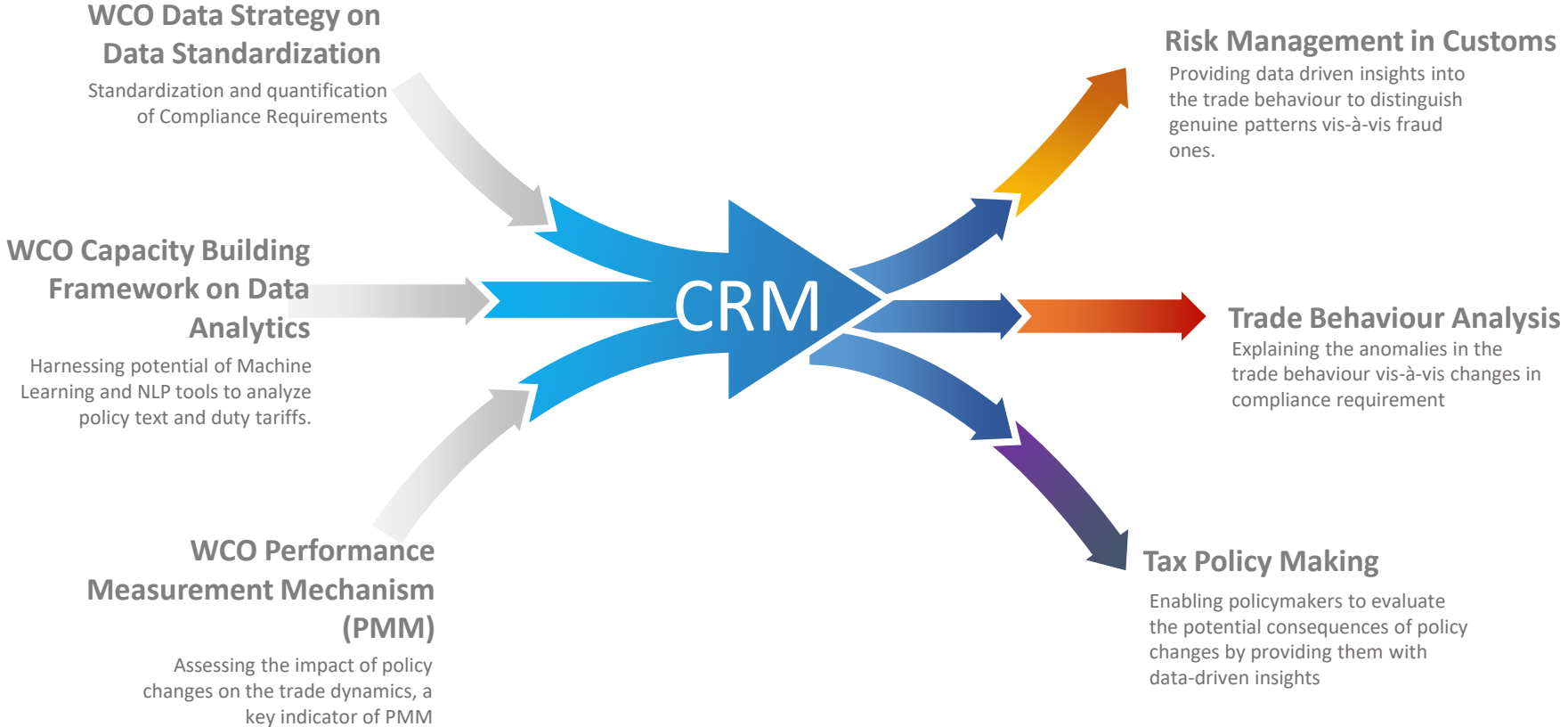# CRM Data Model: Understanding Trade Behavior

