Step-by-Step Approach to Data Harmonization and Modeling
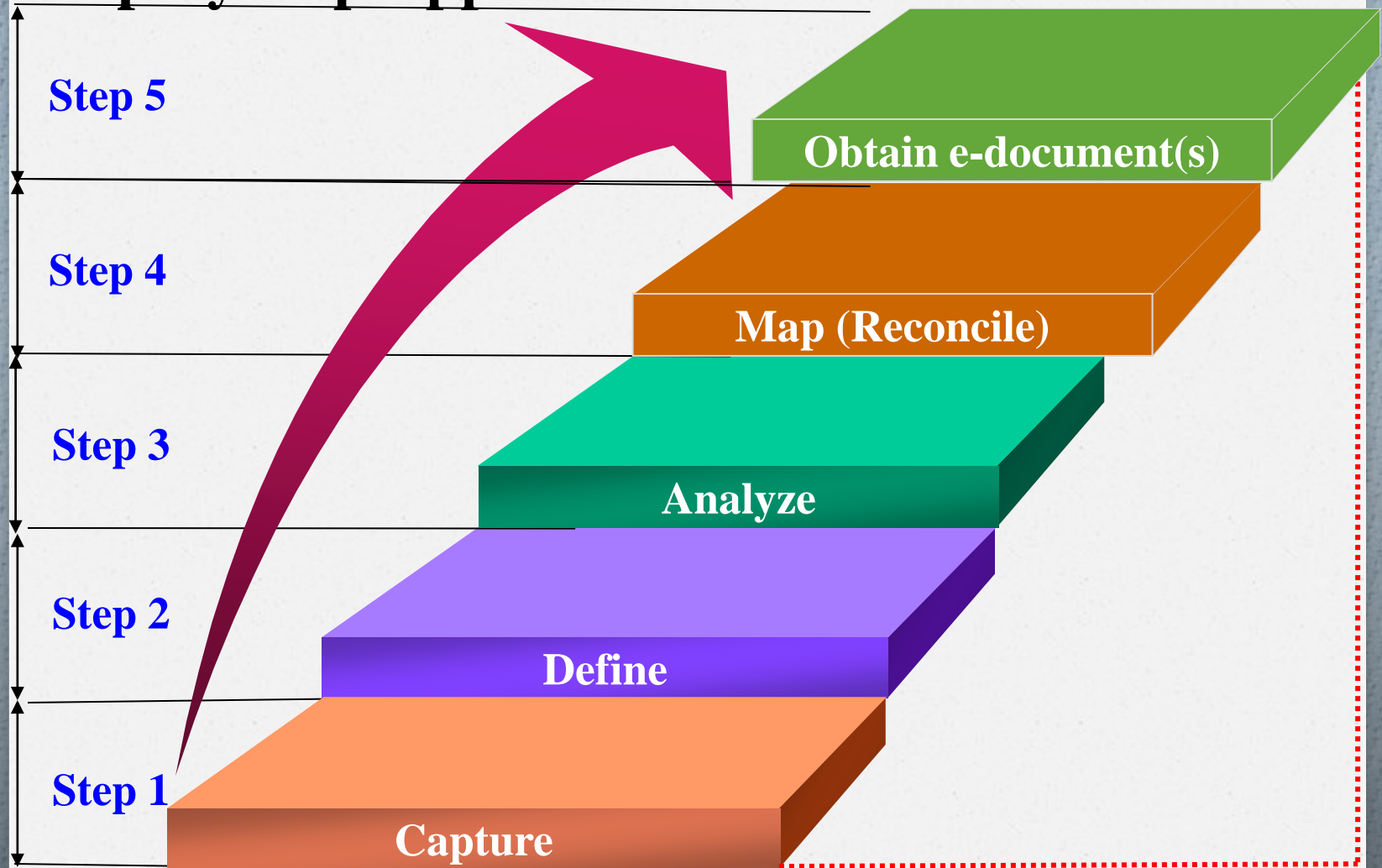
19 - 28 September 2022
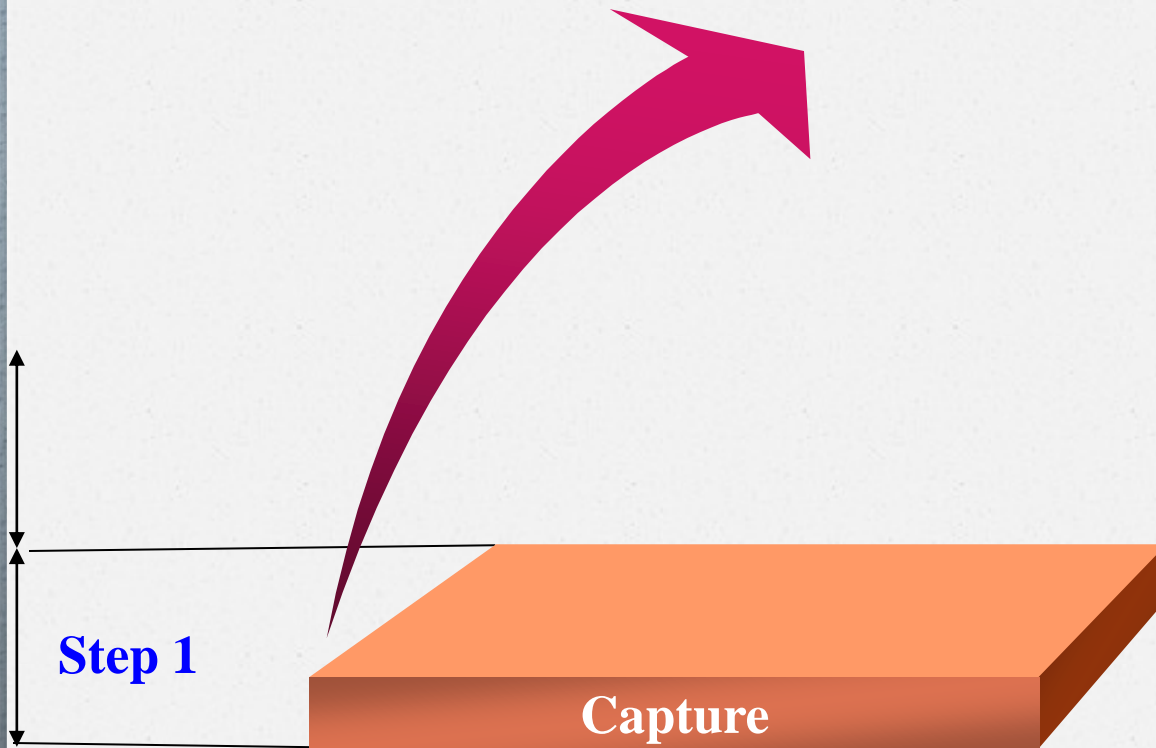
Seoul, Republic of Korea

