration throughout Single Window project lifecycle • Ensure that major stakeholders are committed to make the project a success • Develop a Single Window Master Plan	• Identify stakeholders of the supply chain • Define roles and responsibilities of stakeholders as well as their individual objectives, requirements, and concerns • Create the environment for interagency coordination and collaboration in the later phases of Single Window implementation • Elaborate and refine broad vision, strategy, objectives, and goals of the Single Window • Define the scope of Single Window Implementation and constraints in terms of resources and competence availability • Define value proposition of the Single Window and demonstrate its relation to stakeholders priorities • Identify a set of key performance indicators that will serve as a benchmark to measure the success of the Single Window implementation • Assess stakeholders' readiness for Single Window implementation • Conduct a review on stakeholder IT systems that are of relevance to the project • Secure funding and develop a master plan that describes overarching strategies for the overall project execution and a series of sub-projects that will gradually enable the full-scale operation of Single Window • Obtain political will and commitment for Single Window implementation • Secure formal approval and initial funding for project implementation • Organize marketing campaign and awareness raising programmes	• A High Level Project Management Group with key stakeholders established • A High Level Master Plan that defines project phases, activities and deliverables • Key performance indicators that measure project performance established • A High Level Master Plan approved • Initial finding for following project phases secured
Phase B: Business Architecture	• Analyse existing business processes • Identify bottlenecks • Redesign and simplify business processes	• Elicit, document, and analyse the existing a export, import, and transit business processes as well as corresponding information flows and the trade documents used • Develop business case scenarios and analyse potential benefits to convey to stakeholders • Develop, propose, and seek approval for efficient business processes and a list of actions required to be carried out prior to adopting them • Start the necessary activities to establish an enabling legal framework for Single Window	• Analysis of Business Processes and documents used by the Government agencies and private sector • Agreements on simplification of processesand data • Agreements on the business processes and data to be automated

Phase	Objective	Activity	Results/Outputs
Phase C: Information Systems Architectures (consisting of Data Architecture and Application Architecture)	Data Architecture • Simplify, harmonize and standardize data used in the business processes • Develop a data model • Develop the structures for electronic messages Application Architecture • Define the major application system necessary to process the data and support business processes • Formulate a basis for estimating resources needed for implementing, deploying, and operating the Single Window Legislative Architecture • Create the required legal environment for the operation of a Single Window	Data Architecture • Identify relevant standards for harmonization and standardization of data • Identify data elements used in the business processes that are supported by the SW • Describe each data element in terms of their definition, source, type, representation format, and constraint using relevant international standards • Simplify data requirements • Analyse data elements across various documents/messages and organize them in a comparable manner • Map data elements to a reference data model Application Architecture • Provide a detailed analysis of the main in-house application systems including their relevant functions, and capabilities that will be linked to the Single Window • Identify main services to be provided by the Single Window for the connected agencies • Design a high level Application Architecture that will deliver the Single Window services Legislative Architecture • Asses existing legal environment • Identify gaps • Initiate changes in legal environment	• Agreements on standards, tools and techniques to develop, publish and maintain data and application architectures. • Published national Data Model and message structures for electronic data interchange with the Single Window • Definition of standards for Single Window applications • Documentation of the existing application architecture • Gap analysis of legal environment and legislative initiatives
Phase D: Technology Architecture	• To design a hardware and software architecture of the Single Window which will be the basis for implementation	• Identify logical software, hardware, as well as IT and network infrastructure required to support the implementation, deployment, and operation of Single Window • Identify interoperability requirements, and select open and international standards to enable technical interoperability among different involved ICT platforms	• Blueprint of future Single Window application architecture
Phase E: Opportunities and Solutions	• Resource plan for implementing, deploying, and operating the Single Window	• Identify the Single Window sub-systems which have to be implemented in a series of step-wise, phased projects • Establish technical guidelines for developing the various Single Window components to ensure their interoperability • Identify a financial model that supports full scale roll-out and sustainable operation of the Single Window • Develop necessary legal framework for the Single Window, e.g. e-Transaction Law, Digital Signature Law, Data Privacy and Security	• Detailed implementation plan