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CBIC, India

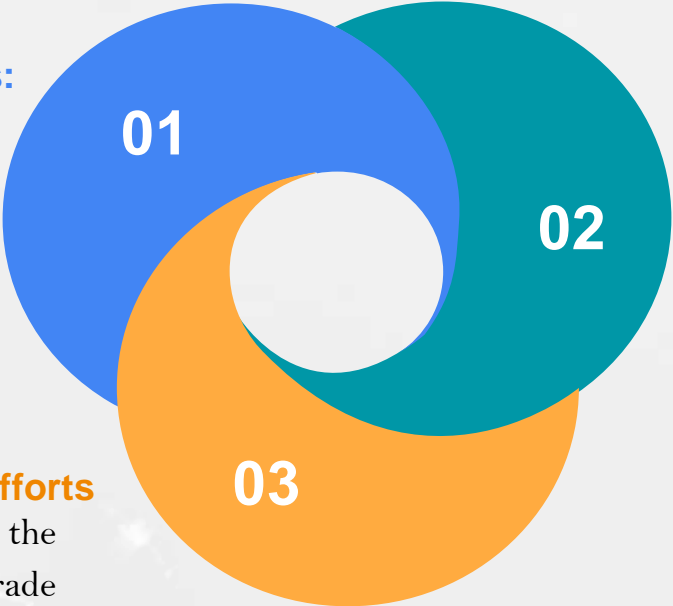# The Concept of Compliance Requirement Measurement(CRM): An overview

WCO Data Strategy on Data Standardization

Standardization and quantification of Compliance Requirements

WCO Capacity Building Framework on Data Analytics

Harnessing potential of Machine Learning and NLP tools to analyze policy text and duty tariffs.

WCO Performance Measurement Mechanism (PMM)

Assessing the impact of policy changes on the trade dynamics, a key indicator of PMM

CRM

Risk Management in Customs

Providing data driven insights into the trade behaviour to distinguish genuine patterns vis-à-vis fraud ones.

Trade Behaviour Analysis

Explaining the anomalies in the trade behaviour vis-à-vis changes in compliance requirement

Tax Policy Making

Enabling policymakers to evaluate the potential consequences of policy changes by providing them with data-driven insights

CRM Model: An improvement over existing models

Limitations in current solutions:
Existing solutions are limited to Descriptive Analysis i.e. identifying anomalies in trade behaviour, no robust method available to provide explanations for the same in an automated manner

01

Generation of Automated Insights using CRM Model:

CRM Model bridges the gap by providing Diagnostic Analytics into trade behaviour changes using CRM Matrix and other tools

02

Reduction of Manual Efforts
Using CRM Model, all the insights into the trade behaviour are available at the click of a button.

03

CRM Basics: Compliance Requirement (CR) Score and CRM Matrix:

CRM Matrix

CTH	PROHIBITION	RESTRICTION	BIS	PSIC	PGA	MISC	BCD	ADD	IGST	NON_TARIFF	TARIFF	COMPLIANCE_SCORE
71081200	0.0	1.32	0.0	0.0	0.0	0.26	0.1	1.88	0.17	1.58	2.14	3.72
39211200	2.63	0.0	0.0	0.0	0.0	0.26	0.08	1.88	1.0	2.89	2.96	5.85
48239012	0.0	0.0	0.0	0.0	0.0	0.0	0.08	1.88	1.0	0.0	2.96	2.96
71101900	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.88	0.17	0.0	2.14	2.14

Automated Insights through CRM Matrix:

OSINT Analysis
Domestic and Global developments with respect to the CTI

Behaviour Analysis
Changes in CR Score of the CTI

Uses of CRM Matrix in generating Insights into Trade Behavior

Extreme CR Score Analysis
Analysis of extreme CR Score CTIs in a chapter to find out possible Mis-declaration CTI pairs

BERT Analysis
Changes in CR Score of any correlated CTI(s)