Sangwon Lim
Special Advisor
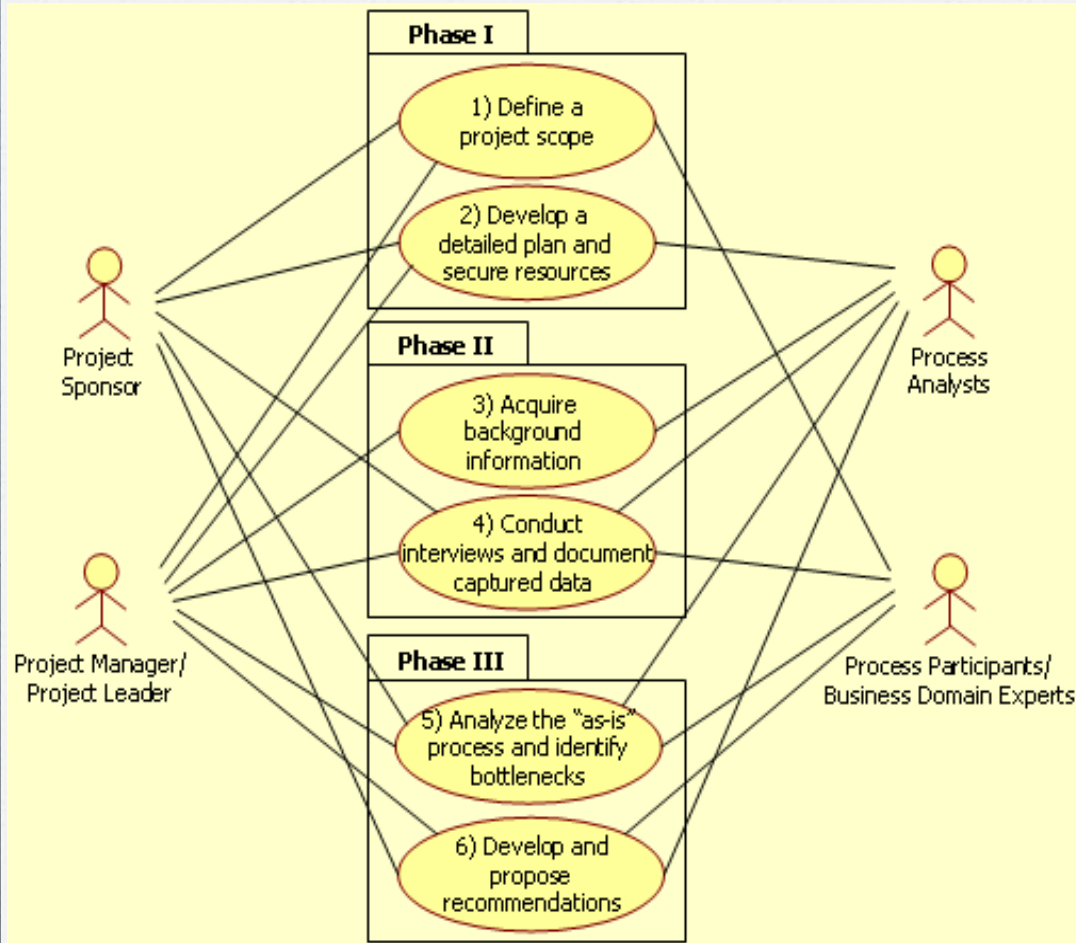**UNNExT**

Step-by-step Approach

Step 5

Step 4

Step 3

Step 2

Step 1

Obtain e-document(s)

Map (Reconcile)

Analyze

Define

Capture

Capture business processes and identify documents and basic data requirements

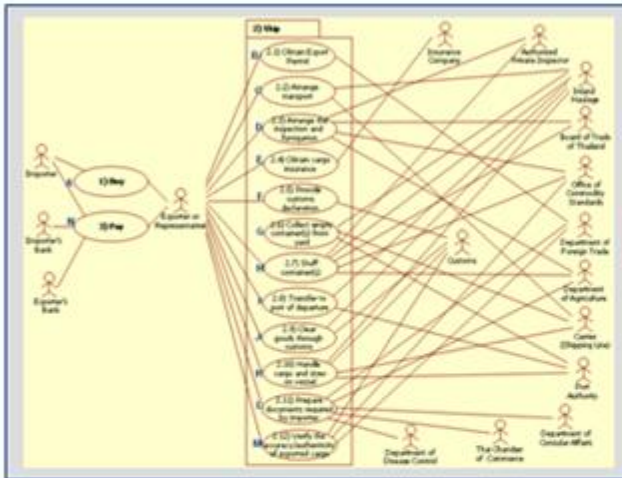**Step 1**

Capture

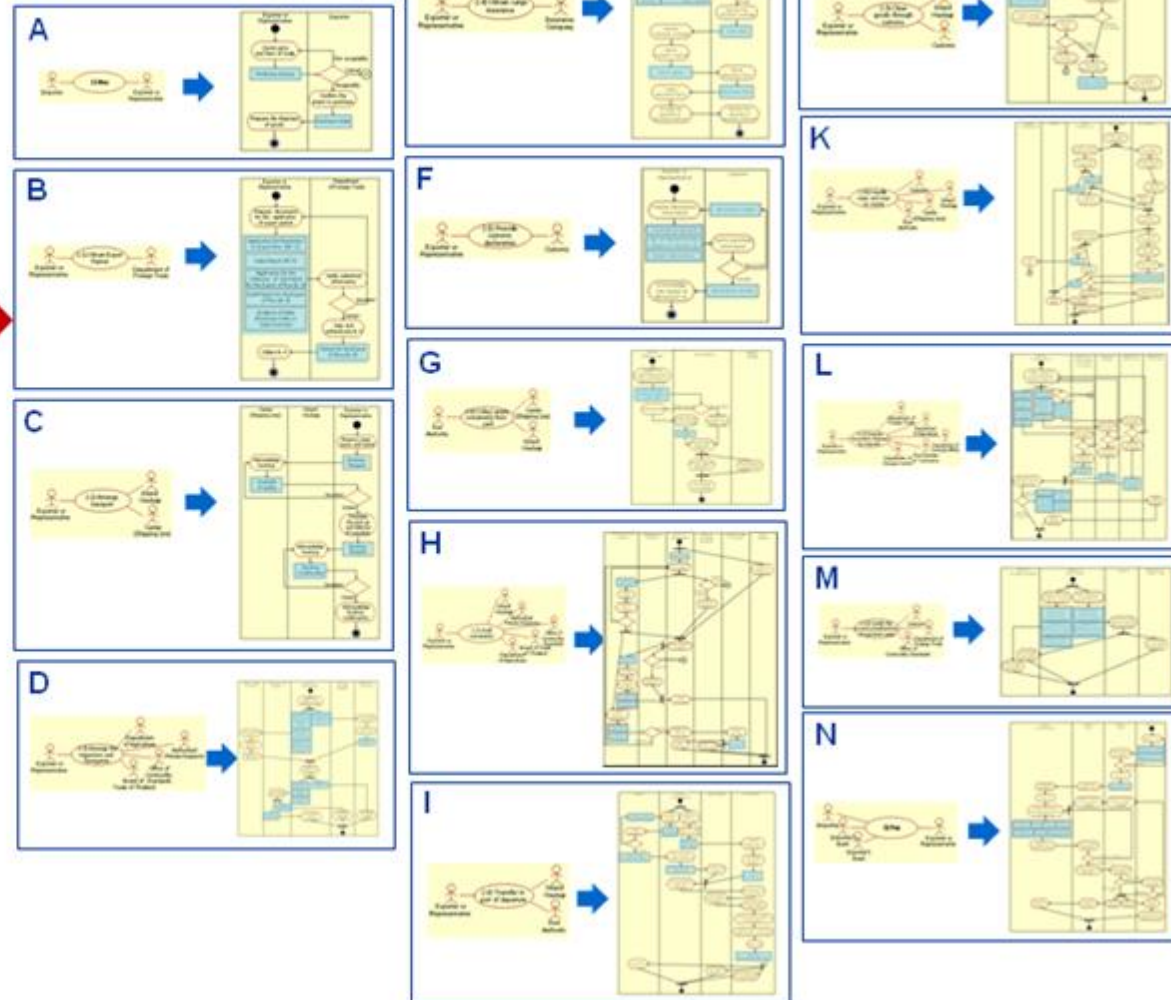# Major Phases of Business Process Analysis

