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toute une vie en bonne santé

FCM DATABASES

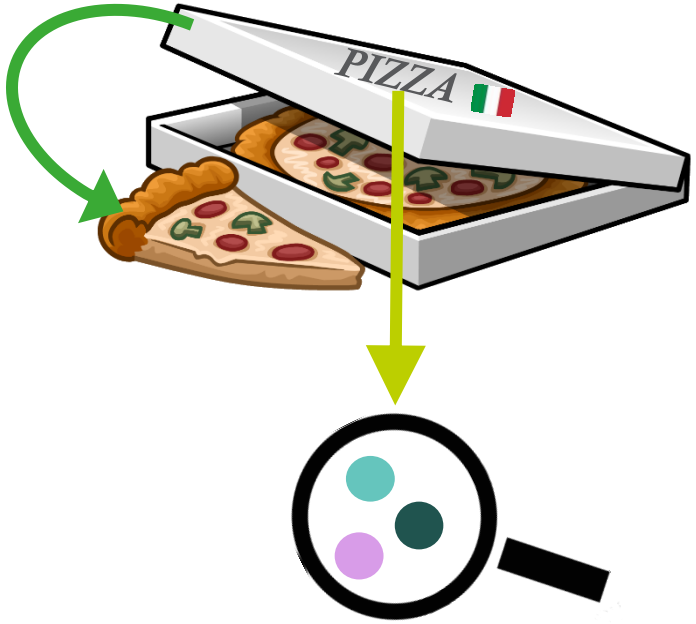
Current situation and future developments

Els Van Hoeck - Head of Service

.be

Introduction

MIGRATION

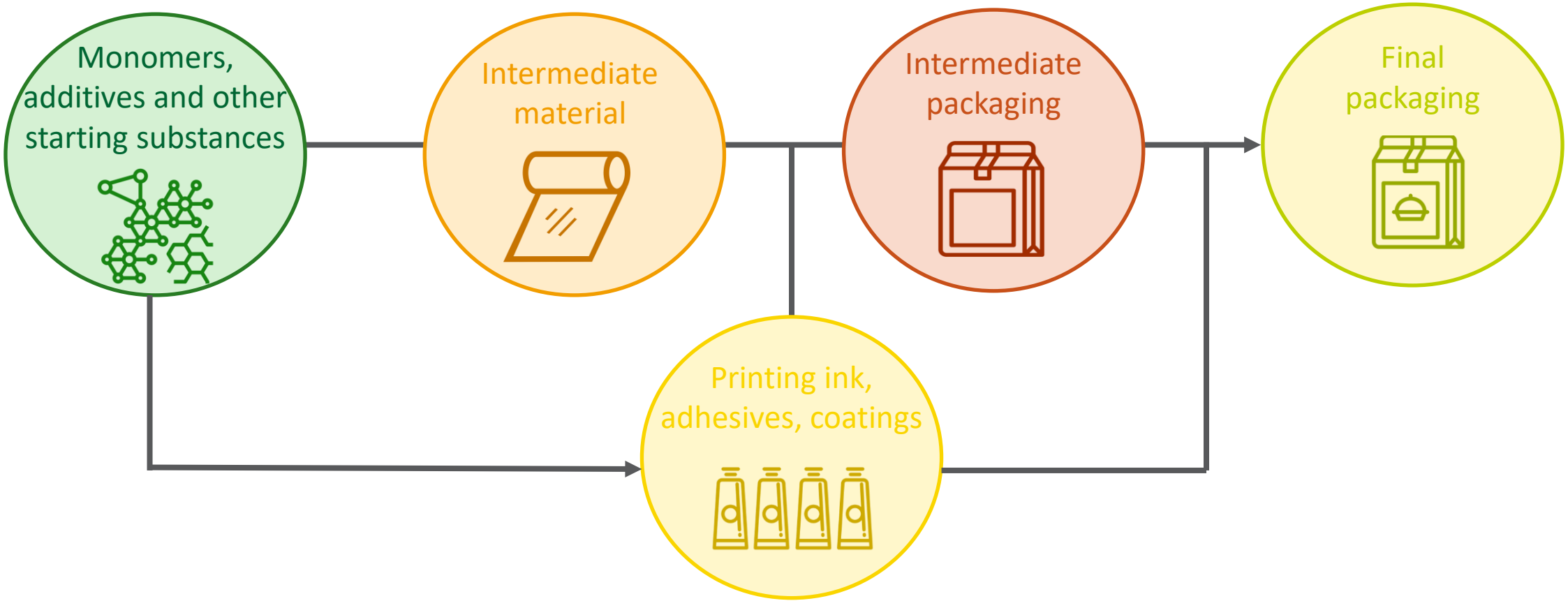


Exposure

Thousands of substances can migrate from food contact materials

How can these substances be managed?

Manufacture of food contact materials



Which substances can intentionally be added to a FCM?