1. Changes in CR Score of a CTI (Behaviour Analysis):

Assessable Value Graph for the selected CTH

CTH:39211200 Polymers Of Vinyl Chloride

Compliance Matrix Graph for the selected CTH

CTH:39211200 Polymers Of Vinyl Chloride

Introduction of ban on SUP plastics in June'22

Introduction of new policy conditions in Feb' 22
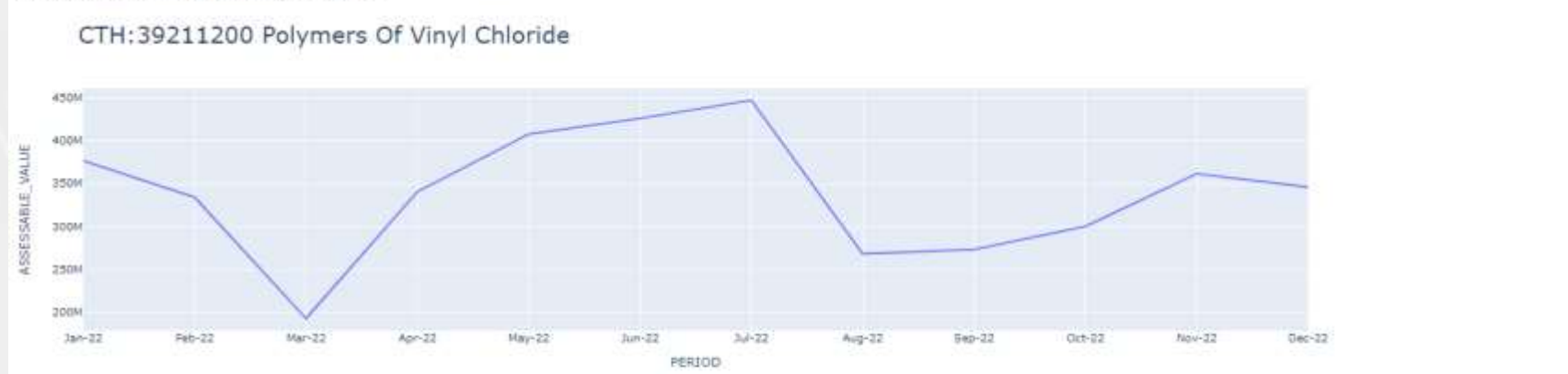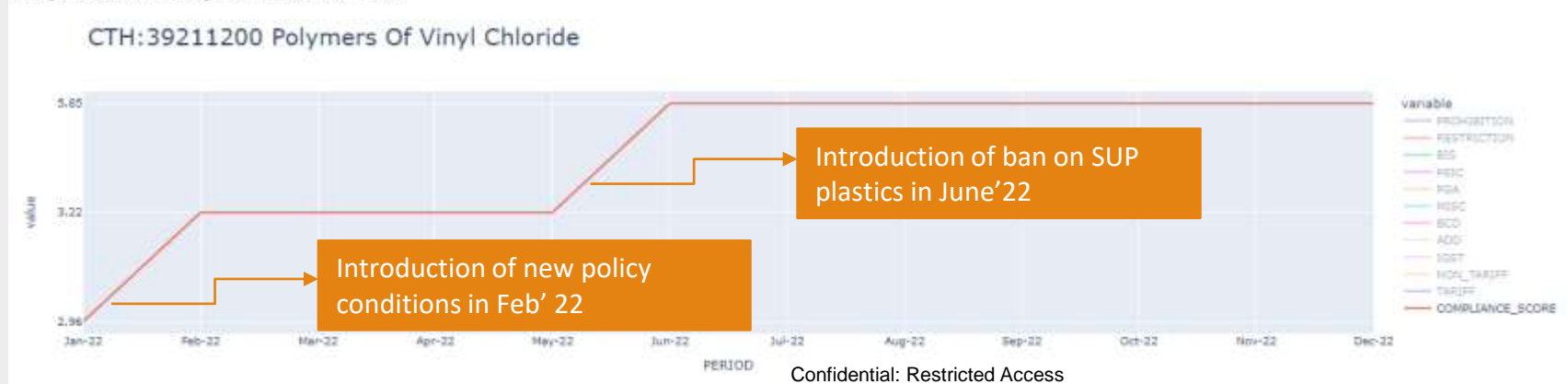
Policy Changes Details (CCR) for CTH:39211200 (Polymers of Vinyl Chloride):