Phase I: Scope setting

Phase II: Data collection & process documentation
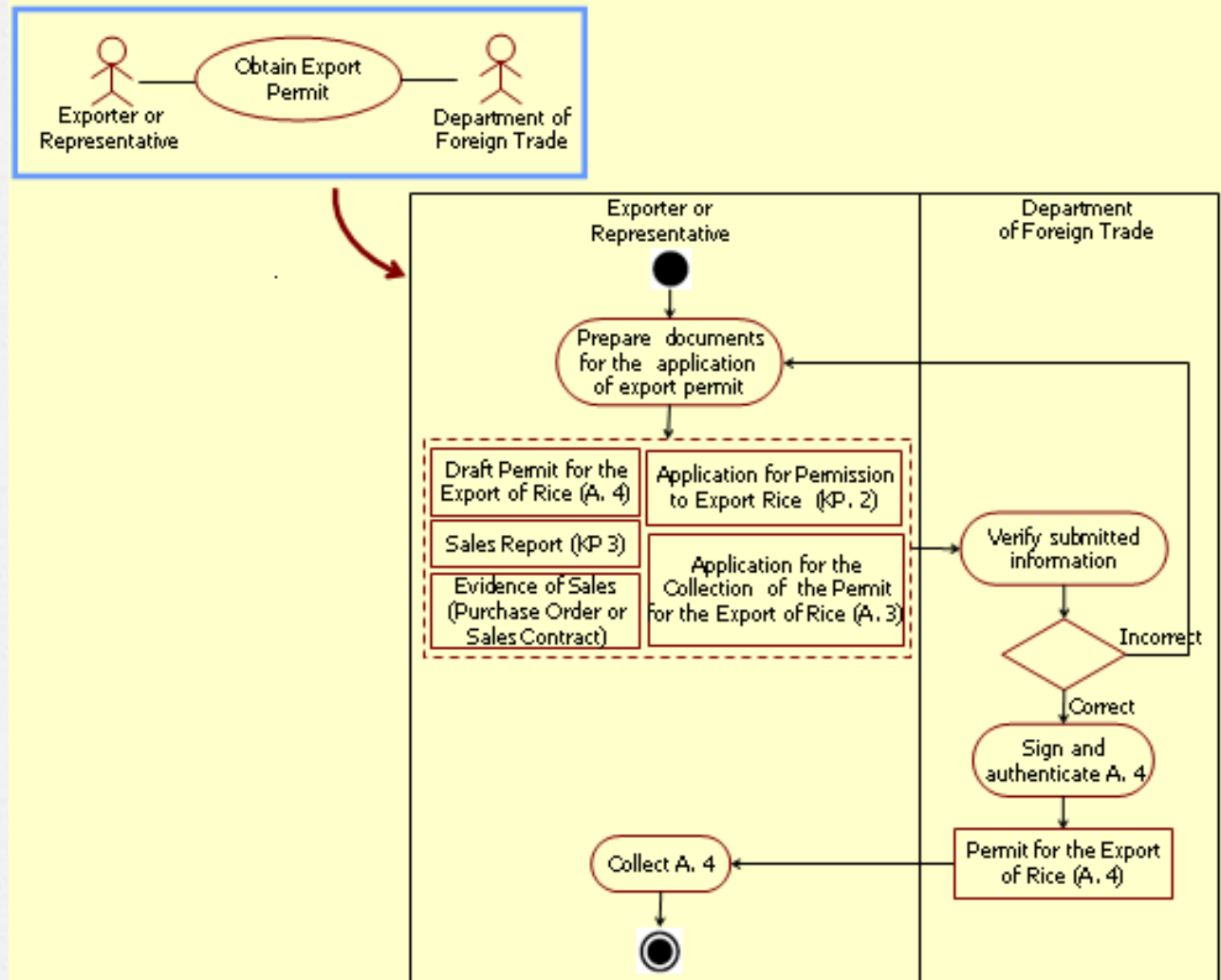
Phase III: Process analysis & recommendations development

Use Case Diagram

Activity Diagram

Use Case to Activity Diagram

Output: Collection of Documents, Forms and Messages

Sample List of Documents and Forms
Captured from Activity Diagrams

1. Proforma Invoice
2. Purchase Order
3. Application for Permission to Export Rice (KP. 2)
4. Sales Report (KP 3)
5. Application for the Collection of the Permit for the Export of Rice (A. 3)
6. Permit for the Export of Rice (A. 4)
7. Application for Certificate of Standards of Product (MS. 13)
8. Rice Quality Certificate
9. Certificate of Standards of Products (MS. 24)
10. Application for Phytosanitary Certificate (PQ. 9)
11. Booking Request Form – Border Crossing
12. Booking Confirmation – Border Crossing
13. Booking Request Form – Inland Transport
14. Booking Confirmation – Inland Transport
15. Cargo Insurance Application Form
16. Commercial Invoice
17. Letter of Credit
18. Packing List
19. Cover Note
20. Bill of Lading
21. Insurance Policy
22. Export Declaration
23. Good Transition Control List
24. TKT 308.2
25. Equipment Interchange Report (EIR)
26. Container Loading List
27. Container List Message
28. Outward Container List
29. Manifest
30. Phytosanitary Certificate
31. Certificate of Origin
32. Application for Certificate of Origin
33. Application for Letter of Credit
34. Credit Advice
35. Debit Advice
36. Remittance Advice

Analyze data in each document and **define** the meaning (semantic) of the data and the data formats (syntax)

Step 2

Define
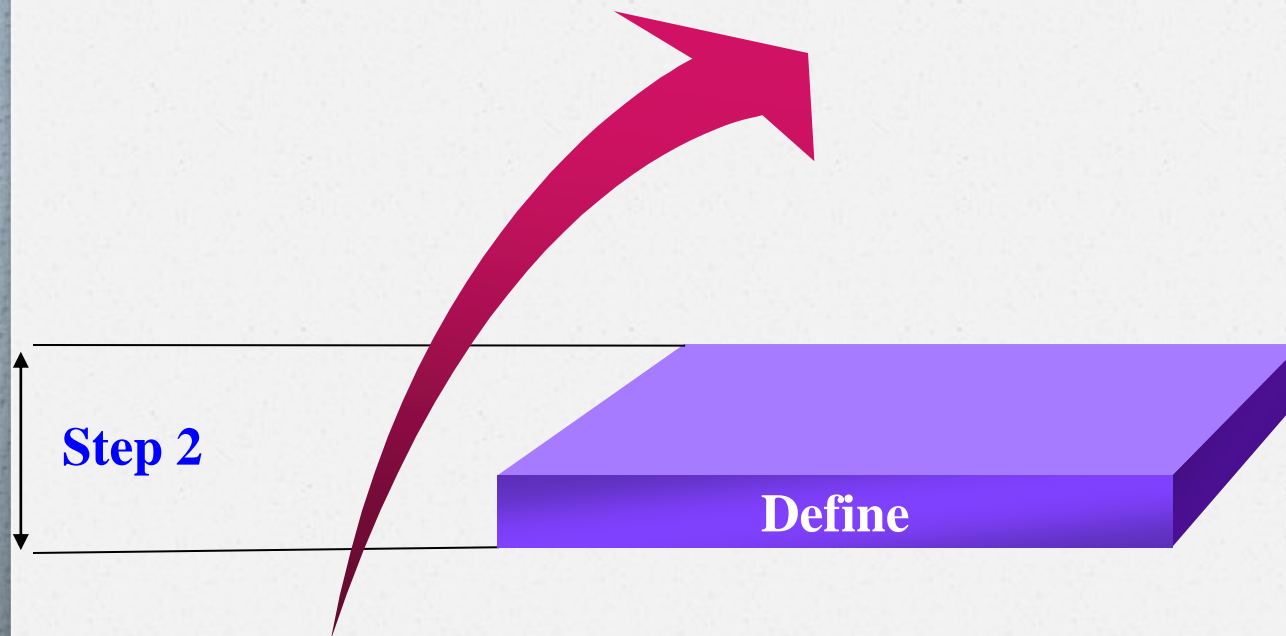
To identify the exact meaning of the data and extract data type, representation, format, and constraints based on these sources, for example:

