



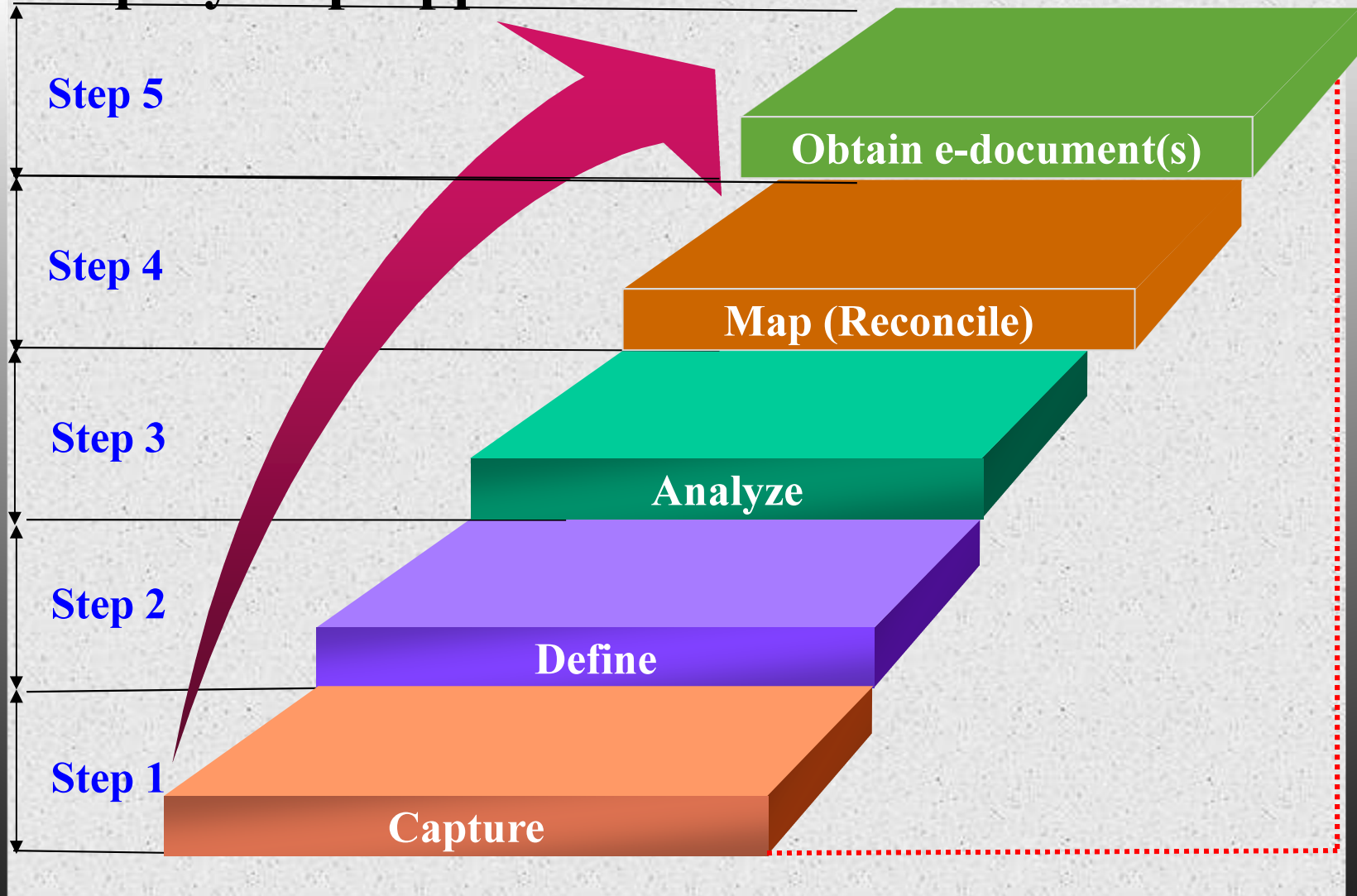
# Step-by-Step Approach to Data Harmonization and Modeling

**16 October 2013**

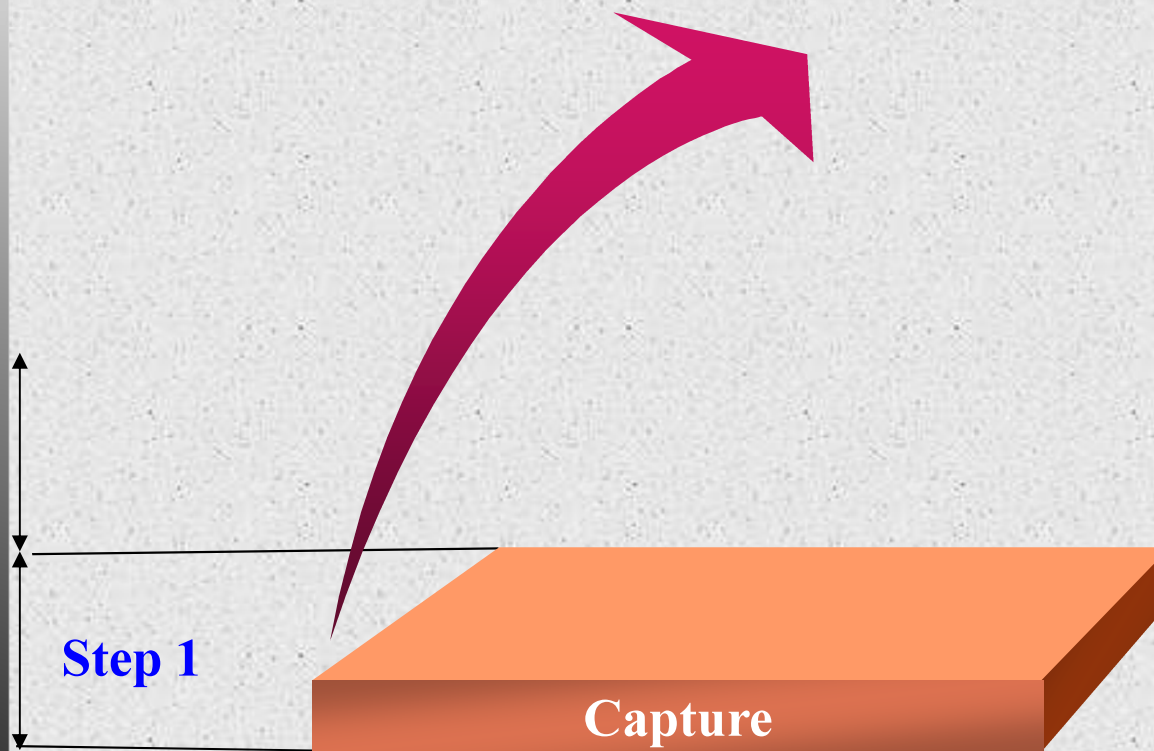
**Customs Border Control Training Center  
Cheon-an, Republic of Korea**

