



UCD Institute of Food & Health

New frontiers in Dietary Exposure Assessment

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University College Dublin

www.ucd.ie/foodandhealth



UCD Institute of Food & Health



New frontiers in Dietary Exposure Assessment

Tracy McCrorie

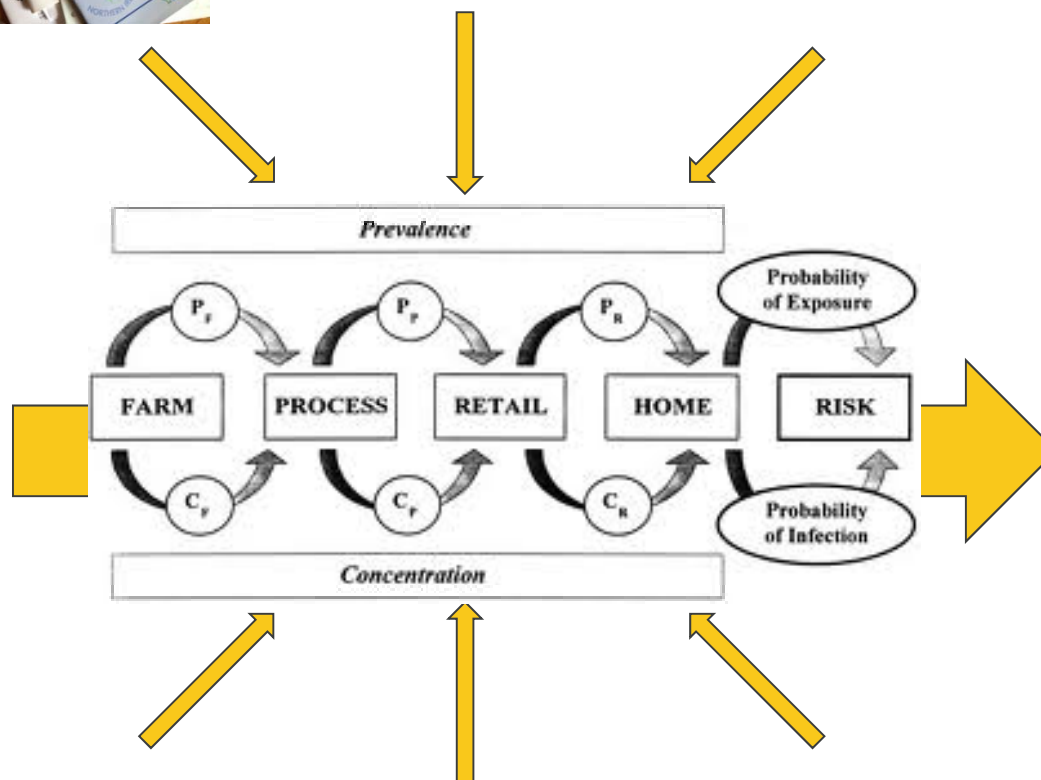
**Northern Ireland Centre for Food and Health
University of Ulster**