Month	Details
Jan-22	None
Feb-22	¿*FOLLOWING ENTITIES SHALL REGISTER ON THE CENTRALIZED PORTAL DEVELOPED BY CENTRAL POLLUTION CONTROL BOARD NAMELY: -(I) PRODUCER (P);(II) IMPORTER (I); (III) BRAND OWNER (BO);(IV) PLASTIC WASTE PROCESSOR ENGAGED IN (A) RECYCLING, (B) WASTE TO ENERGY, (C) WASTE TO OIL, AND (IV) INDUSTRIAL COMPOSTING, SUBJECT TO THE GUIDELINES ON EXTENDED PRODUCER RESPONSIBILITY FOR PLASTIC PACKAGING UNDER RULE 9(1) OF SCHEDULE-II OF THE PLASTIC WASTE MANAGEMENT (AMENDMENT) RULES, 2022(REFER GSR 133(E) DATED 16-02-2022 OF THE MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE)*¿
Mar-22	
Apr-22	
May-22	
Jun-22	*FOLLOWING ENTITIES SHALL REGISTER ON THE CENTRALIZED PORTAL DEVELOPED BY CENTRAL POLLUTION CONTROL BOARD NAMELY: -(I) PRODUCER (P);(II) IMPORTER (I); (III) BRAND OWNER (BO);(IV) PLASTIC WASTE PROCESSOR ENGAGED IN (A) RECYCLING, (B) WASTE TO ENERGY, (C) WASTE TO OIL, AND (IV) INDUSTRIAL COMPOSTING, SUBJECT TO THE GUIDELINES ON EXTENDED PRODUCER RESPONSIBILITY FOR PLASTIC PACKAGING UNDER RULE 9(1) OF SCHEDULE-II OF THE PLASTIC WASTE MANAGEMENT (AMENDMENT) RULES, 2022(REFER GSR 133(E) DATED 16-02-2022 OF THE MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE)*¿*REFER LETTER FNO.B-17011/7/UPC-II-PWM (MLP)/2021/12900 DATED 01.02.2022 RECEIVED FROM MOEF&CC BRINGING INTO ATTENTION THE CHANGES IN PLASTIC WASTE MANAGEMENT RULES VIDE ITS NOTIFICATION DATED 12.08.2021[G.S.R.571(E)] AND PLASTIC WASTE MANAGEMENT (AMENDMENT) RULES, 2022 NOTIFIED VIDE NOTIFICATION DATED 16.02.2022 [G.S.R.133)(E)] AND CBIC INSTRUCTION NO.09/2022-CUSTOMS DATED 22-06-2022. WHEREIN THE KEY CHANGES IN THE NOTIFICATION DATED 12.08.2021, RELATING TO IMPORT ARE AS FOLLOWS: (I).RULE 4(1) (C): CARRY BAG MADE OF VIRGIN OR RECYCLED PLASTIC, SHALL NOT BE LESS THAN SEVENTY-FIVE MICRONS IN THICKNESS WITH EFFECT FROM 30-09-2021 AND ONE HUNDRED AND TWENTY (120) MICRONS IN THICKNESS FROM 31-12-2022.(II).RULE4(2):THE MANUFACTURE, IMPORT, STOCKING, DISTRIBUTION, SALE AND USE OF FOLLOWING SINGLE USE PLASTIC (SUP), INCLUDING POLYSTYRENE AND EXPANDED POLYSTYRENE, COMMODITIES SHALL BE PROHIBITED WITH EFFECT FROM 01-07-2022: (A).EAR BUDS WITH PLASTIC STICKS, PLASTIC STICKS FOR BALLONS, PLASTIC FLAGS, CANDY STICKS, ICE-CREAM STICKS, POLYSTYRENE {THERMOCOL) FOR DECORATION.(B)PLATES, CUPS, GLASSES, CUTLERY SUCH AS FORKS, SPOONS, KNIVES, STRAW, TRAYS, WRAPPING OR PACKING FILMS AROUND SWEET BOXES, INVITATION CARDS AND CIGARETTE PACKETS, PLASTIC OR PVC BANNERS LESS THAN 100 MICRON, STIRRERS. (III). RULE 4(3): THE PROVISIONS OF SUB-RULE (2) (B) SHALL NOT APPLY TO COMMODITIES MADE OF COMPOSTABLE PLASTIC.*FURTHER, RULE 6 OF THE PLASTIC WASTE MANAGEMENT (AMENDMENT) RULES, 2022 PRESCRIBES REGISTRATION OF IMPORTERS OF PLASTIC PACKAGING PRODUCT OR PRODUCTS WITH PLASTIC PACKAGING OR CARRY BAGS OR MULTI-LAYERED PACKAGING OR PLASTIC SHEETS, ON A CENTRALIZED PORTAL DEVELOPED BY CPCB AND RULE 7.3 PRESCRIBES EXTENDED PRODUCER RESPONSIBILITY AND OBLIGATIONS OF IMPORTERS.*¿