**Sangwon Lim  
Trade and Investment Division  
United Nations ESCAP**

## Step-by-step Approach

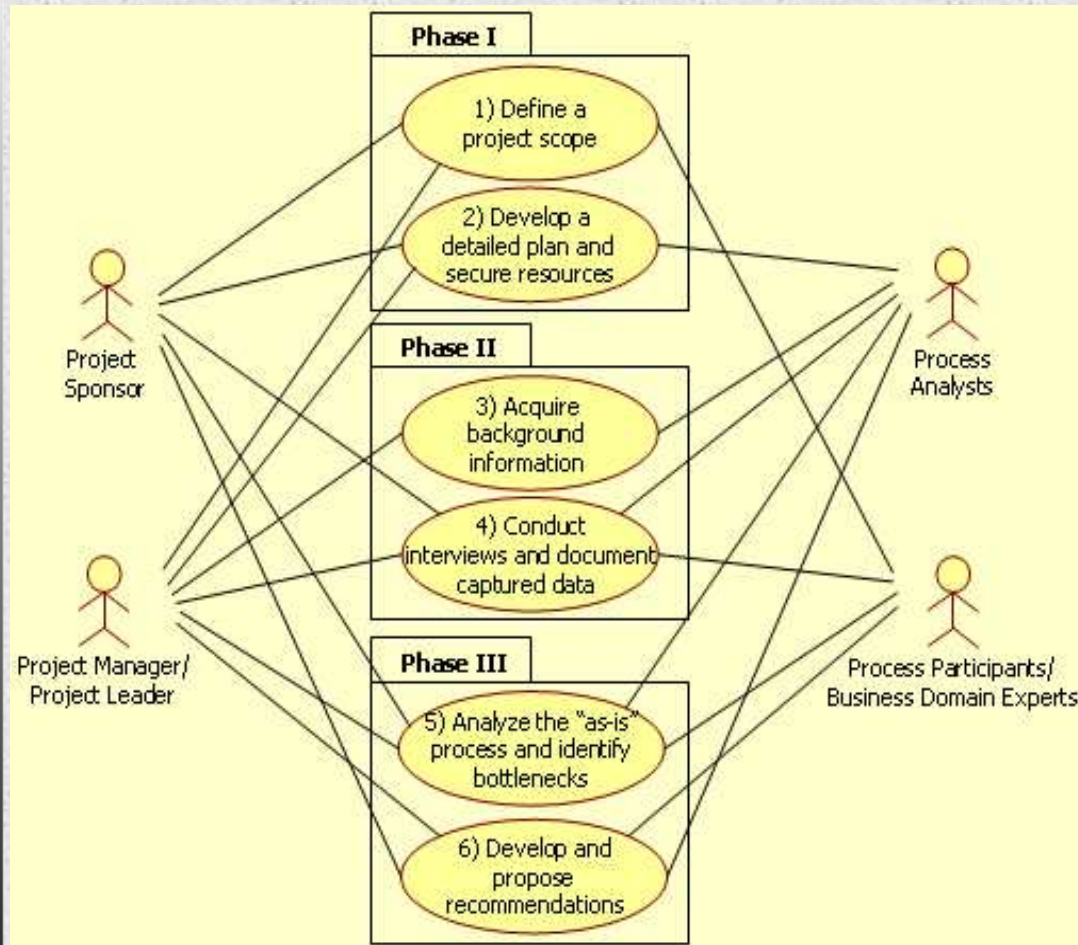


**Capture** business processes and identify documents and basic data requirements





# Major Phases of Business Process Analysis

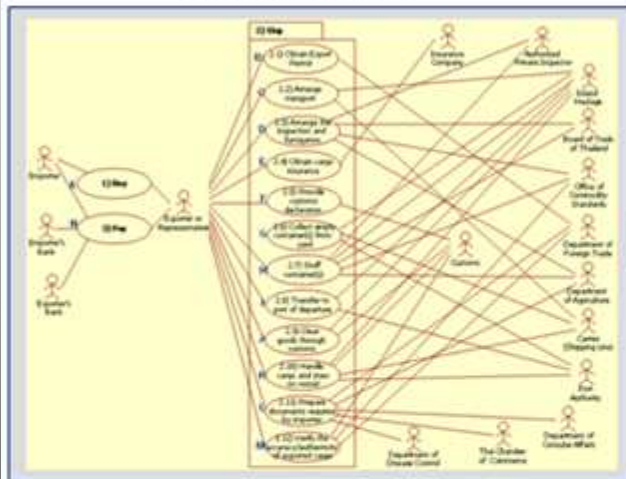


Phase I: **Scope setting**

Phase II: **Data collection  
& process documentation**

Phase III: **Process analysis  
& recommendations  
development**

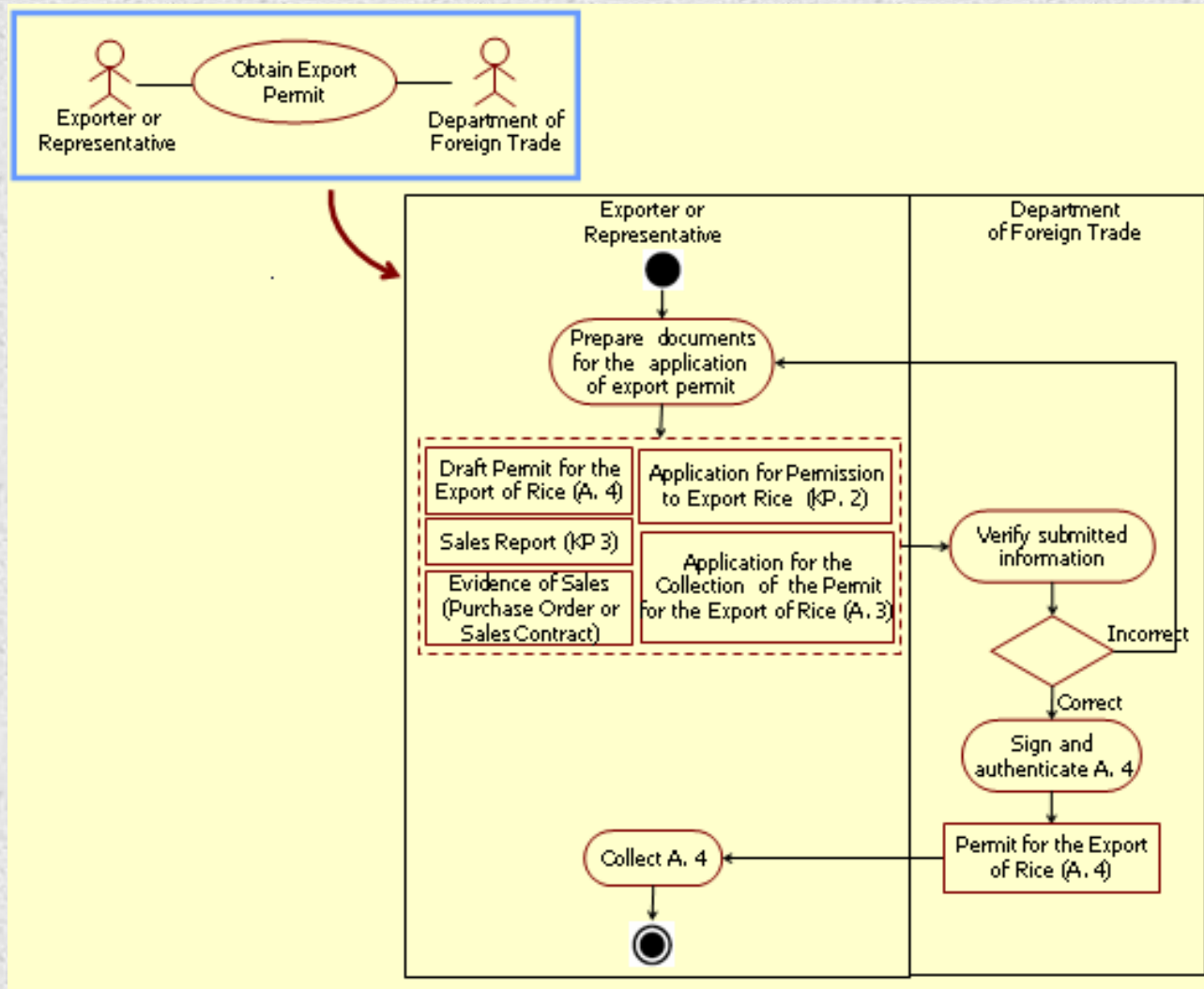
Use Case Diagram



Activity Diagram



# Use Case to Activity Diagram





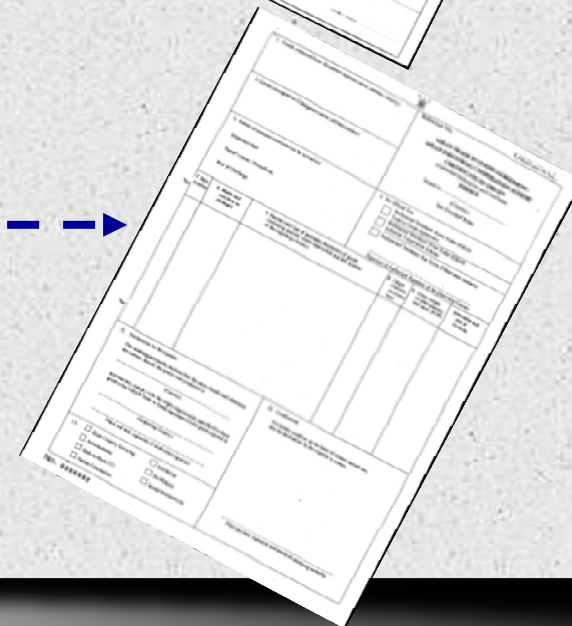