www.ucd.ie/foodandhealth



National Food
Safety
Authorities

EFSA



Risk
Assessors

Food
Processors

EU
Commission

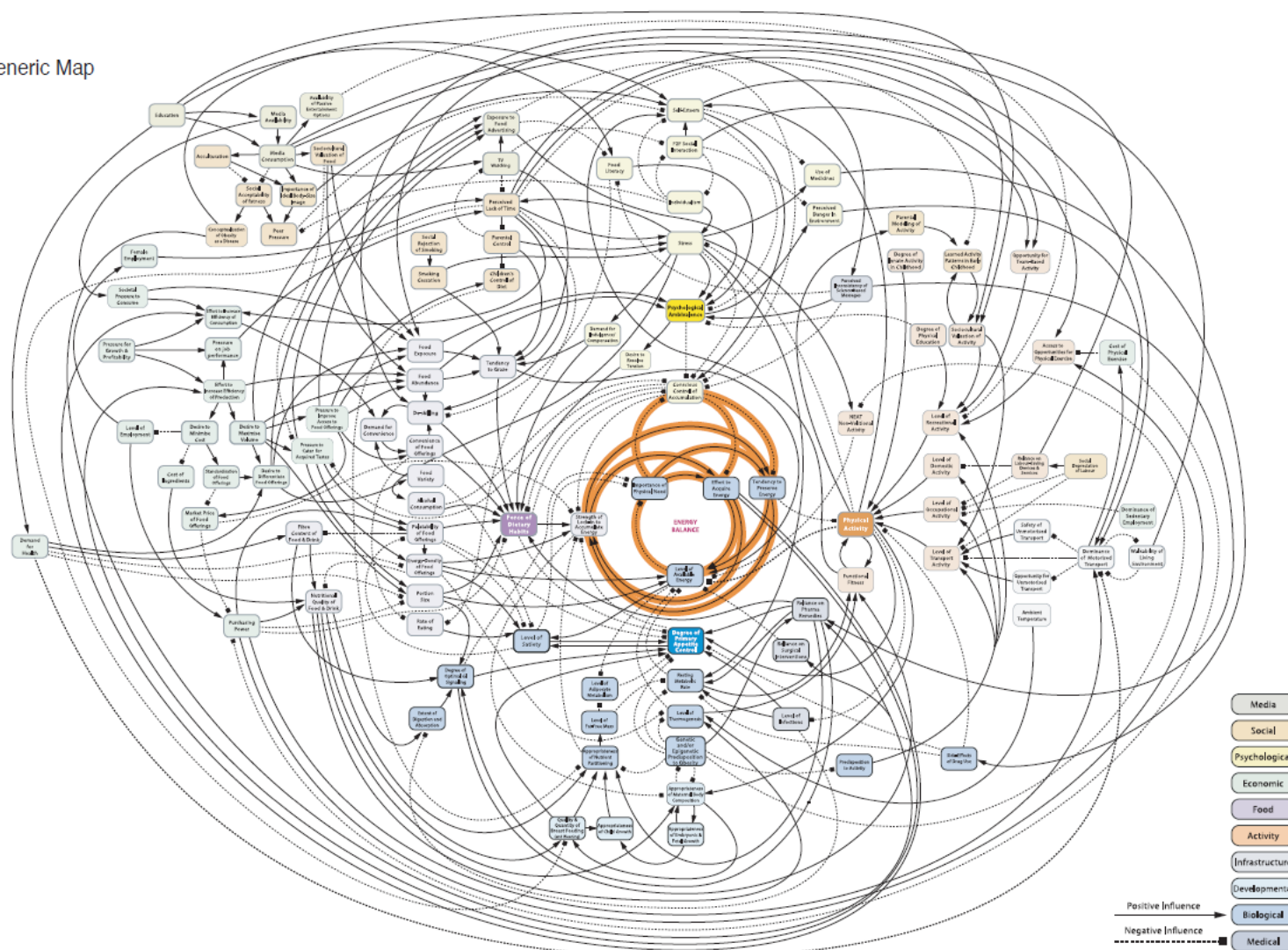


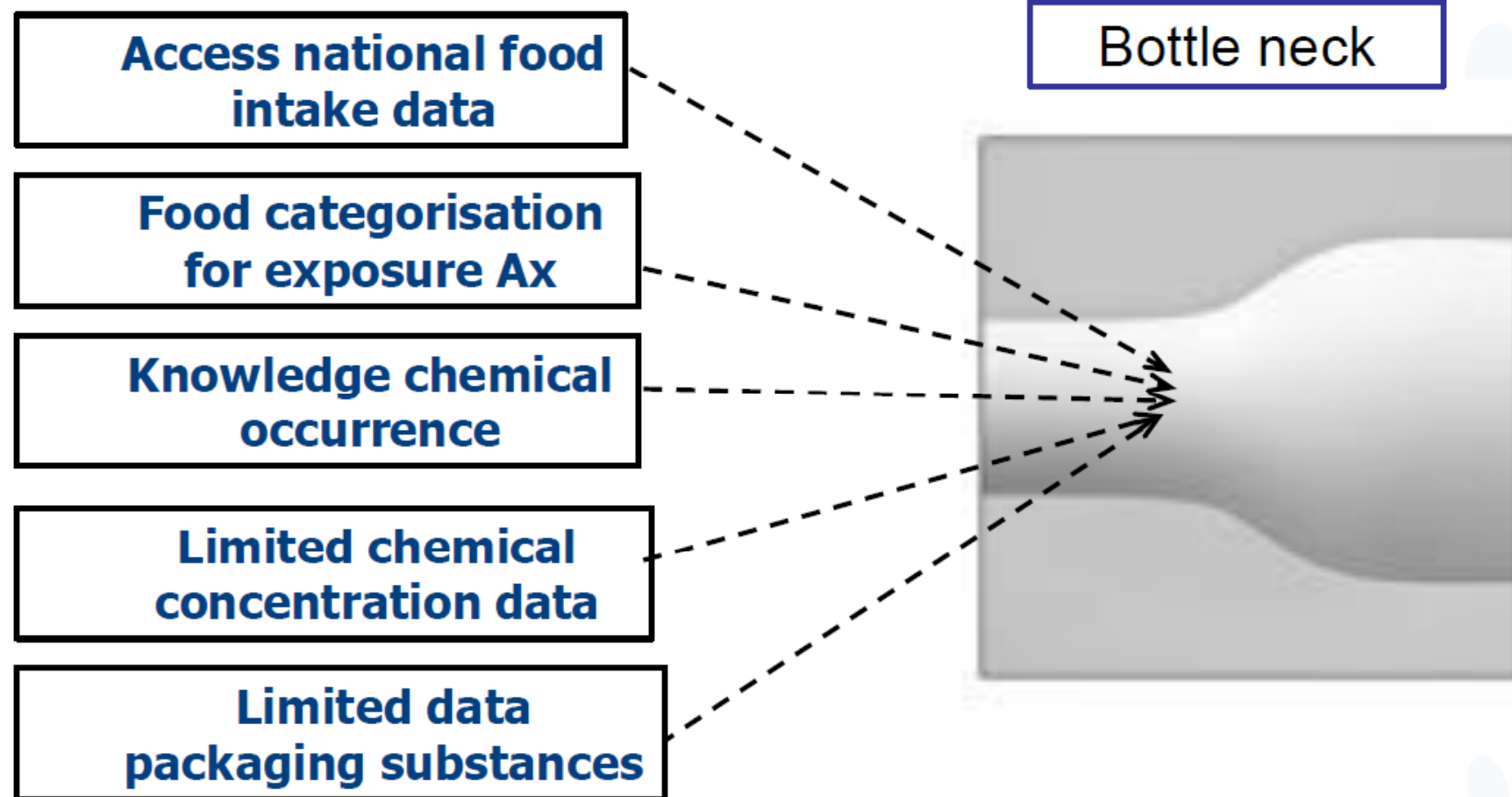