Inventories of intentionally added substances

Regulation (EU) No 10/2011

National legislation

And other European countries

efsa
European Food Safety Authority

Supporting Publications 2012:EN-139

Report of ESCO WG on non-plastic Food Contact Materials

Council of Europe

Resolutions & Technical guides

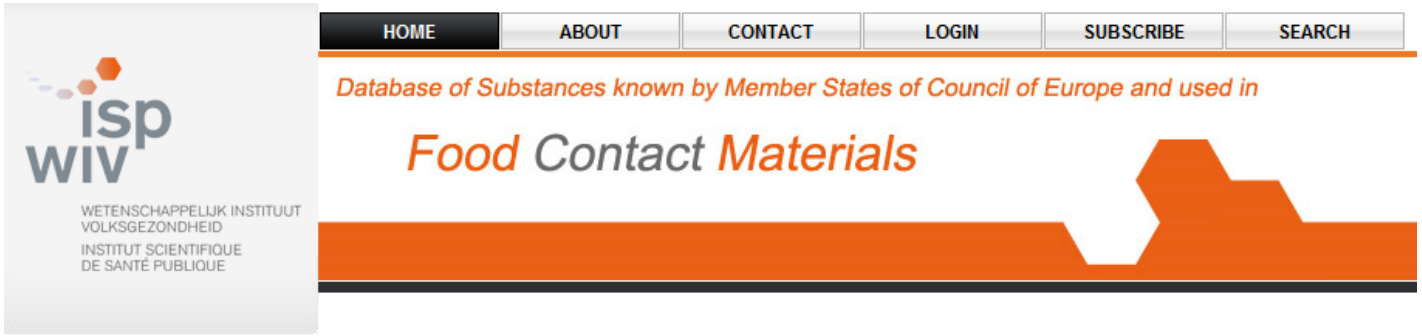
COUNCIL OF EUROPE
CONSEIL DE L'EUROPE

- Coatings
- Metals and alloys
- Silicone
- Rubber
- Ion exchange resin
- Paper and board
- Printing ink

Databases and inventories were developed

Inventories of intentionally added substances

Database of substances known by Member States of the Council of Europe and used in Food Contact Materials



Available online until 2021

but no funding to maintain the database

In 2022

Updated and used in research projects

~ 10 000 substances

Information available in the database:

- Chemical information (CAS No, SMILES, etc.)
- Source and restrictions
- *In silico* predictions of human toxicity

Inventories of intentionally added substances

Database of substances developed in Denmark

DTU

In collaboration with

EB Consult

2040 substances

Origin of the substances:

- EFSA
- FDA (CEDI database)
- Other inventories of FDA
- Chemical analyses

Information available in the database:

- Chemical information (CAS No., molecular mass, chemical formula, SMILES, etc.)
- Source
- *In silico* predictions on human toxicity using VEGA HUB (https://www.vegahub.eu)

For more information, please contact Elena Boriani (EB consult)

Inventories of intentionally added substances

Council of Europe

COMMITTEE OF MINISTERS
COMITÉ DES MINISTRES

COUNCIL OF EUROPE
CONSEIL DE L'EUROPE

MINISTERS' DEPUTIES Resolutions **CM/Res(2020)9** 7 October 2020

Resolution CM/Res(2020)9 on the safety and quality of materials and articles for contact with food

3.2 European Committee for Food Contact Materials and Articles (CD-P-MCA[6])

The CD-P-MCA, in accordance with its terms of reference and resources permitting, prepares technical guidance that supplements the Guiding Principles of the resolution. Further to section 3.1 a, the Committee agrees on the procedures for creating, publishing and updating lists of officially evaluated substances.

Procedure for data submission has been established

Evaluation must be carried out according to internationally recognised scientific principles

Proposed requested information:

- Type(s) of evaluated food contact material
- Chemical name (IUPAC nomenclature, CAS No.)
- Limits, specifications and restrictions
- Applications
- Date of evaluation/approval
- Reference documents
- Short summary/conclusion of the evaluation
- URL of the published opinion (if available)

CoE member states are strongly encouraged to submit updates on their officially evaluated substances