# Output: Collection of Documents, Forms and Messages

## Sample List of Documents and Forms Captured from Activity Diagrams

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

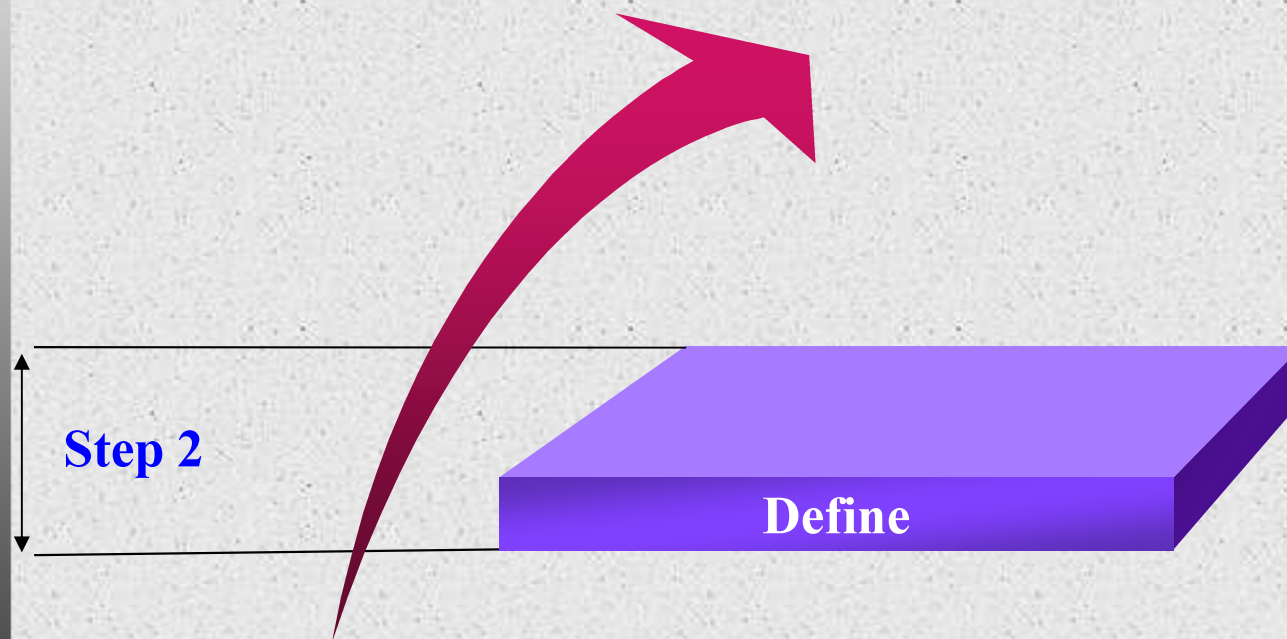


This is a sample of a complex export declaration form, likely a 'Formule de déclaration d'exportation' (Formal Declaration of Exportation). It features a grid-like structure with numerous fields for data entry, including sections for 'Informations générales' (General Information), 'Informations sur le produit' (Product Information), and 'Informations sur le transport' (Transport Information). The form is tilted and has a red circular stamp in the top left corner.

