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HERMES: a history tracker for codes of goods in TARIC

A companion tool for the interpretation of results in THESEUS

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Table of contents

Acknowledgements.....	1
Abstract.....	2
1 Introduction.....	3
2 HERMES front-end.....	5
3 History tracking module.....	8
4 Conclusion.....	11
5 Annex: Database structure.....	12
5.1 Prod_registry.....	12
5.2 Prod_tree.....	13
5.3 Tmp_prod_db.....	13
5.4 Tmp_prod_change.....	14
5.5 Desc_sanction.....	14
5.6 Tmp_reused.....	14
6 Annex: The "Tree Hierarchy" procedure.....	14
7 Annex: The "Navigator" procedure.....	16
8 Annex: The "Get description" procedure.....	17
References.....	19
List of figures.....	20

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Abstract

This manual describes the architecture and use of a tool introduced to track the history of the nomenclature of goods in trade in a certain time window. The name of system, HERMES, is adopted from the name of the Greek god of the trade. The tool is accessible through THESEUS, a web-based antifraud resource developed by the JRC to disseminate patterns and fair prices detected or estimated using international trade data. THESEUS is accessible only by authorized users in the Commission and Member States (customs and law enforcement services). On the other hand the user community of HERMES is potentially wider, pointing to international traders and other economic operators. For this reason, HERMES may be moved to the public area of THESEUS.

1 Introduction

THESEUS is a web based antifraud resource developed by SITAF to save and visualize results of interest to authorized users in the Commission and Member State services. Results are patterns and fair prices detected or estimated using international trade data¹. Users can navigate through the published results, sort, filter, save them, download selected technical reports on methods developed and results obtained, and look up definitions of product and country codes.

All goods traded between different countries are classified in the European Union (EU) according to the **Combined Nomenclature** (CN). The CN has been created to meet, at one and the same time, the requirements both of the Common Customs Tariff and of the external trade statistics of the European Union². The CN is based on the **Harmonized System** (HS), which is internationally standardized and maintained by the World Customs Organization (WCO). In practice:

- a) The first 6 digits of the CN correspond to those of the HS nomenclature.
- b) The 7th and 8th digits of the CN identify the Community subdivisions, referred to as 'CN subheadings'.

On the basis of the CN product classification, the Commission established an integrated tariff referred to as the "**TARIC code**"³, which regulates the common EU tariffs applied to products imported into the EU. Traders are requested to declare the imported and exported goods at the Member States (MS) customs, stating under which subheading of the CN nomenclature they fall. *This classification determines the duty applied to the goods and how the goods are treated for statistical purposes, according to the EU Common Customs Tariff.*

The EC adopts each year a revised version of the CN together with the common customs tariff rates. As a consequence, from one year to another a CN code can be subject to deletions or transformations. For example, a certain code can be split into different ones (see an example in Figure 1) or several codes can be merged into a single one (see an example in Figure 2). New codes can also appear.

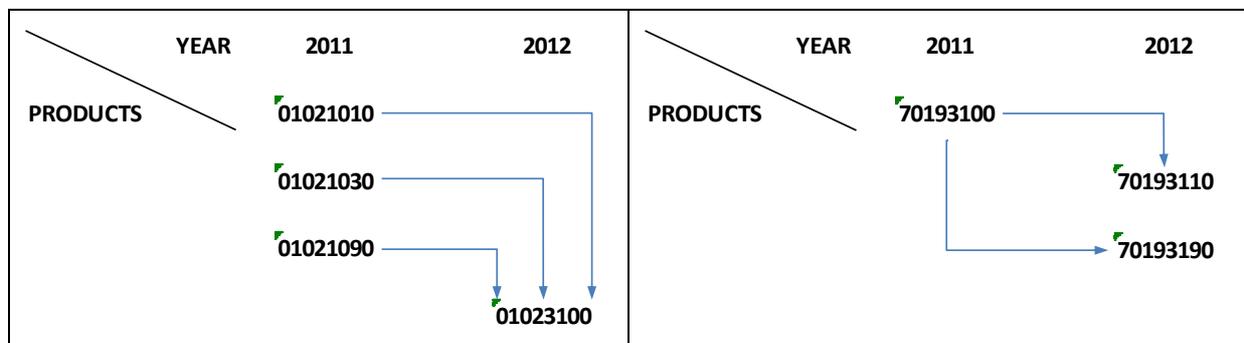


Figure 1 - Example of merged codes

Figure 2 - Example of split code

¹ We use public data taken from <http://epp.eurostat.ec.europa.eu/newxtweb/> ESTAT's COMEXT database, as well as confidential data, i.e. import declarations provided by the Member States Customs or Surveillance data provided by OLAF or TAXUD (for a number of products under import monitoring, according to article 308d of Commission Regulation No 2454/93 - Customs Code's Implementing Provisions).

² See the Council Regulation (EEC) No 2658/87 of 23 July 1987 on the tariff and statistical nomenclature and on the Common Customs Tariff. Legal basis: OJ L 256, 7.9.1987, p. 1.