Inventories of intentionally added substances

Baseline study performed by the JRC

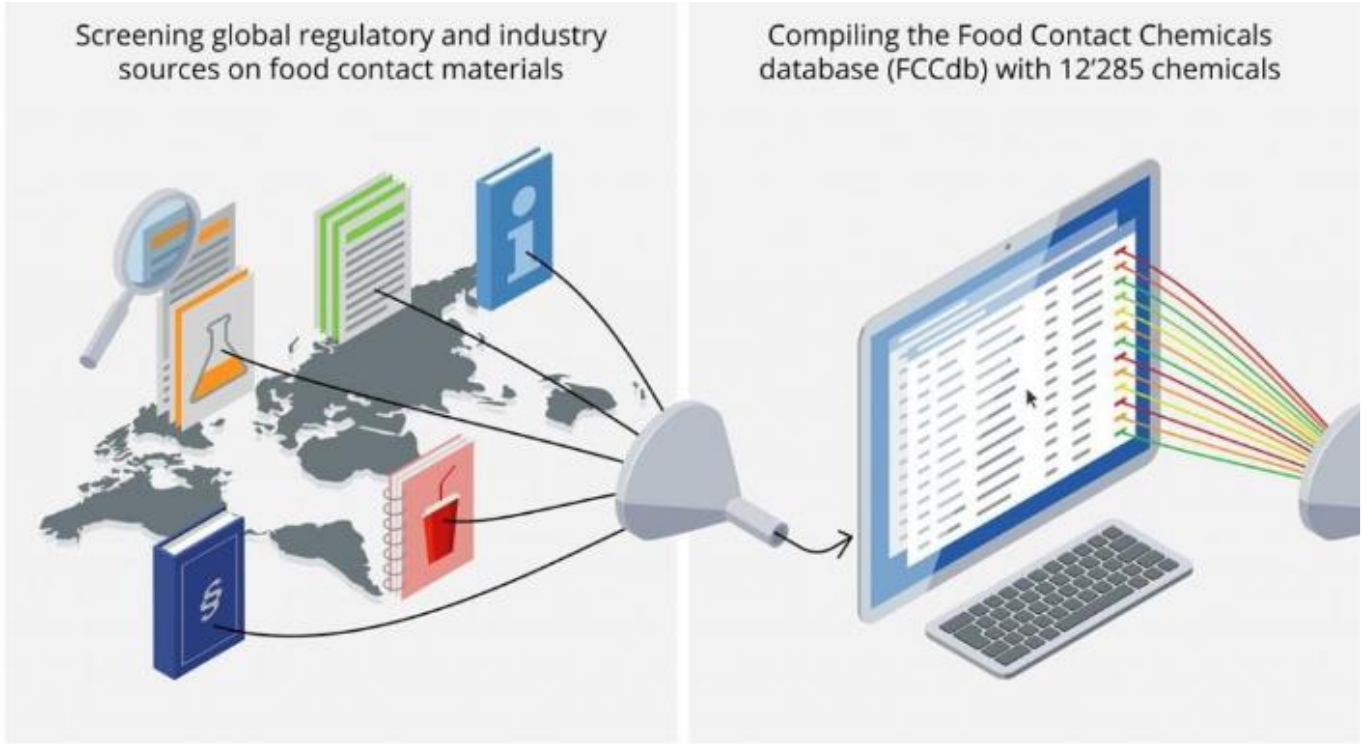
~ 8 000 substances

Origin of the substances:

- Lists of (authorised) substances available in the Member States
- Council of Europe Resolutions and Technical Guides
- Lists of European professional associations
- Other databases (e.g. Decernis, Norden, etc.)
- Questionnaires

Inventories of intentionally added substances

Food Contact Chemicals database (FCCdb)



67 sources ***12 285 substances***

Regulatory & industry inventories

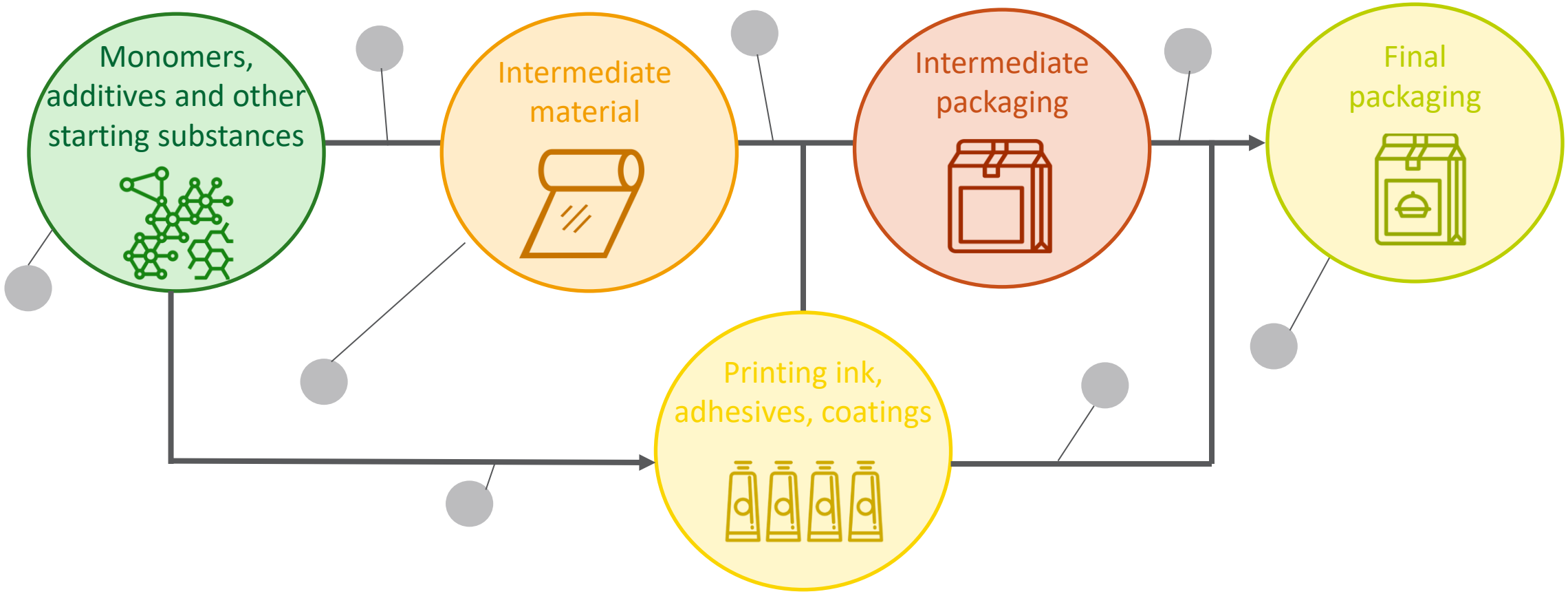
Food Packaging Forum

Information available in the database:

- Chemical information (CAS No., synonyms)
- Source
- Hazard information from:
  a) GHS classification
  b) Chemicals of concern due to endocrine disruption or persistence-related hazards
  c) EU/US regulatory lists of hazardous substances

Groh et al., 2021 (https://doi.org/10.1016/j.envint.2020.106225)

What about non-intentionally added substances?

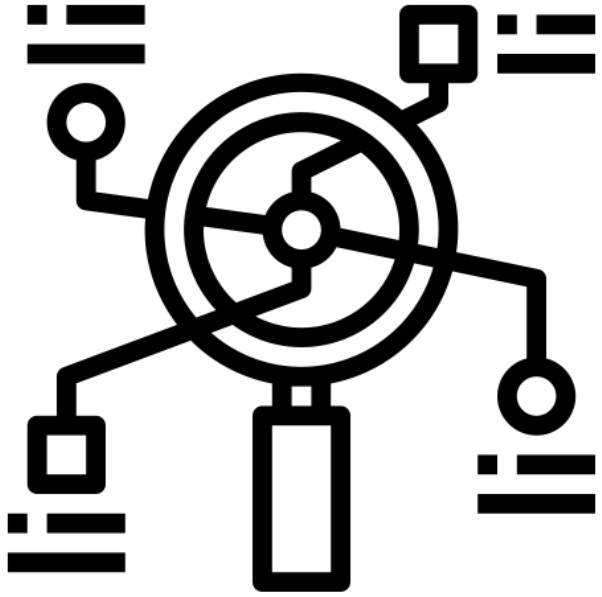


At each step of the production process, non-intentionally added substances can be present

e.g. breakdown products, impurities, reaction products, contaminants, etc.