Another Example of Behaviour Analysis(Paper/Pulp Articles):

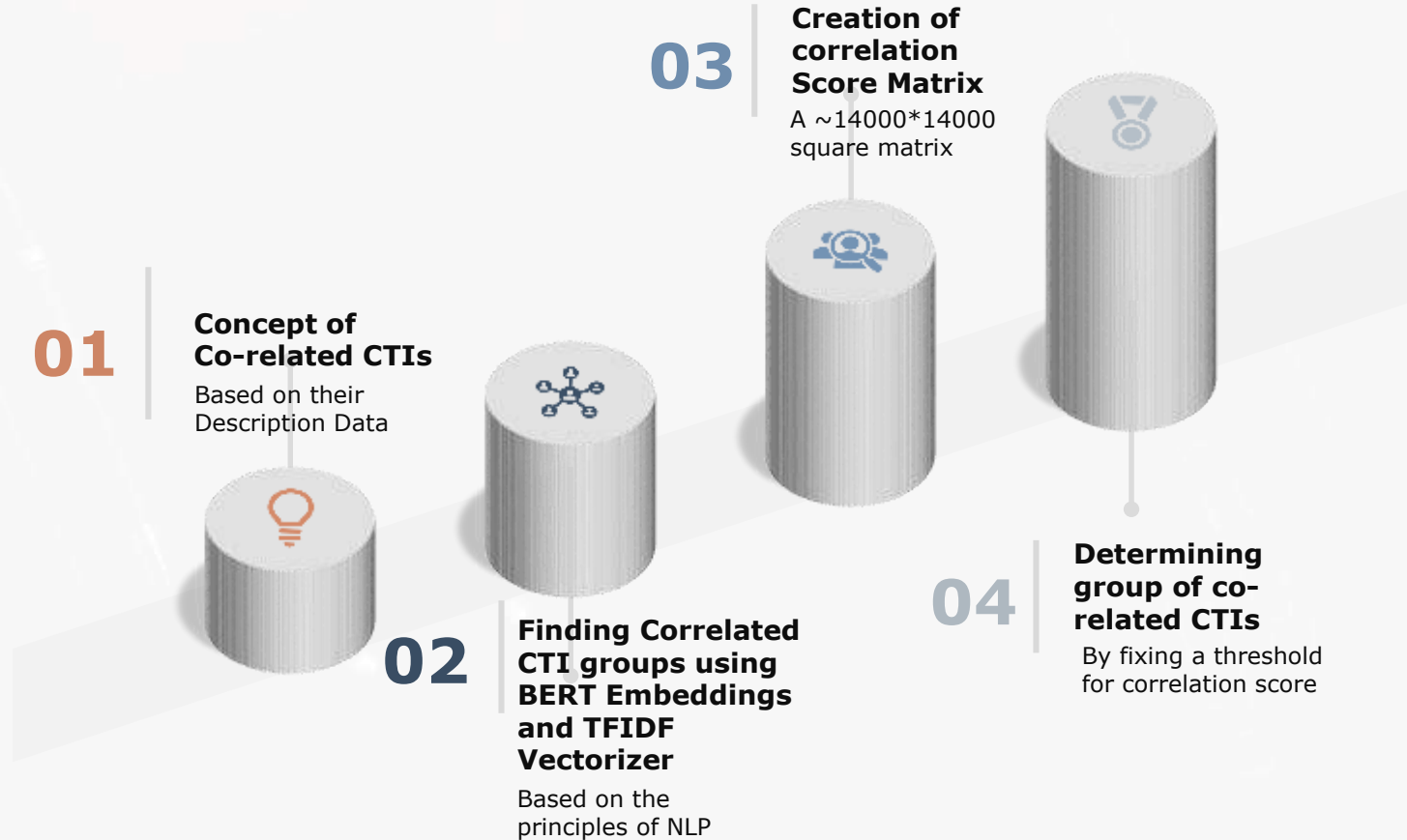CTH:48239012 Other Articles Of Paper Pulp, Paper, Paperboard

