

# Machine Learning Approaches for Fraud Analytics in Customs

35th UN/CEFACT Forum Webinar  
Advancements in AI towards facilitating cross border paperless trade

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Jonathan Koh  
Trade Facilitation Pte Ltd



**Trade Facilitation**

# Challenges faced by Customs administrations

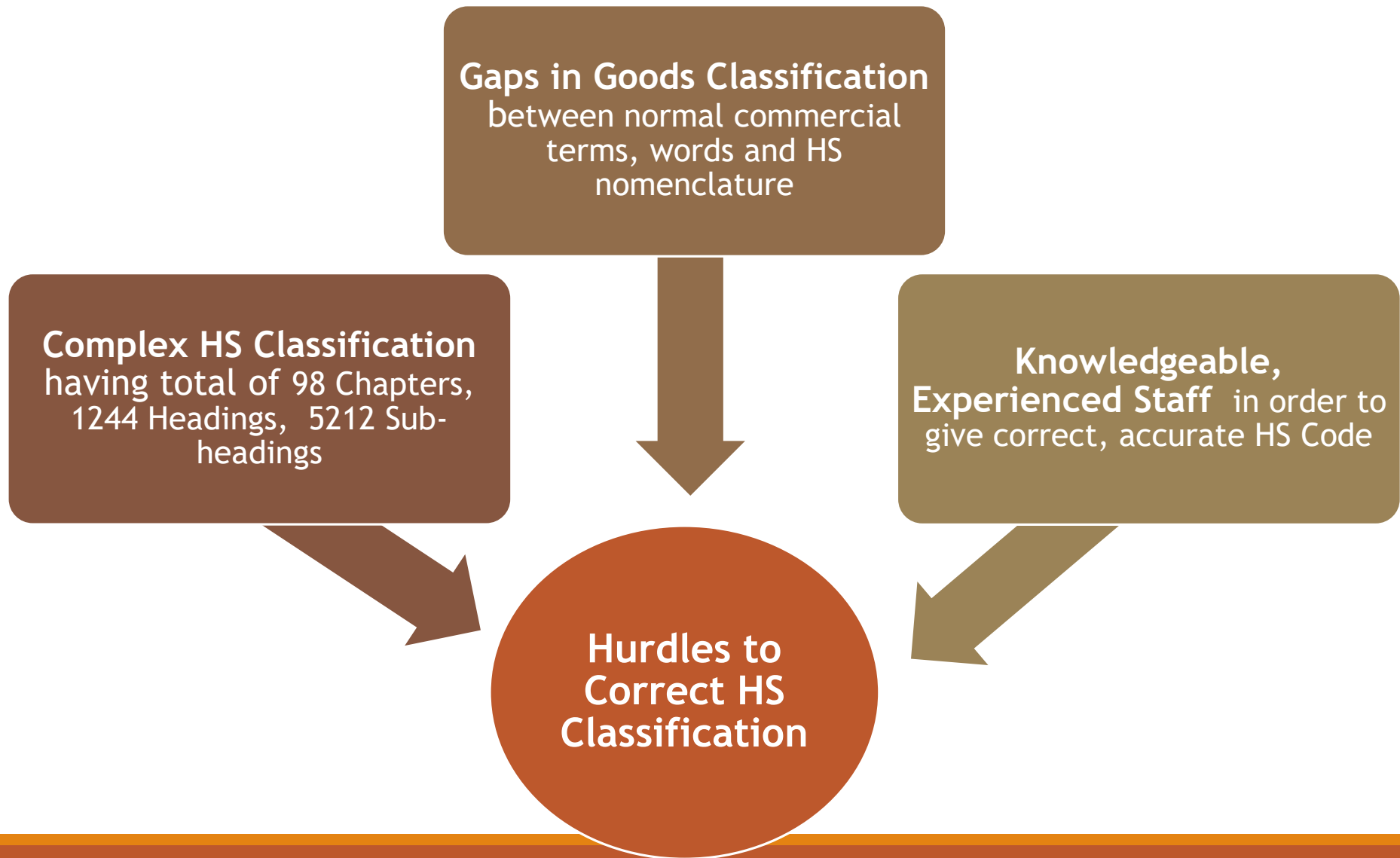
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- *Ensuring speed and efficiency* in the clearance process for an increasing volume of transactions
- *Managing change* from a few large/bulk shipments into a large number of low-value and small shipments
- *Managing risks* posed by limited knowledge on importers and the e-commerce supply chain
- *Ensuring data quality* (accuracy and adequacy of the data received)
- Defining the *role and responsibility (liability)* of e-commerce operators to assist governments (e-vendors/intermediaries)
- Identifying *abuse or misuse of 'de minimus'* for illicit trade purposes (splitting of consignments/undervaluation)
- Ensuring *compliance* with *classification and origin rules*
- *Integration* of e-commerce vs traditional trade

# Goods Classification/ HS Codes Problems

# Challenges in HS Classification

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# Goods Classification

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Classification codes are used for three main purposes:

- Calculation of duties, taxes and fees
- Determination of permits, licenses and certificates requirements
- Collection of trade statistics

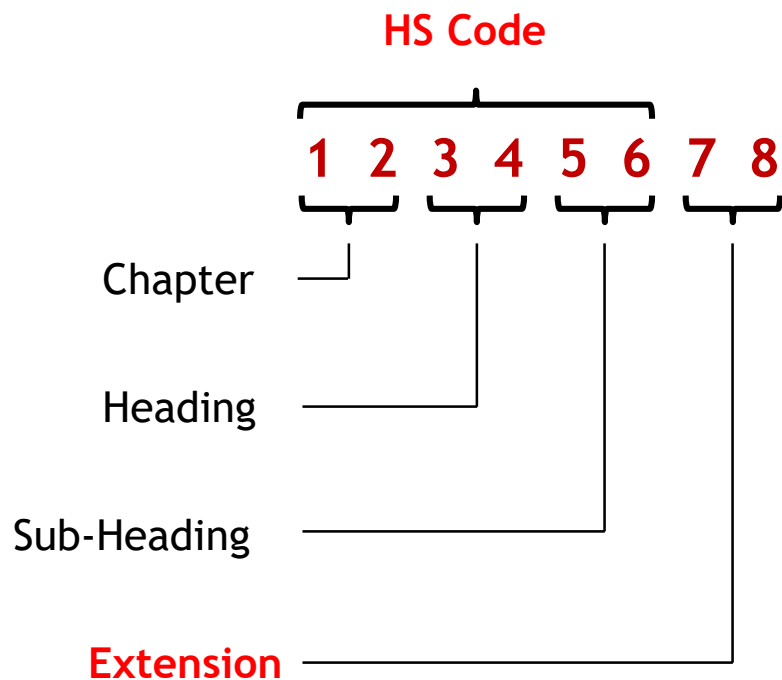
# Importance of Goods Classification

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## Classification determines the regulatory rules to be applied to declarations

- **Calculation of duties, taxes and fees is also dependent on**
  - FOB value
  - Country of origin
  - Certificates of origin
  - Exchange rates
  - Tariff concession codes
- **Collection of National Trade Statistics**
  - Exports
  - Imports
  - Transshipments
- **Permits, Licenses or Certificates to export / import**
  - Customs also act on behalf of Other Government Authorities (OGA)
  - Examples of permits , licenses, certificates
    - Health permits
    - Veterinary certificates
    - CITES certificates
    - Phytosanitary certificates

# HS Codes



A **6-digit code** consisting of three parts:

- Chapter,
- Heading and
- Sub-Heading

Arranged in a logical structure,

- by section,
- used to classify goods for export / import

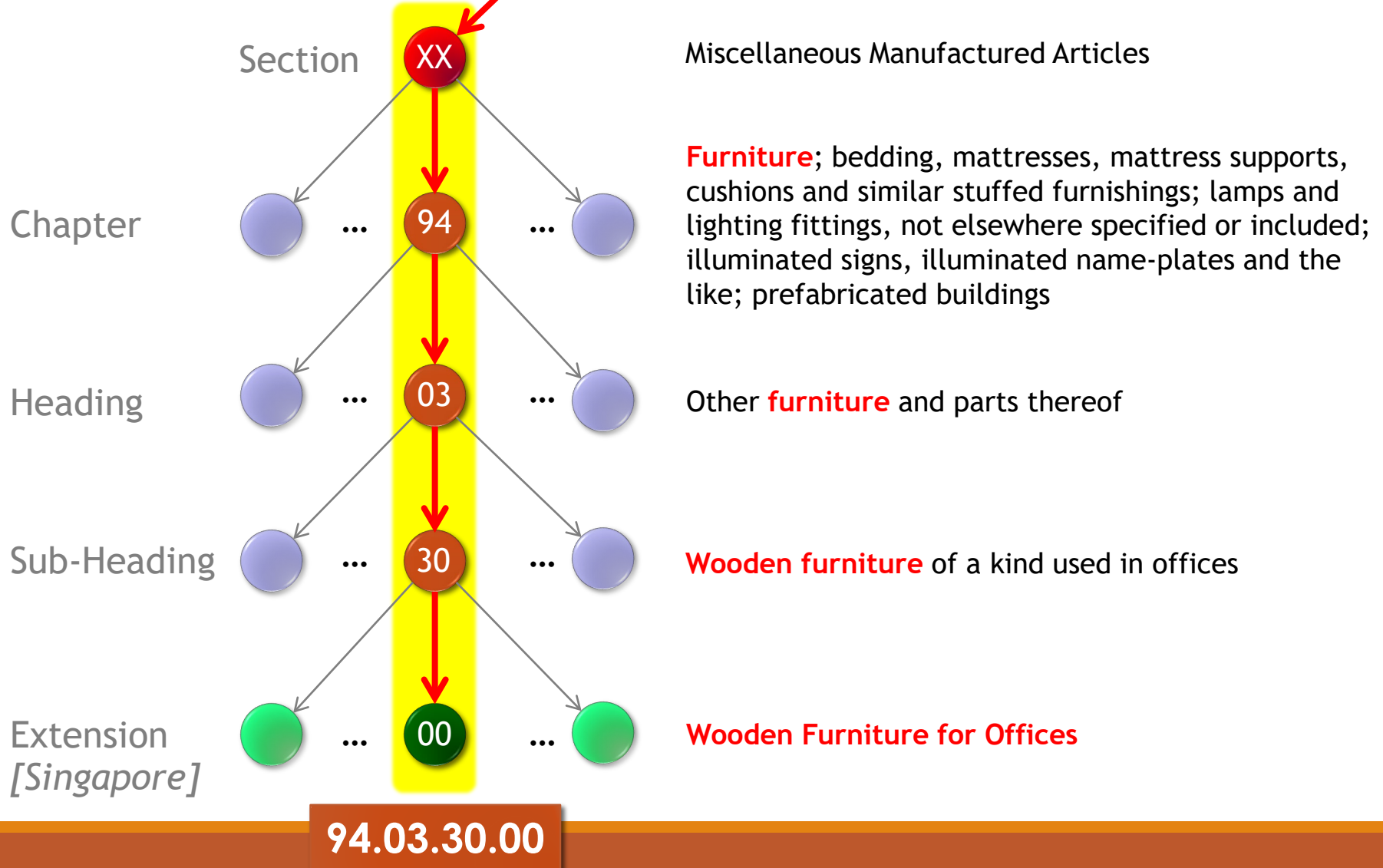
# HS Codes - Top-Level Classification

SECTION	TITLE	CHAPTERS
I	LIVE ANIMALS; ANIMAL PRODUCTS	01 - 05
II	VEGETABLE PRODUCTS	06 - 14
III	ANIMAL OR VEGETABLE FATS AND OILS AND THEIR CLEAVAGE PRODUCTS; PREPARED EDIBLE FATS; ANIMAL OR VEGETABLE WAXES	15
IV	PREPARED FOODSTUFFS; BEVERAGES, SPIRITS AND VINEGAR; TOBACCO AND MANUFACTURED TOBACCO SUBSTITUTES	16 - 24
V	MINERAL PRODUCTS	25 - 27
VI	PRODUCTS OF THE CHEMICAL OR ALLIED INDUSTRIES	28 - 38
VII	PLASTICS AND ARTICLES THEREOF; RUBBER AND ARTICLES THEREOF	39 - 40
VIII	RAW HIDES AND SKINS, LEATHER, FURSKINS AND ARTICLES THEREOF; SADDLERY AND HARNESS; TRAVEL GOODS, HANDBAGS AND SIMILAR CONTAINERS; ARTICLES OF ANIMAL GUT (OTHER THAN SILK-WORM GUT)	41 - 43
IX	WOOD AND ARTICLES OF WOOD; WOOD CHARCOAL; CORK AND ARTICLES OF CORK; MANUFACTURES OF STRAW, OF ESPARTO OR OF OTHER PLAITING MATERIALS; BASKETWARE AND WICKERWORK	44 - 46
X	PULP OF WOOD OR OF OTHER FIBROUS CELLULOSIC MATERIAL; RECOVERED (WASTE AND SCRAP) PAPER OR PAPERBOARD; PAPER AND PAPERBOARD AND ARTICLES THEREOF	47 - 49
XI	TEXTILES AND TEXTILE ARTICLES	50 - 63
**	OTHER	98



# Classification & HS Codes

Office Table made of Wood



# Example of an Invoice & Goods Description



**"Your Contract Furniture Source"**

**Insalco Corporation**  
**7 Capital Drive**  
**Wallingford, CT 06492**  
**Phone: (203) 269-1238**  
**Fax: (203) 265-9378**  
**www.insalco.com**

**Customer: CHESHIRE POLICE DEPT**

**Sales Rep: Evan Golden**

**INVOICE**

**1765**

**Proposal: 2010-3201**  
**Invoice Date: 5/18/2011**  
**Due Date: 6/17/2011**

Item No.	Item Description	Qty	Item Sell	Ext Sell
Line: 24 WW2448WSSL	National Office Furniture - Furniture Sales WAVEWORKS,24DX48W,SURFACE,RECTANGULAR,LAMINAT E - Honey	1	\$120.29	\$120.29
Line: 25 WW7227MPM	National Office Furniture - Furniture Sales WAVEWORKS,72WX27H,MODESTY PANEL,METAL Graphite - 461	2	\$94.55	\$189.10
Line: 26 WW3323MPM	National Office Furniture - Furniture Sales WAVEWORKS,33WX23H,MODESTY PANEL,METAL Graphite - 461	1	\$58.41	\$58.41
Line: 27 WW2315PUBBFM	National Office Furniture - Furniture Sales WAVEWORKS,23DX15W,PEDESTAL,UNDERSURFACE,BOX/B OX/FILE,Graphite - 461	1	\$196.52	\$196.52
Line: 28 WW3015PUFFM	National Office Furniture - Furniture Sales WAVEWORKS,30DX15W,PEDESTAL,UNDERSURFACE,FILE/F ILE, METAL -- Graphite - 461	1	\$181.17	\$181.17
Line: 29 WW0827SPM	National Office Furniture - Furniture Sales NONGSA WAVEWORKS,8DX27H,SUPPORT CORNER POST,METAL Graphite - 461	2	\$109.89	\$219.78
Line: 30 WW1227SRM	National Office Furniture - Furniture Sales WAVEWORKS,12DX27H,RETURN SUPPORT PANEL,METAL Graphite - 461	2	\$49.01	\$98.02
Line: 31 WW1423MPM	National Office Furniture - Furniture Sales WAVEWORKS,14WX23H,MODESTY PANEL,METAL Graphite - 461	1	\$53.46	\$53.46

# Mis-classification in HS code

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Undervaluation is the most common type of customs fraud - mis-classification is very common.

## Interpretation Challenges

- Differences of opinion interpretation of the HS nationally and internationally
- WCO Explanatory Notes - usually not binding in all countries
- Legal Notes - which are legally binding
- General Interpretive Rules (GIRs) for the HS - not always universal
- Advance rulings
- Customs directives on the classification of certain goods

# Penalties for Mis-classification in HS code


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- It is common most Customs laws provides for a penalty regime for incorrect tariff classification.
- clear parameters to ensure that requirements and obligations are clearly understood, and that there is a redress or appeal procedure in place.
- Did the importer or the Customs broker know that an incorrect HS code was used? Did they ignore a ruling?
- Penalties can cause great impact - penalty amount assessed, plus possible additional duties and taxes, etc
- Penalties should not be seen as the only way to promote compliance and deter non-compliance
- We need the best possible mechanisms to resolve differences of opinion and to educate all who have responsibility for HS classification, inside and outside Customs.

# Machine Learning (ML)

# Applying Machine Learning (ML) for HS Goods Classification

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## Conventional approach - Rule Based

- High costs
- Time consuming
- Tedious troubleshoot
- Error prone
- Manual maintenance



## Machine Learning

- Reduce costs
- Reduce time
- **Learning** capability (incremental)
- Less prone to errors
- **Automated** maintenance

# Efforts in Applying ML for HS Goods Classification

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**Brazil** - The Customs Selection System through Machine Learning (SISAM) is an artificial intelligence which learns from historical import declarations and help to reduce the percentage of goods verified during customs clearance and thus reduce tax evasion and noncompliance with administrative requirements like failing to obtain consents from the ministries of health, agriculture or defence.

*Source : [http://www.jambeiro.com.br/jorgefilho/sisam\\_mono\\_eng.pdf](http://www.jambeiro.com.br/jorgefilho/sisam_mono_eng.pdf)*

**China** - This effort proposes a text-image adaptive convolutional neural network to effectively utilize website information and facilitate the customs classification process, helping cross-border e-commerce sellers to classify goods efficiently.