³ TARIC (TARif Intégré Communautaire; Integrated Tariff of the European Communities) is a public service for customs and economic operators, giving a view of measures to be undertaken when importing or exporting goods to/from the EU. The legal base of the TARIC is Council Regulation (EEC) No 2658/87 of 23 July 1987 on the tariff and statistical nomenclature and on the Common Customs Tariff (Official Journal L 256, 07/09/1987).

Eurostat’s website on “Reference and Management Of Nomenclatures” (**RAMON**, <http://ec.europa.eu/eurostat/ramon/>) is the official source of the yearly CN classification. We obtained from this website all past nomenclature tables and the yearly updates, in CSV format (the download page is shown in Figure 3 below). The CSV files were then uploaded into a dedicated THESEUS database, using a MATLAB script.

This manual describes the architecture and use of a new THESEUS feature introduced to track the history of the nomenclature of goods in trade in a certain time window, selected by the user. The system has been called **HERMES**, from the name of the Greek god of the trade.

HERMES is used interactively through the THESEUS interface, as described in Section 2. In addition its history-tracking module, which is based on MySQL stored procedures⁴, can be called automatically from any external program. This is useful to analyze data of a specific CN product code over several years, in order to build coherent sets of trade records. The key features of the history-tracking module are described in Section 3 .

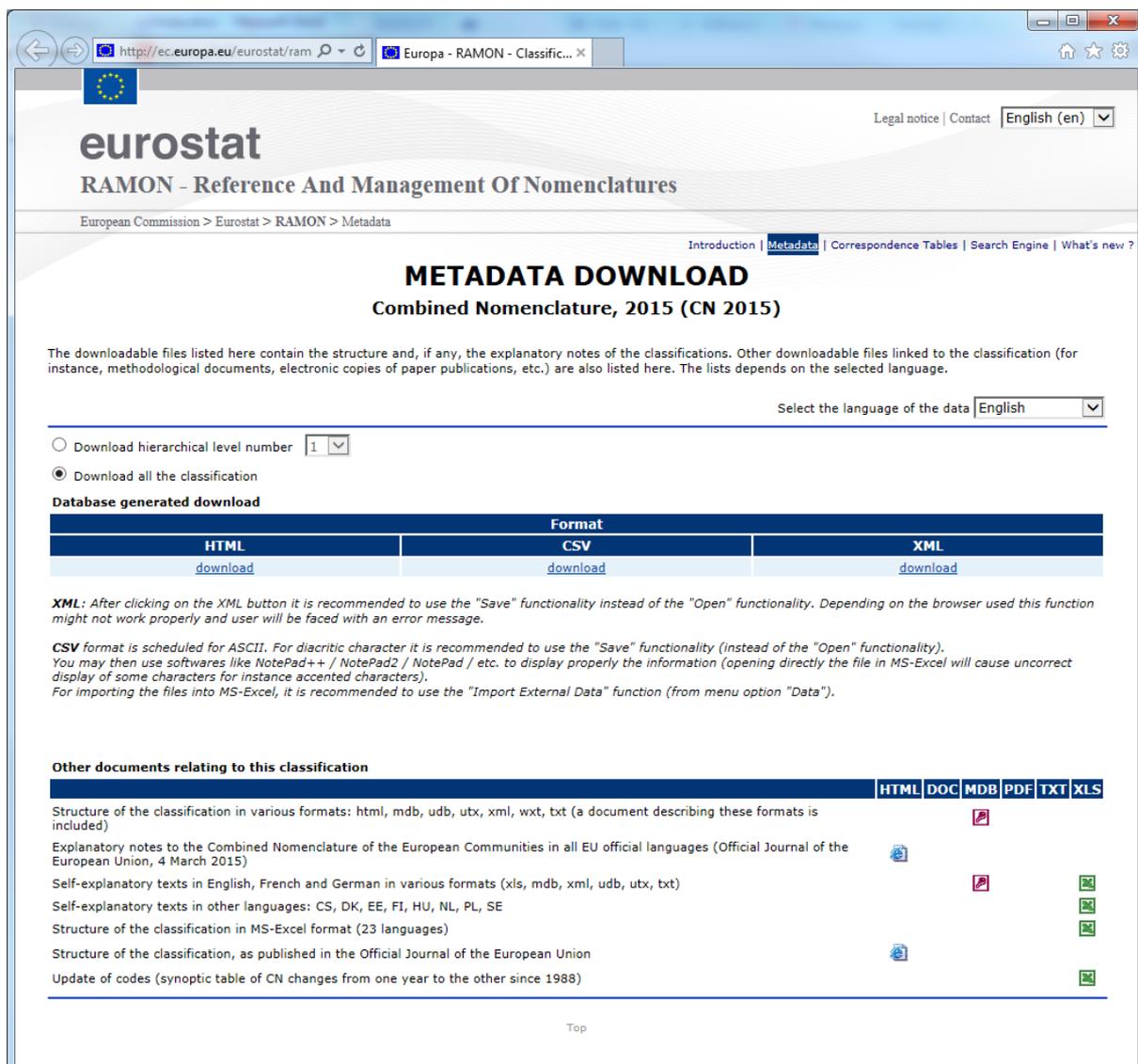


Figure 3 – RAMON web site <http://ec.europa.eu/eurostat/ramon/>

⁴ The SQL code has been developed and tested on MySQL 5.6, having in mind porting to ORACLE.

