

# Odeuropa Semantic Technologies

Pasquale Lisena | EURECOM

# What is a **Knowledge Graph**?

It is a specific kind of **knowledge base** which is:

- a directed graph  
connections between nodes are first-class citizens
- semantic  
the meaning of the connections are part of the data itself
- smart  
allows graph-computing techniques and algorithms
- alive  
easy to extend, access, reuse

**Semantic Web** technologies enable to represent graphs in which nodes and properties (linking the nodes) are identified by **URIs**

PARRY'S  
CYCLOPÆDIA  
OF  
PERFUMERY

A HANDBOOK  
On the Raw Materials used by the Perfumer, their  
Origin, Properties, Characters and Analysis; and  
on other subjects of Theoretical and Scientific  
Interest to the User of Perfume Materials, and to  
those who have to Examine and Value such Materials

ERNEST  
Analytical

OSPHRÉSIOLOGIE,  
OU

TRAITÉ DES ODEURS, DU SENS ET DES ORGANES  
DE L'OLFACTION;  
AVEC L'HISTOIRE NÉCESSAIRE DES MALADIES DE NEZ ET DES MOIENS PARALLÈLES,  
ET DES OPÉRATIONS QUI LEUR SONT DESTINÉES.

PAR HIPPOL. CLOQUET.

Docteur en médecine de la Faculté de Paris, Médecin titulaire de l'École royale de  
pharmacie, des hôpitaux, professeur, maître d'École de l'École royale de  
pharmacie de la même ville, et de la Société médicale d'émulation, de celle des médecins étrangers,  
ancien Professeur et Aide de Clinique interne en la Faculté de médecine de Bonn, et  
Président de l'École royale de Paris, Médecin du Bureau de Charité de la dite ville,  
etc., etc.

Et précédé d'un rapport par son collègue M. BOUILLON.

SECONDE ÉDITION,  
ENTièrement révisée et considérablement augmentée.



A PARIS,  
CHEZ MÉQUIGNON-MARVIS, LIBRAIRE  
POUR LA PARTIE DE MÉDECINE,  
RUE DE L'ÉCOLE DE MÉDECINE, N° 3.  
1851.

Text

# Centuries of collective smell memories



# Heritage



Images

# PARRY'S CYCLOPÆDIA OF PERFUMERY

A HANDBOOK

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Origin, Preparation, Characters and Analysis; and  
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Interest to the User of Perfume Materials, and to  
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ERNEST  
D-De  
Analytical

## OSPHRÉSIOLOGIE, OU

### TRAITÉ DES ODEURS, DU SENS ET DES ORGANES DE L'OLFACTION;

AVEC L'HISTOIRE NÉCESSAIRE DES MALADIES DE NERF ET DES SENSÉS PARALYSÉS,  
ET DES OPÉRATIONS QUI LEUR SONT DESTINÉES.

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J. B.



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1851.

Text

# Knowledge Graph

## Query + AI



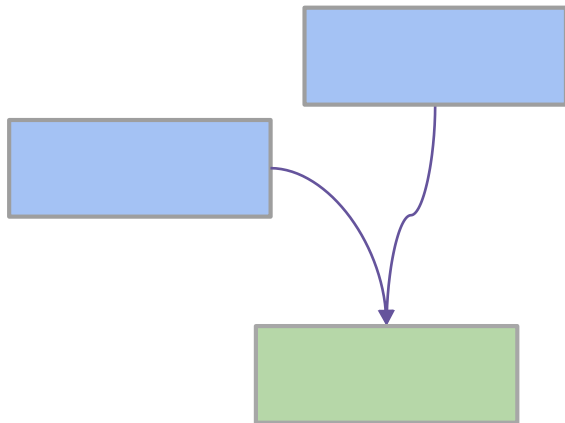
## Odeuropa



Images

# What is a **data model**?

An **abstract** model that organizes elements for structuring the data and standardizes how they **relate** to each other and to the properties of real-world entities.



When a data model gain formal naming and definition, we can speak about an **ontology**, that can be developed in **OWL** (Web Ontology Language) following the Semantic Web technical stack.

# State of Art

We can find KG, ontologies or data models representing:

## ***Disciplines***

- ✓ Cultural Heritage
- ✓ History
- ✓ Art
- ✓ Chemistry
- ✓ Scientific Observation

## ***Senses***

- ✓ Vision / Images
- ✓ Hearing / Sounds
- ✓ Taste
- Olfaction  
*(only from a chemical perspective)*

- Olfactory experiences
- Sensory experiences

# Competency questions (CQ)

74 questions, organised in 7 categories  
defined by olfactory experts (history and heritage domain)

## 1. Smells

*What smells were significant in the past?*

## 2. Noses

*How did people use their noses in the past and what types of smell expertise or experience can we find?*

## 3. Identities

*What meaning did smells have and how did they communicate identities or stereotypes?*

## 4. Emotions

*What feelings were associated with smells in parts of Europe at different times?*