Compliance Matrix Graph for the selected CTH

CTH:48239012 Other Articles Of Paper Pulp, Paper, Paperboard

Introduction of PIMS Registration in Sept'22

variable
- PROHIBITION
- RESTRICTION
- BIS
- PSIC
- PGA
- MISC
- BCD
- ADD
- IGST
- NON_TARIFF
- TARIFF
- COMPLIANCE_SCORE

Confidential: Restricted Access

2. BERT Analysis for correlated CTIs:

03

Creation of correlation Score Matrix

A ~14000*14000 square matrix

01

Concept of Co-related CTIs

Based on their Description Data

02

Finding Correlated CTI groups using BERT Embeddings and TFIDF Vectorizer

Based on the principles of NLP

04

Determining group of co-related CTIs

By fixing a threshold for correlation score

Correlation Matrix Example:

correlation_df1

	1008201	1008202	1008203	1012100	1012910	1012990	1013010	1013020
1008201	1.00000	0.99343	0.97770	0.22376	0.32778	0.13663	0.25202	0.36757
1008202	0.99343	1.00000	0.97514	0.22314	0.33020	0.13576	0.24759	0.34636
1008203	0.97770	0.97514	1.00000	0.22692	0.30929	0.11146	0.25096	0.32271
1012100	0.22376	0.22314	0.22692	1.00000	0.49631	0.18011	0.89488	0.53645
1012910	0.32778	0.33020	0.30929	0.49631	1.00000	0.32826	0.33450	0.43070
1012990	0.13663	0.13576	0.11146	0.18011	0.32826	1.00000	0.17944	0.34451
1013010	0.25202	0.24759	0.25096	0.89488	0.33450	0.17944	1.00000	0.58809
1013020	0.36757	0.34636	0.32271	0.53645	0.43070	0.34451	0.58809	1.00000
1013090	0.21016	0.21249	0.18614	0.17883	0.34912	0.88377	0.23559	0.43119
1019030	0.53303	0.50850	0.50383	0.50104	0.48271	0.21727	0.49669	0.74515
1019090	0.13663	0.13576	0.11146	0.18011	0.32826	1.00000	0.17944	0.34451
1022110	0.25769	0.23998	0.23389	0.72489	0.29612	0.04790	0.80719	0.55946
1022120	0.31048	0.29866	0.29886	0.73122	0.25790	0.04329	0.79480	0.58849
1022910	0.32060	0.29713	0.26840	0.42157	0.38656	0.27290	0.50291	0.57373
1022990	0.44951	0.42758	0.40816	0.41674	0.37876	0.24248	0.48630	0.60979
1023100	0.35693	0.34503	0.34016	0.68294	0.28848	0.05532	0.73013	0.55732
1023900	0.35261	0.32816	0.30093	0.50495	0.44944	0.44058	0.56427	0.71391
1029010	0.31544	0.29392	0.26730	0.42776	0.36128	0.28045	0.49074	0.55581
1029090	0.32476	0.30008	0.27355	0.49539	0.47103	0.51923	0.54612	0.69495
1031000	0.28274	0.26992	0.27788	0.79643	0.28345	0.09553	0.91909	0.58286