*Source: “Customs classification for cross-border e-commerce based on text-image adaptive convolutional neural network” by Guo Li & Na Li , School of Management and Economics, Beijing Institute of Technology, Beijing*

**The Netherlands** - The effort sought to classify products descriptions with convolutional neural networks (CNNs), a deep learning technique for text classification with good success, and we obtain domain-specific word embeddings by iterative pre-training on context-rich, domain-specific corpora we obtain from DBpedia, scraping Wikipedia and public data sets. The corpora we create contain almost two billion tokens.

*Source - Masters thesis by Classifying Short Text for the Harmonized System with Convolutional Neural Networks - Jeffrey Luppens*

# Efforts in Applying ML for HS Goods Classification

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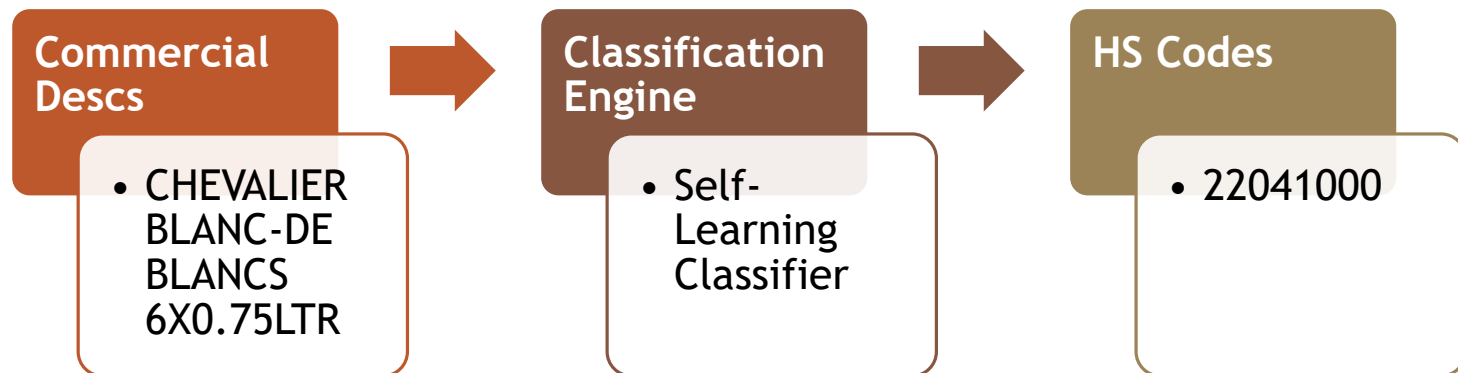
**Singapore** - This effort aims to produce an auto-categorization system is expected to accurately classify products into HS codes based on the text description of the goods declaration using background nets approach as the key technique for the development of classification engine in the system.

*Source : “Auto-Categorization of HS Code Using Background Net Approach” Liya Dinga et al , Institute of Systems Science, National University of Singapore*



# Applying Machine Learning (ML) for HS Goods Classification

- Classify the products according to HS System based on a given description accurately and efficiently
- A highly flexible and adaptable ML engine with self-learning capability from historical data, catering to continuous changing product descriptions
- Able to learn from product descriptions written in different languages



# HS Classification Mechanics

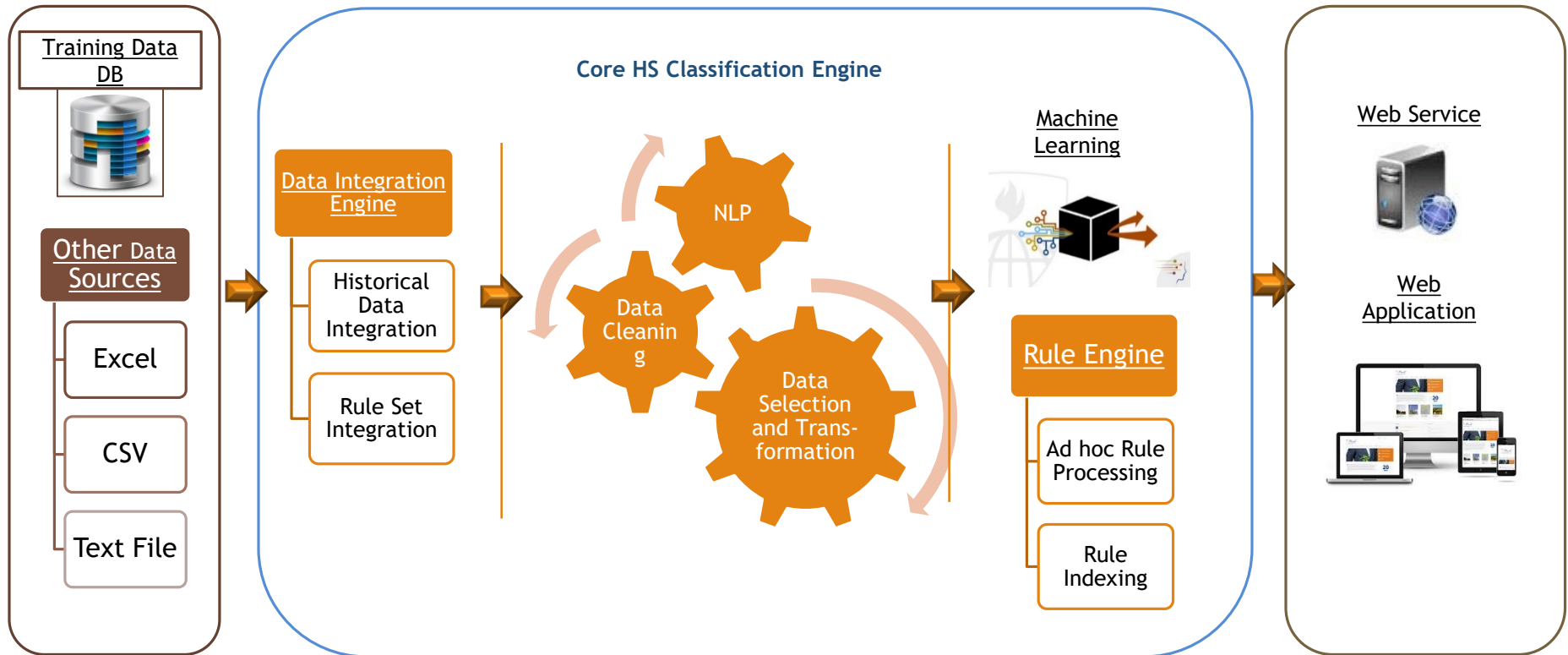
Data Source

Data Integration

Data Preparation

Modeling

Deployment



# Key Features/Capabilities

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## Search

- By HS Code (2/4/6/8 digits)
- By Chemical Abstract Number (CAS)
- By Product Code, Name
- By HS Alphabetical Index (HSAI)

## Localisation

- Multi-language Support
- Understand use of localised words & terms

## Semantics

- Understand meaning of whole sentence in query
- Ability to detect noise in query and omit in search
- Detect spelling errors and Auto correct