- Document/form, with sample filled-in data and/or box completion guideline if available

- EDI Message Implementation Guide

- User Interface (Data Entry Screens), with its data dictionary if available

- Interviews with users of the document

- Internationally-accepted standard repository (e.g. WCO Data Model, UNTDED) for the semantic of data elements used in international trade

Ex) Trade Data Elements Directory (UNTDED – ISO 7372: 2005)

Change indic.	Tag UID	New Name	Description	repr.	Old name	Business Term	Notes	Locations, Bridges
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
cnd	1000	Document. Type Name.Text	Free text name of a document such as 'Proforma invoice', 'Commercial invoice'.	an..35	Document/message name	Document/ message name		UNLK: L 02, P 45-80 MAR: IMO/FAL 1-7
cndr	1001	Document. Type.Code	Code specifying the name of a document such as 352 for proforma invoice, 380 for commercial invoice.	an..3	Document/message name, coded	Document/ message name code		UNLK: L 04, P 41-45 CIMP: (120): a1 SAD: (SAD 1(first to third subdivision))
x	1002	.			Message name		DE to use instead - 1000	
cnd	1003	Document. Type.Identifier	Document type identifier such as INVOIC. See also 0065	an..6	Message name, coded	Message name code		CIMP: (101): a3
cnd	1004	Document. Identifier	Reference number identifying a specific document.	an..35	Document/message number	Document/ message number		CIMP: (112) n3 and (114) an6 or (805) n8 and (118) n6 MAR: IMO/FAL 2 UNLK: an..17 L 04, P 63-80 SAD:
add	1007	Event. Identifier	Reference number identifying an event.	an..35				
add	1008	Event. Sequence.Identifier	Sequence number differentiating a specific event amongst others	n..5				
cnd	1010	Additional Document. Identifier	Identifier of a document providing additional information.	an..35	Additional document reference			SAD: (SAD 44)
add	1012	Packing List Document. Item Sequence.Identifier	Sequence number differentiating a specific packing list item within a packing list.	n..5				
cndr	1014	Packing List Document. Identifier	Reference number to identify a packing list	an..35	Packing List number			UNLK: an..17, L 04 P 63-80
cndr	1016	Consignment. Carrier Assigned.Identifier	Reference number assigned by a carrier or its agent to identify a specific consignment such as a booking reference number when cargo space is reserved prior to loading.	an..35	Booking reference number	Reservation number of shipment		CIMP: (117): an..15 MAR: IMO/FAL 7 UNLK: an..17 L 04, P 63-80
cndr	1018	Order Acknowledgement Document. Identifier	Reference number identifying the acknowledgement of an order.	an..35	Acknowledgement of Order number	Purchase order response number		UNLK: L 04, P 63-80

United Nations Trade Data Element Directory (UNTDED, ISO 7372)

- An internationally accepted standard *repository for the semantic of trade data elements* used in international trade

- A method to describe information requirements from business perspective (*a non-technical description of trade information*).

- The definition is *syntax-neutral* and provides the *basis for a later automation of document* for paperless trade.

- Defining the data content in terms of the UNTDED makes *different trade documents become directly comparable*, which helps identify duplication and reduce the number of documents to the strict minimum.

How does UNTDED work?

- Each UNTDED element consists of a data element *tag* in the form of a four-digit number*, a name (informative) and a description (definition).*

- The data element may have *a reference to a UN-recommended code list*.

- For document alignment, it is recommended to *use the tag, the dictionary's old name or the business term and the description of the ISO 7372:2005 release* when defining the Box Completion Guideline.

- The format of the UNTDED Revision 2005 (ISO 7372:2005) contains *additional fields such as dictionary entry name for core component libraries* so as to integrate the requirements of electronic business and paperless trade.

Grouping used in the Trade Data Element Directory (TDED)

Group 1: (0001-1699) Documentation, references

Group 2: (2000-2699) Dates, times, periods of time

Group 3: (3000-3699) Parties, addresses, places, countries

Group 4: (4000-4699) Clauses, conditions, terms, instructions

Group 5: (5000-5699) Amounts, charges, percentages

Group 6: (6000-6699) Measures, identifiers, quantities (other than monetary)

Group 7: (7000-7699) Goods and articles: descriptions and identifiers

Group 8: (8000-8699) Transport modes, means, and equipments

Group 9: (9000-9799) Other data elements (Customs, etc.)

TDED 3404 Person name
Family name and given names of an individual.

Change indic.	Tag UID	New Name	Description	repr.	Old name	Business Term	Notes	Locations, Bridges
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
cnd	1000	Document. Type Name.Text	Free text name of a document such as 'Proforma invoice', 'Commercial invoice'.	an..35	Document/message name	Document/ message name		UNLK: L 02, P 45-80 MAR: IMO/FAL 1-7
cndr	1001	Document. Type.Code	Code specifying the name of a document such as 352 for proforma invoice, 380 for commercial invoice.	an..3	Document/message name, coded	Document/ message name code		UNLK: L 04, P 41-45 CIMP: (120): a1 SAD: (SAD 1(first to third subdivision))
x	1002	.			Message name		DE to use instead - 1000	
cnd	1003	Document. Type.Identifier	Document type identifier such as INVOIC. See also 0065	an..6	Message name, coded	Message name code		CIMP: (101): a3
cnd	1004	Document. Identifier	Reference number identifying a specific document.	an..35	Document/message number	Document/ message number		CIMP: (112) n3 and (114) an6 or (805) n8 and (118) n6 MAR: IMO/FAL 2 UNLK: an..17 L 04, P 63-80 SAD:
add	1007	Event. Identifier	Reference number identifying an event.	an..35				
add	1008	Event. Sequence.Identifier	Sequence number differentiating a specific event amongst others	n..5				
cnd	1010	Additional Document. Identifier	Identifier of a document providing additional information.	an..35	Additional document reference			SAD: (SAD 44)
add	1012	Packing List Document. Item Sequence.Identifier	Sequence number differentiating a specific packing list item within a packing list.	n..5				
cndr	1014	Packing List Document. Identifier	Reference number to identify a packing list	an..35	Packing List number			UNLK: an..17, L 04 P 63-80
cndr	1016	Consignment. Carrier Assigned.Identifier	Reference number assigned by a carrier or its agent to identify a specific consignment such as a booking reference number when cargo space is reserved prior to loading.	an..35	Booking reference number	Reservation number of shipment		CIMP: (117): an..15 MAR: IMO/FAL 7 UNLK: an..17 L 04, P 63-80
cndr	1018	Order Acknowledgement Document. Identifier	Reference number identifying the acknowledgement of an order.	an..35	Acknowledgement of	Purchase order		UNLK: L 04, P 63-80

Output: Document Data Dictionary for Each Document

A **Data Dictionary** describes in detail the data elements contained in a document, with the following pieces of information:

- ❑ Document title
- ❑ Document purpose
- ❑ Name of document owner
- ❑ Identification number for each data element name
  (e.g. Box Number in the document)
- ❑ Data element name from the document to be modeled
- ❑ Data element definition in local language and/or English as
  given by the document owner and/or relevant standards
  (e.g. WCO Data Model, UNTDED, UN/CEFACT CCL)
- ❑ Data format (alpha, numeric) and size (length of a data element,
  value in terms of digit or characters)
- ❑ Constraint on the occurrence of each data element
  (MinOccurs, MaxOccurs)
- ❑ Code lists & subsets of code lists