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Lammerding & Fazil 2000

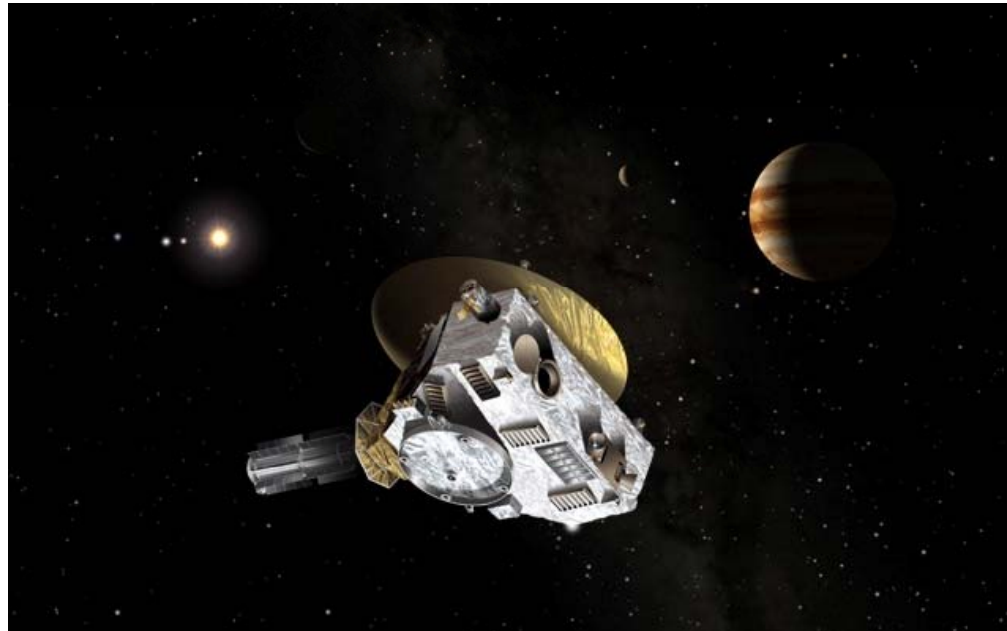
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Map 0
Full Generic Map