# Benefits

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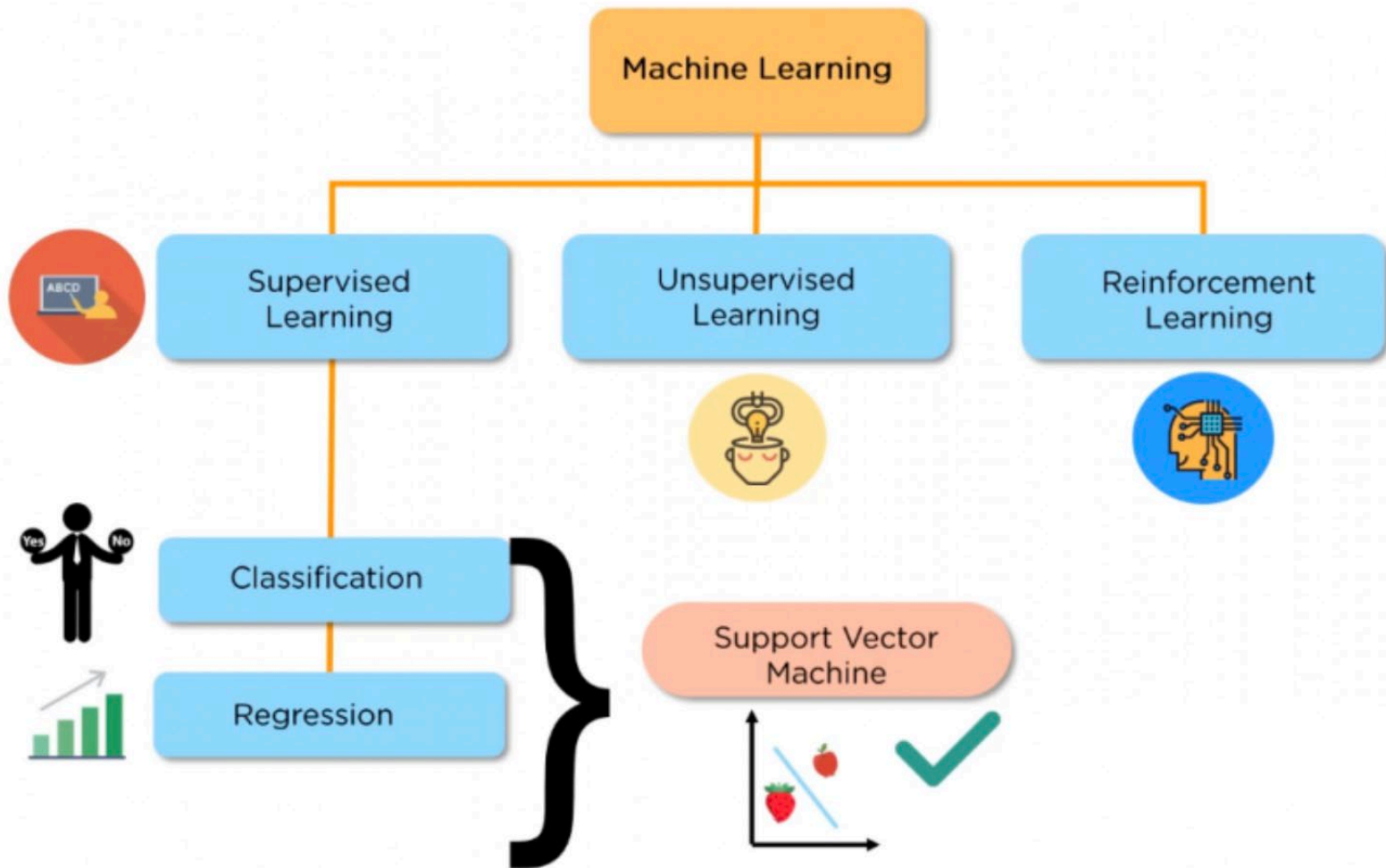
## For Traders

- More Accurate Classification of Goods
- Save Time, Costs
- Faster Clearance & Approval

## For Government Agencies

- Better Compliance from Trading Community
- Better Risk Assessment
- Prevention of Fraud
- Better Statistics

# Machine Learning



Source: <https://spotle.ai/feeddetails/Machine-Learning-A-Crash-Course-On-Support-Vector-Machines/3339>

# Support Vector Machine (SVM)

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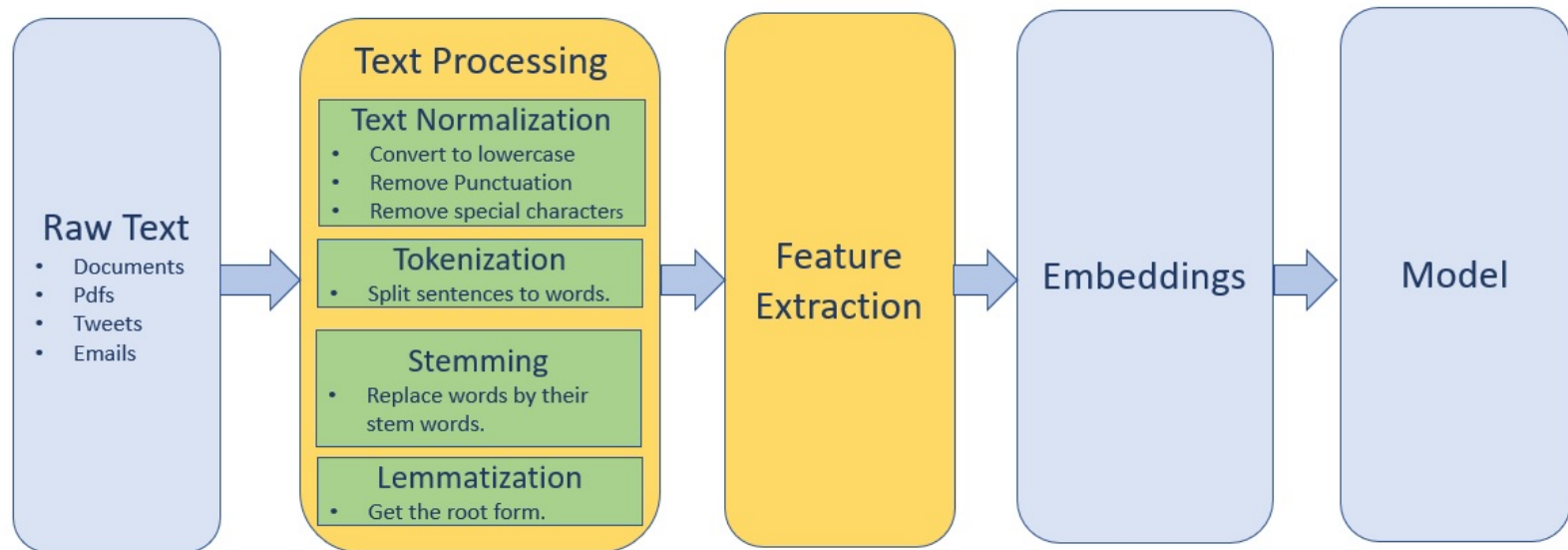
Support-vector Machines (SVMs), are supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis. Applications includes:

- **Face recognition:** SVM classifies parts of the image as face and non-face and draws a square box around it.
- **Hypertext and text categorization:** SVM will allow both hypertext and text categorization. By using training data it classifies documents into categories. It differentiates by using score generated and then compares with the threshold value.
- **Image classification:** It provides great search accuracy for classifying the image. SVM will give better accuracy comparing with traditional query-based search algorithms.
- **Recognizing handwriting:** We use SVM to recognize handwritten characters.

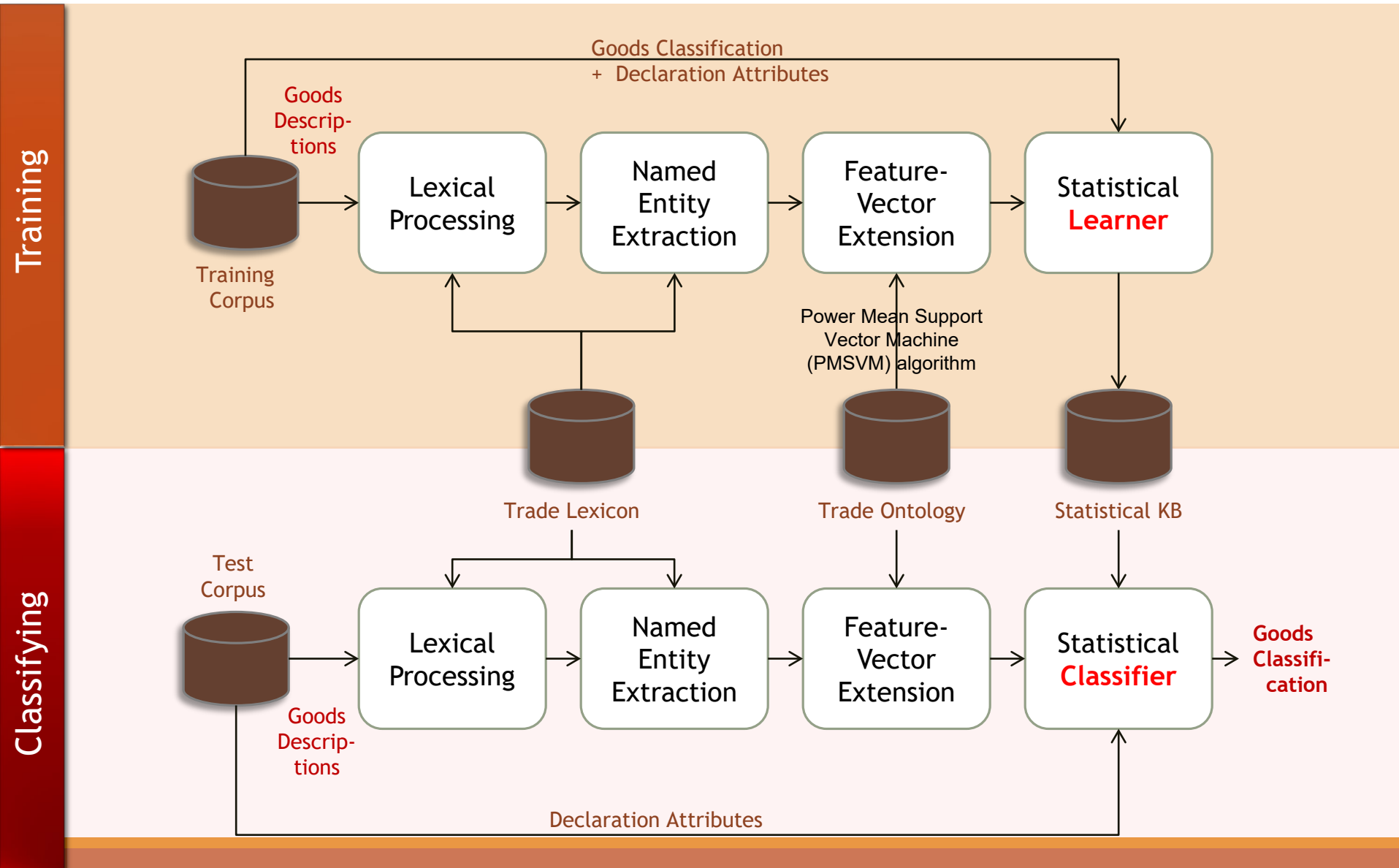
# Natural Language Processing

Text mining is an artificial intelligence (AI) technology that uses **natural language processing (NLP)** to transform the free (unstructured) text in documents and databases into normalized, structured data suitable for analysis or to drive machine learning (ML) algorithms

## NLP pipeline



# Anatomy of an Auto-Classifer





# Results

# Semantic Understanding

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Test Examples :

1. Two containers STC mayonnaise sauce
2. 264 carton disposable medical products: -  
blood bag

Able to catch the meaning of whole sentence  
other than just keywords

# Semantic Understanding

Smart Search ?