Inventories of non-intentionally added substances

Inventories of identified NIAS not readily available

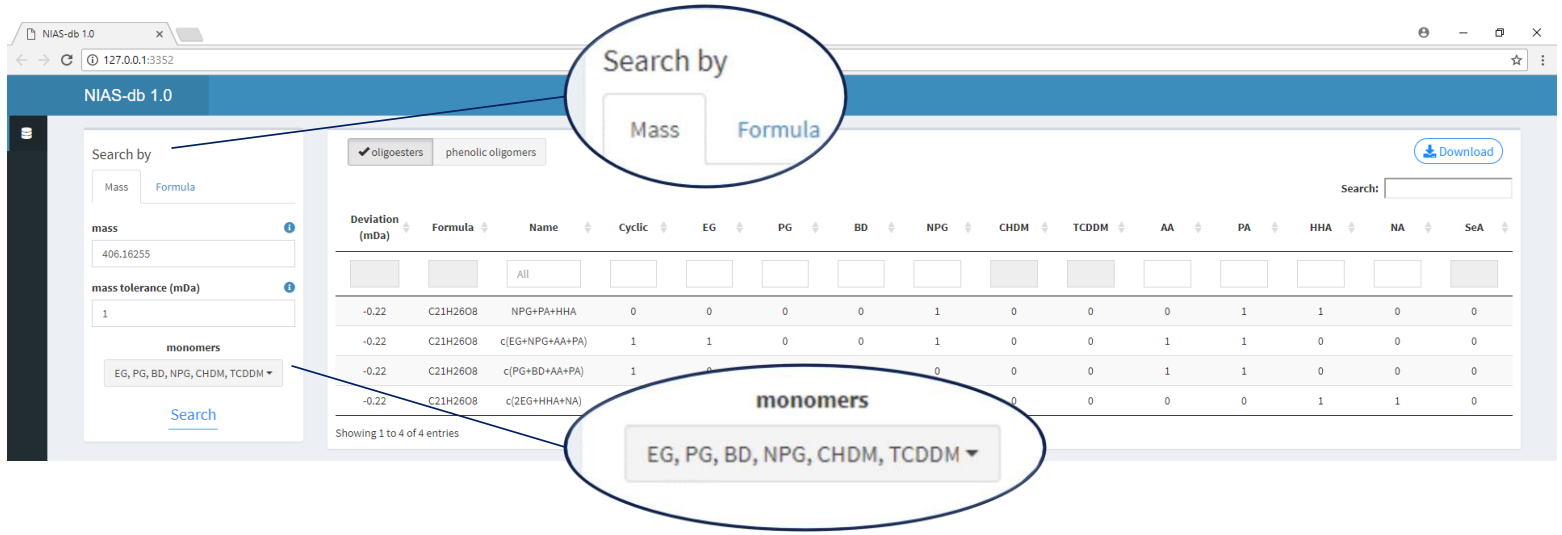


Many research is performed and many NIAS are identified,
but the information is not collected and saved in an open-source database

Prediction of non-intentionally added substances

Database of predictable oligoesters

Theoretical combination of 17 polyols and 15 polyacids with a cut-off < 1000 Da



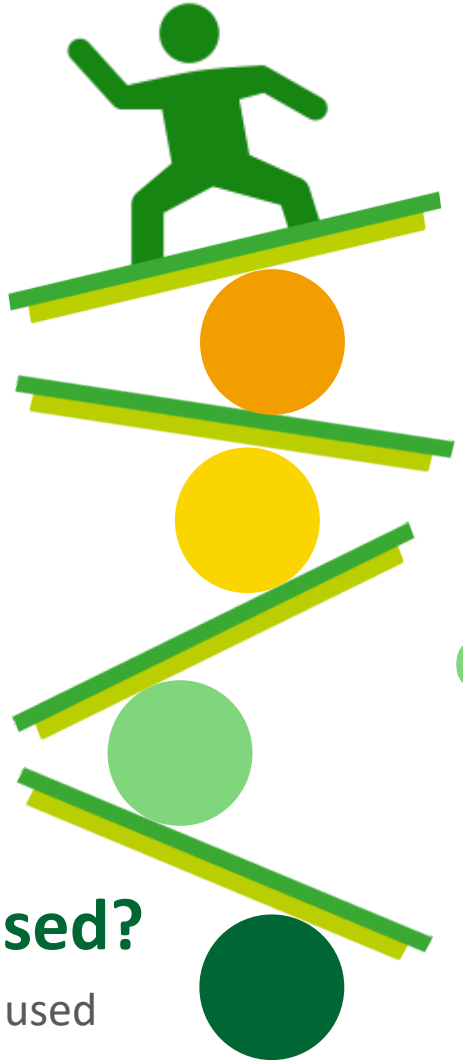
NIAS-db

Open-source software
(DOI: 10.15454/HHY2Z2)

Cariou et al., 2022 (https://doi.org/10.1016/j.jhazmat.2022.129026)

Inventories of intentionally added substances

Issues & Challenges



Keeping lists up-to-date

New or updates of legislation,
evaluation status of substances, etc.

Sustainable financing

To ensure the future of the database

Complete missing information

SMILES, analytical data,
(predicted) toxicological data, etc.

Are the substances being used?