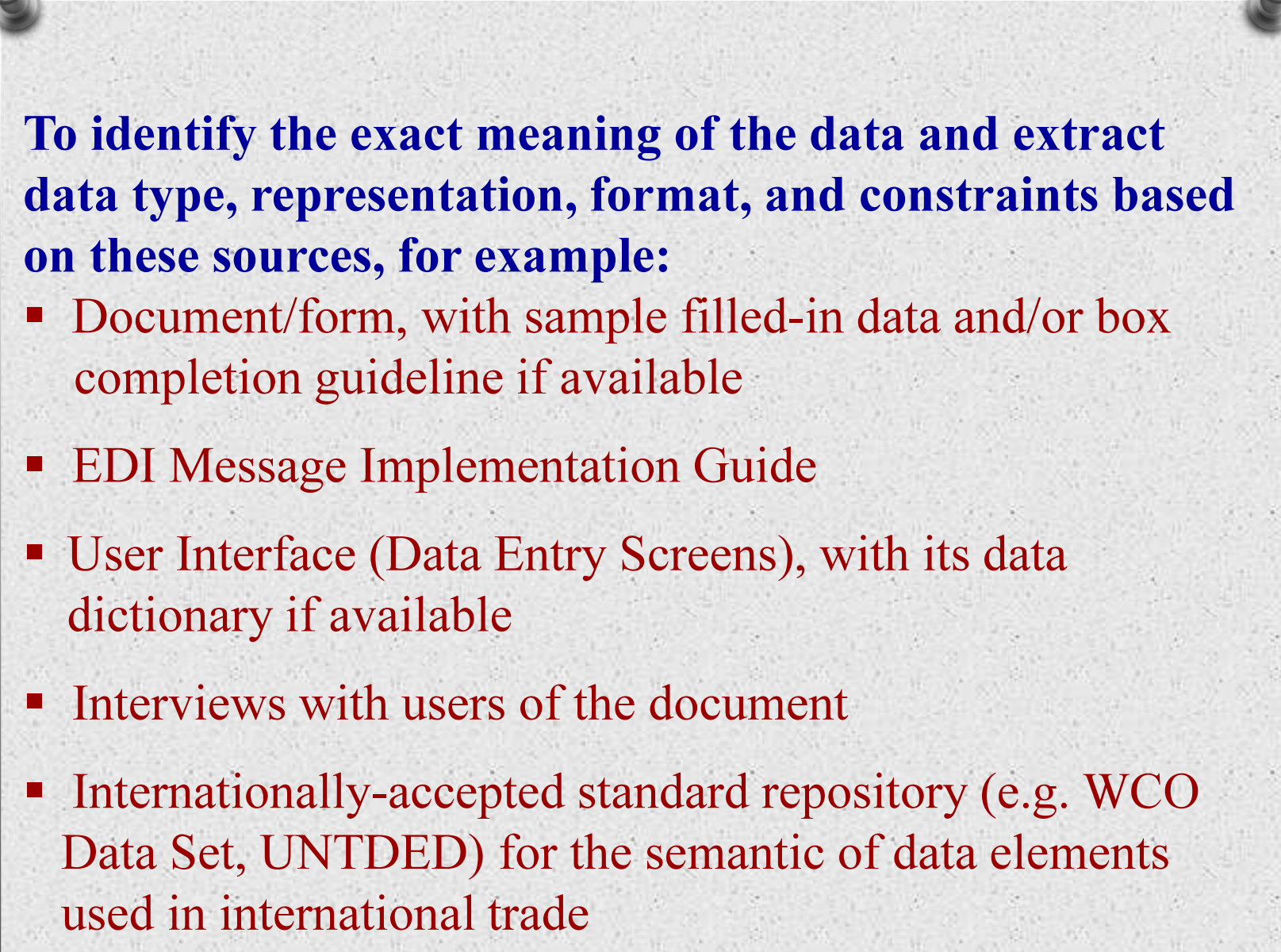


This is a sample of a phytosanitary certificate form, specifically a 'Certificat phytosanitaire' (Phytosanitary Certificate). It includes sections for 'Informations générales' (General Information), 'Informations sur le produit' (Product Information), and 'Informations sur le transport' (Transport Information). The form is tilted and has a red circular stamp in the top left corner.

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







**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 Set, UNTDED) for the semantic of data elements used in international trade

# Ex) Trade Data Elements Directory (UNTDDED – 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/m essage 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/m essage 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/m essage 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	Acknowledg ement of Order number	Purchase order response number		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 Set, 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)

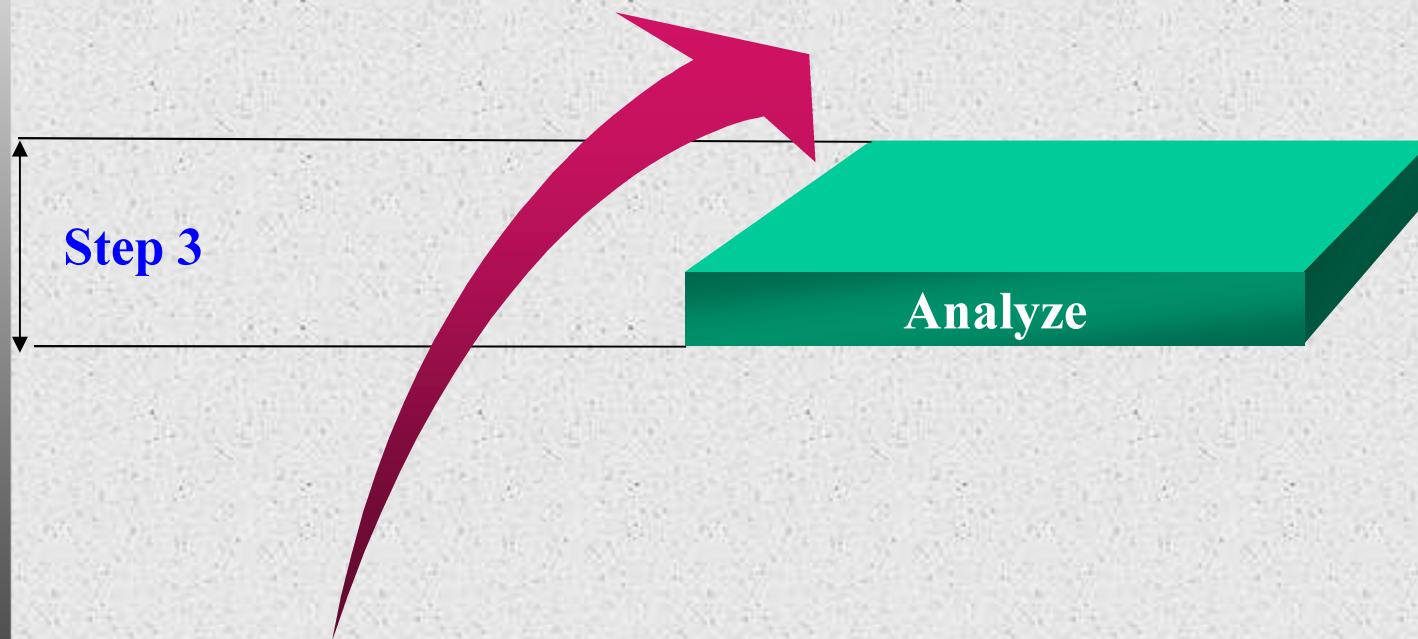
**TDED 1001: Code specifying the name of a document. an..3**  
(Min=1, Max=1)