New horizons in food chemical exposure





**Food
additives**

**Food contact
materials**

**Flavouring
compounds**

Food intake data

Food chemical occurrence data

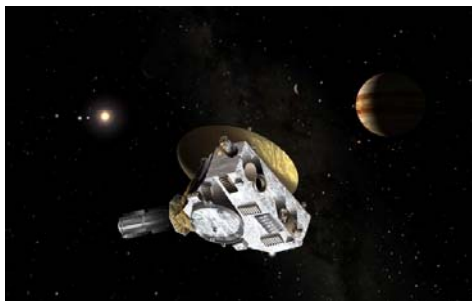
Food chemical concentration data

Algorithms

Software code



New horizons in food chemical exposure



A common coding of food intake data

Data on food chemical concentration

Data on food chemical occurrence

Food flavouring exposure tool

Food contact material database

Validated and publicly available exposure modeling software



Food Categorization

Raw data should be as disaggregated as possible

- Example 1. Additive X in Wafer-biscuits only
 - Level 1: Snacks
 - Level 2: Biscuits
 - Level 3: Wafer-Biscuits
 - Level 4: Brand of Wafer-Biscuits
- Example 2. Colour Y in Red Lemonade only
 - Level 1: Beverages
 - Level 2: Carbonated Beverages
 - Level 3: Cola
 - Level 4: Brand of Cola