Some historical substances are no longer used

Substances used or present in FCM

Flavourings, Additives, and food Contact materials Exposure Tool (FACET)

facet
flavourings | additives | contact materials exposure task

Objective: Estimate the dietary exposure to flavourings, additives and food contact material substances and compare the results with available safety limits (2008-2012)

SEVENTH FRAMEWORK PROGRAMME

Publically available inventories

6 475 substances

FACET Industry Group
collected data
on occurrence and concentration range
of substances in inks, adhesives, plastics,
metal, paper and board

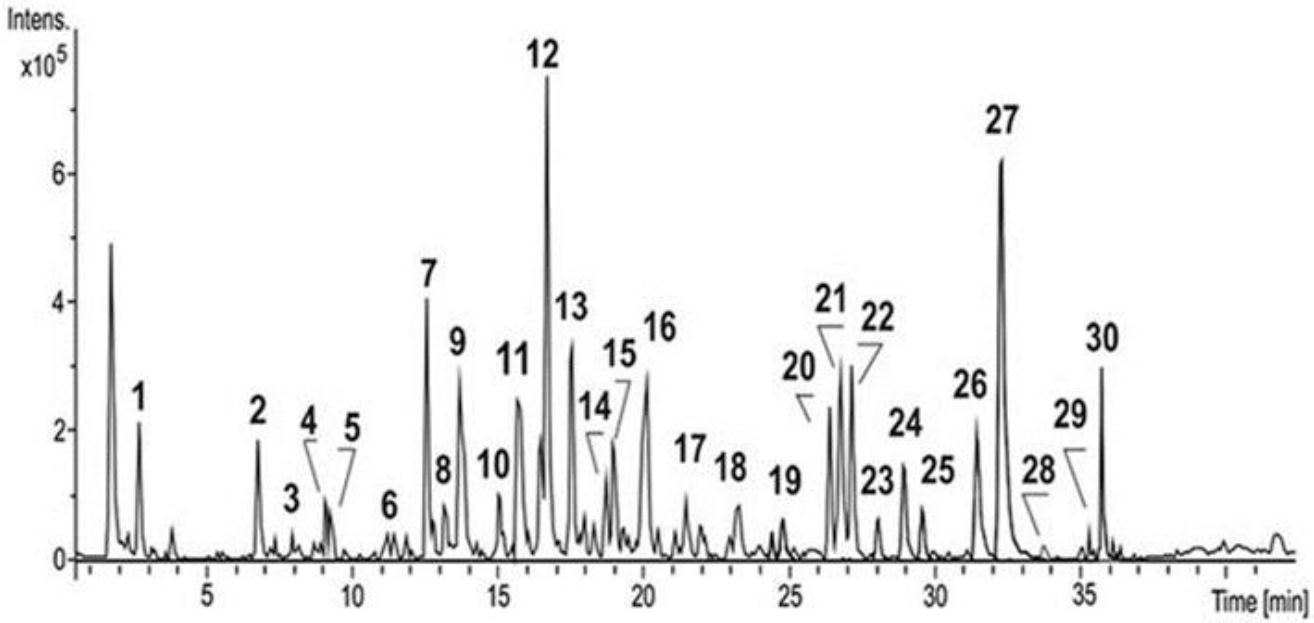
Data embedded in the FACET software

??? substances

Oldring et al., 2014 (http://dx.doi.org/10.1080/19440049.2013.862348)

Substances used or present in FCM

Analysis of the actual migration



Identification of all migrating substances is very challenging

Use of

Mass Spectra Libraries

Substances used or present in FCM

Analysis of the actual migration

(Commercial) libraries

NIST

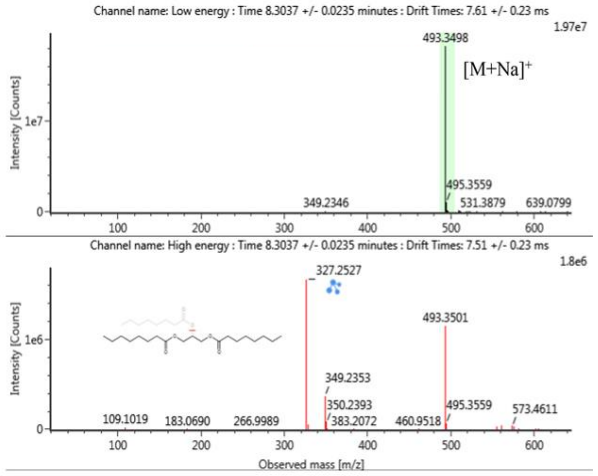
MassBank
High Quality Mass Spectral Database

In-house MS/MS libraries

Most libraries are not publically available

Dedicated libraries linked to vendor software (e.g. m/z Cloud)

Open-source database created by C. Nerin et al.