2 HERMES front-end

- Figure 4: The initial page of HERMES.
- Figure 5: While the user types the digits of a code of interest, the system proposes the set of 8-digit codes starting with the typed digits. At this stage, the reference year is not required.
-
- **Figure 6:** The user can also select the code of interest by typing a description keyword.
- Figure 7: The user selects a specific product code.
-
- Figure 8: The graph representing the history of the selected product code.
- Figure 9: The graph can be scrolled on the right, to highlight the far history (till year 2000).
- Figure 10: By clicking on one of the cells of the graph, the use can retrieve its history.
- Figure 11: The mouse-over on a specific cell is used to visualize the description of a cell's code.
- Figure 12: The types of changes are described in the legend at the bottom left of HERMES.



Figure 4: HERMES page

Prod. code	Year
Prod code	
961900	
Sanitary towels (pads) and tampons, napkins and napkin liners for babies, and similar articles, of any material	
96190011 - Sanitary towels of paper pulp, paper, cellulose wadding or webs of cellulose fibres	Jan 2012-Dec 2013
96190013 - Tampons of paper pulp, paper, cellulose wadding or webs of cellulose fibres	Jan 2012-Dec 2013
96190019 - Feminine hygiene products of paper pulp, paper, cellulose wadding or webs of cellulose fibres (excl. sanitary towels and tampons)	Jan 2012-Dec 2013
96190021 - Napkins and napkin liners for babies, of paper pulp, paper, cellulose wadding or webs	Jan 2012-Dec 2013

Figure 5: Product codes retrieved after typing 6 digits; the first is proposed by default

Prod. code	Year
Prod code	
sanitary	
96190079 - Feminine hygiene products (excl. of textile materials, and sanitary towels and tampons)	Jan 2014-now
96190089 - Sanitary articles, e.g. incontinence care articles (excl. of textile materials, and sanitary towels, tampons, napkins and napkin liners for babies)	Jan 2014-now
96190090 - Sanitary towels and tampons, napkins and napkin liners for babies, and similar articles (excl. of paper pulp, paper, cellulose or textile materials)	Jan 2012-Dec 2013

Figure 6: Product codes retrieved after typing the keyword "sanitary"

Prod. code	Year
Prod code	
96190089	
96190089 - Sanitary articles, e.g. incontinence care articles (excl. of textile materials, and sanitary towels, tampons, napkins and napkin liners for babies)	Jan 2014-now

