



Published Paper:

**Towards a Single Window Trading Environment:
Singapore's TradeNet®**

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1. Executive Summary

A number of countries in the Asia-Pacific region are in the process of establishing national Single Window (SW) facilities. A Single Window would help to simplify trade processes and procedures and improve transparency and predictability in international trade transactions. This means fewer complexities, less delays and lower costs of trade that can ultimately lead to improved competitiveness and more trade.

This Paper introduces Singapore's TradeNet® as a best practice case in implementing a Single Window environment. TradeNet® is regarded as a successful case not only in the region but also in the World. This Paper outlines the background and motivation for the initiative, institutional arrangements underpinning the development of the Single Window, major benefits from TradeNet®, key success factors and lessons for those countries that are in early stages of implementing national Single Windows.

2. The Inception of TradeNet®

The TradeNet® is an Electronic Data Interchange (EDI) system that allows computer-to-computer exchange of inter-company business documents in an established format between connected members of the Singapore trading community. It links multiple parties involved in external trade transactions, including 35 controlling agencies¹ to a single point of transaction for most trade documentation tasks, such as processing import and export permits and certificates of origin.

2.1 Background and Motivation

Due to the physical constraint of Singapore, the Government realised that Information Technology (IT) could provide special opportunities for the economy. A Committee on National Computerization (CNC) was established in 1979 to develop ways for Singapore to pursue a future in the IT field.

In 1980, the CNC issued a report stating that Singapore could become a world leader in the creation and use of IT. In order to achieve this, a special statutory board - the National Computer Board (NCB) was created to develop programmes to build Singapore into an IT society. Its first major effort was to bring computerisation to government agencies under its Government Computerisation Project.

One of the areas targeted for improvement was external trade. This resulted in concentrated efforts to implement IT in the port and airport, an important factor leading to TradeNet®.

The Singapore Trade Development Board (STDB) (which is the current International Enterprise Singapore) was the government agency responsible for trade facilitation. While maintaining Singapore's status as a reliable trading nation of integrity, STDB was aware that the manufacturers and exporters were unduly hampered by the cumbersome systems and procedures in their conduct of external trade. Therefore, it established service standards for the processing of trade documents - i.e. two days for normal service and two hours for urgent service.

However, with the looming shortage of labour in the 1980s and the need for quicker turnaround of goods for Just-In-Time (JIT) stock inventory management, the STDB

¹ Examples of Controlling Agencies are Arms and Explosives Branch, Central Narcotics Bureau and Agri-Food & Veterinary Authority. There are 35 Controlling Agencies in Singapore including Singapore Customs.

realised that the service standards for the permit approval (2 – 4 days) were not satisfactory. A quicker processing system was required.

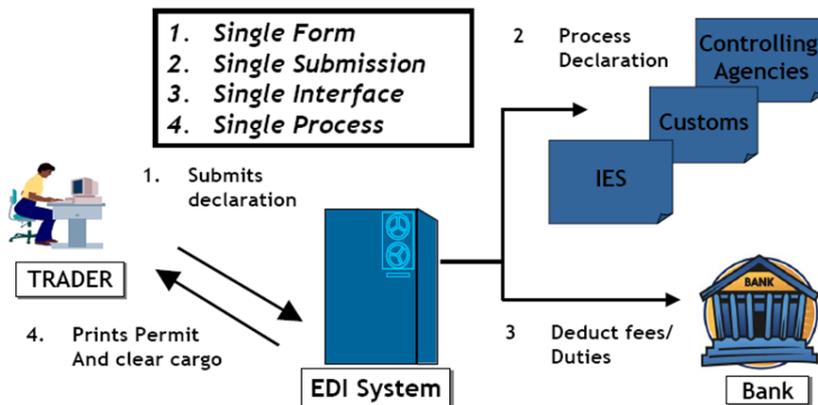
Another push factor in the development of TradeNet® was Singapore's first recession in 1985. The Government's response was the establishment of a high-powered Economic Committee to review the weaknesses of the Singapore economy and to chart new strategies to improve its economic competitiveness. One of the recommendations was to expedite the use of IT to improve trade competitiveness. In 1986, Hong Kong, a major shipping competitor, revealed that it was creating a trade oriented EDI system (TradeLink), which further strengthened Singapore's resolve to implement TradeNet®.