> 500

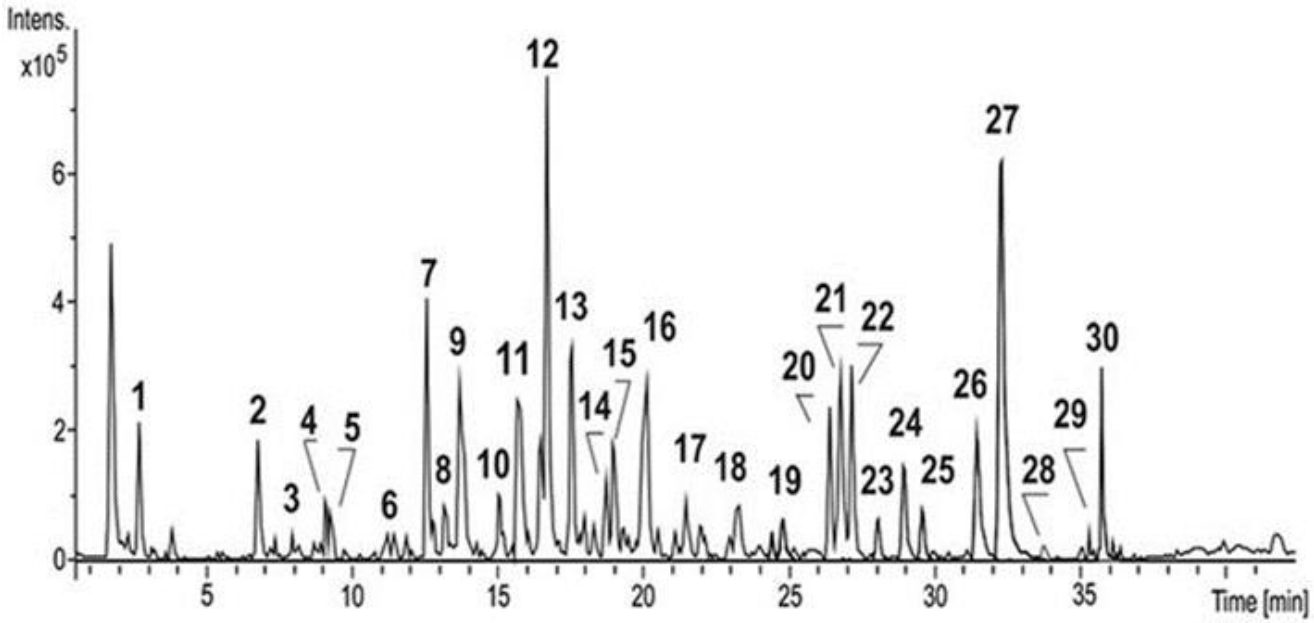
plastic-related substances

(https://zenodo.org/record/4454645)

Su et al., 2023 (https://doi.org/10.1021/acs.analchem.2c05389)

Substances used or present in FCM

Analysis of the actual migration



Identification of all migrating substances is very challenging

Development of

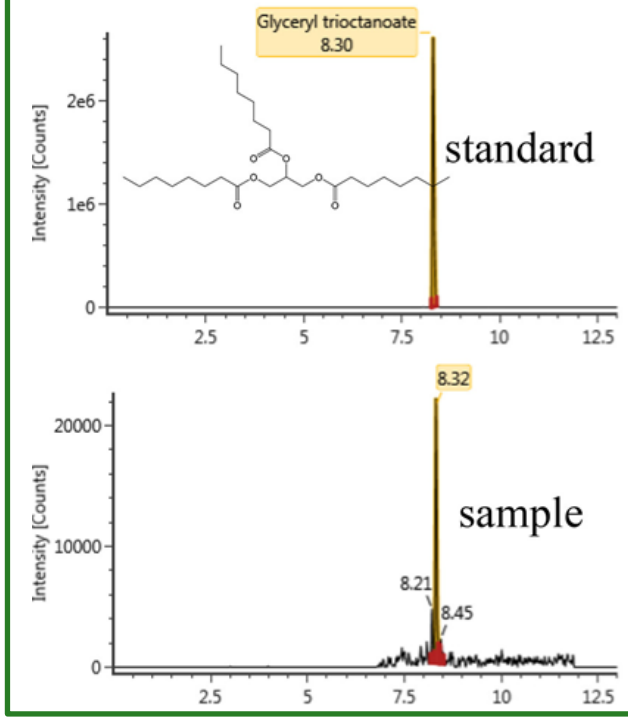
Prediction models

Substances used or present in FCM

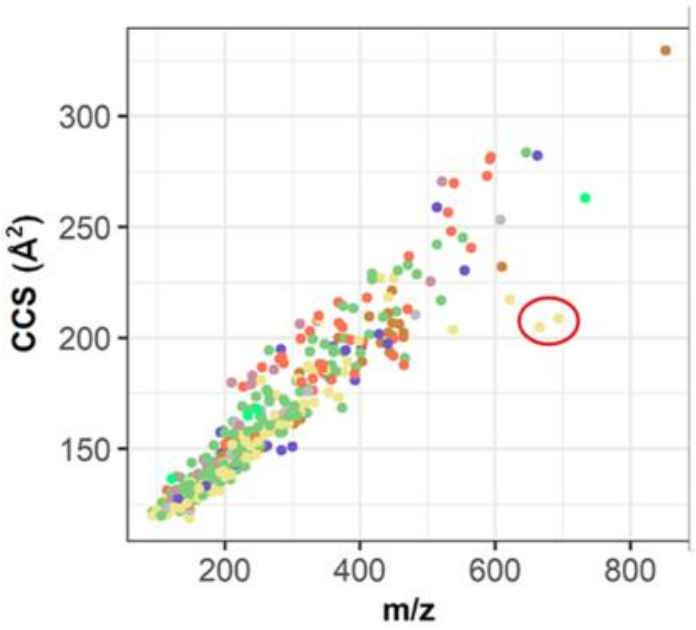
Analysis of the actual migration

Prediction tools developed by C. Nerin et al.

Retention time



Ion Mobility (CCS)



Applied to FFCdb

> 10 000 substances

Open-source in the future

Song et al., 2022 (https://doi.org/10.1021/acs.jafc.1c06989)