Figure 7: Selection of a product code

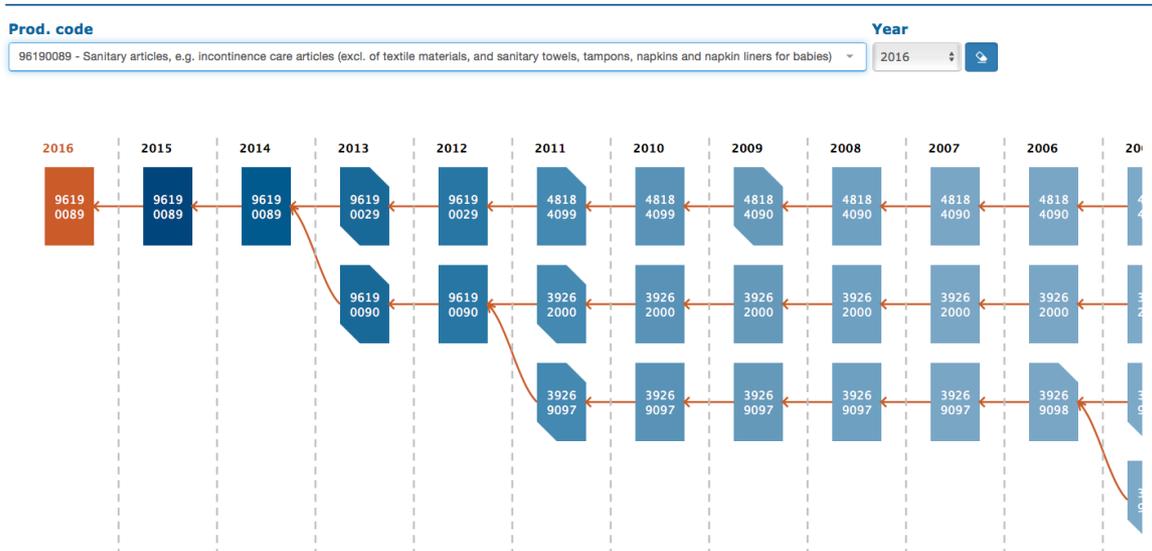


Figure 8: History of the selected product code

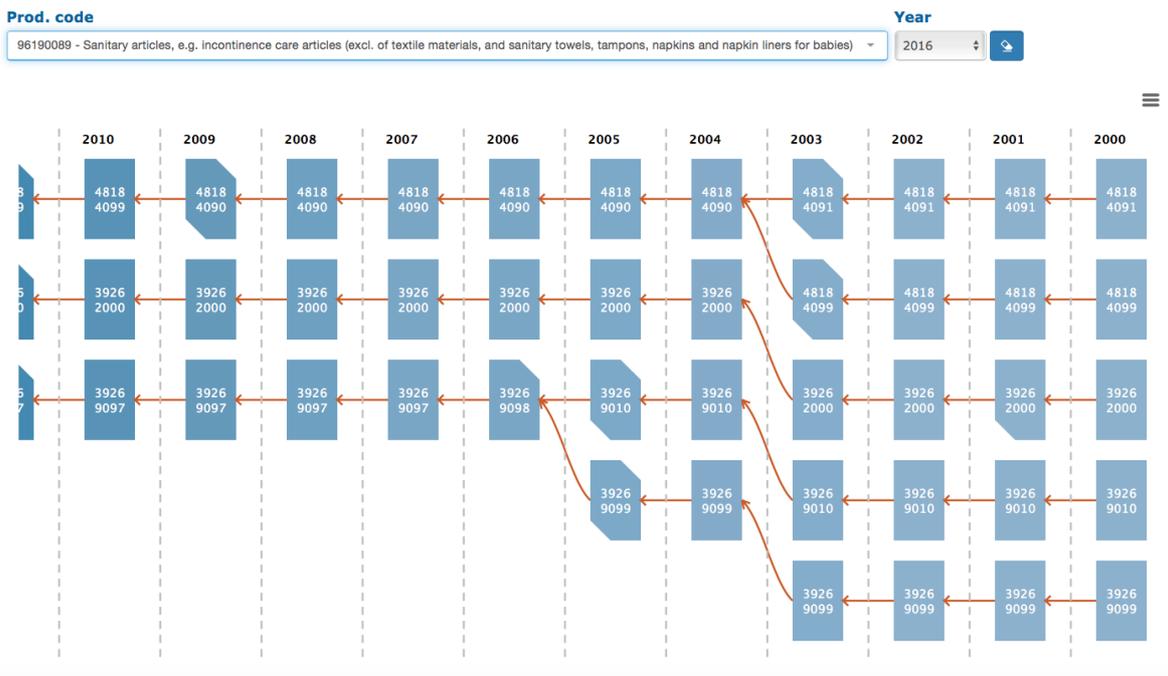


Figure 9: History of the selected code from year 2000, obtained by right scrolling

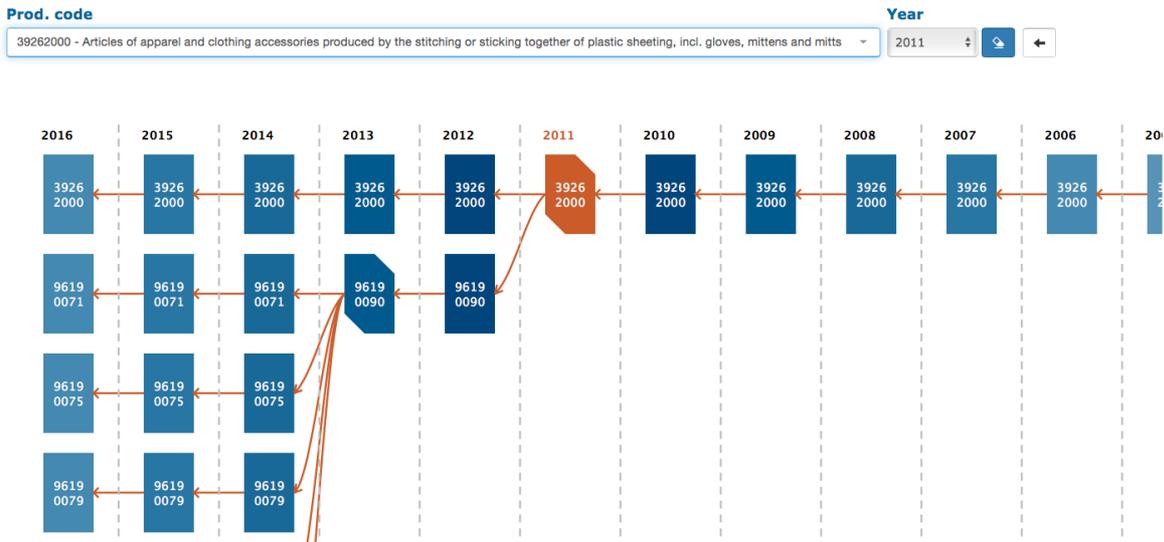


Figure 10: History of a product code selected by clicking on one of the cells of the previous graph