2.2 Initiation of TradeNet® Development

In a move to demonstrate the Government's commitment to this project, Mr. Lee Hsien Loong, the former Minister for Trade and Industry (the current Prime Minister), declared in 1986 that the TradeNet® project would be completed within two years. This greatly propelled the development of TradeNet® as the team was given full authority and resources to proceed.

STDB was given the task of mobilising the trade community and became the coordinating point among various agencies such as Customs and Excise, Port of Singapore Authority, and Civil Aviation Authority of Singapore. In 1986, a core team comprising representatives from relevant government agencies and interested parties from the private sector were formed to conceptualise a nationwide Electronic Data Interchange (EDI) system for traders to submit trade declarations electronically to the regulatory authorities.

A TradeNet® Steering Committee was created to oversee the process. In the subsequent year, three working sub-committees - sea shipping, air shipping and various government agencies were formed to specify the functional requirements and propose data standards. The National Computer Board (NCB) was appointed to support each sub-committee. Consolidating the profiles of essential trade documentation activities from all sub-committees, the NCB produced an "Integrated Procedures Report"; the focal point of procedural reform discussions. Efforts were made to reduce the 20 forms used in international trade into a single online form to serve nearly all trade documentation needs in Singapore. This single administrative document formed the core of the new computerised system.

Figure 1: TradeNet® Processes

3. The Development of TradeNet®

3.1 Implementation of TradeNet® Services

The development and operation of the TradeNet® system were contracted to a newly set up company. In addition, this company would also provide IT services in other areas of development. The rationale behind the creation of an independent profit centre was that the government could avoid the cost of operating a nationwide network infrastructure and services. On the other hand, trading companies benefited by paying for use of the services without incurring developmental or maintenance costs.

In March 1988, Singapore Network Services Pte Ltd (SNS) (now known as CrimsonLogic Pte Ltd) was created to own and operate the TradeNet® system. SNS is owned by four key agencies involved in system development –

- Singapore Trade Development Board (55%)
- Port of Singapore Authority (15%)
- Civil Aviation Authority of Singapore (15%)
- Singapore Telecoms (15%)².

The decision to adopt an EDI-based system came next. After reviewing the 23 responses to the initial Request for Information (RFI), the choice was narrowed to three vendors: IBM, McDonnell Douglas Information Systems and GE Information Services. All three were already operating EDI networks in other countries. A

² The Singapore Trade Development Board has been renamed International Enterprise Singapore; both the Port of Singapore Authority and Singapore Telecoms have been corporatized and are now called PSA Corporation Ltd and Singapore Telecommunications Ltd respectively.

Request for Proposal (RFP)/tender was issued and after intensive evaluation (including overseas on-site visits), SNS selected IBM to develop the first version of the system. IBM had also sub-contracted a local software company - Computer Systems Advisers (CSA) to develop the respective interchange software programs and related modules.

The first transaction on TradeNet® was a shipping application submitted on 1 Jan 1989. Approval of the shipment was returned 10 minutes later. By December 1989, TradeNet® had 850 out of 2,200 possible subscribers and handled about 45% of all trade documentation for sea and air shipments.