Automated Insights using BERT Analysis(Platinum Alloy):
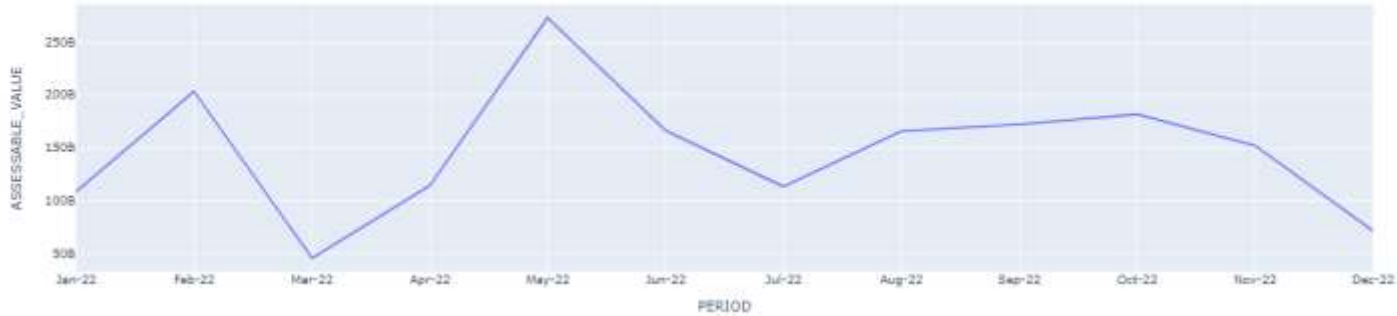

Assessable Value Graph for the selected CTH

CTH:71101900 Platinum

Compliance Matrix Graph for the selected CTH
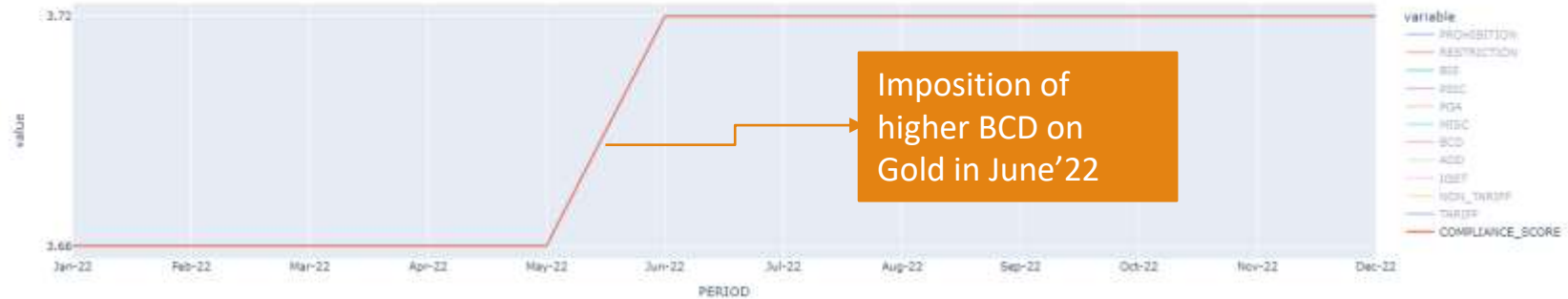
CTH:71101900 Platinum
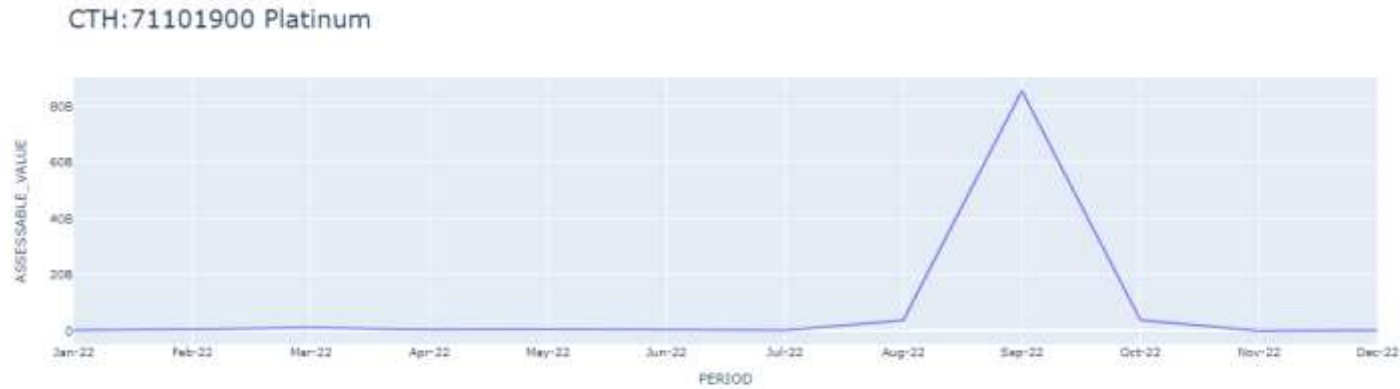
Automated Insights using BERT Analysis(Gold):