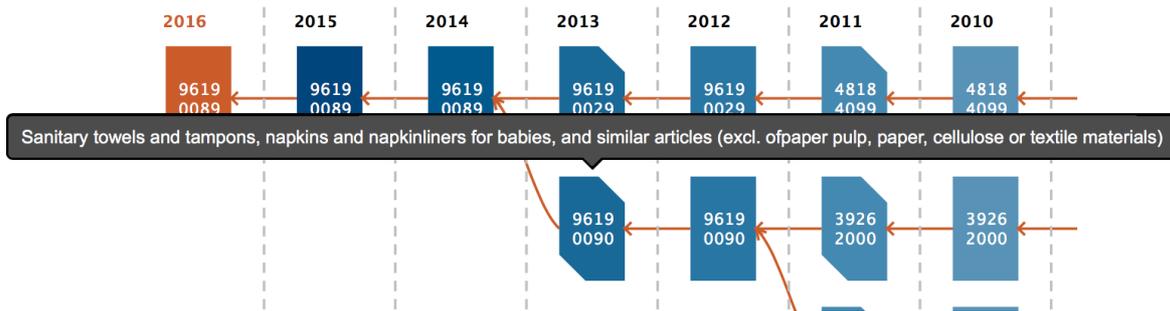


Figure 11: Mouse-over on a specific cell; the description of the cell's product code appears



Figure 12: legend informing on the type of code change

3 History tracking module

The THESEUS front-end to HERMES relies on a history-tracking module based on MySQL stored procedures. The key input parameters of the module are:

- The product code that has to be tracked.
- A reference year.
- A time window delimiting the history of the selected product.

The output returned by the tracker can be better understood with an example. Assume to be interested in the history of product CN-96190089, active in the year 2014, in a time window comprised between 2008 and 2015. Then, the output of the history-tracking module will be the list represented in the tables or the graph below (Figure 13).

In the tables and graph there is an important distinction between "Non-filtered results" and "Filtered results".

- "Filtered results" refer to the set of paths formed by direct edges that flow in, or depart from, the cell of the reference code. In other words, the filtered results contain all transitive dependencies that originate or end in the cell of the reference code.
- "Non-filtered results" refer to the set of all paths.

In the graph, a red arrow indicates a direct relationship, and the fields in yellow are the selected reference date and product code.

Non-filtered results

Level	Product	Year	Roots	Leafs
-6	39262000	2008	39262000	39262000
-6	39269097	2008	39269097	39269097
-6	48184011	2008	48184011	48184011
-6	48184013	2008	48184013	48184013
-6	48184019	2008	48184019	48184019
-6	48184090	2008	48184090	48184090
-5	39262000	2009	39262000	39262000
-5	39269097	2009	39269097	39269097
-5	48184011	2009	48184011	48184011
-5	48184013	2009	48184013	48184013
-5	48184019	2009	48184019	48184019
-5	48184090	2009	48184090	48184091, 48184099
-4	39262000	2010	39262000	39262000
-4	39269097	2010	39269097	39269097
-4	48184011	2010	48184011	48184011
-4	48184013	2010	48184013	48184013
-4	48184019	2010	48184019	48184019
-4	48184091	2010	48184090	48184091
-4	48184099	2010	48184090	48184099
-3	39262000	2011	39262000	39262000, 96190090
-3	39269097	2011	39269097	39269097, 96190090
-3	48184011	2011	48184011	96190011
-3	48184013	2011	48184013	96190013
-3	48184019	2011	48184019	96190019
-3	48184091	2011	48184091	96190021
-3	48184099	2011	48184099	96190029
-2	39262000	2012	39262000	39262000
-2	39269097	2012	39269097	39269097
-2	96190011	2012	48184011	96190011
-2	96190013	2012	48184013	96190013
-2	96190019	2012	48184019	96190019
-2	96190021	2012	48184091	96190021
-2	96190029	2012	48184099	96190029
-2	96190090	2012	39262000, 39269097	96190090
-1	39262000	2013	39262000	39262000
-1	39269097	2013	39269097	39269097
-1	96190011	2013	96190011	96190071
-1	96190013	2013	96190013	96190075
-1	96190019	2013	96190019	96190079
-1	96190021	2013	96190021	96190081
-1	96190029	2013	96190029	96190089
-1	96190090	2013	96190090	96190071, 96190075, 96190079, 96190081, 96190089
0	39262000	2014	39262000	39262000
0	39269097	2014	39269097	39269097
0	96190071	2014	96190011, 96190090	96190071
0	96190075	2014	96190013, 96190090	96190075
0	96190079	2014	96190019, 96190090	96190079
0	96190081	2014	96190021, 96190090	96190081
0	96190089	2014	96190029, 96190090	96190089
1	39262000	2015	39262000	
1	39269097	2015	39269097	
1	96190071	2015	96190071	
1	96190075	2015	96190075	
1	96190079	2015	96190079	
1	96190081	2015	96190081	
1	96190089	2015	96190089	