**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

1. Goods consigned from (Exporter's business name, address, country)		Reference No. ASEAN TRADE IN GOODS AGREEMENT/ ASEAN INDUSTRIAL COOPERATION SCHEME CERTIFICATE OF ORIGIN (Combined Declaration and Certificate)		<b>ASEAN ATIGA FORM D Data</b>  <b>0-1 Reference Number</b> TDED 1004: Reference number identifying a specific document. an..35 (Min=1, Max=1)	
2. Goods consigned to (Consignee's name, address, country)		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 <input type="checkbox"/> Preferential Treatment Given Under ASEAN Trade in Goods Agreement <input type="checkbox"/> Preferential Treatment Given Under ASEAN Industrial Cooperation Scheme <input type="checkbox"/> Preferential Treatment Not Given (Please state reason/s)		<b>1 Goods consigned from (Exporter's business name, address, country)</b> 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)	
		Signature of Authorised Signatory of the Importing Country		<b>2 Goods consigned to (Consignee's name, address, country)</b> TDED 3132: Name and address of party to which goods are consigned an..512 (Min=1, Max=1)	
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		<b>3-1 Departure date</b> 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)	
				<b>3-2 Vessel's name/aircraft etc.</b> TDED 8212: Name of a specific means of transport such as the vessel name an..35 (Min=1, Max=1)	
				<b>3-3 Port of discharge</b> TDED 3224: Name of a location. an..256 (Min=1, Max=1)	
				<b>4 For official use (Declaration Type)</b> TDED 1001: Code specifying the name of a document. an..3 (Min=1, Max=1)	
13 <input type="checkbox"/> Third Country Invoicing <input type="checkbox"/> Exhibition <input type="checkbox"/> Accumulation <input type="checkbox"/> De Minimis <input type="checkbox"/> Back-to-Back CO <input type="checkbox"/> Issued Retroactively <input type="checkbox"/> Partial Cumulation				<b>5 Item No.</b> 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





**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 commercial transaction and payment.*
  - ✓ *Category 2: documents for transport and official control that provide information of a single consignment (e.g. customs declaration)*
  - ✓ *Category 3: documents of transport and official control that provide information of multiple consignments (e.g. manifest)*
- **Data dictionaries compilation** according to document categories/families

# Document Categorization

Example of Document Categorization based on UNLK

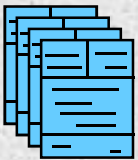
## UNLK Document Families



**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

<b>ASEAN ATIGA FORM D</b> A Certificate of Origin certifies expressly that the goods to which the certificate relates originate in a specific country. Issuing Authorities, Thailand	<b>Permit for the Export of Rice (A. 4)</b> 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	<b>Certificate of Standards of Products (MS. 24)</b> 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
	<b>11 Place of departure</b> 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)	<b>20 Place of departure</b> 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)
<b>11-2 Country of Exportation</b> TDED 3229: Country subdivision time of the departure of the goods item original consignor an..2 (Min=1, Max=1)	<b>5 Destination country</b> 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)	<b>21 Country of destination of goods</b> 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)
<b>5 Item Number</b> TDED 1050: Number indicating the position in a sequence n..5 (Min = 1, MAX = unbounded)	<b>12 Line item</b> TDED 1082: An identifier differentiating an individual line item from within a series an..6 (Min = 1, Max = unbounded)	
<b>9-2 Item Price</b> 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)	<b>17 Price (FOB)</b> 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)	<b>13 FOB Amount</b> 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)
<b>6 Marks and numbers on packages</b> TDED 7102: Free form description of the marks and numbers on a transport unit or package an..512 (Min=1, Max= unbounded)		<b>18 Marks and numbers on packages</b> 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)

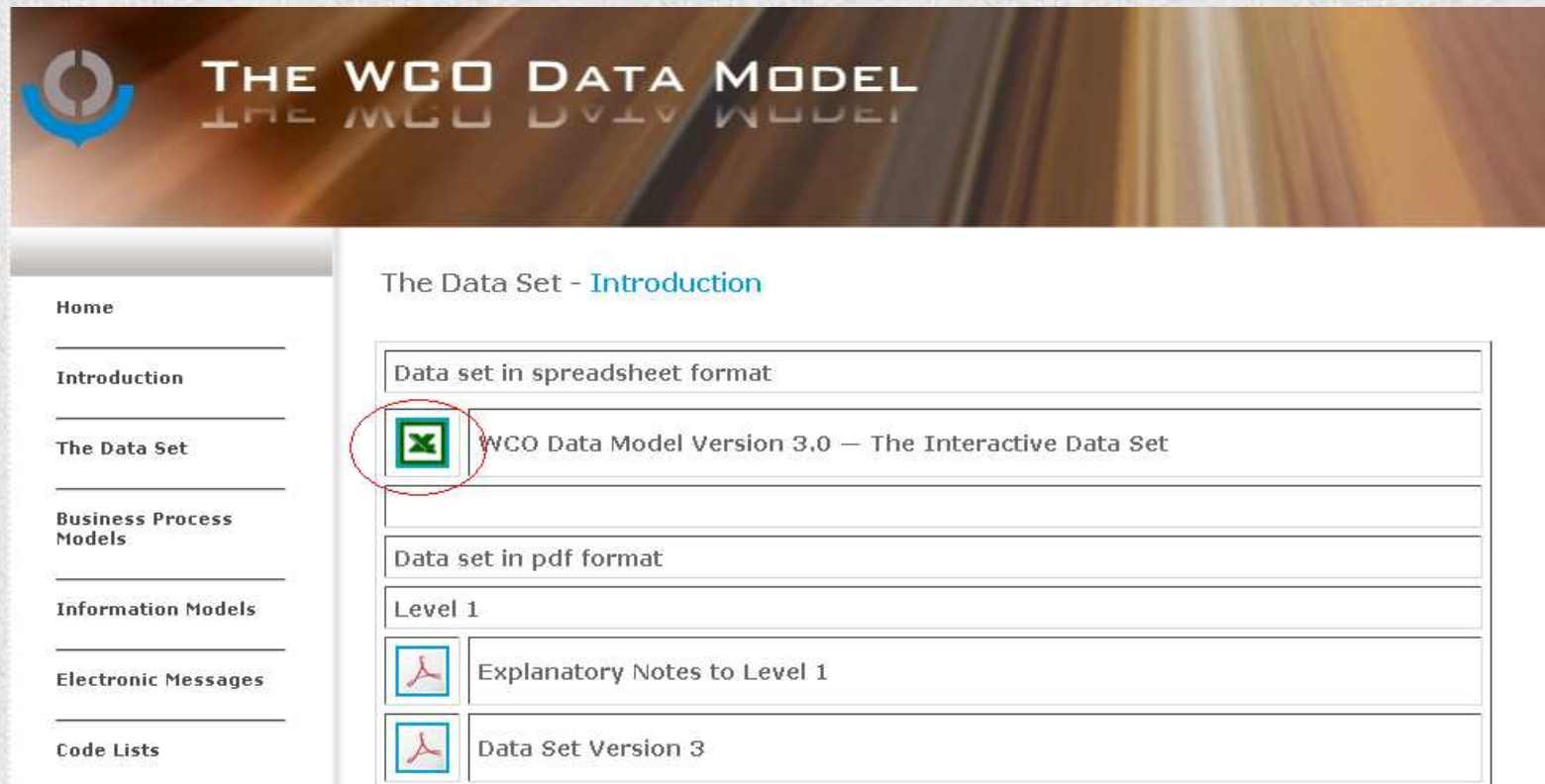


**To map the data elements in the compiled Data Dictionary with the semantically equivalent data element in Reference Data Model (example here is WCO DM).**




- ☐ 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



The screenshot shows the 'The WCO Data Model' website. The header features the logo and the title 'THE WCO DATA MODEL'. A left sidebar contains navigation links: Home, Introduction, The Data Set, Business Process Models, Information Models, Electronic Messages, and Code Lists. The main content area is titled 'The Data Set - Introduction'. It contains a table with the following rows:

Data set in spreadsheet format	
	WCO Data Model Version 3.0 — The Interactive Data Set
Data set in pdf format	
Level 1	
	Explanatory Notes to Level 1
	Data Set Version 3

The green Excel icon in the second row is circled with a red line.