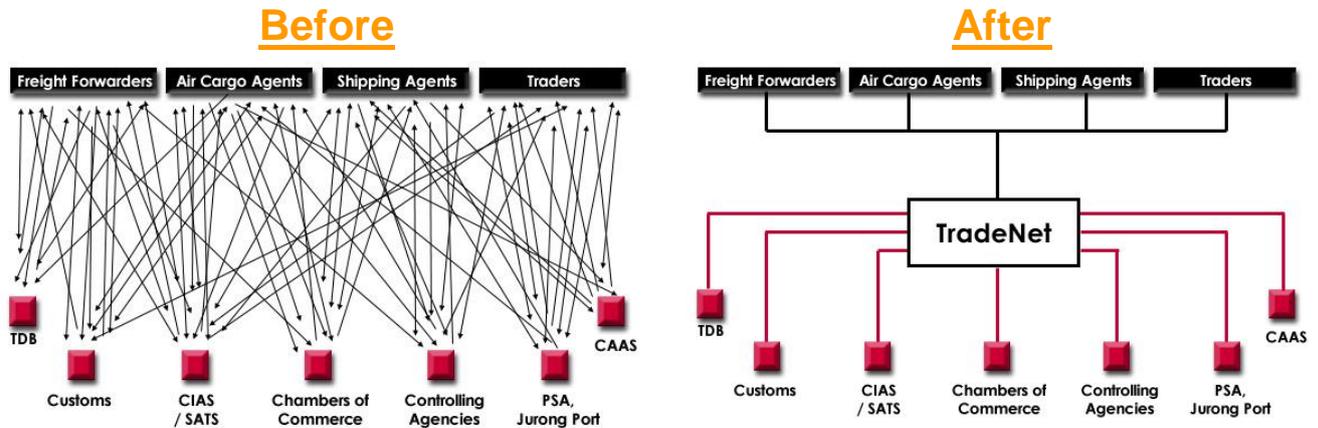
Due to overwhelming response, STDB brought forward the date of making TradeNet® mandatory for all transactions from 1993 to 1991. By mid 1991, 1,800 subscribers were using TradeNet® to process 95% of trade documentation requirements.

Table 1: Volume of Documents Processed through TradeNet®³

Year	Target	Actual
1989	15%	45%
1990	40%	92%
1991	70%	95%
1992	90%	95%

Today, all trade documentations are electronically submitted. The number of permit applications had increased from 10,000 declarations daily in 1987 to between 30,000 - 40,000 daily currently. This amounts to some 9 million transactions a year. The number of companies using TradeNet® has now reached approximately 2,500 companies with over 8,000 users.

³From "Managing Risk in Information Technology Projects: A Case Study of TradeNet®" by BS Neo & SL Kwong, Nanyang Technological University, 1994

Figure 2: Before and After TradeNet® Implementation

3.2 Capital Investment and Service Fees

The direct capital cost of TradeNet®'s development (i.e. contract cost to IBM and other sub-contractors) was in excess of S\$20 million⁴ in 1987. This does not include the costs incurred by various agencies in conceiving the project, developing requirements/ specifications, managing contract or establishing SNS.

A company wanting to join TradeNet® had to pay a one-time connection fee of S\$750, a monthly charge of S\$30 for a dial-up port and transaction cost of S\$0.50 per kilobyte of transmitted information (the average declaration requires 0.7 kilobytes). A company also need to have the necessary hardware for local processing of applications and transmission of the coded UN/EDIFACT data. The minimum required PC configuration then cost about S\$4,000 and software cost was approximately S\$1,000 - S\$4,000.

However, the indirect costs to a company in making changes to procedures and protocols required for adoption of TradeNet® were less clear than the direct costs. For some companies, the conversion was minimal because they already had the relevant systems in place. For companies with no prior experience in doing business with computers, the change was more difficult.

Today, the user pays a one-time registration fee of S\$50 and a monthly fee of S\$20 per user. In addition, the user pays S\$2.88 for each declaration made through the system.

⁴ Exchange rate of 1US\$ = S\$1.6 in late 1980s

3.3 Legal Basis for the TradeNet®⁵

TradeNet® serves is an electronic Single Window that requires users (declarants) to submit their documents in the form of electronic records and facilitates the issuance of electronic permits for trade clearance. The legal basis for TradeNet® as the national single window is found in several legislative provisions.

Firstly, section 47(1) of the Electronic Transactions Act (ETA) provides that any department or ministry of the Government, organ of the State or statutory corporation that accepts the filing of documents or requires that documents be created or retained, pursuant to any written law, may accept the filing, creation or retention of such documents in the form of electronic records. The ETA also provides that any such department, ministry, organ of the State or statutory corporation that issues any permit, licence or approval, pursuant to any written law, may issue such permit, licence or approval in the form of electronic records.