Standard Description Search ?

2 containers STC Mayonnaise sauce

CLASSIFY

## Results / HS Code

⊖ 2103 Sauces and preparations therefor; mixed condiments and mixed seasonings; mustard flour and meal and prepared mustard.

HS Description	HS Code	Details
- Other:	210390	
- - Other	21039090	>
Your query hits 6591 past declarations under this hs code.		

Number of times this HS code with  
this description had been submitted  
to Customs

# Sentence strings

Smart Search ?

Standard Description Search ?

264 carton disposable medical products: - blood bag

CLASSIFY

## Results / HS Code

⊖

9018 Instruments and appliances used in medical, surgical, dental or veterinary science, including scintigraphic apparatus, other electro-medical apparatus and sight- testing instruments.

HS Description	HS Code	Details
- Other instruments and appliances:	901890	
- - Other	90189090	>

Your query hits 4087 past declarations under this hs code.

# Semantic Understanding

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Examples:

## 1. Water Pump

- Able to understand vague information and classify depend on heading level description

# Semantic Understanding

Smart Search ?

Standard Description Search ?

CLASSIFY

## Results / HS Code

8413 Pumps for liquids, whether or not fitted with a measuring device; liquid elevators.

HS Description	HS Code	Details
- Hand pumps, other than those of subheading 8413.11 or 8413.19:	841320	
- - Water pumps	84132010	>
Your query hits 139 past declarations under this hs code.		
- - Other	84132090	>
Your query hits 320 past declarations under this hs code.		
- Fuel, lubricating or cooling medium pumps for internal combustion piston engines:	841330	

# Semantic Understanding

- Other reciprocating positive displacement pumps:	841350	
- - Water pumps, with a flow rate not exceeding 8,000 m3/h	84135030	>
Your query hits 743 past declarations under this hs code.		
- - Water pumps, with a flow rate exceeding 8,000 m3/h but not exceeding 13,000 m3/h	84135040	>
Your query hits 94 past declarations under this hs code.		
- - Other	84135090	>
Your query hits 460 past declarations under this hs code.		
- Other rotary positive displacement pumps:	841360	
- - Water pumps, with a flow rate not exceeding 8,000 m3/h	84136030	>
Your query hits 283 past declarations under this hs code.		
- - Water pumps, with a flow rate exceeding 8,000 m3/h but not exceeding 13,000 m3/h	84136040	>
Your query hits 38 past declarations under this hs code.		
- - Other	84136090	>
Your query hits 327 past declarations under this hs code.		
- Other centrifugal pumps:	841370	
- - Single stage, single suction horizontal shaft water pumps suitable for belt drive or direct coupling, other than pumps with shafts common with the prime mover:		
- - - With an inlet diameter not exceeding 200 mm	84137011	>
Your query hits 125 past declarations under this hs code.		
- - Single stage, single suction horizontal shaft water pumps suitable for belt drive or direct coupling, other than pumps with shafts common with the prime mover:		
- - - Other	84137019	>

# Semantic Understanding

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Examples:

1. ETHYL GLYCOL, INDUSTRIAL GRADE  
INV:00082

- Able to detect “noise” within description



# Chemicals

Smart Search ?

Standard Description Search ?

ETHYL GLYCOL, INDUSTRIAL GRADE INV:00082

CLASSIFY

## Results / HS Code

⊖ 2909 Ethers, ether-alcohols, ether-phenols, ether-alcohol- phenols, alcohol peroxides, ether peroxides, ketone peroxides (whether or not chemically defined), and their halogenated, sulphonated, nitrated or nitrosated derivatives.		
HS Description	HS Code	Details
- Ether-alcohols and their halogenated, sulphonated, nitrated or nitrosated derivatives: - - Other monoalkylethers of ethylene glycol or of diethylene glycol	29094400	>
Your query hits 118 past declarations under this hs code.		

# CAS Number Detection

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Test Examples:

1.96392-96-0 ←,

2.41183-64-6,

3.80809-81-0

Able to understand and classify Chemical Abstracts Service (CAS) number instantly

# CAS Number Detection

Smart Search ?

Standard Description Search ?

96392-96-0

CLASSIFY

## Results / HS Code

⊖

2843 Colloidal precious metals; inorganic or organic compounds of precious metals, whether or not chemically defined; amalgams of precious metals.

HS Description	HS Code	Details
- Other compounds; amalgams	28439000	>

# Goods Description

Smart Search ?

Standard Description Search ?

ZDP0AW0PM00

CLASSIFY

## Results / HS Code

⊖ 0904 Pepper of the genus Piper; dried or crushed or ground fruits of the genus Capsicum or of the genus Pimenta.

HS Description	HS Code	Details
- Pepper:	090412	
- - Crushed or ground:		
- - - White	09041210	>

# Product Codes

---

Test Examples:

1. ZDP0AW0PM00 ←

2. HFT0PA

3. ZCP0AB0PN00

Able to understand and classify Product code instantly

# Product Name

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Test Examples:

1. KINOHIMITSU HEALTH PAD ← ,
2. OSIM massage equipment and product

Able to classify even with product brand name

# Product Name

Smart Search ?

Standard Description Search ?

KINOHIMITSU HEALTH PAD

CLASSIFY

## Results / HS Code

3005 Wadding, gauze, bandages and similar articles (for example, dressings, adhesive plasters, poultices), impregnated or coated with pharmaceutical substances or put up in forms or packings for retail sale for medical, surgical, dental or veterinary purposes.

HS Description	HS Code	Details
- Adhesive dressings and other articles having an adhesive layer:	300510	
- - Impregnated or coated with pharmaceutical substances	30051010	>

Your query hits 4 past declarations under this hs code.

# Product name

---

Test Examples:

1. KINOHIMITSU HEALTH PAD ,

2. OSIM massage equipment and product ←

Able to classify even with product brand name



Smart Search ?

Standard Description Search ?

OSIM massage equipment and product

CLASSIFY

## Results / HS Code

9019 Mechano-therapy appliances; massage apparatus; psychological aptitude-testing apparatus; ozone therapy, oxygen therapy, aerosol therapy, artificial respiration or other therapeutic respiration apparatus.

### HS Description

HS Code

Details

- Mechano-therapy appliances; massage apparatus; psychological aptitude-testing apparatus;

901910

-- Electronic

90191010

>

Your query hits 287 past declarations under this hs code.

-- Other

90191090

>

Your query hits 129 past declarations under this hs code.

# Localization

---

Test Examples:

1. Chicken satay ←
2. “Old Town” White Coffee 3 in 1

Able to understand local words and terms

Smart Search



Standard Description Search



Chicken satay

CLASSIFY

## Results / HS Code

1602 Other prepared or preserved meat, meat offal or blood.

HS Description

HS Code

Details

- Of poultry of heading 01.05:

160232

-- Of fowls of the species *Gallus domesticus*:

--- Other

16023290



Your query hits 2637 past declarations under this hs code.

# Localization

---

Test Examples:

1. Chicken satay

2. “Old Town” White Coffee 3 in 1 ←

Able to understand local words and terms

Smart Search



Standard Description Search



Old town white coffee 3 in 1

CLASSIFY

## Results / HS Code

⊖ 2101 Extracts, essences and concentrates, of coffee, tea or maté and preparations with a basis of these products or with a basis of coffee, tea or maté; roasted chicory and other roasted coffee substitutes, and extracts, essences and concentrates thereof.

HS Description	HS Code	Details
-Extracts, essences and concentrates, of coffee, and preparations with a basis of these extracts, essences or concentrates or with a basis of coffee :	210112	
--Preparations with a basis of Extracts, essences or concentrates or with a basis of coffee:		
- - - Other	21011290	>

Your query hits 1644 past declarations under this hs code.