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	<a href="#">Data Model Classes</a>						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 details				Import	Export	Conveyance	Transit	Response	WCO details		UNTDDED Details		DENS	SAFE
WCO ID	Name	Definition	Data Model Classes						Format	Code remarks	UID	Name		
142	Shipping marks	Free form description of the marks and numbers on a transport unit or package.	Packaging	X	X		X		an..512	UNECE 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	UNTDDED Details		DENS	SAFE
WCO ID	Name	Definition	<a href="#">Data Model Classes</a>						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				Import	Export	Conveyance	Transit	Response	WCO details		UNTDDED Details		DENs	SAFE
	WCO ID	Name	Definition	<a href="#">Data Model Classes</a>						Format	Code remarks	UID	Name		
1															
2															
3															
4															
45	105	Free text	Free text field available to the message sender for information.	AdditionalInformation	X	X	X	X		an..512		4440	FreeText.Text		
157	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
<b>0-1 Reference Number</b> TDED 1004: Reference number identifying a specific document. an..35 (Min=1, Max=1)	D014	Declaration	Declaration. Identification. Identifier
<b>1 Goods consigned from (Exporter's business name, address, country)</b> 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
<b>2 Goods consigned to (Consignee's name, address, country)</b> TDED 3132: Name and address of party to which goods are consigned an..256 (Min=1, Max= 1)	R037	Importer	Importer. Name. Text
<b>3-1 Departure date</b> 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
<b>3-2 Vessel's name/aircraft etc.</b> TDED 8212: name of specific means of transport such as vessel name an..35 (Min=1, Max= 1)	T001	ArrivalTransport Means	ArrivalTransportMeans. Name. Text
<b>3-3 Port of discharge</b> TDED 3224: Name of a location an..256 (Min=1, Max=1)	L012	UnloadingLocation	UnloadingLocation. Name. Text
<b>4 For official use (Declaration Type)</b> TDED 1001 : Code specifying the name of a document. an..3 (Min=1, Max=1)	D013	Declaration	Declaration.Type. Code
<b>5 Item No.</b> TDED 1050: Number indicating the position in a sequence n..10 (Min=1, Max=1)	006	Commodity	Commodity. Sequence. Numeric

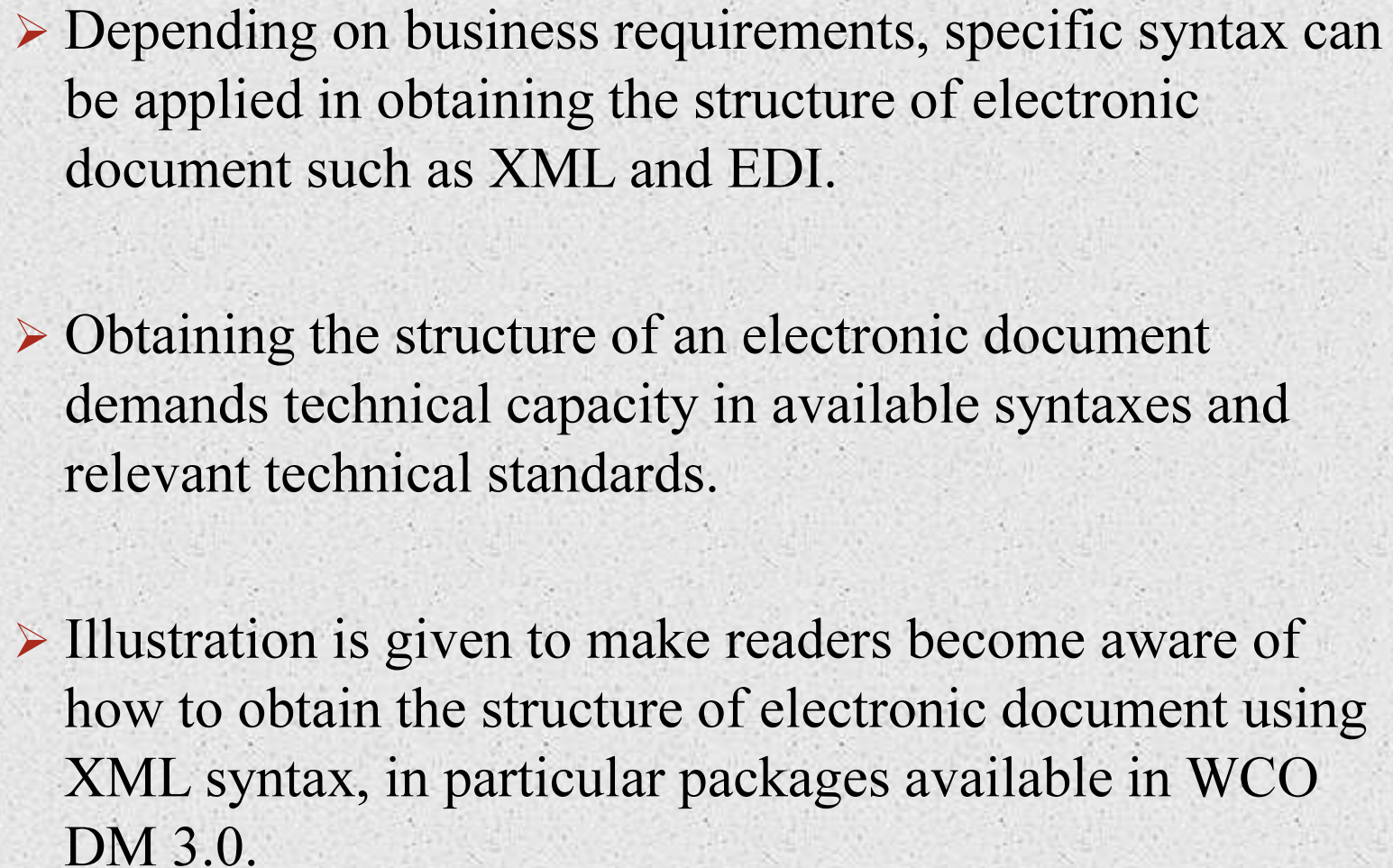


## Obtain the structure of the electronic document

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)

```
- <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
<b>Goods consigned from (Exporter’s business name, address, country)</b> 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>WC0IDR031</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

[illegible]

Marked



# Final ASEAN ATIGA Form D XML Schema

```
<?xml version='1.0' encoding='UTF-8'?>
<?xml-styleSheet href="GenHTML(H).xsl" type="text/css"?>
<!-- ===== WCO Declaration ===== -->
<!-- ===== ASEAN ATIGA FORM D Schema ===== -->
<!-- ===== -->

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addressed to copyright@wcoomd.org ? .