Filtered results

Level	Year	Product	Roots	Leafs
-6	39262000	2008	39262000	39262000
-6	39269097	2008	39269097	39269097
-6	48184090	2008	48184090	48184090
-5	39262000	2009	39262000	39262000
-5	39269097	2009	39269097	39269097
-5	48184090	2009	48184090	48184091, 48184099
-4	39262000	2010	39262000	39262000
-4	39269097	2010	39269097	39269097
-4	48184099	2010	48184090	48184099
-3	39262000	2011	39262000	39262000, 96190090
-3	39269097	2011	39269097	39269097, 96190090
-3	48184099	2011	48184099	96190029
-2	96190029	2012	48184099	96190029
-2	96190090	2012	39262000, 39269097	96190090
-1	96190029	2013	96190029	96190089
-1	96190090	2013	96190090	96190071, 96190075, 96190079, 96190081, 96190089
0	96190089	2014	96190029, 96190090	96190089
1	96190089	2015	96190089	

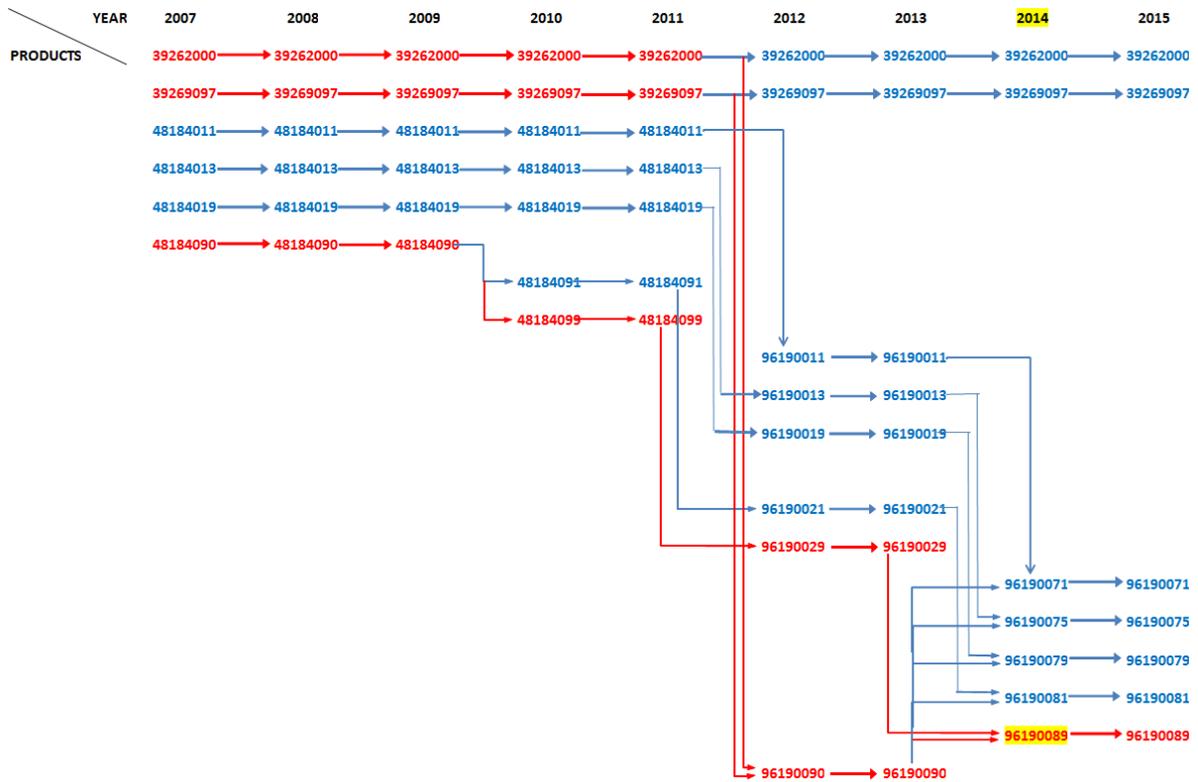


Figure 13 – History tree

4 Conclusion

HERMES is a tool that allows tracking the history of the nomenclature of goods in trade. It closely relate to TARIC and the related EU legal base on tariffs, statistical nomenclature and Common Customs Tariff. The service relies on the official yearly updates of the Combined Nomenclature classification, extracted from Eurostat's RAMON website. The user community of HERMES is potentially very wide, pointing to customs services, low enforcement agencies, international traders and other economic operators. For this reason, HERMES may be open to the general public in the unrestricted area of THESEUS.

5 Annex: Database structure

We provide the structure and data type of the MySQL database table of the historical CN codes downloaded from RAMON. The table may change in next releases, depending on future needs (e.g. porting to Oracle).