# Auto-spelling Correction

---

Test Examples:

1. Fuji bpple ←,

2. cottno,

3. massag chair

Able to correct different wrong spelling

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Smart Search



Standard Description Search



Fuji bpple

CLASSIFY

Please give us more specific information.

Spelling Suggestion:fuji appleOr see all possibilities:[Click here](#)

Smart Search



Standard Description Search



fuji apple

CLASSIFY

## Results / HS Code

0808 Apples, pears and quinces, fresh.

HS Description

HS Code

Details

- Apples

08081000



Your query hits 3570 past declarations under this hs code.



# Classification with Vague Descriptions

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Test Examples:

Heading Level Description:

water pump

Able to understand vague information and  
classify depend on heading level description

Smart Search



Standard Description Search



water pump

CLASSIFY

## Results / HS Code

8413 Pumps for liquids, whether or not fitted with a measuring device; liquid elevators.

### HS Description

### HS Code

### Details

- Hand pumps, other than those of  
subheading 8413.11 or 8413.19:

841320

- - Water pumps

84132010



Your query hits 139 past declarations under this hs code.

- - Other

84132090



Your query hits 320 past declarations under this hs code.

- Fuel, lubricating or cooling medium pumps  
for internal combustion piston engines:

841330

- Other reciprocating positive displacement pumps:	841350	
-- Water pumps, with a flow rate not exceeding 8,000 m3/h	84135030	>
Your query hits 743 past declarations under this hs code.		
-- Water pumps, with a flow rate exceeding 8,000 m3/h but not exceeding 13,000 m3/h	84135040	>
Your query hits 94 past declarations under this hs code.		
-- Other	84135090	>
Your query hits 460 past declarations under this hs code.		
- Other rotary positive displacement pumps:	841360	
-- Water pumps, with a flow rate not exceeding 8,000 m3/h	84136030	>
Your query hits 283 past declarations under this hs code.		
-- Water pumps, with a flow rate exceeding 8,000 m3/h but not exceeding 13,000 m3/h	84136040	>
Your query hits 38 past declarations under this hs code.		
-- Other	84136090	>
Your query hits 327 past declarations under this hs code.		
- Other centrifugal pumps:	841370	
-- Single stage, single suction horizontal shaft water pumps suitable for belt drive or direct coupling, other than pumps with shafts common with the prime mover:		
--- With an inlet diameter not exceeding 200 mm	84137011	>
Your query hits 125 past declarations under this hs code.		
-- Single stage, single suction horizontal shaft water pumps suitable for belt drive or direct coupling, other than pumps with shafts common with the prime mover:		
--- Other	84137019	>

# Demo: classification with vague descriptions

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Test Examples:

Chapter level Description:

1. Cottons ←,
2. Zinc alloy,
3. glasses,
4. cereals

Able to understand chapter level information  
and give the relevant result

Smart Search ?

Standard Description Search ?

Cottons|

CLASSIFY

## Results / HS Code

- 5201 Cot on, not carded or combed

HS Description

HS Code

Details

Cot on, not carded or combed

52010000

&gt;

Your query hits 16 past declarations under this hs code.

+ 5202 Cotton waste (including yarn waste and garnetted stock)

+ 5203 Cot on, carded or combed.

+ 5204 Cotton sewing thread, whether or not put up for retail sale.

- ⊕ 5202 Cotton waste (including yarn waste and garnetted stock)

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- ⊕ 5203 Cotton, carded or combed.

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- ⊕ 5204 Cotton sewing thread, whether or not put up for retail sale.

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- ⊕ 5205 Cotton yarn (other than sewing thread), containing 85% or more by weight of cotton, not put up for retail sale.

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- ⊕ 5206 Cotton yarn (other than sewing thread), containing less than 85% by weight of cotton, not put up for retail sale.

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- ⊕ 5207 Cotton yarn (other than sewing thread) put up for retail sale.

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- ⊕ 5208 Woven fabrics of cotton, containing 85% or more by weight of cotton, weighing not more than 200 g/m<sup>2</sup>.

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- ⊕ 5209 Woven fabrics of cotton, containing 85% or more by weight of cotton, weighing more than 200 g/m<sup>2</sup>.

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- ⊕ 5210 Woven fabrics of cotton, containing less than 85% by weight of cotton, mixed mainly or solely with man-made fibres, weighing not more than 200 g/m<sup>2</sup>.

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- ⊕ 5211 Woven fabrics of cotton, containing less than 85% by weight of cotton, mixed mainly or solely with man-made fibres, weighing more than 200 g/m<sup>2</sup>.

---

- ⊕ 5212 Other woven fabrics of cotton.

---

# Declaration Validation

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## Help flag declarations with wrong or insufficiently clear description:

- By reading the description submitted by declarants. For example:

accessories	90069190
accessories	90329030
accessories	90159000
accessories	90089090
accessories	90191090

- By matching the description entered by declarants vs. those in the supporting documents.

## Help flag suspicious declarations:

- By reading the description submitted by declarants and determine whether the HS Code entered was misclassified.

**This will result in better risk assessment as well as better trade statistics.**

# Post Clearance Audit

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During Post Clearance Audit, Customs officers may run supporting documents through ALICE as a form of validation against old declarations:

- ALICE will alert the officers if the supporting document's goods description does not match the goods being declared

This will help in Post Clearance Audit work.



# Valuation

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ALICE could be deployed as a valuation engine:

- ALICE will learn the acceptable range of value for a HS Code from various countries and later on flag those declarations which are out of the acceptable range.
- For example, if a machinery from Germany usually cost \$ Xx per unit, and the same machinery from China cost \$y per unit, ALICE will flag a declaration of the machinery from Germany with value of \$ Yy.

This will help in Customs valuation and prevent revenue lost.

# Abnormality Detection

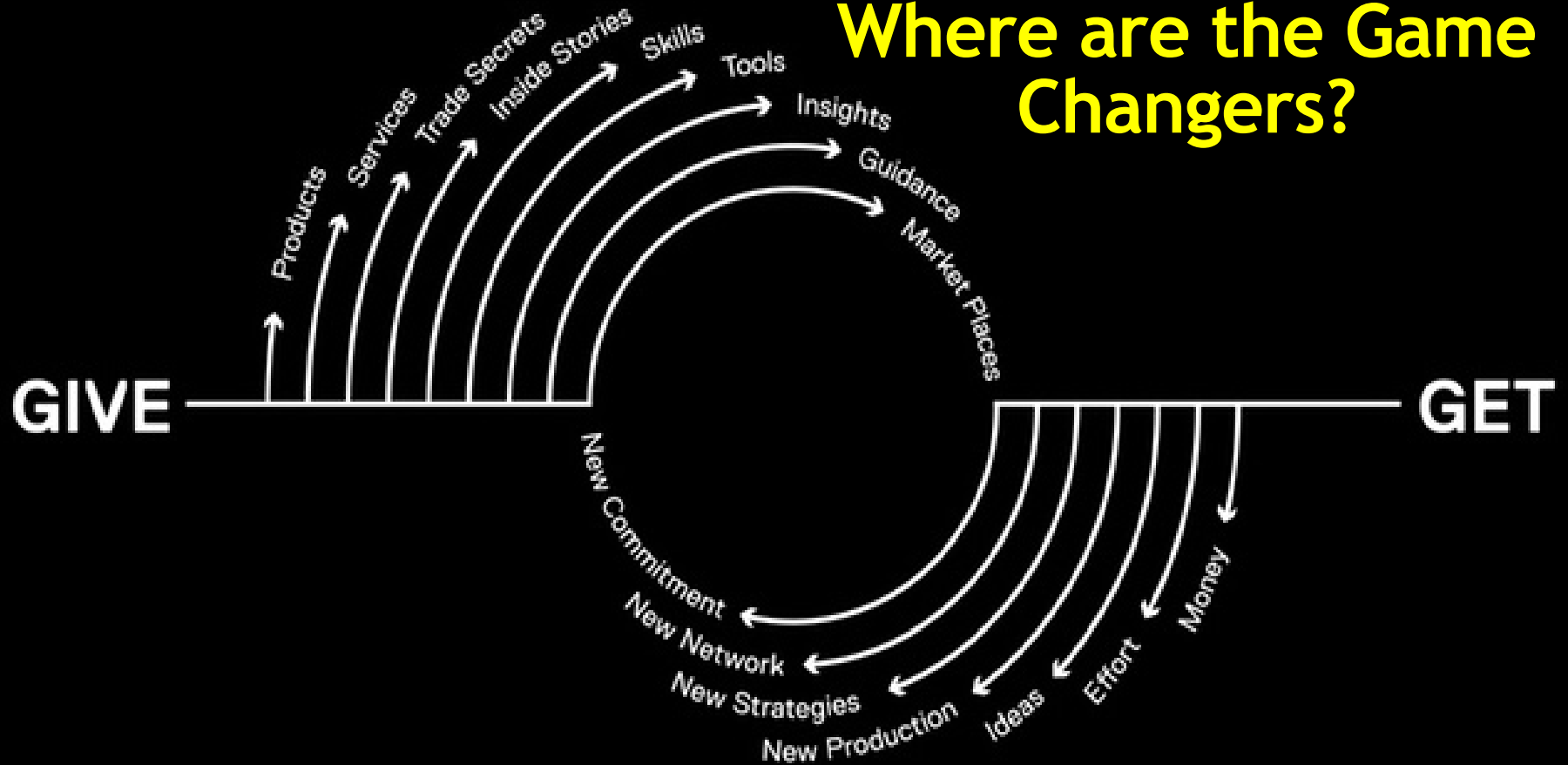
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ALICE could be deployed as an engine for abnormality detection. For example:

- ALICE will learn the import or export pattern associated with a trader and it will be able to flag out abnormality if the trader trade something very different from previously. For example IBM importing live fish.