## 5. Practices

*What kinds of practices produced smells?*

## 6. Sites and contexts

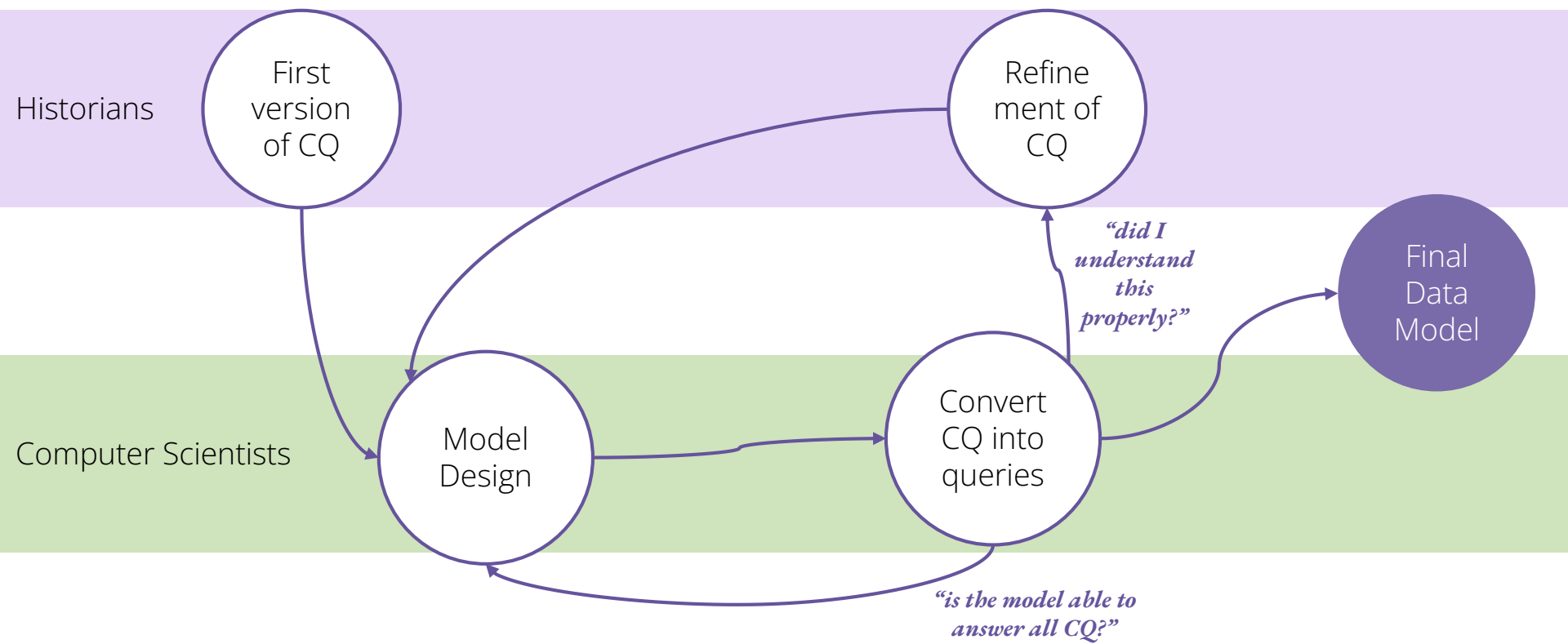
*Which communities, institutions, or spaces were associated with particular smells?*

## 7. Texts and images

*How smells are represented in texts and images?*



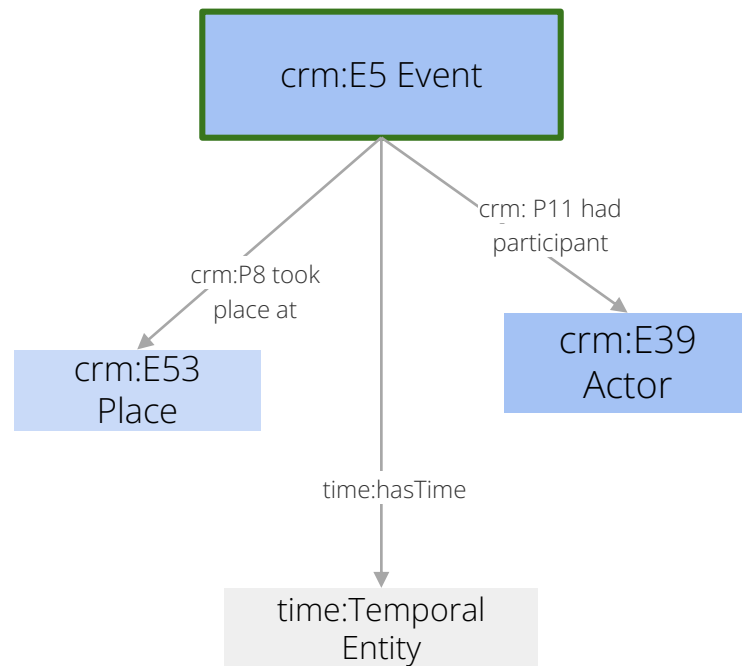
# Collaboration between Disciplines





# Extending CIDOC CRM and CRMsci

- CIDOC-CRM is an **event-based ontology**
  - Everything exists through an event (birth, production, etc.)
- Already **familiar** within Cultural Institutions
- It is a **bridge** to other cultural and heritage objects
- It is **expressive** and **flexible**
- It has an extension covering Scientific Observation: CRMsci