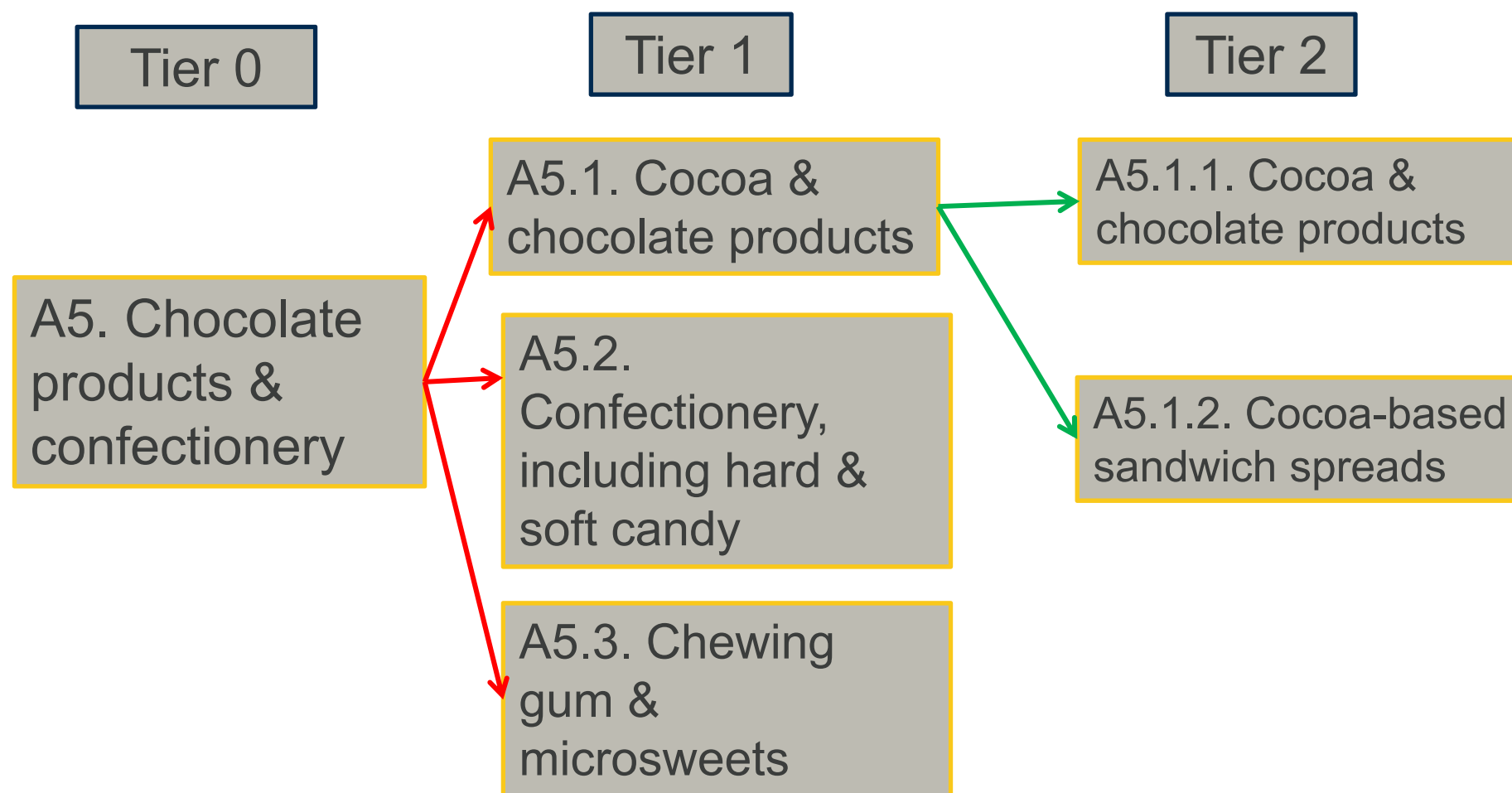


Task: Collate information on food consumption databases from 8 regions

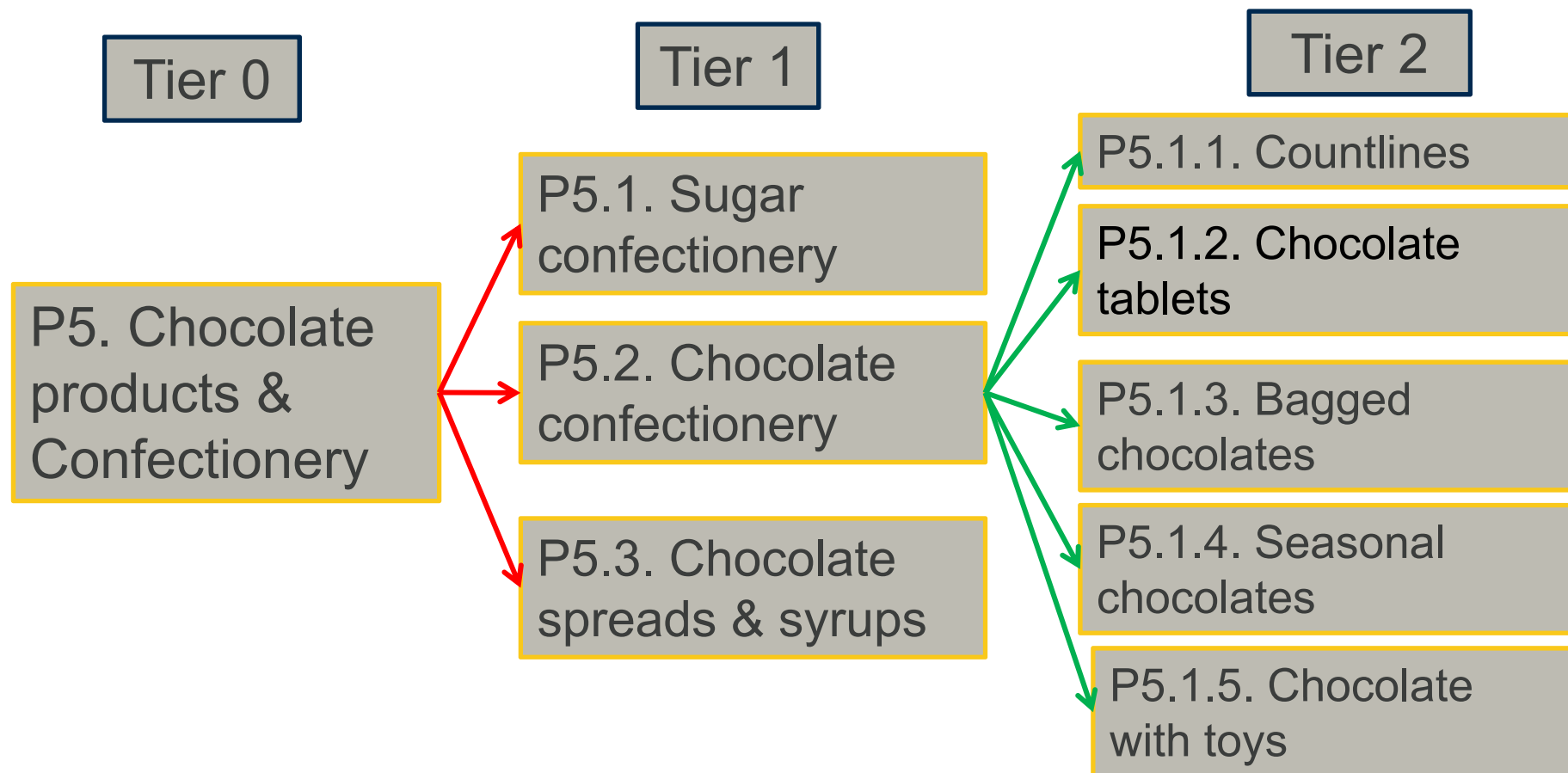
Age group	Finland	France	Hungary	Ireland	Italy	Poland	Portugal	UK
0 - 1.5				4d diary	3d diary	1d recall		
1.5 - 3				4d diary	3d diary	1d recall		4d diary
3 - 5		7d diary		4d diary	3d diary	1d recall		4d diary
5 - 12		7d diary		7d diary	3d diary	1d recall		7d diary
12 - 18		7d diary		7d diary	3d diary	1d recall		7d diary
18 - 25		7d diary	3d record	4d diary	3d diary	1d recall	7d diary	7d diary
25 - 65	3d diary	7d diary	3d record	4d diary	3d diary	1d recall	7d diary	7d diary
65+	3d diary	7d diary	3d record		3d diary	1d recall	7d diary	4d diary