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Phase E: Opportunities and Solutions	• Resource plan for implementing, deploying, and operating the Single Window	• Identify the Single Window sub-systems which have to be implemented in a series of step-wise, phased projects • Establish technical guidelines for developing the various Single Window components to ensure their interoperability • Identify a financial model that supports full scale roll-out and sustainable operation of the Single Window • Develop necessary legal framework for the Single Window, e.g. e-Transaction Law, Digital Signature Law, Data Privacy and Security	• Detailed implementation plan
Phase F: Migration Planning	• Prepare the implementation and ensure that the management and implementation of individual Single Window sub-systems will be coordinated with the high-level master plan	• Set up the project management groups who will manage the allocation of budget and administer the implementation of the Single Window sub-systems • Assign business value and performance criteria to each project	• Detailed implementation plan
Phase G: Implementation Governance	• Establish a framework for monitoring the implementation, deployment, and operation of Single Window and the Single Window sub-systems so that their conformance with the defined specifications, plan, policies, and recommendations can be ensured	• Oversee the project management groups who manage the allocation of budget and administer the implementation of the Single Window sub-systems • Formulate policies and recommendations (i.e. those related to procurement, contractual agreement, service quality, and charges) to govern the implementation, deployment, and operation of Single Window • Perform governance functions while Single Window sub-systems are being developed and deployed	• Project implementation oversight
Phase H: Architecture Change Management	• Identify areas where changes should be introduced to ensure a) the maximization of business value from Single Window implementation and; b) the alignment of implementation approach with relevant emerging technologies and business requirements	• Assess outputs and outcome of implemented architecture components to ensure that the defined architectures achieve the target business value • Review emerging policy directives and recommendations related to Single Window implementation that are discussed at international and regional forum • Make recommendations for changes	• Review of implementation results and impact on the High Level Implementation Plan
Requirements Management	• Ensure that a) stakeholders' requirements are addressed across artefacts produced in different phases of the implementation lifecycle and; b) the incorporation of new requirements is facilitated and controlled.	• Identify baseline stakeholders' requirements • Manage stakeholders' and other requirements change requests and assess their impact • Determine whether to implement change or defer it to the later SWIF cycle • Ensure consistencies of related work products, developed architectures and components with the requirements and objectives of the Single Window	

In reality, the development of the SW components is not smooth and straight according to plan and sequence. Deliverables or the expected results of each component are unlikely to be completed and commonly agreed in just one attempt or just one workout. Due to the size and complexity of the project, the particular interests of the many stakeholders, the resource constrains and policy dependencies, it is likely that there will be parallel activities and iterations in the development of SW components and outputs. The development cycle or loop, intentionally as shown in Figure 4, is iterative in nature, over the whole cycle, between two components, and within each component. This iterative development provides an additional challenge that the managers of the SW project need to address in their approach.

SWIF cycles, iterations, and sub-projects
SWIF considers a Single Window initiative as a system that exists in an environment formed by technology, trade and transport agreements, international relations and demands of global markets. This environment is complex and changing. Indeed, as a SW implementation project may take over decade, there can be many unforeseen events and developments, for example, the involved stakeholder community may change, there may be new standards or technologies, and lessons will be learned about what processes will work best in a specific country's settings. Moreover, the environment generates policy directives and recommendations that influence the design, implementation, and operation of Single Window. These policy directives and recommendations need to be taken into account to enable alignment, in particular with the international context of the SW. Given that these policy directives and recommendations are also likely to change over time, SWIF stresses the need for the management of SW to be dynamic and responsive to emerging changes in a timely and appropriate manner. ADM supports the adaptation to a changed environment through a concept of selective repetition of project phases which allows for the adaptation of project deliverables to the changed requirement. Therefore, SWIF supports ADM's concept of iteration at three levels.
1. **Cycling around a single phase**: The execution of the activities within a phase is repeated in order to elaborate or to refine the content of artifacts in that phase.
2. **Cycling between phases**: The completion of one phase leads to the commencement of linked phases in order to update the content of artifacts of these phases.
3. **Cycling around the ADM**: The completion of one phase feeds into subsequent phases. The new ADM cycle begins after the completion of the previous ADM