# The Odeuropa Data Model

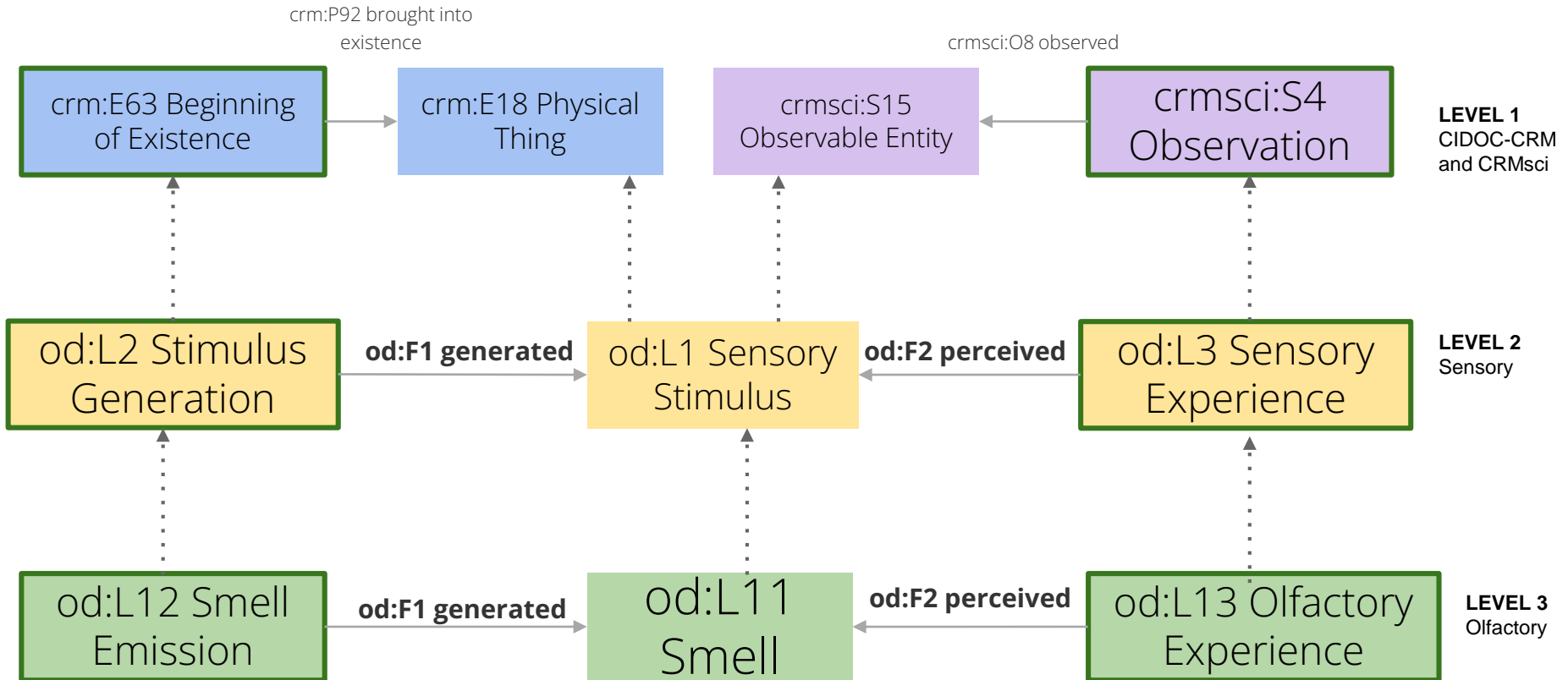
# Core



Event

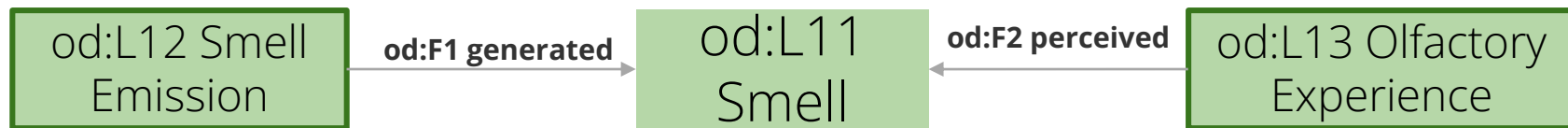


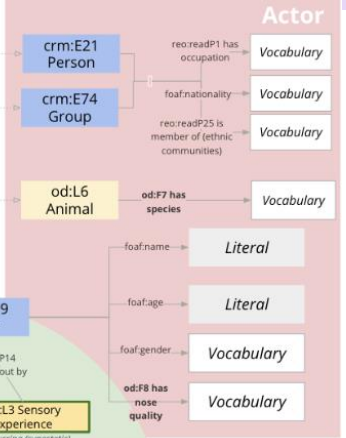
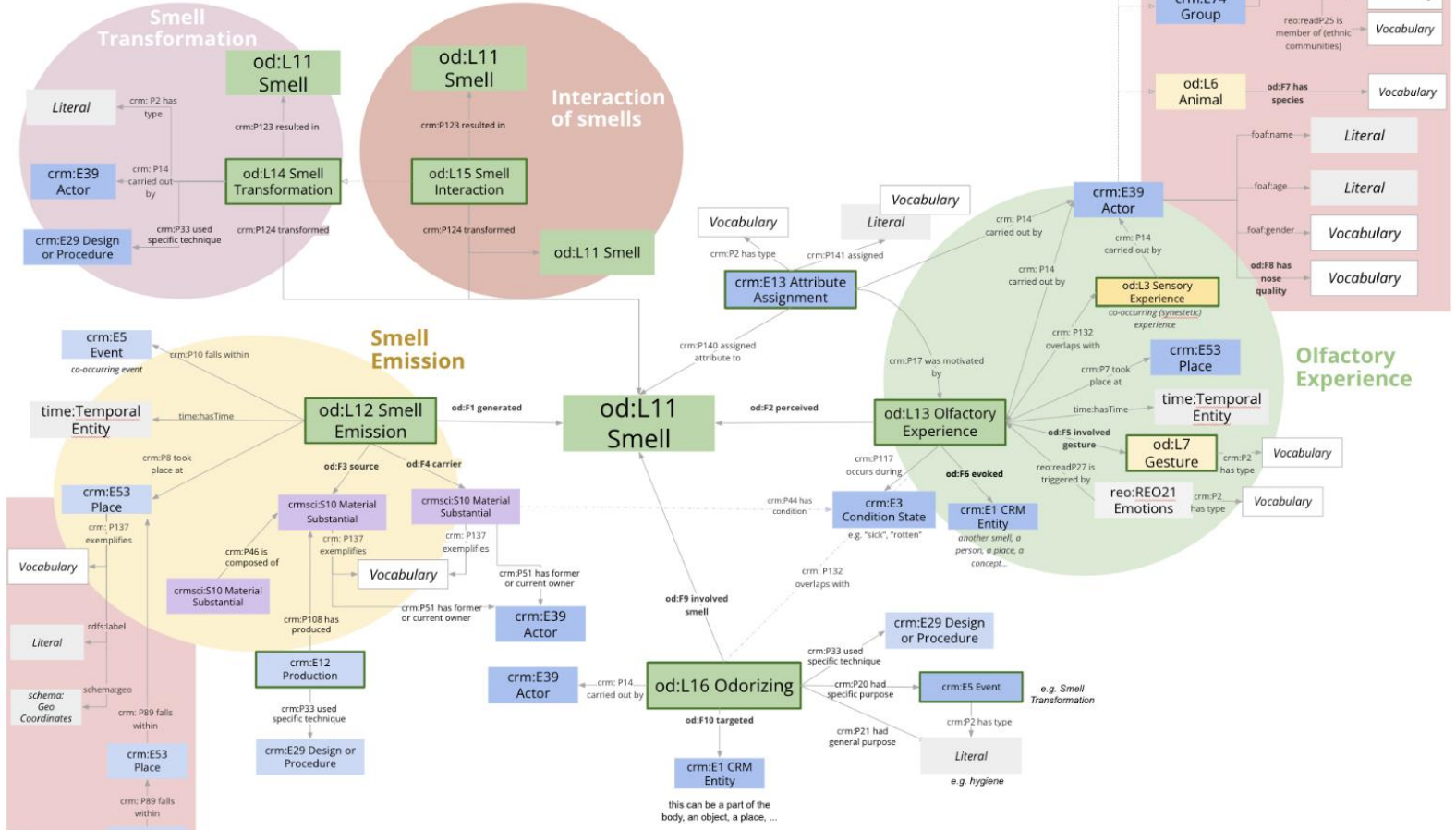
subclass of  
property



# What is a Smell?

- In this model, we consider a **smell as a unique and non-repeatable entity**
  - Two roses have two distinct (but similar) smells
  - A smell is normally connected to time and space
  - The “smell of roses” exists only as a generalisation of the smells of all roses
- A given smell can be experienced by multiple people
  - Each person can describe the same smell differently





# What the model enables to represent

Smell  
Emission

Olfactory  
Experience

Odorizing

- Provenance of the information (which document, which tool)
  - **Space & Time**
  - Co-occurring event

- **Source**
- **Carrier**
- Smell Transformation
- Smells Interaction
- Connection with multiple experiences

- Perceiver
- **Gesture**
- **Attributes/Qualities** used for describing it
- **Emotion**
- Evoked entities
- Multi-sensory experiences