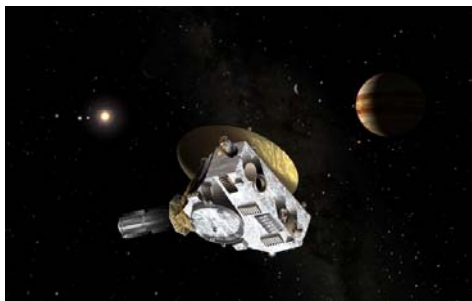
Additives example: Tier 0, 1,2



Packaging example: Tier 0, 1,2



New horizons in food chemical exposure



A common coding of food intake data

Data on food chemical concentration

Data on food chemical occurrence

Food flavouring exposure tool

Food contact material database

Validated and publicly available exposure modeling software

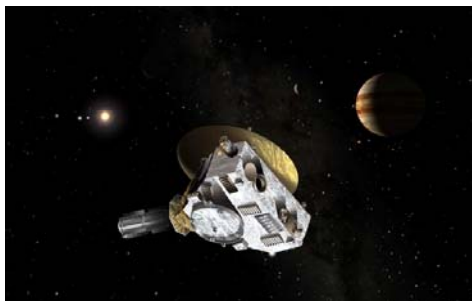


Food additive concentration data



- Data collected by FoodDrinkEurope
 - ✓ 23 National Federations
 - ✓ 26 European Sector Associations
 - ✓ 19 Major food companies
- Likely technological use
- Additive concentration data
 - ✓ Typical range for all food groups
 - ✓ Extreme ranges (high and low)