The ETA, which is based on the UNCITRAL Model Law on Electronic Commerce (1996), provides for the legal recognition of the electronic functional equivalents of written documents and written signatures through a number of provisions. The validity of a transaction entered into by electronic means is determined by the substantive law of the transaction (e.g. law of contract, legislation governing the transaction). The ETA provides that electronic communications are functionally equivalent to communications in paper form, and that an electronic document or transaction shall not be denied of its validity for the sole reason that it is in electronic form.

Secondly, various provisions in the relevant legislation provide authorisation for the establishment and operation of a computer service, and for the relevant documents (e.g. manifest, return, list, statement, declaration, direction, notice, permit, receipt) to be made, served or submitted by electronic means. Section 86(1) of the Customs Act authorises the Director-General of Customs to establish and operate a computer service and make provision for any manifest, return, list, statement, declaration, direction, notice, permit, receipt or other document required or authorised by the Customs Act to be made, served or submitted by electronic transmission (referred to in the Act as an electronic notice). Section 86 of the Customs Act provides that a registered user may make and serve an electronic notice to the computer account of the Director-General, and vice versa.

Section 8(1) of the Regulation of Imports and Exports Act ("RIEA") is similar to section 86(1) of the Customs Act, and authorises the Director-General of Customs to establish and operate a computer service and make provision for any document required or authorised by the Act or any regulations made thereunder to be made, served or submitted by electronic transmission. Section 8 RIEA contains provisions

⁵ From "Legal and regulatory Aspects of International Single Window Implementation – The Asean Experience," Chong Kah Wei, Attorney-General's Chambers, Singapore.

relating to service of electronic notices that are similar to section 86 of the Customs Act.

Section 42 of the Goods and Services Tax Act authorises the Comptroller of Goods and Services Tax to provide an electronic service for the filing or submission of any return, declaration or document, and the service of any notice, direction, order, permit, receipt or document by the Comptroller.

3.4 Major Development Factors Considered in TradeNet®

It is critical that institutional arrangements, specially the lead agency and its role, should be clearly defined at early stages. Private sector buy-in for the new system is another factor that needs careful consideration.

3.4.1 Lead Agency for the NSW System

To develop and implement the new National Single Window (NSW) system, there must be a lead agency to spearhead the concept and co-ordinate activities of all the parties to be involved in the new system. At the initial stage, the lead agency needs to put in place a multi-agency steering committee by identifying its members. The lead agency itself chairs this committee and acts as liaison between the steering committee and the government. In the case of Singapore, the lead agency was STDB.

The lead agency is therefore responsible for drawing up the concept of the system, setting up the policy direction for change and putting in place the mechanism to implement the new system. The final blueprint of the NSW based on feedback and discussions with all members of the steering committee and sub-committees is fine-tuned by the lead agency and submitted to the government for endorsement, funding and implementation.

The lead agency is responsible for the NSW system until it is directed to hand over to a private operator or a newly established government agency specifically established to operate the NSW system.

3.4.2 Primary Users of the System

The NSW system is developed primarily to ensure the efficiency and integrity of the trade and Customs documentation system. The objective is to enable government agencies to receive trade and Customs documentation electronically for processing and approval. Therefore, the government agencies need to take the initiative in

consultation with the private sector to study and set up the NSW system for the benefits of all participants.

3.4.3 Support from the Private Sector

The private sector will prepare and submit the trade and Customs documentation via the NSW system. A change is required to move from manual to electronic submission. The government agencies must ensure that the NSW system has the total support of the private sector; especially when the initial set up costs are significant.

3.4.4 Partial Government Grants and Financial Assistance

To defray part of the expenses and to enlist support, the government agencies may consider giving grants and other financial assistance to the first group of companies willing to participate in the newly established NSW system. After the NSW system is in place and working smoothly, the government agencies may terminate this financial assistance.