Assessable Value Graph for the selected CTH

CTH:71081200 Gold

Compliance Matrix Graph for the selected CTH

CTH:71081200 Gold

Imposition of higher BCD on Gold in June'22

3. Extreme CR Score Analysis:

- ❿ CTHs having Minimum/ Maximum CR Score in any Chapter are the most crucial CTIs for mis-declaration etc.

- ❿ Field officials needs to be specifically sensitized about the importance of these CTIs.

- ❿ The model provides the list of these CTIs automatically for easy look up.
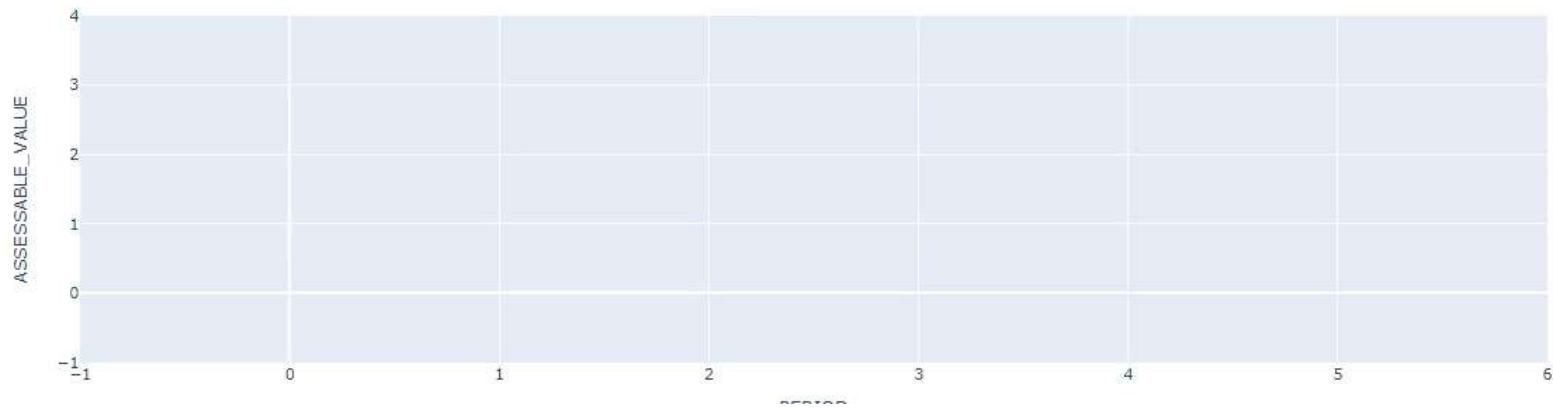
4. OSINT Analysis

- ❿ Model incorporates automated tool for providing updates on significant domestic and global developments with respect to the CTH

- ❿ Will further enhance efficiency and reduce manual efforts.

NCTC Compliance Requirement Measurement (CRM) Model

SELECT CTH

Select...

Assessable Value Graph for the selected CTH

Applications of the CRM Model:

01 Provides automated insights into the trade behavior

02 Enhances decision making and understanding of import trends

03 Empowers users with valuable data-driven information

04 Essential for Risk Management Agencies, Policy Makers, Tax Researchers and Businesses etc.

Thank You !

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