This will help in Customs risk assessment.

# Future of CBT - Where are the Game Changers?



# Auto-Classification

# Auto-Classification Needs ...

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Corpus (collection of texts) of Classified Goods Descriptions with relevant attributes

- Training Statistical Learner
- Building Knowledge-Bases & Lexicons

Knowledge Base of WCO HS Codes

- Hierarchy of HS Coding Concepts (Section, Chapter, Headings, Sub-Headings, etc.)
- Country-Specific Extensions to HS Codes

Specialized Lexicon

- Concepts used in Trade and Goods Descriptions
- Names (Proper Nouns), e.g. “Intel”, “Herman Miller”, etc.

Country of Destination

Specialised Ontology of Concepts

- Explicit relations (e.g. is-a, part-of, etc.) between words / concepts

Natural Language Processing Capability

- Named Entity Extraction
- Expansion of Extracted Concepts “Feature-Vectors” using specialized lexicon and ontology, and country of destination

Statistically derived associations between feature vectors and Goods Classifications

# Deploying Auto-Classification Needs

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## Deployment / Operational Scenarios

- Suggest Goods Classifications rather than authoritatively provide them
- Embed in Goods Classification Wizards that provide other helpful services
- Deploy Classification Wizards as a SOA API that can be invoked from within Private Sector IT systems' workflows

## Zero Declaration Clearance Regulatory Regime

- Training
- Enlisting Community Support
- Supporting the Community
- Communications

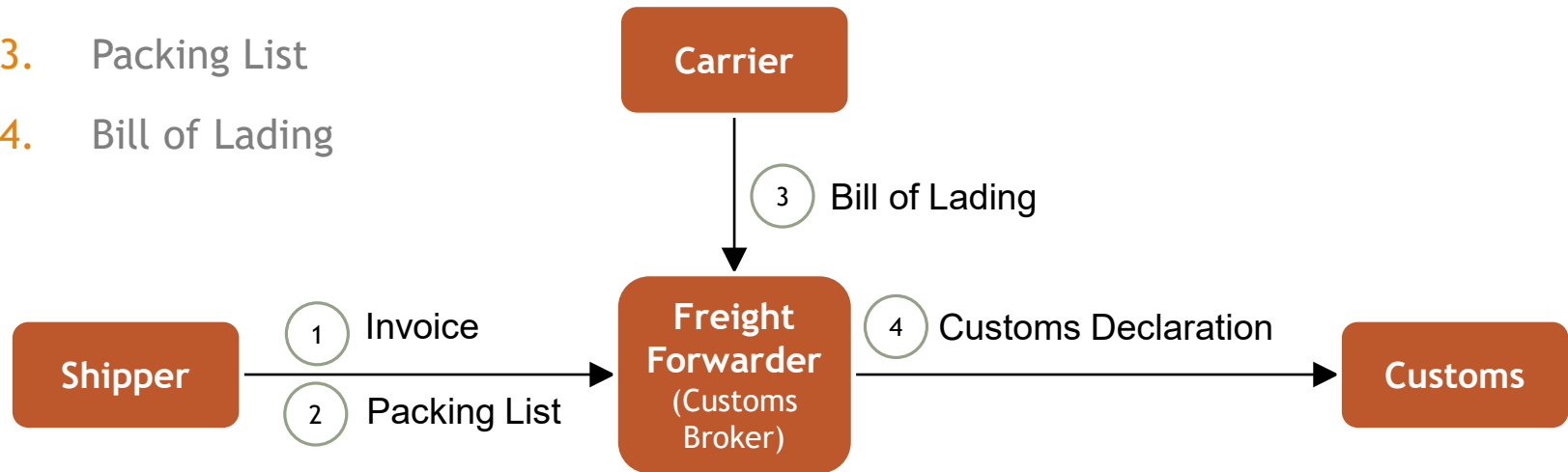
## Changes to existing regulations to ...

- Set up equipped & certified private entities that embed wizards
- Legalize non-declaration via certified entities
- Specify inspections and corrective / enforcement actions regulators may carry out post (implicit) declaration using source documents only