3.4.5 Training and Technical Support

Comprehensive training programs need to be developed to train the staff of both the public and private sectors on how to operate the new NSW system efficiently. Such courses should be conducted regularly and well in advance of the system implementation. Ready technical support in the form of Help Desk and technical support teams must also be set up to provide immediate assistance when a user has problems in understanding or operating the NSW system.

3.4.6 Secrecy of Processing Criteria and Data

The NSW system allows the private sector to prepare and submit trade and Customs documents to the government agencies for processing and approval. The processing criteria, including the business rules, are built into the NSW system. These criteria should be kept secret so that no one can override these criteria to get their documents wrongfully approved.

The NSW system will also allow compilation of trade statistics from the documents submitted for processing. Again, the data in the NSW system should be kept secret from disclosure.

3.4.7 Legislative Empowerment

To provide the legal basis for the NSW system, there must be regulations that will empower the government agencies to set up the system for use by both the public and private sectors. The regulations should provide for complete and accurate electronic submission of data to the NSW system by the users for processing and approval. Severe penalties including, fines and imprisonment may be meted out for those who abuse or hack into the system.

4. Benefits from TradeNet®

One of the main benefits of TradeNet® was a reduction in the turnaround time for processing of typical trade documents, from 2 – 4 days to as little as 15 minutes. Most transactions are actually completed in less than 10 minutes. This resulted in productivity improvements. Studies suggest that TradeNet® reduced trade documentation processing costs by 20% or more⁶. Users of TradeNet® found that there were significant savings accruing from filling out single online form versus over 20 paper forms in the past.

Table 2: Impact of TradeNet®

Key Indicator	Before TradeNet®	After TradeNet®
Processing time/permit	4 hrs to 2 – 7 days	10 minutes
Submission of documents	Multiple submission	Single document through a single interface
Number of documents	3 – 35 documents	1 document
Trade documentation fees	US\$6.25/document*	US\$1.80/application*

* Assumed exchange rate of 1US\$ = S\$1.6 in late 1980s

TradeNet® streamlined trade procedures and protocols, which made the entire trading community more competitive internationally. Clerks/couriers no longer need

⁶From "Singapore TradeNet® – The Tale Continues" by Neo, King & Applegate, Harvard Business School, 1993

to transport trade documents to various agencies; saving time and improving deployment of staff and vehicles. In addition, it eliminated the need to stand in queues and wait for documents to be cleared. Faster turnaround made it possible to better organise shipments and improve overall productivity. Freight forwarders have reported time savings of 25%-35% in handling trade documentation as TradeNet® operates 24 hours as compared to agencies that only open during normal office hours.

Benefits also accrued to government agencies using the system. By moving from a system of post-approval to pre-approval of applications, the Customs receive payments faster as duties are now pre-paid through electronic means. The TradeNet® also enabled faster compilation of more accurate and complete external trade statistics. This is possible because the relevant data from the documents need not be re-keyed in by the Government agencies to compile the trade statistics.

Such accurate statistics will not only serve the private sector better by providing them with timely trade statistics for market analysis and marketing policy formulation but also help the Government agencies in their trade policy, trade surveillance and trade monitoring.

While joining TradeNet® posed no problems for larger companies, which already had significant in-house computer capabilities, not all smaller companies were willing to invest in the adoption of TradeNet® right away. STDB developed three plans to help these companies:

- Use the facilities of service centres
- Go direct to STDB where data would be captured by available officers
- Go to the public terminals opened by STDB, where access and assistance could be obtained for a modest fee.