Example of Document Data Dictionary

Document Title	ASEAN ATIGA FORM D
Document Purpose	A Certificate of Origin is a document/message identifying goods, in which the authority or body authorized to issue it, certifies expressly that the goods to which the certificate relates originate in a specific country.
Name of Document Owner	Issuing Authorities, ASEAN Nations

| **ASEAN ATIGA FORM D Data** |
|---|
| **0-1 Reference Number**
TDED 1004: Reference number identifying a specific document. an..35
(Min=1, Max=1) |
| **1 Goods consigned from (Exporter's business name, address, country)**
TDED 3036: Name (and address) of the party consigning the goods as stipulated in the contract by the party ordering the transport (This may be the exporter or seller.) an..35
(Min=1, Max=1) |
| **2 Goods consigned to (Consignee's name, address, country)**
TDED 3132: Name and address of party to which goods are consigned an..512
(Min=1, Max= 1) |
| **3-1 Departure date**
TDED 2380: The value of a date, a date and time, a time or of a period in a specified representation. an..35
(Min=1, Max= 1) |
| **3-2 Vessel's name/aircraft etc.**
TDED 8212: Name of a specific means of transport such as the vessel name an..35
(Min=1, Max= 1) |
| **3-3 Port of discharge**
TDED 3224: Name of a location. an..256
(Min=1, Max=1) |
| **4 For official use (Declaration Type)**
TDED 1001: Code specifying the name of a document. an..3
(Min=1, Max=1) |
| **5 Item No.**
TDED 1050: To identify a position within a sequence an..10
(Min=1, Max=1) |

Mapping of Data from Paper Form to Document Data Dictionary

Paper Form (left):

1. Goods consigned from (Exporter's business name, address, country)

2. Goods consigned to (Consignee's name, address, country)

Reference No.

ASEAN TRADE IN GOODS AGREEMENT/
ASEAN INDUSTRIAL COOPERATION SCHEME
CERTIFICATE OF ORIGIN
(Combined Declaration and Certificate)

FORM D

Issued in _____
(Country)
See Overleaf Notes

3. Means of transport and route (as far as known)

Departure date

Vessel's name/Aircraft etc.

Port of Discharge

4. For Official Use

☐ Preferential Treatment Given Under ASEAN Trade in Goods Agreement

☐ Preferential Treatment Given Under ASEAN Industrial Cooperation Scheme

☐ Preferential Treatment Not Given (Please state reason/s)

Signature of Authorised Signatory of the Importing Country

5. Item number	6. Marks and numbers on packages	7. Number and type of packages, description of goods (including quantity where appropriate and HS number of the importing country)	8. Origin criterion (see Overleaf Notes)	9. Gross weight or other quantity and value (FOB)	10. Number and date of invoices

11. Declaration by the exporter

The undersigned hereby declares that the above details and statement are correct; that all the goods were produced in

_____
(Country)

and that they comply with the origin requirements specified for these goods in the ASEAN Trade in Goods Agreement for the goods exported to

_____
(Importing Country)

Place and date, signature of authorised signatory

2. Certification

It is hereby certified, on the basis of control carried out, that the declaration by the exporter is correct.

Place and date, signature and stamp of certifying authority

13
☐ Third Country Invoicing   ☐ Exhibition
☐ Accumulation   ☐ De Minimis
☐ Back-to-Back CO   ☐ Issued Retroactively
☐ Partial Cumulation

ASEAN ATIGA FORM D Data (right):

0-1 Reference Number
TDED 1004: Reference number identifying a specific document. an..35
(Min=1, Max=1)

1 Goods consigned from (Exporter's business name, address, country)
TDED 3036: Name (and address) of the party consigning the goods as stipulated in the contract by the party ordering the transport (This may be the exporter or seller.) an..35
(Min=1, Max=1)

2 Goods consigned to (Consignee's name, address, country)
TDED 3132: Name and address of party to which goods are consigned an..512
(Min=1, Max= 1)

3-1 Departure date
TDED 2380: The value of a date, a date and time, a time or of a period in a specified representation. an..35
(Min=1, Max= 1)

3-2 Vessel's name/aircraft etc.
TDED 8212: Name of a specific means of transport such as the vessel name an..35
(Min=1, Max= 1)

3-3 Port of discharge
TDED 3224: Name of a location. an..256
(Min=1, Max=1)

4 For official use (Declaration Type)
TDED 1001: Code specifying the name of a document. an..3
(Min=1, Max=1)

5 Item No.
TDED 1050: To identify a position within a sequence an..10
(Min=1, Max=1)

Analyze data elements across various documents and organize them in a comparable manner

Step 3

Analyze
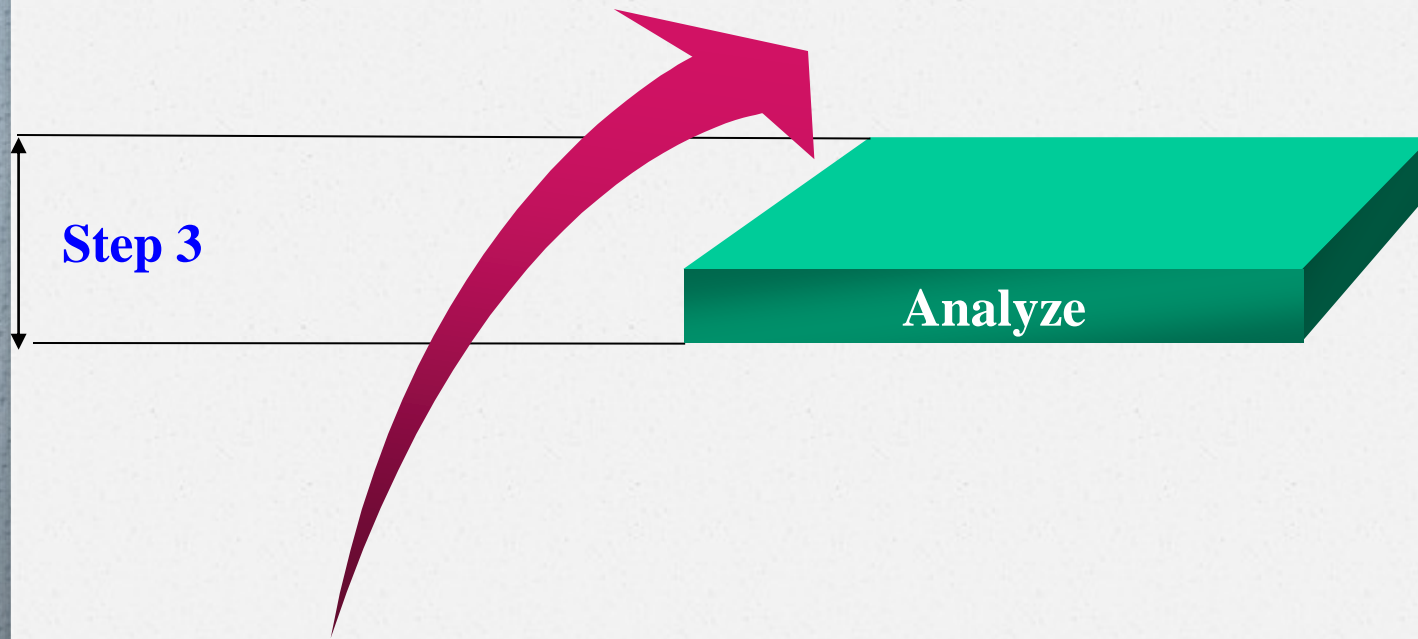
To organize data specifications from different documents in a comparable manner for consistent mapping of data elements to a data model in the next step

➢ **Document categorization** according to the type of trade documents that they belong to, for example:

  ✓ *Category 1: documents related to <u>commercial transaction and payment</u>.*

  ✓ *Category 2: documents for <u>transport and official control</u> that provide information of a <u>single consignment</u> (e.g. customs declaration)*

  ✓ *Category 3: documents of <u>transport and official control</u> that provide information of <u>multiple consignments</u> (e.g. manifest)*