- User
- Technique
- Purpose

# Controlled vocabularies in SKOS

## Multilingual Vocabularies (6 langs)

realised during the project



### Olfactory Objects

420 Concepts



### Olfactory Gestures

35 Concepts

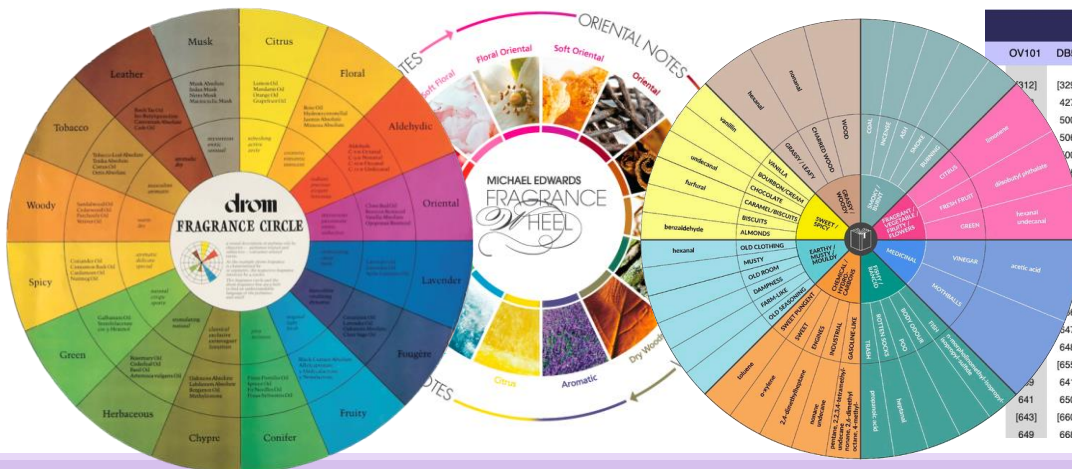


### Fragrant spaces

110 Concepts

- hierarchy
- bridges between vocabularies
- interlinks with Wikidata and Iconclass

## Olfactory taxonomies published in SKOS



Flavornet Home					Kovats RI	
OV101	DB5	OV17	C20M	Odorant	Odor	
[329]	[329]	[420]	677	trimethylamine	fish	
427	[518]	714		ethanal	pungent, ether	
500	[591]	696		methanethiol	sulfur, gasoline, ga	
506	[597]	571		propanal	solvent, pungent	
500	500	500		pentane	alkane	
5	[827]	1037		propanol	alcohol, pungent	
	[596]	716		dimethyl sulfide	cabbage, sulfur, ga	
	[591]	848		ethyl formate	pungent	
	[688]	[945]		methyl ethyl ketone	ether	
	[700]	[957]		methyl ethyl sulfide	sulfur, garlic	
	600	600		hexane	alkane	
	[719]	907		ethyl acetate	pineapple	
	[711]	[968]		methylbutenol	herb	
	[6]	[727]		pentanone	ether	
	547	[738]		isobutanol	wine, solvent, bitter	
	648	[739]		trans-crotonaldehyde	flower	
	[655]	[746]		methylpentanone	mint	
	641	729	912	methylbutanal	cocoa, almond	
	641	650	728	910	methylbutanal	malt
	[643]	[660]	[751]	1008	pyrrolidine	alkaline
	649	668	17591	929	ethanol	sweet

A text example



# A text example

From somewhere there came a **rich oriental odor**. It intoxicated me with its **subtle perfume**. [...] I turned again to the **table**, and carelessly reached out for a pair of dainty, pale tan-colored **gloves**. Then I seized them eagerly and **brushed them against my face**; I had found the odor. The gloves were perfumed.

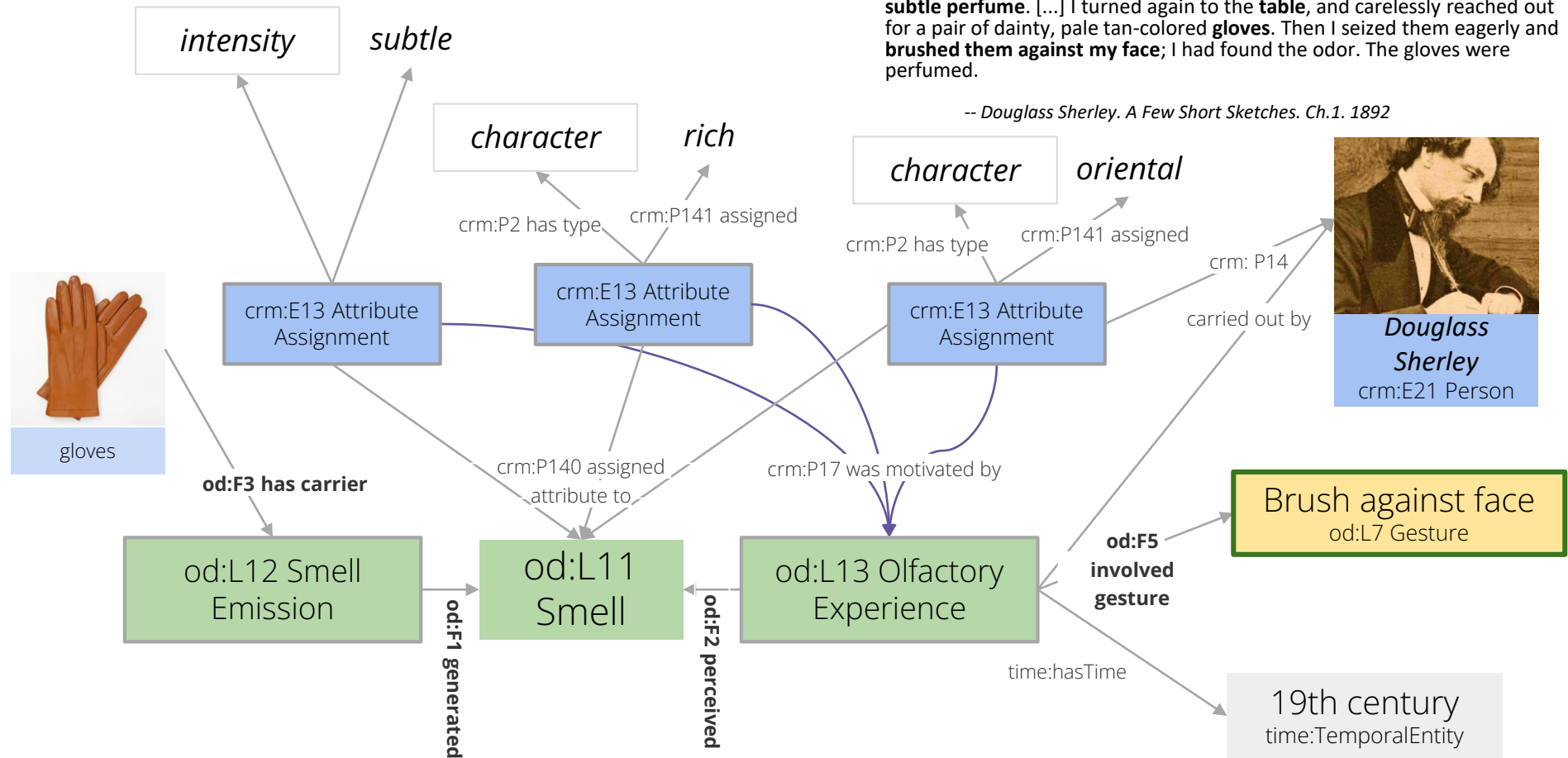
-- *Douglass Sherley. A Few Short Sketches. Ch.1. 1892*