-->
<!-- ===== -->
<xsd:schema xmlns:uf="urn:unicef:data:standard:UnqualifiedDataType:6" xmlns:ds="urn:wco:datamodel:standard:WCO:DS:1"
xmlns:cbs="urn:unicef:data:documentation:standard:CoreComponentsTechnicalSpecification:2"
xmlns:xsd="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified" attributeFormDefault="unqualified" version="1.0">
<!-- ===== -->
<!-- ===== Imports ===== -->
<!-- ===== -->
<xsd:import namespace="urn:unicef:data:standard:UnqualifiedDataType:6" schemaLocation="http://www.unicef.org/unicef/
dataStandard/UnqualifiedDataType_6p0.xsd"/>
<xsd:import namespace="urn:wco:datamodel:standard:WCO:DS:1" schemaLocation="..common/DS_1p0.xsd"/>
<!-- ===== -->
<!-- ===== Root element ===== -->
<!-- ===== -->
<xsd:element name="Declaration">
<xsd:complexType>
<xsd:sequence>
<!--Declaration Date-->
<xsd:element name="AcceptanceDateTime" type="ds:DeclarationAcceptanceDateTimeType"/>
<!--Declaration Place-->
<xsd:element name="DeclarationOfficeID" type="ds:DeclarationDeclarationOfficeIDType"/>
<!--Declarant's reference number-->
<xsd:element name="ID" type="ds:DeclarationIdentificationIDType"/>
<!--Submission Date/Time-->
<xsd:element name="IssueDateTime" type="ds:DeclarationIssueDateTimeType"/>
<!--Document Code-->
<xsd:element name="TypeCode" type="ds:DeclarationTypeCodeType"/>
<xsd:element name="AdditionalDocument">
<xsd:complexType>
<xsd:sequence>
<!--CertificationPlace-->
<xsd:element name="AuthenticationLocationName" type="ds:AdditionalDocumentAuthenticationLocationNameTextType"/>
<!--Issued in (Country) Code-->
<xsd:element name="IssueLocationID" type="ds:AdditionalDocumentIssueLocationIDType"/>
<!--Issued in (Country) Name-->
<xsd:element name="IssueLocation" type="ds:AdditionalDocumentIssueLocationTextType" minOccurs="0"/>
<!--Add sequence-->
<xsd:complexType>
<xsd:sequence>
<!--For Official use-->
<xsd:element name="Content" type="ds:AdditionalInformationContentTextType" minOccurs="0"/>
<!--C/O Type-->
<xsd:element name="StatementCode" type="ds:AdditionalInformationStatementCodeType" minOccurs="0"/>
<!--Add sequence-->
```



# Steps and Activities

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

# Tools for Development of Electronic Documents

Steps	Suggested Tools
<b>Step 1:</b> Capture business processes and identify documents and basic data requirements	<ul style="list-style-type: none"><li>• <b>UMM</b> (UN/CEFACT Modeling Methodology)</li><li>• <b>UML</b> (Unified Modeling Language)</li><li>• <b>UNNEXT BPA Guide</b></li></ul>