➢ **Data dictionaries compilation** according to document categories/ families

Document Categorization

Example of Document Categorization based on UNLK

UNLK Document Families

Commercial Transaction Document Family
(*e.g Quotation, Order, Invoice, etc.*)
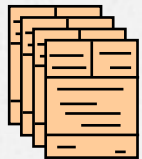
Transport & Related Services Document Family
(*e.g. Bill of Lading, Cargo Manifest, Insurance Contract, etc.*)

Official Controls Document Family
(*e.g. Goods Declarations, Export/Import Licenses, Certificate of Origin, etc.*)
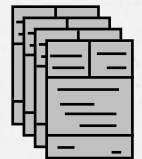
Payment Document Family (*e.g. Letter of Credit, Documentary Credit, etc.*)

Process	UNLK Document Family			Document
Buy	Commercial Transaction			Proforma Invoice Purchase Order Commercial Invoice Packing List
Ship	Transport and Related Services	Forwarding and Cargo Handling	Single Consignment	N/A
			Multiple Consignments	N/A
			Transport Equipment(s)	TKT 308.2 (Gate Pass) Equipment Interchange Report (EIR)
		Transport	Single Consignment	Bill of Lading Booking Request Form – Border Crossing Booking Confirmation – Border Crossing Booking Request Form – Inland Transport Booking Confirmation – Inland Transport
			Multiple Consignments	Manifest
			Transport Equipment(s)	Container Loading List Container List Message Outward Container List
		Insurance		Cargo Insurance Application Form Cover Note Insurance Policy
	Official Controls			Application for Permission to Export Rice (KP. 2) Sales Report (KP 3) Application for the Collection of the Permit for the Export of Rice (A. 3) Permit for the Export of Rice (A. 4) Application for Certificate of Standards of Product (MS. 13) Rice Quality Certificate Certificate of Standards of Products (MS. 24) Application for Phytosanitary Certificate (PQ. 9) Phytosanitary Certificate Application for Certificate of Origin Certificate of Origin Export Declaration Good Transition Control List
Pay	Payment			Application for Letter of Credit Letter of Credit Credit Advice Debit Advice Remittance Advice

Data Dictionary Compilation
Sample Template of Document Data Dictionary Compilation

ASEAN ATIGA FORM D	Permit for the Export of Rice (A. 4)	Certificate of Standards of Products (MS. 24)
A Certificate of Origin certifies expressly that the goods to which the certificate relates originate in a specific country. Issuing Authorities, Thailand	**Permit for the Export of Rice (A. 4) is only given to rice exporters who follow the Ministry of Commerce's Regulation for Rice Exportation 1997.** Department of Foreign Trade, Ministry of Commerce, Thailand	**Certificate of Standards of Products (MS. 24) certifies that the rice to be exported has the quality set by importer.** Board of Trade of Thailand
	11 Place of departure **TDED 3214: Name of the port, airport or other type of location from which a means of transport is scheduled to depart or has departed an.. 256 (Min = 1, Max = 1)**	**20 Place of departure** **TDED 3214: Name of the port, airport or other type of location from which a means of transport is scheduled to depart or has departed an.. 256 (Min = 1, Max = 1)**
11-2 Country of Exportation **TDED 3229: Country subdivision time of the departure of the goods item original consignor an..2 (Min=1, Max=1)**	**5 Destination country** **TDED 3216:Name of the country to which the goods are to be delivered** **to the final consignee or buyer** **an..35 (Min = 1, Max = 1)**	**21 Country of destination of goods** **TDED 3014: Name of the country to which a consignment of goods is to be or has been delivered** **an..35 (Min = 1, Max = 1)**
5 Item Number TDED 1050: Number indicating the position in a sequence n..5 (Min = 1, MAX = unbounded)	**12 Line item** **TDED 1082: An identifier differentiating an individual line item from within a series** **an..6 (Min = 1, Max = unbounded)**	
9-2 Item Price TDED 5032: Amount declared for Customs purposes of those goods in a consignment which are subject to the same Customs procedure, and have the same tariff/statistical heading, country information and duty regime an..16,2 (Min = 1, Max = unbounded)	**17 Price (FOB)** **TDED 5032: Amount declared for customs purposes of those goods in a consignment which are subject to the same customs procedure, and have the same tariff/statistical heading, country information and duty regime** an..18 (Min = 1, Max = unbounded)	**13 FOB Amount** **TDED 5032: Amount declared for customs purposes of those goods in a consignment which are subject to the same customs procedure, and have the same tariff/statistical heading, country information and duty regime** **an..18 (Min = 1, Max = unbounded)**
6 Marks and numbers on packages TDED 7102: Free form description of the marks and numbers on a transport unit or package an..512 (Min=1, Max= unbounded)		**18 Marks and numbers on packages** **TDED 7102: Marks and numbers identifying individual packages** **an..512 (Min = 1, Max = unbounded)**

Map data elements to a Reference Data Model

Step 4

Map (Reconcile)

To map the data elements in the compiled Data Dictionary with the semantically equivalent data element in Reference Data Model (example here is WCO DM).

- ❑ The WCO Data Model describes the same data with the detailed structure and precision required for automated information processing

- ❑ The corresponding data element in the WCO Data Model is identified with the WCO ID, an alphanumeric unique identifier of the data element in the Data Model.

- ❑ The WCO ID should be included in the compiled Data Dictionary.

Mapping Process (1)

WCO Data Model 3.0 with Link to interactive Data Set

Click the green icon to open the Excel file
"WCO Data Model Version 3.0 – The Interactive Data Set"

Mapping Process (2)

WCO Interactive Data Set with UNTDED UID and WCO ID

WCO details					Import	Export	Conveyance	Transit	Response	WCO details		UNTDED Details		DENs	SAFE
WCO ID	Name	Definition	Data Model Classes							Format	Code remarks	**UID**	Name		
137	Description of goods	Plain language description of the nature of a goods item sufficient to identify it for customs, statistical or transport purposes.	Commodity		X	X		X		an..512		7002	GoodsItem.Description. Text		X
258	Commodity name	A name or a term that identifies the goods are assigned by a seller as distinct from those of other sellers, also known in legal terms as trademark. A brand helps to identify one item, a family of items, or all items of that seller.	Commodity		X	X				an..35		7002	Goods Item. Description.Text		

➤ "**UID**" column identifies the UNTDED tag of the data element
➤ "**WCO ID**" column identifies the corresponding WCO ID.

Different Mapping Cases to Deal With

When mapping to the WCO Data Model, a data modeler need to deal with the following cases**:**

➢ One TDED Data Element maps to exactly one WCO Data Element

➢ One TDED Data Element maps to more than one WCO Data Elements

➢ One TDED Data Element does not have a direct mapping to a WCO Data Model

One TDED Data Element maps to exactly one WCO Data Element

❑ For example, the data element in box "Marks and numbers on packages" of the CoO, in the Data Dictionary Table below, is mapped to "TDED 7102"

Document Title	Certificate of Origin
Document Purpose	A Certificate of Origin is a document/message identifying goods, in which the authority or body authorized to issue it, certifies expressly that the goods to which the certificate relates originate in a specific country.
Name of Document Owner	Ministry of Commerce, Thailand

Data Element Name	Data Element Definition	Format	MinOccur	MaxOccur
Exporter (name and address)	TDED 3336: Name (and address) of the party consigning the goods as stipulated in the contract by the party ordering the transport (This may be the exporter or seller.)	an..256	1	1
Consignee (name and address including country)	TDED 3132: Name and address of party to which goods are consigned	an..256	1	1
Marks and numbers on packages	TDED 7102: Marks and numbers identifying individual packages	an..512	1	unbounded

❑ Search the column "UID" with a TDED tag "7102" to obtain one single WCO Data Element and find the corresponding "WCO ID 142" from the WCO Interactive Data Set

WCO ID	Name	Definition	Data Model Classes	Import	Export	Conveyance	Transit	Response	Format	Code remarks	UID	Name	DENs	SAFE
142	Shipping marks	Free form description of the marks and numbers on a transport unit or package.	Packaging	X	X		X		an..512	UN/ECE Recommendation 15	7102	GoodsItem.ShippingMarks.Text		

One TDED Data Element maps to more than one WCO Data Element

WCO details					Import	Export	Conveyance	Transit	Response	WCO details	UNTDED Details		DENs	SAFE
WCO ID	Name	Definition	Data Model Classes							Format	UID	Name		
137	Description of goods	Plain language description of the nature of a goods item sufficient to identify it for customs, statistical or transport purposes.	Commodity		X	X		X		an..512	7002	GoodsItem.Description. Text		X
258	Commodity name	A name or a term that identifies the goods are assigned by a seller as distinct from those of other sellers, also known in legal terms as trademark. A brand helps to identify one item, a family of items, or all items of that seller.	Commodity		X	X				an..35	7002	Goods Item. Description.Text		

❑ In the WCO Data Model one TDED element can be mapped to several WCO ID's.