From somewhere there came a **rich oriental odor**. It intoxicated me with its **subtle perfume**. [...] I turned again to the **table**, and carelessly reached out for a pair of dainty, pale tan-colored **gloves**. Then I seized them eagerly and **brushed them against my face**; I had found the odor. The gloves were perfumed.

-- Douglass Sherley. *A Few Short Sketches*. Ch.1. 1892



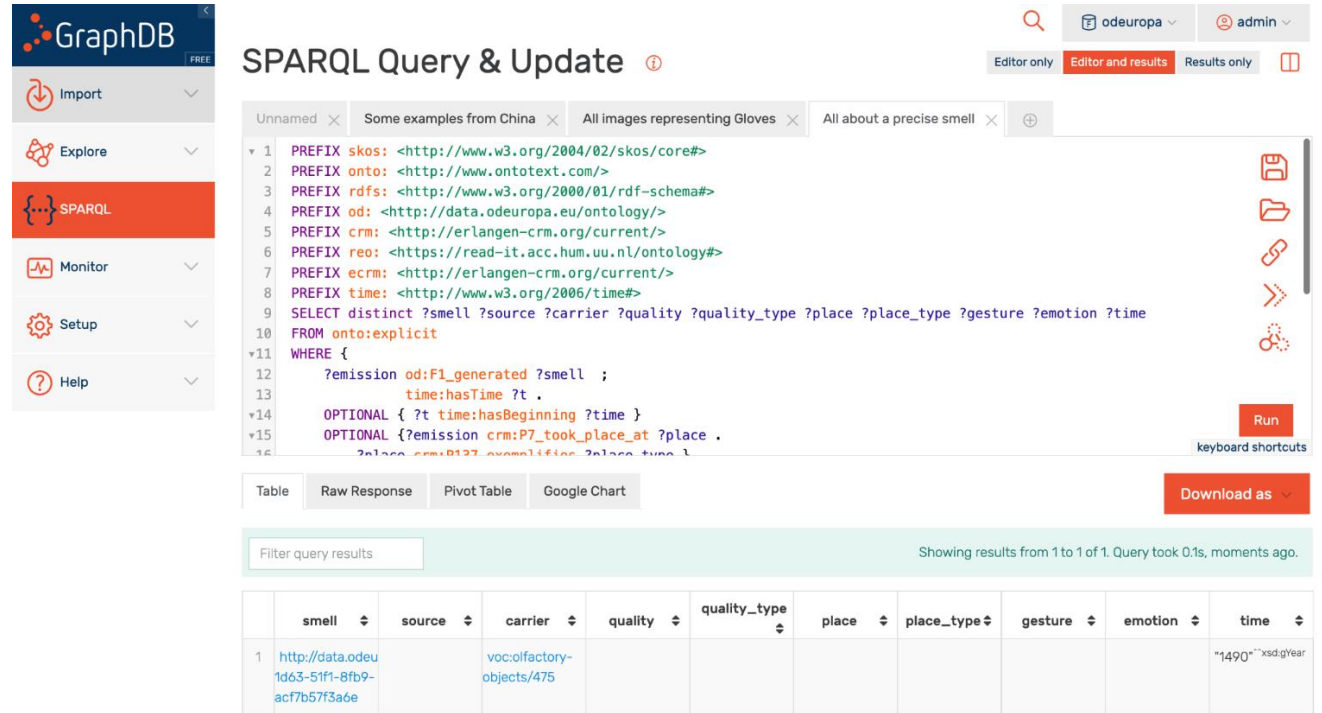
**Douglass Sherley**  
crm:E21 Person



# How to Access Data

# Query the SPARQL Endpoint

<https://data.odeuropa.eu/sparql>



**GraphDB** FREE

- Import
- Explore
- SPARQL**
- Monitor
- Setup
- Help

## SPARQL Query & Update

odeuropa admin

Editor only Editor and results Results only

Unnamed Some examples from China All images representing Gloves All about a precise smell

```
1 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
2 PREFIX onto: <http://www.ontotext.com/>
3 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
4 PREFIX od: <http://data.odeuropa.eu/ontology/>
5 PREFIX crm: <http://erlangen-crm.org/current/>
6 PREFIX reo: <https://read-it.acc.hum.uu.nl/ontology#>
7 PREFIX ecrm: <http://erlangen-crm.org/current/>
8 PREFIX time: <http://www.w3.org/2006/time#>
9 SELECT distinct ?smell ?source ?carrier ?quality ?quality_type ?place ?place_type ?gesture ?emotion ?time
10 FROM onto:explicit
11 WHERE {
12   ?emission od:F1_generated ?smell ;
13     time:hasTime ?t .
14   OPTIONAL { ?t time:hasBeginning ?time }
15   OPTIONAL { ?emission crm:P7_took_place_at ?place .