Substances used or present in FCM

Analysis of the actual migration

Database on migrating and extractable food contact chemicals

Food Packaging Forum

FCCMigex Database

1 312
studies and reports

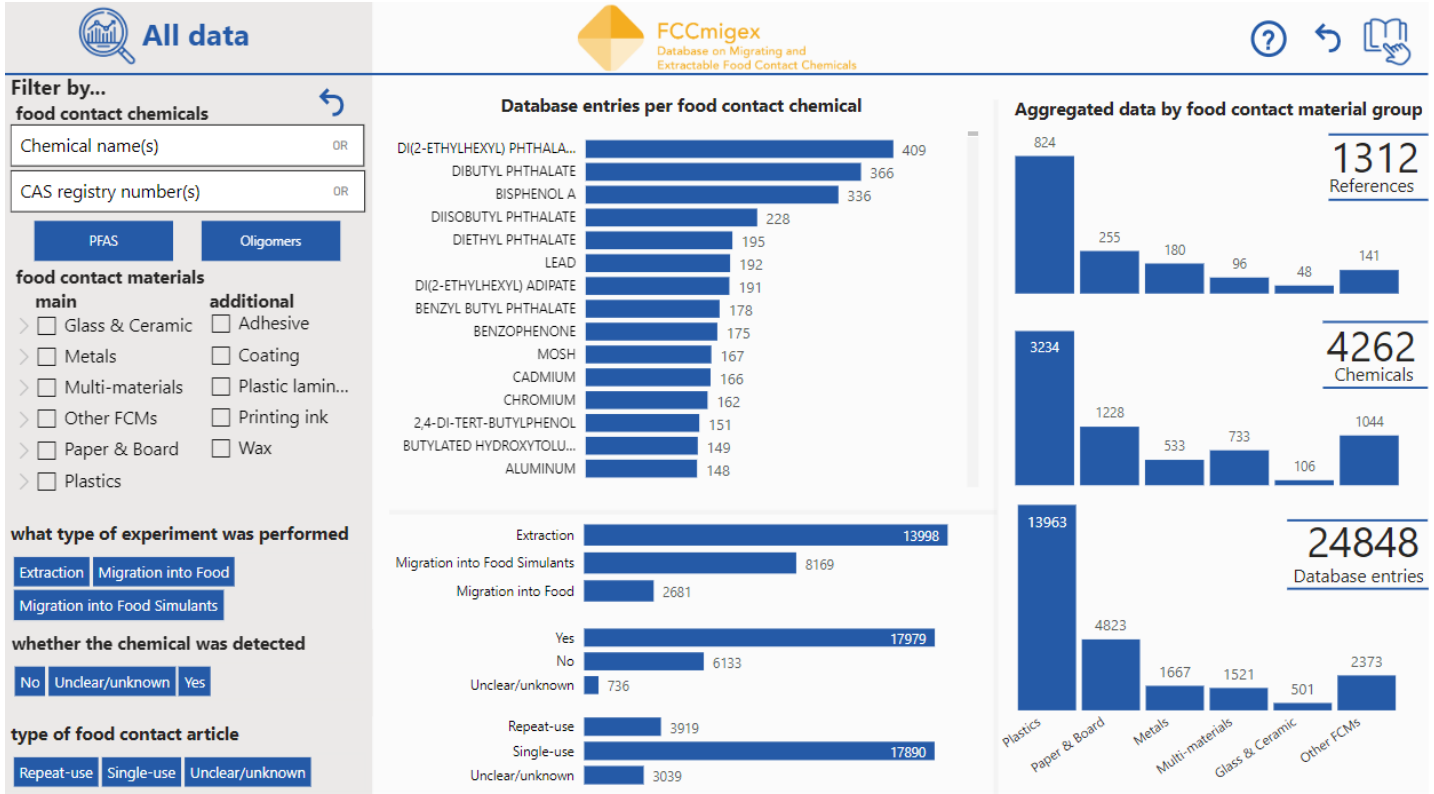
↓

24 848
Database entries

↓

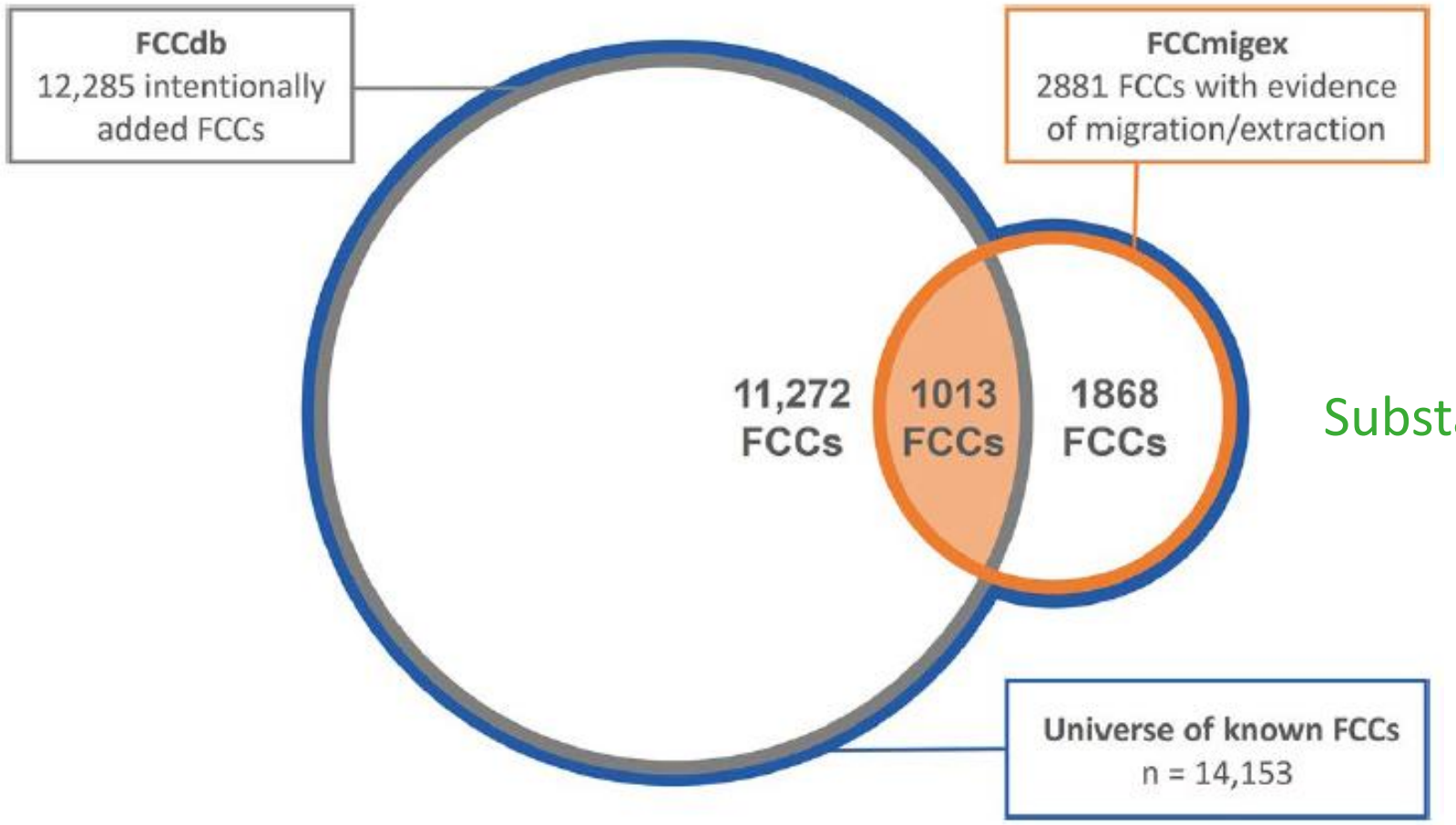
4 262
Chemicals were found
(mostly in plastic FCM)