❑ A data modeler needs to analyse how the data element is used in the trade document and decide which of the two mappings provides the best match.

One TDED Data Element does not have a direct mapping to a WCO Data Element

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
		WCO details					Conveyance		Response	WCO details		UNTDED Details			
	WCO ID	Name	Definition	Data Model Classes	Import	Export	Conveyance	Transit	Response	Format	Code remarks	UID	Name	DENs	SAFE
45	105	Free text	Free text field available to the message sender for information.	AdditionalInformation	X	X	X	X		an..512		4440	FreeText.Text		
117	225	Additional statement text	Description of an additional statement	AdditionalInformation	X	X		X	X	an..512	Certificate text	4440	FreeText.Text		
172	304	Criteria conformance text	A statement indicating specific conformance with statutory and regulatory requirements	Commodity	X					an..512		4440	FreeText.Text		
229	362	Package filler description	Free text description of the material found within a package used to cushion the commodity or otherwise empty space	CommodityRelatedPackaging	X					an..256		4440	Free text subject code		
231	364	Ship-to-ship activity	Text description of ship-to-ship activity.	BorderTransportMeans			X			an..256		4440	Free Text.Text		

For the data element that cannot be directly mapped to the WCO DM, all related data elements of the WCO DM 3.0 are mapped to the generic TDED data element instead.

Output: Data Dictionary with Mapping to WCO Data Model

Example of Data Dictionary of Certificate of Origin (CoO) Mapped to WCO Data Model 3.0

ASEAN ATIGA FORM D Data	WCO ID	Data model Classes	WCO Dictionary Entry Name
0-1 Reference Number TDED 1004: Reference number identifying a specific document. an..35 (Min=1, Max=1)	D014	Declaration	Declaration. Identification. Identifier
1 Goods consigned from (Exporter's business name, address, country) TDED 3036: Name (and address) of the party consigning the goods as stipulated in the contract by the party ordering the transport (This may be the exporter or seller.) (Min=1, Max=1)	R031	Exporter	Exporter. Name. Text
2 Goods consigned to (Consignee's name, address, country) TDED 3132: Name and address of party to which goods are consigned an..256 (Min=1, Max= 1)	R037	Importer	Importer. Name. Text
3-1 Departure date TDED 2380: Date and optionally time of the departure of the goods from original consignor. an..35 (Min=1, Max= 1)	030	GoodsShipment	GoodsShipment. Departure. Datetime
3-2 Vessel's name/aircraft etc. TDED 8212: name of specific means of transport such as vessel name an..35 (Min=1, Max= 1)	T001	ArrivalTransportMeans	ArrivalTransportMeans. Name. Text
3-3 Port of discharge DED 3224: Name of a location an..256 (Min=1, Max=1)	L012	UnloadingLocation	UnloadingLocation. Name. Text
4 For official use (Declaration Type) TDED 1001 : Code specifying the name of a document. an..3 (Min=1, Max=1)	D013	Declaration	Declaration.Type. Code
5 Item No. TDED 1050: Number indicating the position in a sequence n..10 (Min=1, Max=1)	006	Commodity	Commodity. Sequence. Numeric

Obtain the structure of the **electronic document**

Step 5

Obtain e-document(s)

- Depending on business requirements, specific syntax can be applied in obtaining the structure of electronic document such as XML and EDI.

- Obtaining the structure of an electronic document demands technical capacity in available syntaxes and relevant technical standards.

- Illustration is given to make readers become aware of how to obtain the structure of electronic document using XML syntax, in particular packages available in WCO DM 3.0.

Customizing WCO DM XML Schema to obtain the structure of electronic document

☐ To map the data elements of the WCO Data Model to XML structures to develop the XML Schemas for the national trade documents

☐ To identify those data elements in the WCO Schemas that are actually used in the national trade documents and to remove those data elements that are not used in the national context from the Schema

What is XML Schema?

➤ An XML Schema is a specification that describes the data structures of an electronic XML message.

➤ The Schema is the equivalent of the paper form in electronic format and can be used directly for paperless trade.

➤ WCO XML Schemas are generic because they can support the data requirements of several trade documents.

➤ By eliminating all data elements that are not used in the national trade document from the generic Schema, a specific Schema is generated that exactly matches the data requirements of the national document.

➤ The XML Schemas provided with the WCO Data Model 3.0 include all data elements for a set of top level business processes.

XML Schema (Example)

```xml
- <xsd:element name="TransportContractCrossBorder">
  - <xsd:complexType>
    - <xsd:sequence>
      - <xsd:element name="TransportContractCrossBorderConsignment">
        - <xsd:complexType>
          - <xsd:sequence>
            - <xsd:element name="ImporterReferencedParty">
              - <xsd:complexType>
                - <xsd:sequence>
                    <xsd:element name="Name" type="udt:TextType" />
                  </xsd:sequence>
                </xsd:complexType>
              </xsd:element>
            - <xsd:element name="BaseportOfUnloadingReferencedLocation">
              - <xsd:complexType>
                - <xsd:sequence>
                    <xsd:element name="Name" type="udt:TextType" />
                  </xsd:sequence>
                </xsd:complexType>
              </xsd:element>
            - <xsd:element name="TransportContractCrossBorderDocument">
              - <xsd:complexType>
                - <xsd:sequence>
                    <xsd:element name="ID" type="udt:IDType" />
                    <xsd:element name="Name" type="udt:TextType" />
                  </xsd:sequence>
                </xsd:complexType>
              </xsd:element>
              <xsd:element name="AssociatedCrossBorderDocument" type="ram:CrossBorderDocumentType" maxOccurs="2" />
```

To obtain the specific Schema for electronic document

Select the appropriate WCO Schema

- For each document in the Data Dictionary, the data modeler needs to identify the WCO Schema that meets most closely the data requirements of this trade document.

Customise the WCO Schema by removing unused data elements

① List the data elements used in national trade documents onto the Data Dictionary.

② Search for each data element in the Schema using the "Dictionary Entry Name" and then mark this data element in the Schema.

③ When all data elements of the Data Dictionary are marked in the Schema then the unmarked data elements of the Schema are removed.