16     ?place crm:P127_exemplifies ?place_type .
```

Run keyboard shortcuts

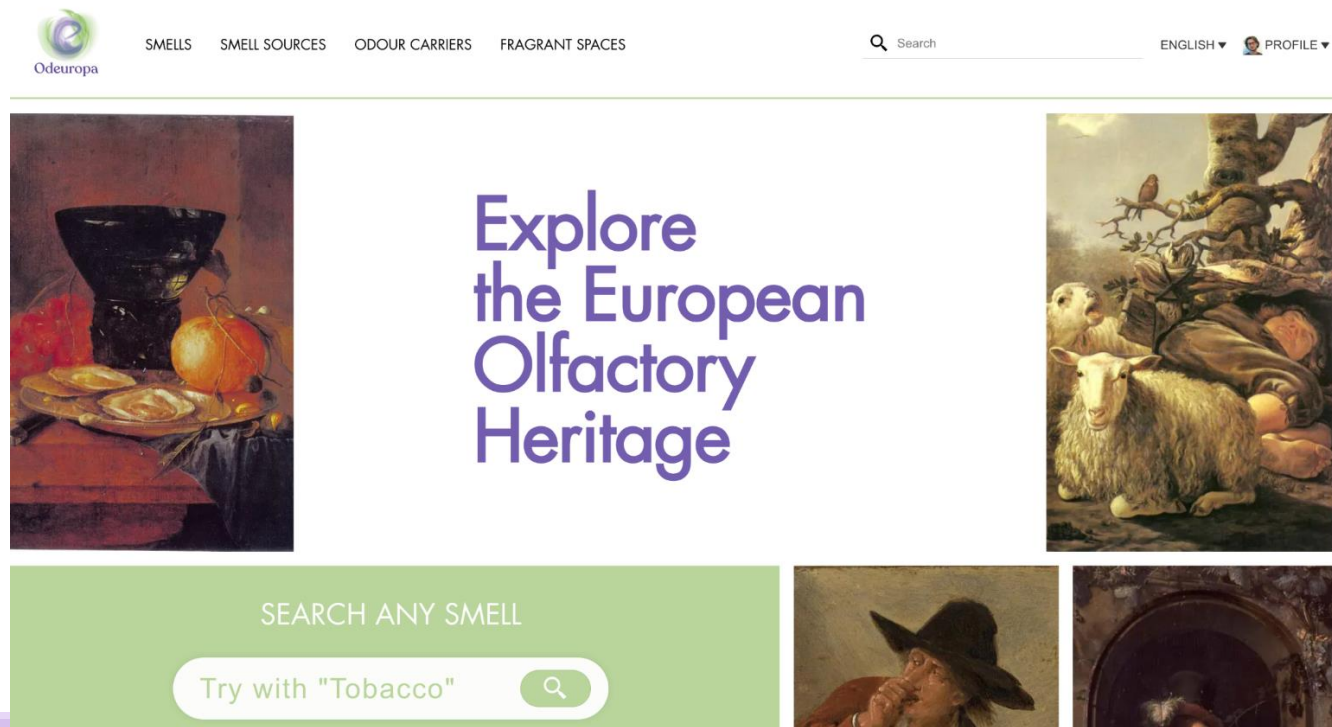
Table Raw Response Pivot Table Google Chart Download as

Filter query results Showing results from 1 to 1 of 1. Query took 0.1s, moments ago.

	smell	source	carrier	quality	quality_type	place	place_type	gesture	emotion	time
1	<a href="http://data.odeuropa.eu/1d63-51f1-8fb9-acf7b57f3a6e">http://data.odeuropa.eu/1d63-51f1-8fb9-acf7b57f3a6e</a>		voc:ofactory-objects/475							"1490"^^xsd:gYear

# Use the Odeuropa Explorer

<https://explorer.odeuropa.eu>



The screenshot shows the Odeuropa Explorer website interface. At the top left is the Odeuropa logo, a stylized 'e' with a green leaf. To its right are navigation links: SMELLS, SMELL SOURCES, ODOUR CARRIERS, and FRAGRANT SPACES. On the top right, there is a search bar with a magnifying glass icon and the text 'Search', followed by language and profile options: ENGLISH and PROFILE. The main content area features a large central text 'Explore the European Olfactory Heritage' in purple. To the left of this text is a still life painting of a black mortar and pestle with fruit. To the right is a painting of a sheep in a landscape. Below the central text is a green search bar with the text 'SEARCH ANY SMELL' and a search button. Below the search bar is a white input field with the text 'Try with "Tobacco"' and a search button. At the bottom right, there are two small thumbnail images: one of a man in a hat and one of a dark interior scene.