# Current Process

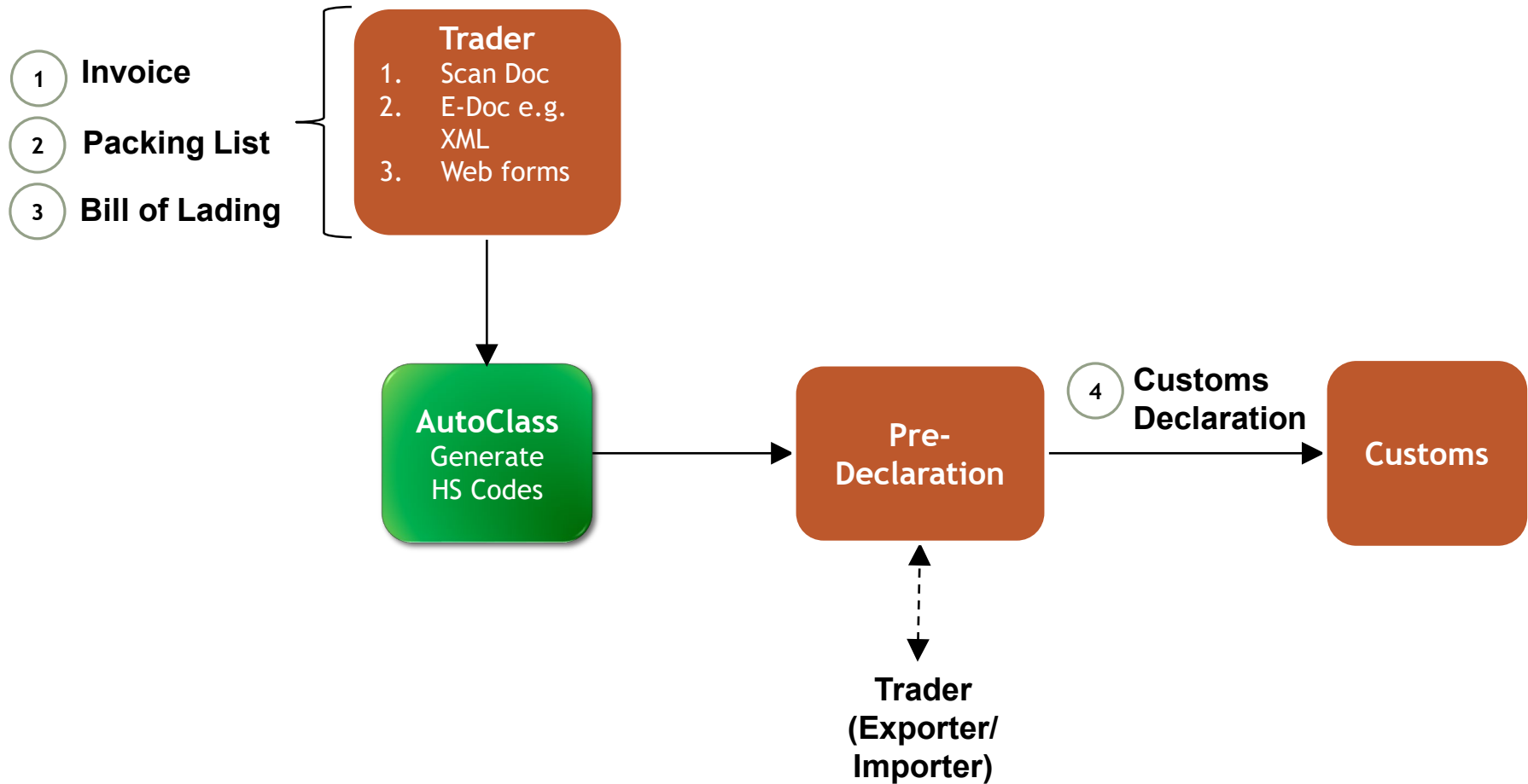
## Customs Documents

1. Customs Declaration
2. Invoice
3. Packing List
4. Bill of Lading



# Possible Solution 1

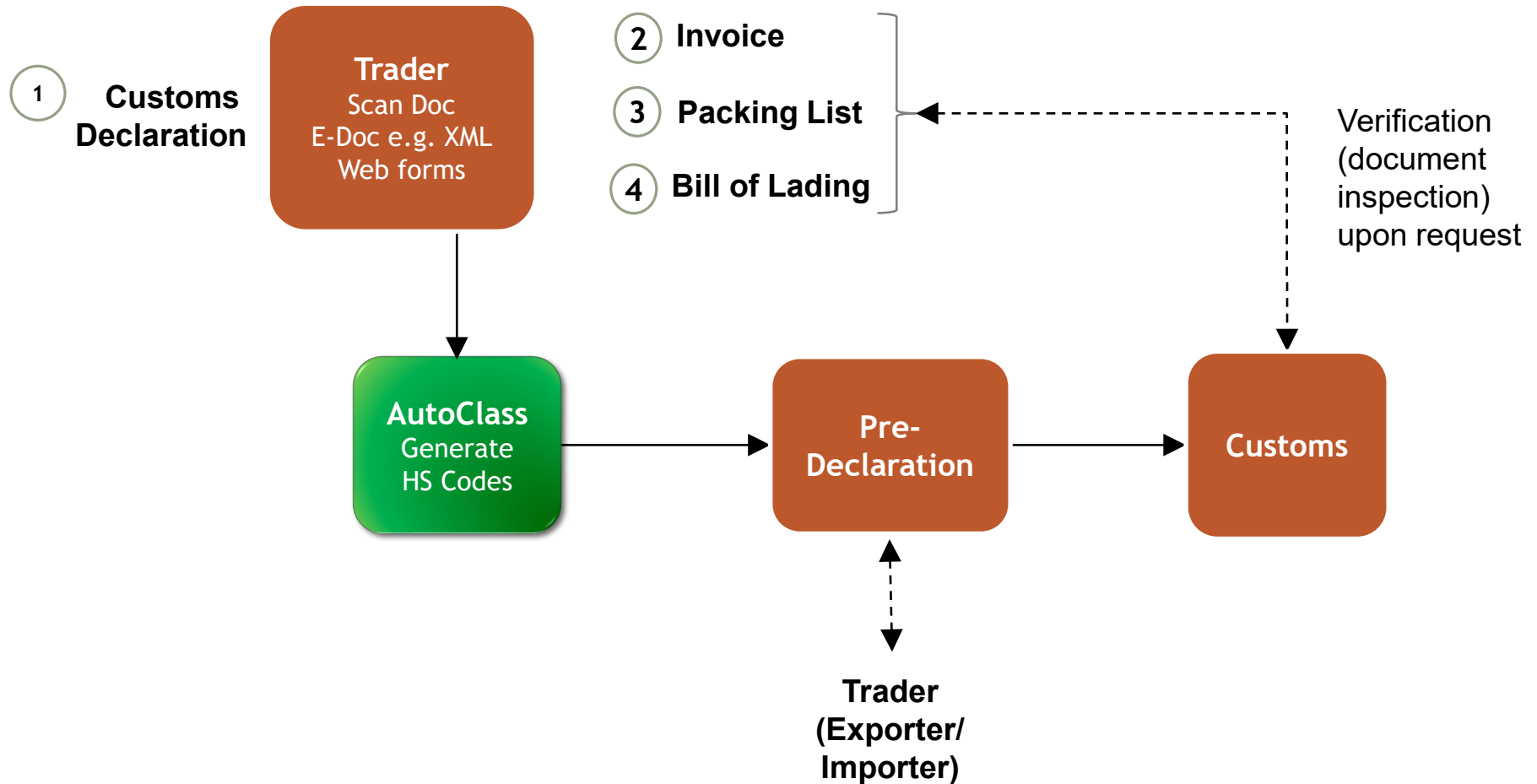
## Source Doc *as* Declaration





# Possible Solution 2

## Simplified Semi-Automatic Declaration



# Future ?

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## Proposal: **Eliminate Declarations**

### (in the Normal Case)

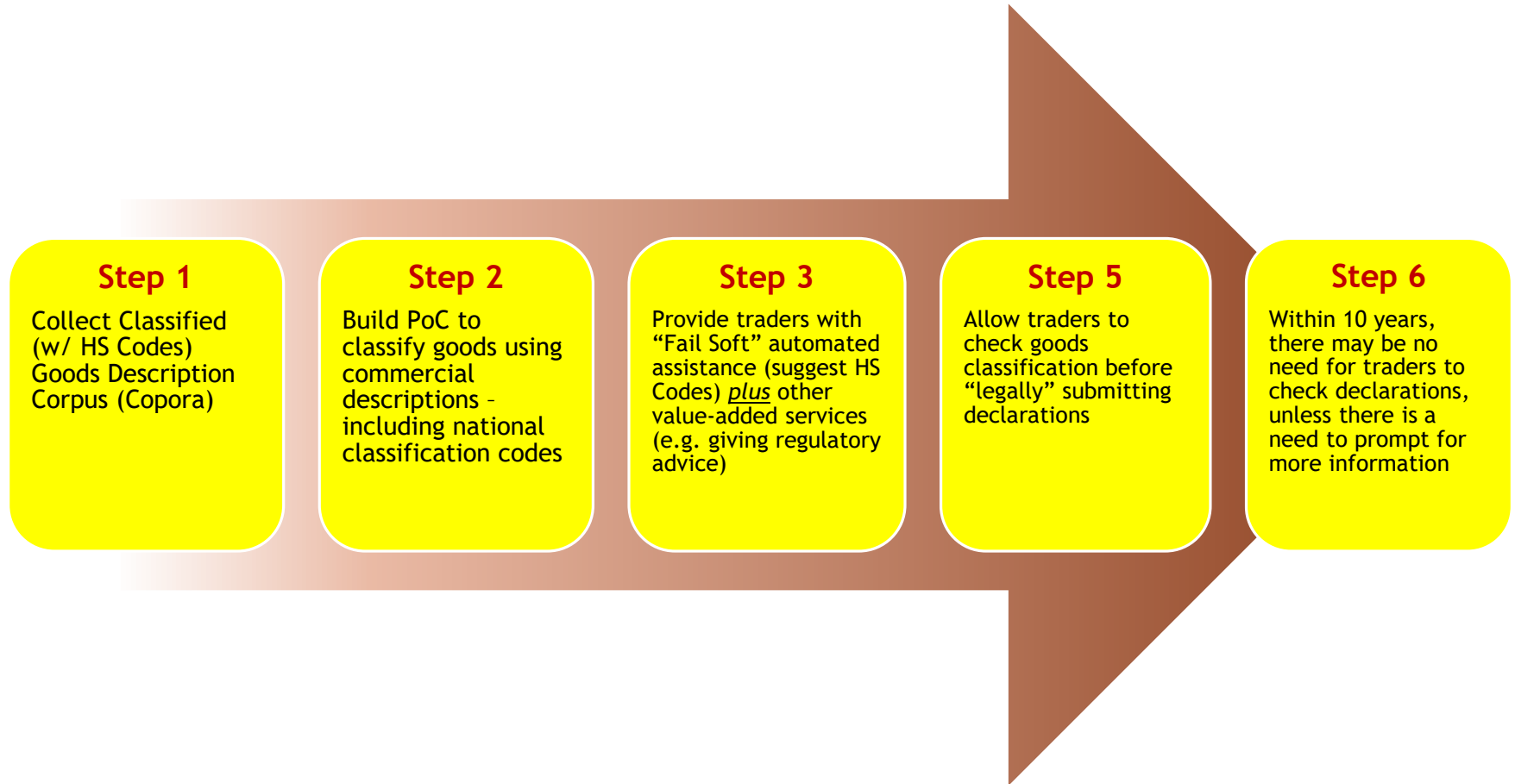
- 21<sup>st</sup> Century Regulatory Regime presuming
  - Cross-Sectoral (Public-Private) collaboration
  - Underlying eGovernment systems able to accept and process source trade / logistics documents in lieu of formal declarations (in the normative case)

## Key Assumptions

- Private Sector IT systems
  - In active use
  - will embed Public Sector Controls in their normal workflows
- Public Sector IT (eGov) systems will be able to
  - Accept (i.e. interoperate with) Private Sector IT systems
  - Process source documents' - including their free-text goods descriptions

# Steps towards Auto-Classification

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# Thank you.

Trade Facilitation Pte Ltd

Jonathan Koh  
Managing Director



TATTSEN@GMAIL.COM  
+65 82330321

160 PAYA LEBAR ROAD  
#02-04 , ORION @ PAYA LEBAR  
SINGAPORE 409022