Figure 14: Database schema

5.1 Prod_registry

Field name	Field description	Field format
product_id	Product id	Big int (20)
plevel	Product level	Varchar (2)
pcode12	Product code 12 digits	Char (12)
period_from	Period from	Date
period_to	Period to	Date
cn_code	CN code	Varchar (2048)
cn_desc	Base description of the product	Varchar (2048)

sup_unit	Supplementary unit	Varchar (2048)
desc_su	Description of the supplementary unit	Varchar (2048)
desc_en	Description in English	Varchar (2048)
desc_de	Description in German	Varchar (2048)
desc_it	Description French	Varchar (2048)
Is_new	Is new	Boolean

5.2 Prod_tree

Field name	Field description	Field format
period	Period	Date
product	Product code 8 digits	Char (8)
prod_roots	Product roots	Varchar (2048)
prod_leafs	Product leafs	Varchar (2048)
Is_equivocal	Is equivocal ("1" means the code is split into two or more leaves, but the root code remains valid, e.g. A → AB)	Boolean (tinyint(1))
sanction_id	Sanction id	Big int (20)

5.3 Tmp_prod_db

Field name	Field description	Field format
period	Period	Date
plevel	Product level	Varchar (2)
pcode12	Product code	Char (12)
cn_code	CN code	Varchar (2048)
cn_desc	Base description of the product	Varchar (2048)
sup_unit	Supplementary unit	Varchar (2048)
desc_su	Description of the supplementary unit	Varchar (2048)
desc_en	Description in English	Varchar (2048)

desc_de	Description in German	Varchar (2048)
desc_fr	Description in French	Varchar (2048)

5.4 Tmp_prod_change

Field name	Field description	Field format
period	Period	Char (8)
original_code	Original Product Code	Varchar (10)
destination_code	Destination Product Code	Varchar (10)

5.5 Desc_sanction

This table is allocated for future use, to treat TARIC sanctions.

Field name	Field description	Field format
sanction_id	Sanction id	Big int (20)
period_from	Period from	Date
period_to	Period to	Date
sanction	Sanction	Varchar (2048)

5.6 Tmp_reused

Field name	Field description	Field format
cn_code	CN code	Varchar (8)

6 Annex: The "Tree Hierarchy" procedure

This is the history-tracking module at the basis of the THESEUS front-end to HERMES. The module returns a table representing the hierarchical tree of direct relationships for a given product.

The procedure has following input parameters:

- Product code (8 digits),
- Reference year (with century, i.e. "2015"),
- Start of the time window delimiting the history of the selected product (optional).
- End of the time window (optional).

- Language flag ("EN", "DE", "FR") to choose the language of the description to be returned. 'EN' for English, 'DE' for German, 'FR' for French or '' for no description.

Output:

- A return code ('0' for "run successful"),
- A result set containing the whole hierarchical tree.

The fields of the result set are:

- Level of the hierarchy. Using a "elevator" metaphor, "ground 0" is the floor of the requested year.
- Year.
- Product code (8 digits).
- Parent codes (using comma separation if there are more than one),
- Leaf codes (using comma, as above).
- Flag "new product code" (set to "true", that is '1', if the product code doesn't exist the previous year).
- Field to be used in the future for sanctions.
- Product description in the chosen language.

Example of call and results:

```

set @prod      = '96190089';
set @year_ref  = '2014';
set @window_from = '2008';
set @window_to   = '2015';
set @lang_code  = 'EN';

call `hermes`.`tree_hierarchy`(@prod, @year_ref, @window_from, @window_to, @lang_code,
@retcode);

p_level,p_year,p_code,p_roots,p_leafs,is_equivocal,sanction_id,p_desc
-6,2008,39262000,39262000,39262000,0,0,"Articles of apparel and clothing accessories..."
-6,2008,39269097,39269097,39269097,0,0,"Articles of plastics and articles of other ma..."
-6,2008,48184090,48184090,48184090,0,0,"Napkins and napkin liners for babies and simi..."
-5,2009,39262000,39262000,39262000,0,0,"Articles of apparel and clothing accessories ..."
-5,2009,39269097,39269097,39269097,0,0,"Articles of plastics and articles of other ma..."
-5,2009,48184090,48184090,"48184091,48184099",0,0,"Napkins and napkin liners for babi..."
-4,2010,39262000,39262000,39262000,0,0,"Articles of apparel and clothing accessories ..."
-4,2010,39269097,39269097,39269097,0,0,"Articles of plastics and articles of other ma..."
-4,2010,48184099,48184090,48184099,0,0,"Sanitary articles, of paper pulp, paper, cell..."
-3,2011,39262000,39262000,"39262000,96190090",1,0,"Articles of apparel and clothing a..."
-3,2011,39269097,39269097,"39269097,96190090",1,0,"Articles of plastics and articles ..."
-3,2011,48184099,48184099,96190029,0,0,"Sanitary articles, of paper pulp, paper, cell..."
-2,2012,96190029,48184099,96190029,0,0,"Sanitary articles, of paper pulp, paper, cell..."
-2,2012,96190090,"39262000,39269097",96190090,0,0,"Sanitary towels and tampons, napki..."
-1,2013,96190029,96190029,96190089,0,0,"Sanitary articles, of paper pulp, paper, cell..."
-1,2013,96190090,96190090,"96190071,96190075,96190079,96190081,96190089",0,0,"Sanitar..."

```

```
0,2014,96190089,"96190029,96190090",96190089,0,0,"Sanitary articles, e.g. incontinec..."
1,2015,96190089,96190089,96190089,0,0,"Sanitary articles, e.g. incontinence care arti..."
```

7 Annex: The "Navigator" procedure

This is the procedure at the basis of the search tool. It has been written for the auto-completion of the web interface. It is called once when the user inserts the first 2 digits and then whenever user types something, cancelling the previous call and starting another. It returns all products beginning with the sub-string code introduced by the user. A search based on keyword (i.e. "lobsters") is also implemented.