④ Remove all data requirements that are not specified in the national trade document from the Schema

Example of XML Schema of "Exporter"

WCO DEN "Exporter. Name. Text" is associated with XML Tag "NameText" of Object Class "Exporter"

ASEAN ATIGA FORM D Data	WCO ID	Data model Classes	WCO Dictionary Entry Name
Goods consigned from (Exporter's business name, address, country) TDED 3036: Name (and address) of the party consigning the goods as stipulated in the contract by the party ordering the transport (This may be the exporter or seller.) (Min=1, Max=1)	R031	Exporter	Exporter. Name. Text

```
<xsd:element name="Name" type="ds:ExporterNameTextType" minOccurs="0">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      <ccts:UniqueID>WCOIDR031</ccts:UniqueID>
      <ccts:DictionaryEntryName>Exporter. Name. Text</ccts:DictionaryEntryName>
      <ccts:Definition>Name [and address] of party who makes - or on whose behalf - the export
declaration - is made - and who is the owner of the goods or has similar right of disposal over them at the
time when the declaration is accepted.</ccts:Definition>
      <ccts:Cardinality>0..1</ccts:Cardinality>
      <ccts:ObjectClassTerm>Exporter</ccts:ObjectClassTerm>
      <ccts:PropertyTerm>Name</ccts:PropertyTerm>
      <ccts:RepresentationTerm>Text</ccts:RepresentationTerm>
    </xsd:documentation>
  </xsd:annotation>
</xsd:element>
```

Marking elements to remain in the XML Schema

Marked

Final ASEAN ATIGA Form D XML Schema

Steps and Activities

	Step 1	Step 2	Step 3	Step 4	Step 5
Purpose	Capture business process & identify documents & basic data requirements	Provide a precise definition for the data elements	Analyze data elements across various documents	Obtain a data model	Obtain structure of the electronic document
Activity	Business Process Analysis (optional) Collect a list of documents & basic data requirements	Analyze each document to extract data definition, type, format & constraints	Organize the analyzed data elements in a comparable way	Map the data elements to Reference Data Model (eg. WCO DM, CCL, TDED)	Generate electronic documents
Input	BPA results, target business documents	List of Documents	List of Document Data Dictionaries	Document Data Dictionary Compilation	Message Implementation Guide (MIG)
Output	Collection of documents, forms and messages.	Document Data Dictionary for each document	Document Data Dictionary compilation for each document family	Data Dictionary with mapping to Reference Data Model	Electronic Message(s)

Tools for Development of Electronic Documents

Steps	Suggested Tools
Step 1: Capture business processes and identify documents and basic data requirements	• **UMM** (UN/CEFACT Modeling Methodology) • **UML** (Unified Modeling Language) • **UNNEXT BPA Guide**
Step 2: Analyze data in each document and define the semantic of the data and the data formats	• **UNTDED** (United Nations Trade Data Elements Directory) • **CCTS** (UN/CEFACT Core Component Technical Specification) • **UNNEXT DH Guide**
Step 3: Analyze data elements across various documents and organize them in a comparable manner	• **UNLK** (United Nations Layout Key) • **UNTDED** • **UNNEXT DH Guide**
Step 4: Map data elements to a Reference Data Model	• **UN Core Component Library** • **WCO Data Model** • **UNNEXT DH Guide**
Step 5: Obtain the structure of electronic document	• **UN XML NDR, EDIFACT MIGs** • **WCO EDIFACT MIG/XML Schemas** • **UNNExT Guide to Implementation of Electronic Messages for Cross-border Paperless Trade**

UNNExT Guide to Implementation of Electronic Messages for Cross-border Paperless Trade

In Summary

➢ The stepwise approach for development of electronic documents establishes semantic rules for development of specifications for electronic messages and documents.

➢ Steps 1, 2, and 3 achieve the development of a simplified, standardised and harmonised data set for cross border trade.

➢ Steps 4 and 5 achieve the mapping of the data set to a Reference Data Model, data modeling and data structure for B2G and G2G data exchange in cross border trade.

➢ The specifications of electronic documents enable information sharing, integration, and exchange among stakeholders of the international supply chain.

➢ The results provide a basis for paperless trade and use of electronic messages in the Single Window system.

Practical Recommendations

1) Gaining support for data harmonization

**Technical nature of data harmonization and
its multi-stakeholder involvement**

⬇

**Support for data harmonization should be gained from
policy makers with decision-making power**

Institutional Mechanism	Stakeholders	Regional/Int'l Initiatives
Arrange an institutional unit to manage a data harmonization program	*Identify main stakeholders, their roles, objectives and concerns for their active involvement*	*Pay due attention to regional/ int'l initiatives which develop regulations & standards affecting trade documents, subsequently influencing DH initiatives*

2) Coordinating the requirements of national data harmonization with regional and international partners

Inter-agency coordination

National Data Harmonization Projects

Government Agencies

Ports

Bank/Insurance

Logistics Service Providers

Develop a strategy for active involvement in international initiatives to create the links between national projects and int'l developments

Interaction/Alignment

International DH Initiatives

Establish a joint working group to coordinate & communicate regularly with relevant int'l partners

Decide on a national standard data set that will be utilized in any international trade protocols

3) Iterative and incremental approach to data harmonization

One-run harmonization of data is not enough to cover documentary requirements of the international supply chain for SW implementation

Start → Capturing → Defining → Analyzing → Reconciling

Iterative and Incremental approach

Buy (commercial activities related to the ordering of goods)

Ship (activities involved in the physical transfer of goods and official controls)

Pay (activities involved in the payment for goods)

Supplier (exporter/seller)

Consumer (importer/buyer)

Intermediary (freight forwarder, customs broker, 3rd party logistics service provider, express integrator, carrier of all modes, port, terminal operator, inland container depot, bank, insurance company, IT value-added service provider, bank and financial institutions)

Authority (including authorized private inspection agency)

4) Criteria for selecting data standards

Comprehensiveness

Select a data model that provides generic semantic rules yet sufficiently contextualizes documentary requirements of all stakeholders in the international supply chain

Compliance with int'l standards

Select a data model that promote semantic interoperability in compliance with relevant international standards for electronic data exchange
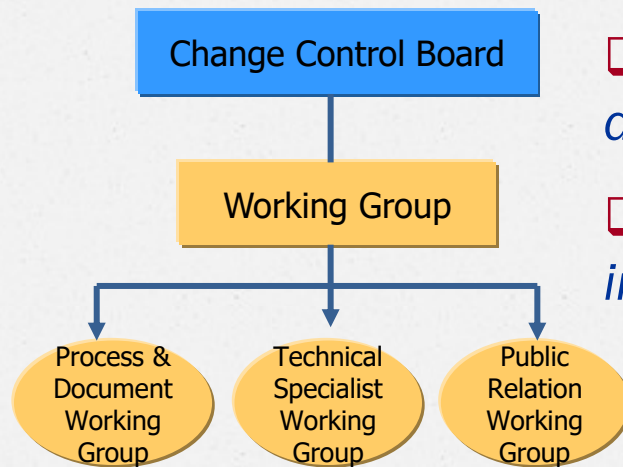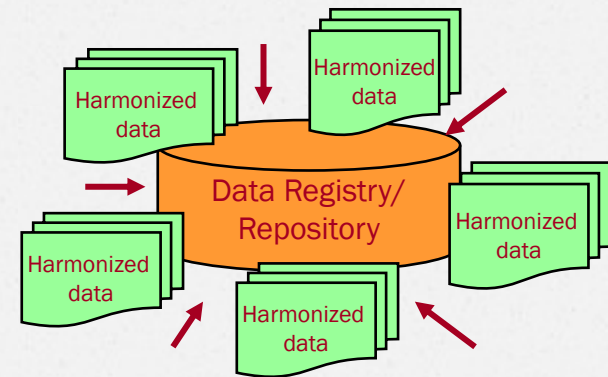
Stability

Select a data model that is built upon on the stable version of standards

5) Maintenance of outputs from data harmonization projects

❑ *Keep baselines of the project outputs by using a platform of national registry and repository*

❑ Facilitate *adoption of the project outputs for continuous implementation*

Harmonized data

Harmonized data

Data Registry/ Repository

Harmonized data

Harmonized data

Harmonized data

Change Control Board

Working Group

Process & Document Working Group

Technical Specialist Working Group

Public Relation Working Group

❑ *Monitor changes in and maintain data harmonization baselines*

❑ *Publicize and promote implementation of new baselines*

Thank you