cycle. The commencement of a new ADM cycle facilitates the incorporation of changes and new visions into the enterprise architecture.
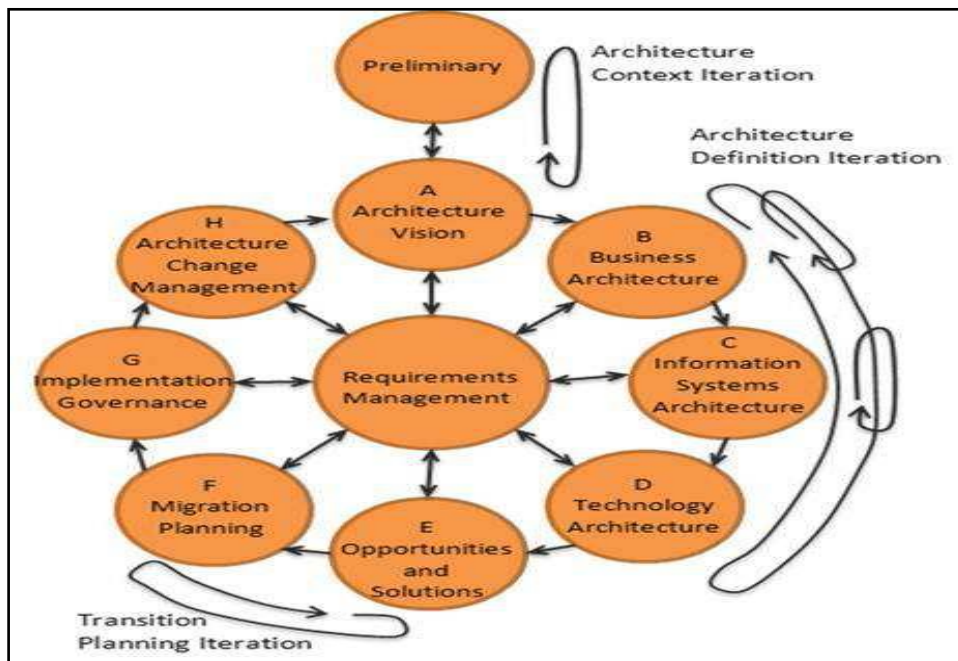

Figure 4. Examples of the Iteration Cycle (Adapted from The Open Group, 2009)

Figure 4 suggests different iteration cycles for iterations that span across the development ofenterprise architecture for Single Window implementation.

1. **Architecture Context Iterations** cycle within Preliminary Phase as well as between Preliminary Phase and Phase A (Architecture Vision).
   - Several iterations of Preliminary Phase, for example, allows policy managers to discover more relevant facts, figures, policy directives, and recommendations related to trade and transport facilitation. The discovery of such information may lead to the adjustment and refinement of visions, goals, objectives, and strategies for Single Window implementation in Phase A.
   - Given that Phase A involves extensive discussions among stakeholders of Single Window, additional rationales for Single Window implementation may be drawn out from those discussions. New rationales which have been updated in the Preliminary Phase then serve as a basis for the adjustment and refinement of visions, goals, objectives, and strategies for Single Window implementation in Phase A.

2. **Architecture Definition Iterations** focus on the creation of architectural content. This type of iteration also involves both cycling around a single phase and cycling between phases.

   - The scope of Single Window is large and complex. Business processes and documents used to fulfill export, import, and transit requirements are different from one country to another. They also vary across products and mode of transportation. Regulatory requirements of the importing country also alter business processes and documents used in the export processes. With limited personnel and financial resources, it is less likely that the study and redesign of all related business processes as well as the harmonization of all data requirements cannot be done at once. The cycle within Phase B (Business Architecture) and C (Data Architecture embedded in Information Systems Architecture) is therefore more practical for this reason. Also, these phases are often revisited when new information is available, and thus there is the need for refinement.

   - During the design of an Application Architecture in Phase C, inconsistencies in the Business Architecture developed in Phase B, may often be identified. If such ambiguities are found, new iterations of Phase B occur as a result.

3. **Transition Planning Iterations** occur between Phase E (Opportunities and Solutions) and Phase F (Migration Planning). This type of iteration supports the development of individual plans for implementing the Single Window's components. While the implementation of the full SWIF cycle enables the development of the SW architecture in great level of details, the introduction of a new cycle allows new requirements, new policy directives and new recommendations related to the Single Window implementation to be incorporated.