Interactive dashboard available at:
https://www.foodpackagingforum.org/fccmigex



Substances used or present in FCM

FCCMigex Database

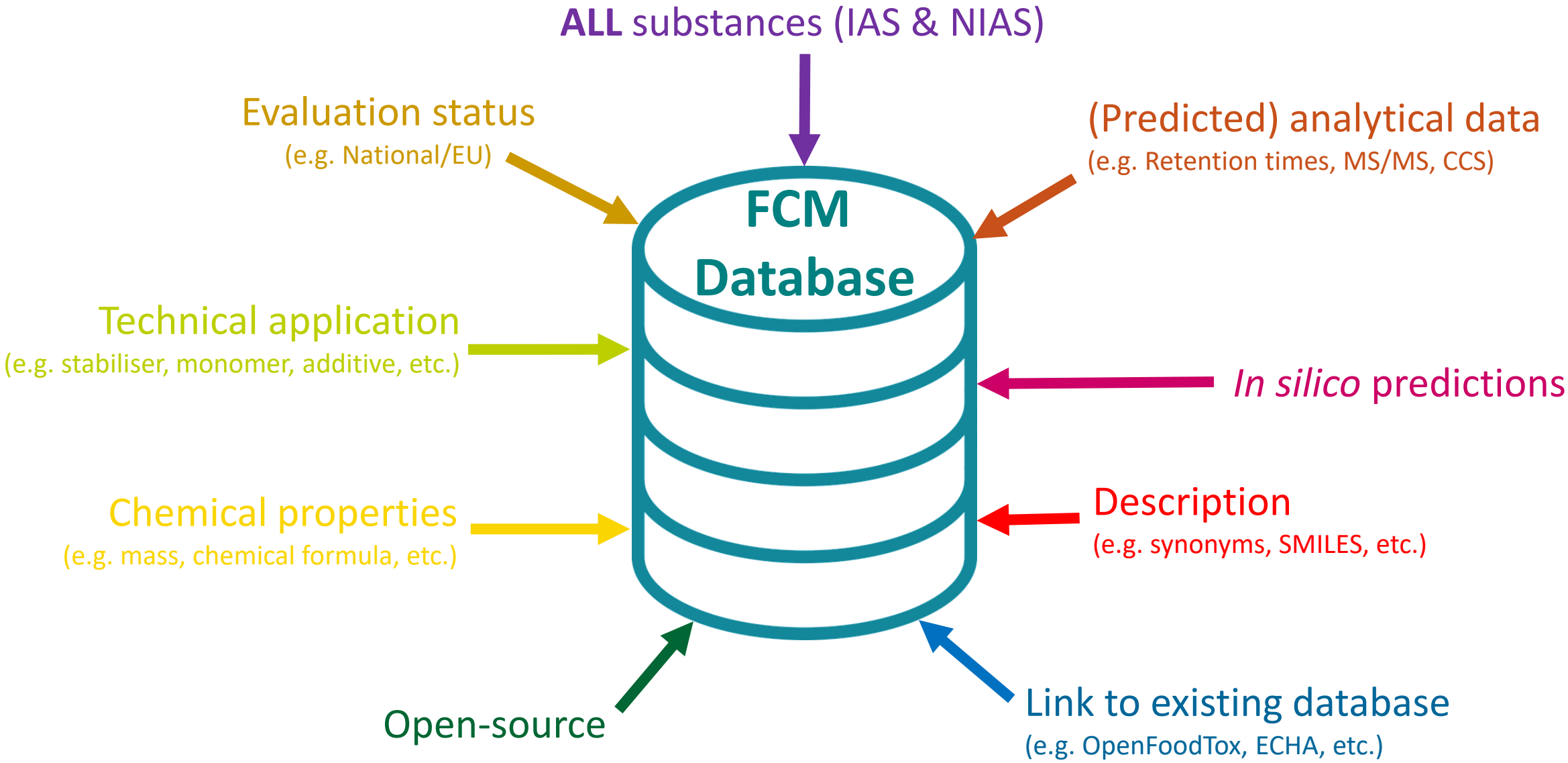


65%

Substances not included in FCCdb

Geueke et al., 2022 (https://doi.org/10.1080/10408398.2022.2067828)

Join forces to obtain the ultimate FCM database



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