5. The Evolution of TradeNet®

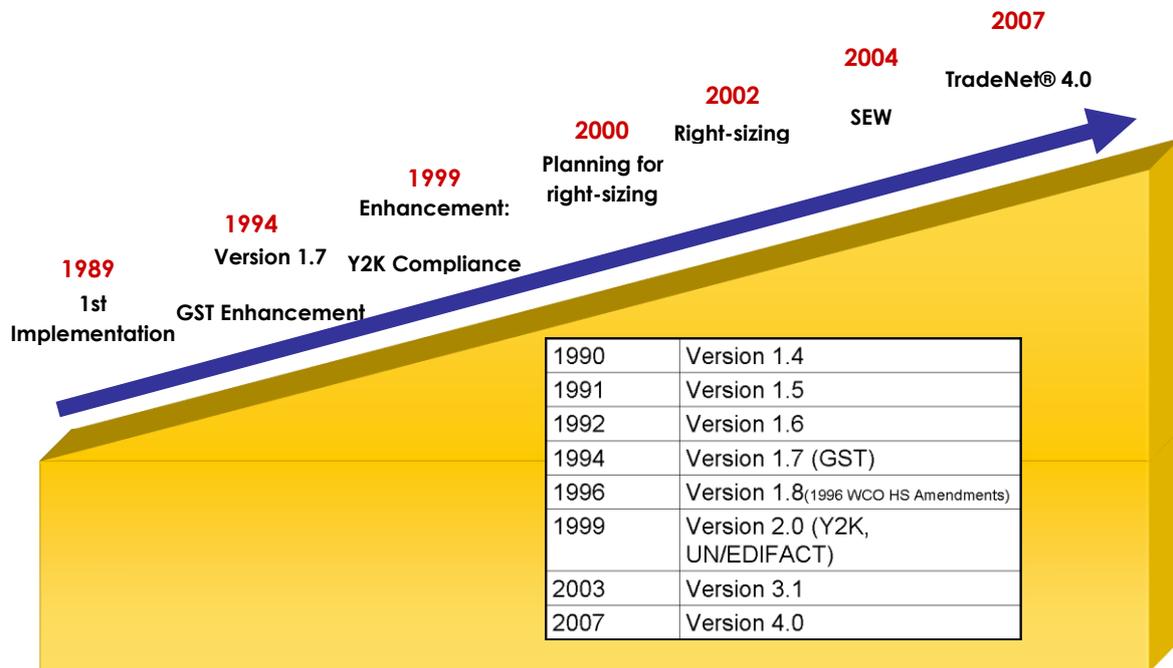
More trade related services were gradually added to the TradeNet®. In 1990, a module that allowed traders to apply electronically for Certificates of Origin (CO) that enabled preferential tax treatment in importing countries was made available. Automation of CO applications reduced the approval processing from 2 to half a day. A fully web-based Electronic Certificate of Origin (ECO) system was launched in April 2003 by CrimsonLogic and the Chambers of Commerce. Exporters could apply and print certificates of origin from any computer anytime, thus saving time and money for the trading community. This ECO platform (www.certoforigin.com),

was built on Public Key Infrastructure and supporting security-related technologies such as print control and optical watermarks, ensured secure and convenient approvals of documents required to authenticate the origin of goods traded.

To facilitate faster customs clearance for the air transport community, an Advance Clearance for Courier and Express Shipment System (ACCESS) was developed. ACCESS enabled pre-clearance for courier companies, allowing them to submit the pre-clearance shipment information for the air express and on-board-courier shipments to the Singapore Customs.

In 1999, further enhancements to the TradeNet® system resulted in TradeNet® Plus. TradeNet® was made to be Y2K compliant and processing time was reduced to 1-2 minutes. In 2003, a major system re-sizing was conducted.

The current web-based TradeNet® version 4.0 was implemented in October 2007. It comprises major enhancements, providing a more simplified permit structure, with less declaration fields. TradeNet® 4.0 also offers a full suite of permit services. Other than declaration of imports and exports, traders can also amend permit details, cancel unused permits and submit claims for refund of duty and GST (Goods and Services Tax) erroneously paid. The new version also has other new features; for example, traders bringing in goods for re-export can now use the new "import for re-export" permit to cover the entire shipment. Under the previous version, two declarations would have to be lodged – one for the import leg and another for the export leg. Along with this new version, traders also enjoyed further cost savings through the reduction of fees. The processing and transmission fees were reduced from S\$2.00 and S\$0.40 (per kilobyte) respectively to S\$1.80 and S\$0.18 (unlimited size). This will result in savings of S\$0.42 per declaration due to reduction in cost from \$3.30 to \$2.88.