Input parameters:

- Product code (2 or more digits) or a keyword.
- Language code.
- Numeric flag (true/false). If true the query contains a keyword otherwise it is a numeric code.

Output:

- A result set with the list of found products.
- A return code (0/1). Where 0 indicates the success and 1 the failure.

The fields of the result set are:

- Product code (8 digits).
- Description, in the specified language.
- Starting date of product validity.
- Ending date of product validity (empty if product is still valid).

An example of call:

```
set @myProd = '8473';
set @myLang = 'EN';
set @numericFlag = false;

call `hermes`.`navigator` (@myProd, @myLang, @numericFlag, @retcode);

cn_code,p_desc,period_from,period_to
8473,"Parts and accessories (other than covers, carrying cases and the like) suitable for use
solely or principally with machines of heading 8469 to 8472, n.e.s.",2000-01-01,
847310,"Parts and accessories for typewriters or word-processing machines of heading 8469,
n.e.s.",2000-01-01,
84731011,"Electronic assemblies of word-processing machines of subheading 8469 00 10,
n.e.s.",2000-01-01,
84731019,"Electronic assemblies of typewriters of heading 8469, n.e.s.",2000-01-01,
84731090,"Parts and accessories of typewriters or word-processing machines of heading 8469,
n.e.s.(excl. electronic assemblies)",2000-01-01,
847321,"Parts and accessories of electronic calculating machines of subheading 8470.10,
8470.21 or 8470.29, n.e.s.",2000-01-01,
84732110,"Electronic assemblies of electronic calculators of subheading 8470.10, 8470.21 or
8470.29, n.e.s.",2000-01-01,
84732190,"Parts and accessories of electronic calculators of subheading 8470.10, 8470.21 or
```

8470.29, n.e.s. (excl. electronic assemblies)",2000-01-01,

847329,"Parts and accessories of non-electronic calculators for accounting machines, cash registers or other machines, incorporating a calculating device, of heading 8470, n.e.s.",2000-01-01,

84732910,"Electronic assemblies of accounting machines, cash registers or other machines, incorporating a calculating device, of heading 8470, n.e.s.",2000-01-01,

84732990,"Parts and accessories of non-electronic calculators, for accounting machines, cash registers or other machines, incorporating a calculating device, of heading 8470, n.e.s. (excl. electronic assemblies)",2000-01-01,

847330,"Parts and accessories of automatic data-processing machines or for other machines of heading 8471, n.e.s.",2000-01-01,

84733010,"Electronic assemblies of automatic data-processing machines or for other machines of heading 8471, n.e.s.",2000-01-01,2006-12-31

84733020,"Electronic assemblies of automatic data-processing machines or for other machines of heading 8471, n.e.s.",2007-01-01,

84733080,"Parts and accessories of automatic data-processing machines or for other machines of heading 8471, n.e.s. (excl. electronic assemblies)",2007-01-01,

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84735090,"Parts and accessories equally suitable for use with two or more typewriters, word-processing machines, calculating machines, automatic data-processing machines or other machines, equipment or devices of heading 8469 to 8472, n.e.s. (excl. electronic assemblies)",2000-01-01,2006-12-31

8 Annex: The "Get description" procedure

This procedure returns the full description of a specified product code in the selected language for a reference year.

Input parameters:

- Product code (8 digits).
- Reference date (YYYY-01-01).

- Language code.

Output:

- An empty result set if nothing found or single-row result set containing the full description of the product in the specified year

Example of call:

```
set @myProd = '96190089';
set @myYear = '2014-01-01'
set @myLang = 'EN';

call `hermes`.`get_description` (@myProd, @myYear, @myLang);

description
"Sanitary articles, e.g. incontinence care articles (excl. of textile materials, and sanitary towels, tampons, napkins and napkin liners for babies)"
```

References

- [1] Council Regulation (EEC) No 2658/87 of 23 July 1987 on the tariff and statistical nomenclature and on the Common Customs Tariff (Official Journal L 256, 07/09/1987).

List of figures

Figure 1 - Example of merged codes.....	3
Figure 2 - Example of split code	3
Figure 3 - RAMON web site http://ec.europa.eu/eurostat/ramon/	4
Figure 4: HERMES page	5
Figure 5: Product codes retrieved after typing 6 digits; the first is proposed by default ..	6
Figure 6: Product codes retrieved after typing the keyword "sanitary"	6
Figure 7: Selection of a product code.....	6
Figure 8: History of the selected product code	7
Figure 9: History of the selected code from year 2000, obtained by right scrolling.....	7
Figure 10: History of a product code selected by clicking on one of the cells of the previous graph.....	8
Figure 11: Mouse-over on a specific cell; the description of the cell's product code appears	8
Figure 12: legend informing on the type of code change	8
Figure 13 - History tree	11
Figure 14: Database schema	12

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