The different components of the Single Window are typically implemented through sub-projects. Sub-projects are individually managed projects with a reduced project scope. A sub-project could before example a Business Process Analysis for selected export products the development of the Single Window Central Information Gateway or the connection of a specific port or airport to the Single Window. The advantage of using up sub-projects is that the specific managerial tasks can be transferred from the central project management to a specialized sub-project team, thus simplifying the overall project management. When using sub-projects it is important that an overall Single Window Architecture is in place which ensures that the deliverables of the sub-project will fit into the overall national Single Window project. Each sub-project must develop

a project plan. From management perspective the Architecture Framework that applies to the overall Single Window project as well as to the sub-projects. Each sub-project goes through the same architecture phases and deliverables as the overall Single Window project. The main difference between a sub project and the overall Single Window project is that sub-projects have limited objectives, stakeholders and outputs. Therefore the management of sub-projects should be based on a simplified and more specific description of SWIF phases which is adapted to the scope of the sub-project. The Single Window Architecture defines the specific components that need to be developed for the future Single Window system and how they will be developed. It delivers a set of project plans that describe the sequence and delivery schedule of the architecture components, the planning for the sub-projects and the activity diagrams. The next sub-section provides a brief discussion of the development of the overall SW Master Plan.

READINESS FACTORS FOR IMPLEMENTING A SINGLE WINDOW

TOGAF (The Open Group, 2009)recommends the use of some readiness factors developed under the Canadian Government's Business Transformation Enablement Program (BTEP) to determine stakeholders' readiness. These factors, adapted for the implementation of Single Window components, are listed in Table 2. For each organization whose commitment is critical to ensure success, make a judgment as to their current level of commitment and the desired future level of commitment and decide how they should be involved in the SW Program. Involvement can range from minimal, or keeping informed, to keeping satisfied or being a key player.

Table2. Readiness factors for implementing a SW

Readiness Factor	Description
Vision	• Objectives of the Single Window and it's components to be achieved and the benefits that it will bring are clearly identified. • There is a clear link between the vision of Single Window's components and the overall Single Window vision.
Desire and Willingness	• Concerned parties understand the need for the targeted SW. • There is a presence of desire to achieve the "vision" and the willingness to accept the impact of doing the work.
Strategic Planning	• There is an established channel for coordinating strategic decision making between the sub-projects (relating to specific activities in the SW implementation) and the program (Single Window implementation initiative as a whole).
Sponsorship and Leadership	• The executive and the senior management support the implementation of the targeted information system. • They are able to engage all concerned parties in the project and keep them on board throughout.
Governance	• Roles and responsibilities of concerned parties in the project are clearly identified.
Funding	• There is an indication that sufficient financial resources have been or will be allocated to the development of targeted information system.
IT Capacity to execute	• There exists the ability to perform all the IT tasks required by the project, including the skills, tools, processes, and management capability. • There is a recognition of the need for knowledge and skill-building and corresponding arrangements which may include training or hiring of competent consultants.
Organization's existing Information Systems	• The organization's existing systems effectively enable the business processes. • They are compliant with standards outlined in the technical guidelines for developing Single Window (interoperability framework).
Ability to implement and operate	• There exists the ability to deal with organizational change resulting from the introduction of new information system, and thus new way of doing things.

CONCLUSIONS AND RECOMMENDATIONS

1. There is no unique model for a Single Window, as operators adopt their systems to specific national/regional conditions and requirements.

2. The Single Window Implementation Framework (SWIF) was introduced to decompose and structure the challenges that accompany a SW implementation. SWIF is a systematic architecture-based framework for guiding the Single Window planning and implementation into reality.
3. Faced challenges relate not only to the technical aspects of SW systems, but also to the organizational and inter-organizational, managerial, financial, political, legal, and national and international settings. Dealing with these challenges requires strong political will, long-term commitment and support from top management, a reliable institutional platform for collaboration, effective management of stakeholders' expectations and perceptions, workable business and architectural models, and necessary business and regulatory reforms.
4. SWIF should be considered and used while implementing Single Window systems in Egypt as it has been developed and implemented in several countries.
5. Readiness factors for implementing a single window should be considered first to evaluate and determine the stakeholders' readiness.
6. Additional work on the SWIF should be made to further evaluate, adapt and tailor the SWIF for different cases in different countries.
7. Future work on the SWIF could also focus on the development of a series of blueprints to prepare the National Master Plans, in order to facilitate the application of the SWIF during SW implementations.

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