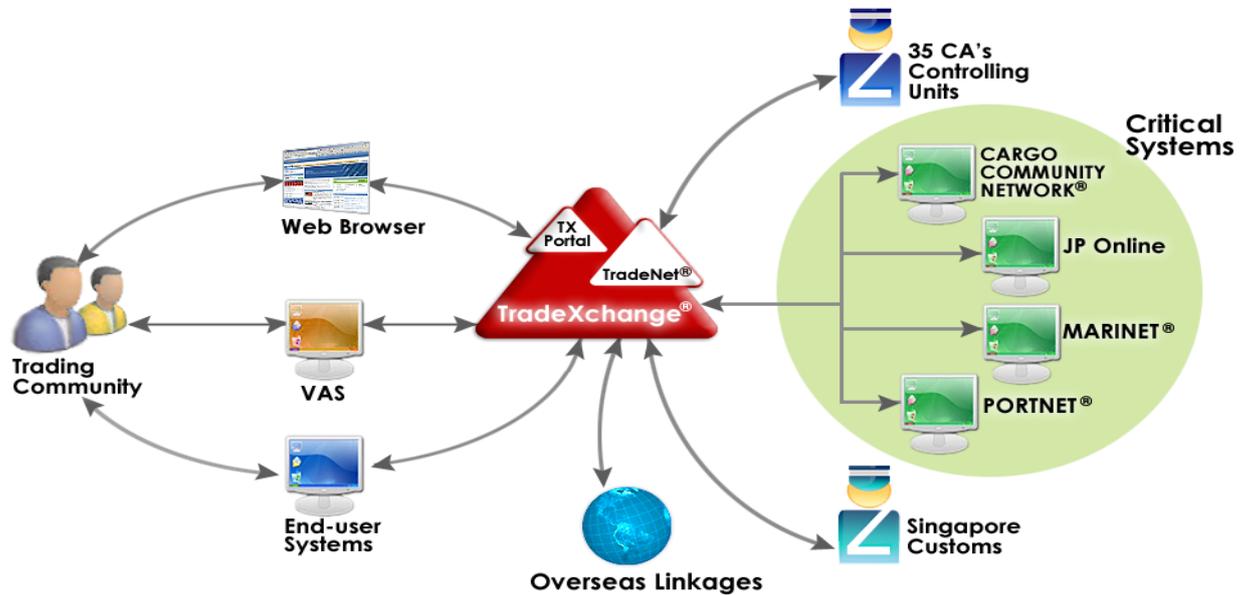
Figure 3: TradeNet® Development 1989 to 2007⁷

TradeNet® is now a core application within the Singapore TradeXchange® platform (went live in October 2007). TradeXchange® is a neutral electronic platform that facilitates the exchange of information in the trade and logistics community. In addition to TradeNet® which connects users to government agencies in Singapore, TradeXchange® also provides connectivity to commercial systems and regulatory systems in other countries. Leveraging on the connectivity and core applications of TradeXchange®, a number of value-added service providers are providing various application services to the trade and logistics community, in areas such as trade documentation preparation, supply chain management, logistics and freight management, trade finance and insurance.

TradeXchange® is the first IT project in Singapore to be implemented as a Public-Private Partnership (PPP). CrimsonLogic Pte Ltd has been appointed by the Government through a competitive tender to develop, maintain and as well as to drive the adoption of TradeXchange® (an initiative led by the Singapore Customs, Singapore Economic Development Board and the Infocomm Development Authority of Singapore).

⁷ Source: CrimsonLogic.

Figure 4: Schematic Diagram of Singapore TradeXchange®



6. The Blueprint for Success

To ensure the successful implementation of NSW system, the government lead agency should consider the following critical success factors:

6.1 Commitment at the Highest Level

To develop and implement the NSW system successfully, the lead agency must secure the commitment of the government at the highest level for change, computerisation and trade facilitation. In Singapore, the former Minister of Trade and Industry provided full support to the TradeNet® team. The government found it useful to set a deadline for the NSW system to be developed and implemented.