# Advanced search of text and images



SMELLS SMELL SOURCES ODOUR CARRIERS FRAGRANT SPACES

Search

ENGLISH PROFILE

CLEAR

In text In images **Both**

Full text search

Search by concept

Place

Time

Smell Source

Carrier

## 223593 search results

Show as cards

Sort by Select...

### SMELLS

CREATION DATE 1657  
AUTHOR Marin Cureau de La Chambre

[SEE MORE](#)

### FETORE

CREATION DATE 1847  
AUTHOR Ludovico [vedi note] Muratori

OLFACTORY EXPERIENCE

DEFINED AS incomportabile

[SEE MORE](#)

### WEL RIECKENDE

CREATION DATE 1655  
AUTHOR volkerus van oosterwyck

[SEE MORE](#)

### ÉÉE

CREATION DATE 1616  
AUTHOR

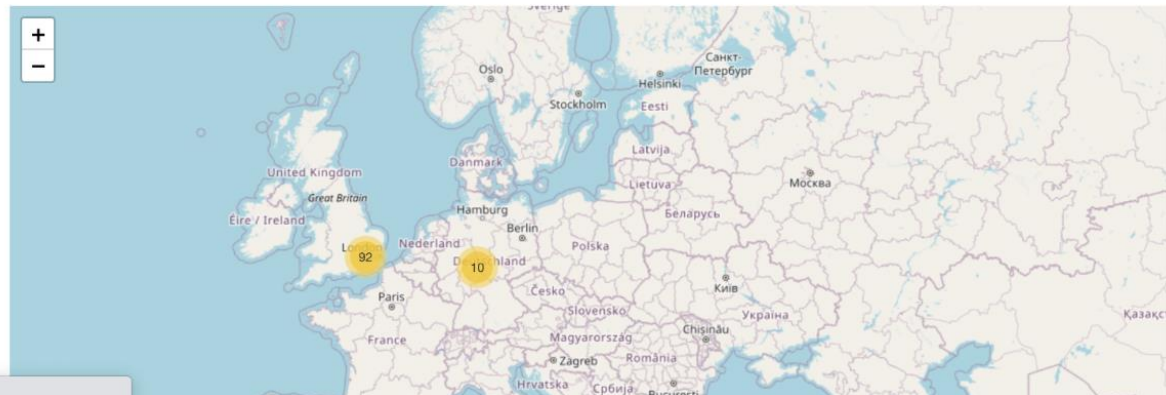
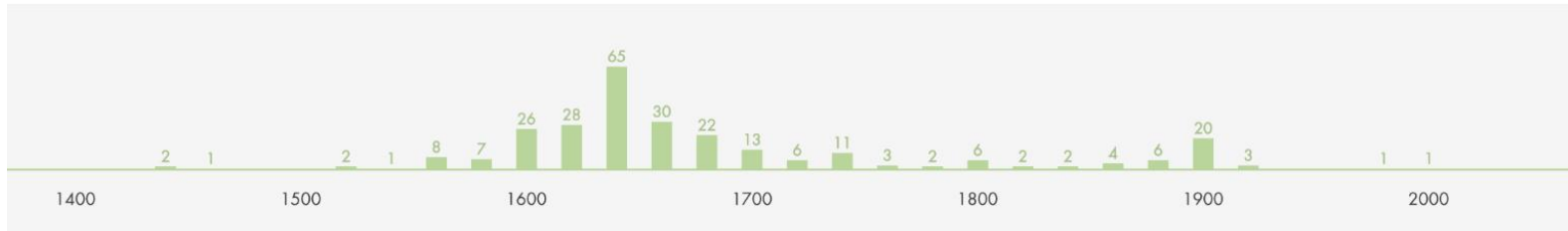
[SEE MORE](#)

Previous 1 2 3 4 5 ... 11179 11180 Next

# Focus on particular smell sources



## Smell of Bread



hepatic seductive acido nesch zonderlingen lekker

pravo

# Save textual excerpts in a personalized list

The screenshot shows a digital library interface. At the top, there are navigation links: « Previous result, [Back to search results](#), 1 / 86, and [Next result »](#). The main content area displays a 'Textual resource' titled 'Flush: A biography of Virginia Woolf'. Below the title, there is a 'Save' button and a source link: 'Odeuropa benchmark (permalink) Source: <http://gutenberg.net.au/eb...>'. A metadata section titled 'Smell Emission' lists 'SOURCE: [Garlic, Wine, Bread, Leather](#)' and 'CREATION DATE: 1933'. Below this is an 'Excerpt 1' section with a quote: 'He went in and out, up and down, where they beat brass, where they bake bread, where the women sit combing their hair, where the bird-cages are piled high on the causeway, where the wine spills itself in dark red stains on the pavement, where leather **smells** and harness and garlic, where cloth is beaten, where vine leaves tremble, where men sit and drink and spit and dice--he ran in and out, always with his nose to the ground, drinking in the essence; or with his nose in the air vibrating with the aroma.'

A white dialog box titled 'Save to a list' is overlaid on the page. It contains a 'Create a new list' button and two existing lists: 'My test list' and 'Tobacco', each with a heart icon.