<b>Step 2:</b> Analyze data in each document and define the semantic of the data and the data formats	<ul style="list-style-type: none"><li>• <b>UNTDDED</b> (United Nations Trade Data Elements Directory)</li><li>• <b>CCTS</b> (UN/CEFACT Core Component Technical Specification)</li><li>• <b>UNNEXT DH Guide</b></li></ul>
<b>Step 3:</b> Analyze data elements across various documents and organize them in a comparable manner	<ul style="list-style-type: none"><li>• <b>UNLK</b> (United Nations Layout Key)</li><li>• <b>UNTDDED</b></li><li>• <b>UNNEXT DH Guide</b></li></ul>
<b>Step 4:</b> Map data elements to a Reference Data Model	<ul style="list-style-type: none"><li>• <b>UN Core Component Library</b></li><li>• <b>WCO Data Model</b></li><li>• <b>UNNEXT DH Guide</b></li></ul>
<b>Step 5:</b> Obtain the structure of electronic document	<ul style="list-style-type: none"><li>• <b>UN XML NDR, EDIFACT MIGs</b></li><li>• <b>WCO EDIFACT MIG/XML Schemas</b></li></ul>



## 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

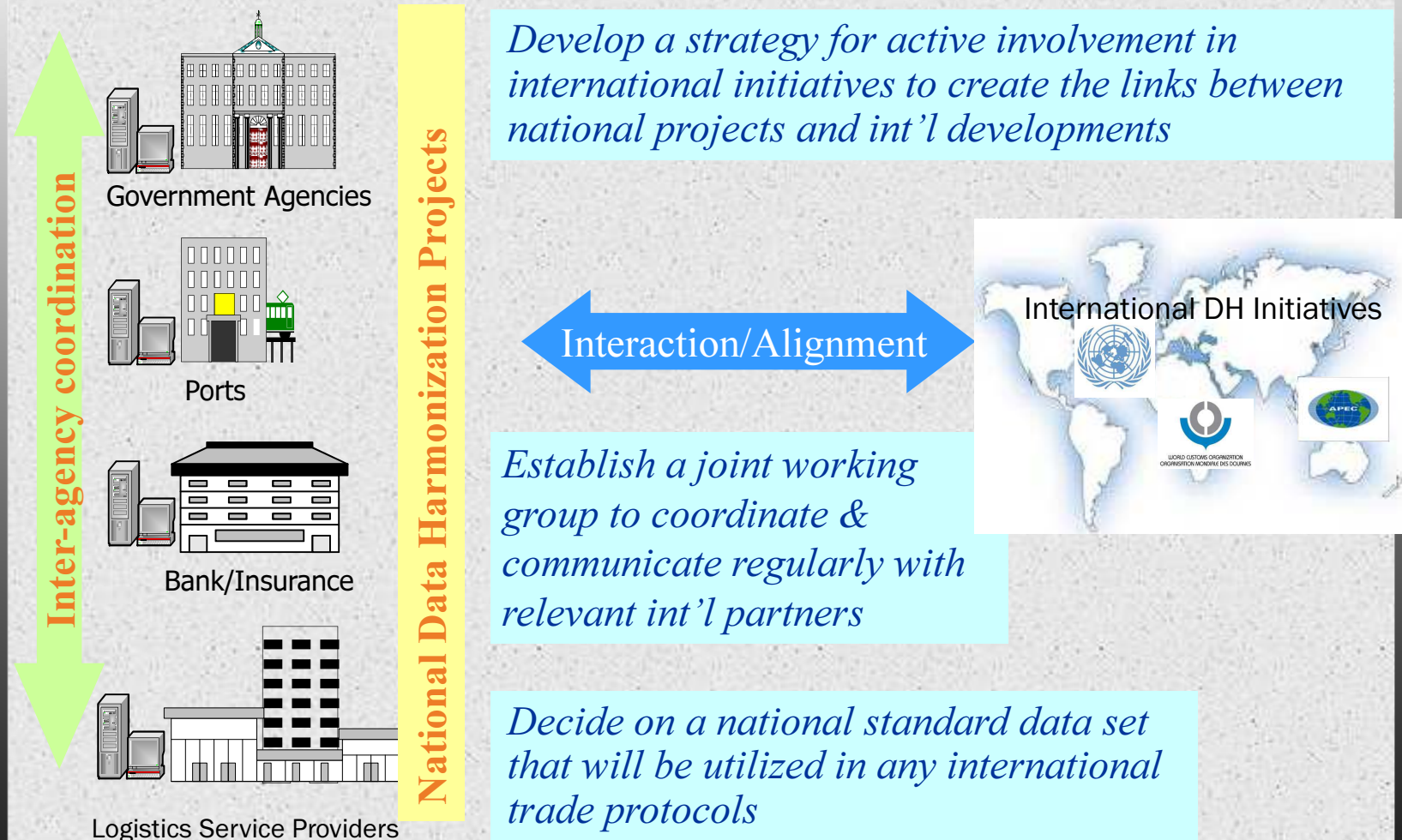
Technical nature of data harmonization and  
its multi-stakeholder involvement



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

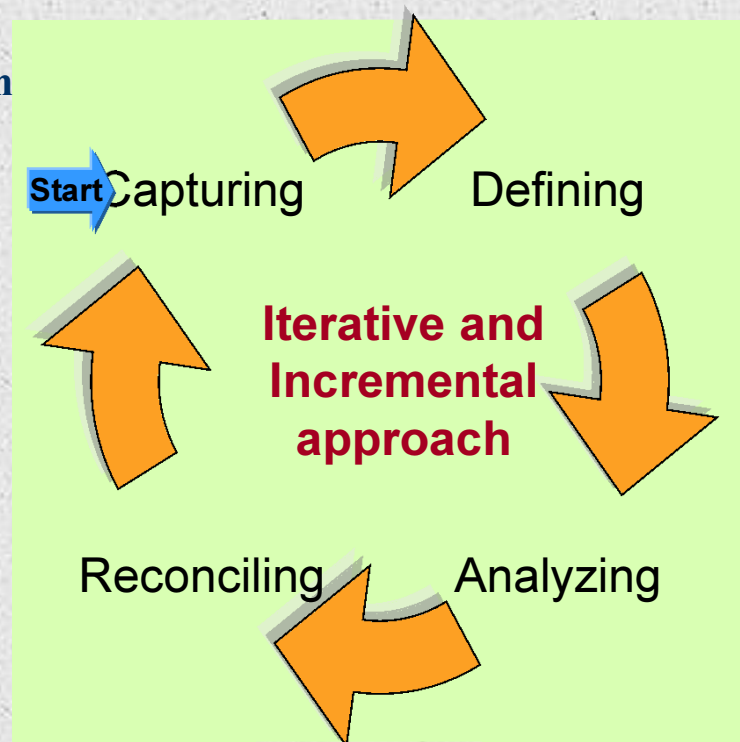
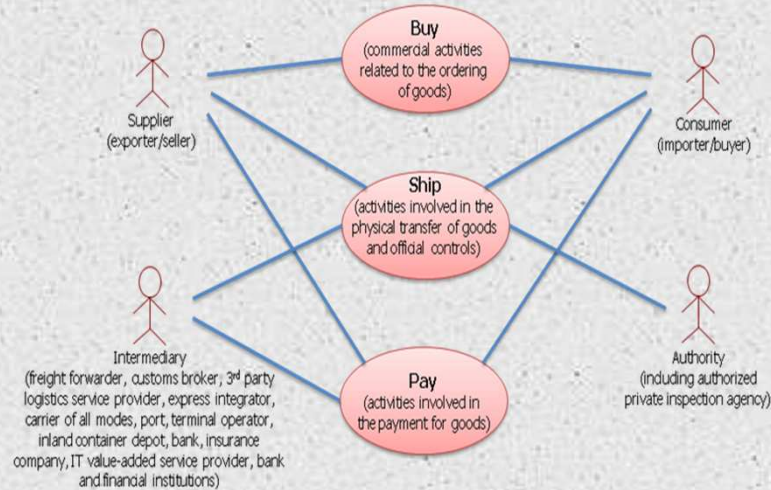
Institutional Mechanism	Stakeholders	Regional/Int'l Initiatives
<i>Arrange an institutional unit to manage a data harmonization program</i>	<i>Identify main stakeholders, their roles, objectives and concerns for their active involvement</i>	<i>Pay due attention to regional/ int'l initiatives which develop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

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



### 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**





#### 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

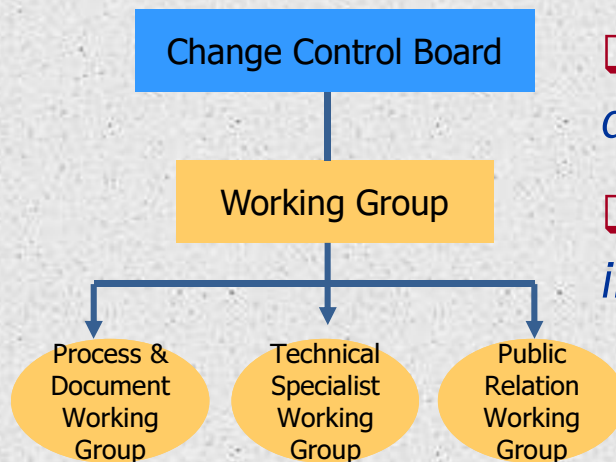
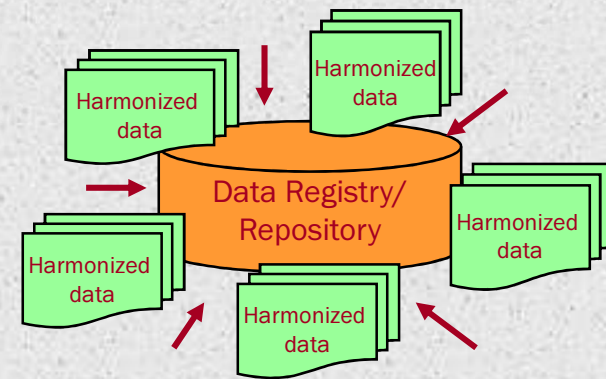
*Select a data model that promote semantic interoperability in compliance with relevant international standards for electronic data exchange*

##### 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*



- ❑ *Monitor changes in and maintain data harmonization baselines*
- ❑ *Publicize and promote implementation of new baselines*



Thank you