An influential person to champion the new system is a critical factor in its adoption. TradeNet® had two influential champions.

6.2 Multi-Agency Steering Committee

At the policy level, the lead agency should set up and chair a multi-agency steering committee with private sector representation as early as possible. The Steering committee will consider policy issues and set the direction for the sub-committees to work out the procedures and implement the system. This will ensure private sector's support and usage of the new system upon completion. This steering committee may draw its membership from a National Trade Facilitation Body (NTFB).

6.3 Sub-Committees

The steering committee should set up a series of sub-committees comprising of representatives from both the public and private sectors to look into the following:

- Simplification of Documentation and Procedures - The work of this sub-committee is to review the existing documentation requirements and operational procedures that will result in a more efficient port clearance of cargo. The sub-committee will also look into the harmonisation and standardisation of the practices and procedures for the business community.
- Development of a Community System - This sub-committee may look into an overall integrated trade and Customs documentation system using Information Technology (IT) and Internet to better service the trading community.
- Data Administration - This sub-committee may examine the coverage and definition of trade data and published statistical reports for dissemination through the system.

6.4 Establishment of a Corporate Vehicle

The private sector on its own may not be willing to undertake the financial risks to develop and implement a system that essentially performs a regulatory function for the government. To overcome this, the lead agency may consider setting up a company with shareholders from both the public and private sectors. The company should have the necessary capitalisation to develop and operate the system. This was done in the case of Singapore's TradeNet® system, through the creation of a separate corporate entity - Singapore Network Services Ltd (SNS), now known as CrimsonLogic.

6.5 Technical Service Providers

To provide for competition, the lead agency may select a number of (the actual number will depend on the volume of daily transactions to be handled) service providers to develop software to run the system. The software developers shall sell their software and services to the business community based on their marketing and merit. They shall also provide the training and technical support to their customers in order to operate the system efficiently.

6.6 Phased Implementation

To ensure success, the lead agency should consider a phased implementation of the NSW system. Phased implementation does not mean that, in the first phase, each government institution or party develops and implements its own system, and that, in the second phase, these institutions or parties attempt to merge their existing systems together. Rather, it means strong cooperation between all institutions and parties involved in implementing an integrated system of limited scale/scope, followed by a full-scale/scope implementation. The sequential approach outlined below may be practical:

- Selected Documents and Goods - During the initial period, the system only accepts simpler type of documents such as, non-dutiable and non-controlled goods for processing. After the system has been tested and stabilised, the lead agency may consider expanding the system to process the documents for other goods such as dutiable, controlled or quota items.
- Pilot Group - The system could initially be configured to accept a pilot group of users in the initial period. At launch, the new system may not operate smoothly and it will be a disaster if the "big bang" adoption method fails. This will affect the entire business community. For the first phase, a pilot group of users may be accepted to use the system. After the system has been found to function well, the lead agency may gradually open the system to other users. Subsequently, a deadline can be set for all users to adopt the system and failure to do so will result in punitive charges.

6.7 Establishment of Document Service Centres

The setting up of document service centres is critical to the acceptance and success of the new system. There may be a large number of Small and Medium Enterprises (SMEs) that do not have the daily volume to justify buying a computer system to prepare and submit their trade and Customs documents.

For such enterprises, the lead agency should encourage the use of document service centres. These centres are registered users of the new system. However, instead of preparing and submitting the documents for their own trade, they do it on behalf of the SMEs. They will levy a fee to provide such services.

7. References

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- "Legal and regulatory Aspects of International Single Window Implementation – The Asean Experience," by Chong Kah Wei, Attorney-General's Chambers, Singapore
- "Singapore TradeNet® – The Tale Continues" by Neo, King & Applegate, Harvard Business School, 1993
- More information about Singapore's TradeNet® can be found at <https://www.TradeXchange.gov.sg>