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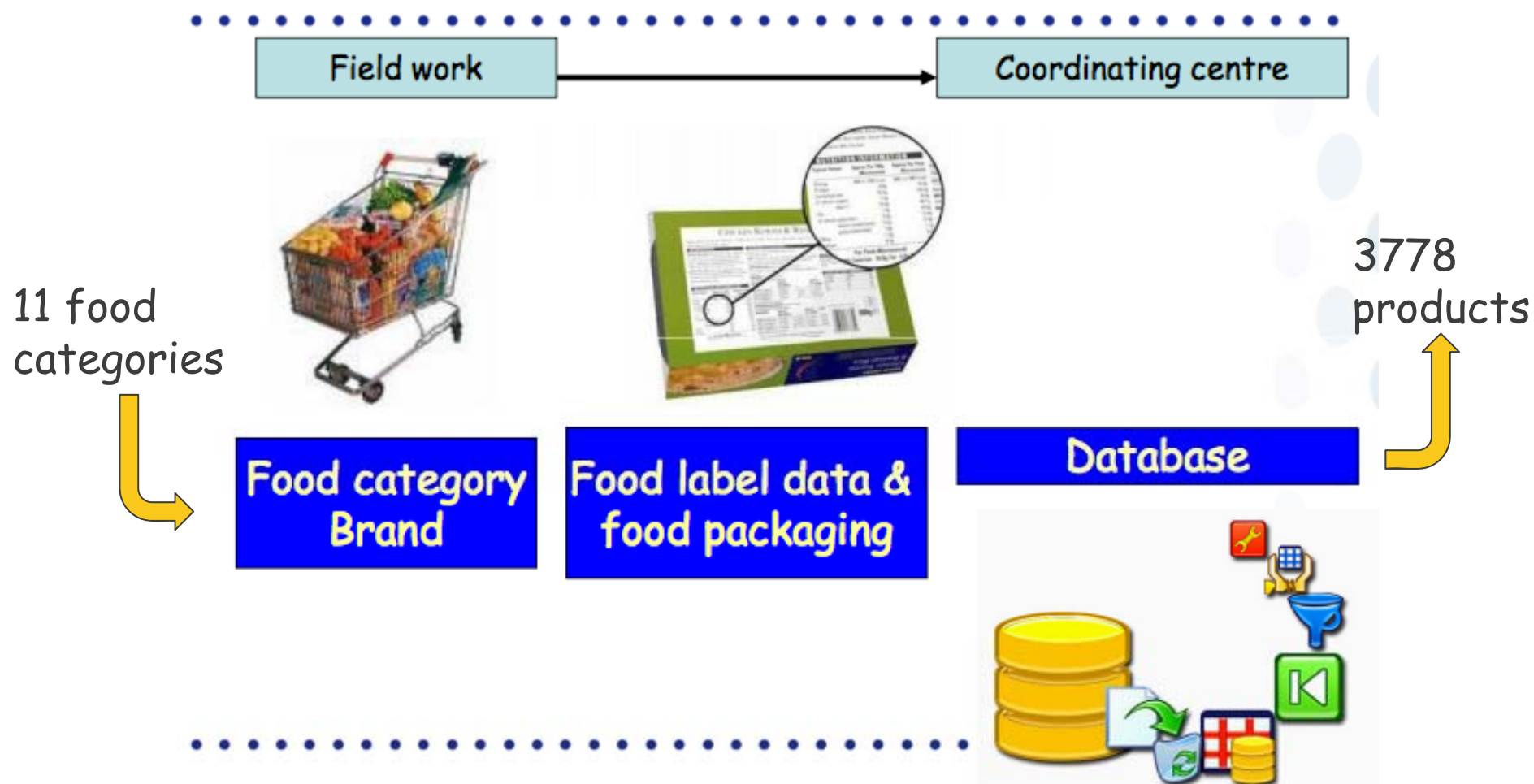
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Countries involved in the food intake and food chemical occurrence data



Gathering of Occurrence data



Food chemical occurrence data recorded on a purpose built database (publicly available)

Main product information

FACET WP6: General Product Information

Researcher Name:	Aine Healy	Date purchased	05/02/2010
Product ID	10001	Outlet name	Sainsbury's
Country centre	Ireland	Outlet type	Supermarket
Town purchased	Dublin 4	Pack weight	1
Barcode	1302738	Pack units	1
Brand 1	Sainsbury's	Portion weight	200
Brand 2	Breakfast Juice	Portion units	ml
Product description	Orange & grapefruit juice from concentrate	Preparation guidelines	Shake well before use
FACET Tier 0		Country of production	UK
Tier 3 Additives		Country where packaged	UK
Tier 3 Flavours		Allergen information	
Tier 3 Packaging	Dried noodles	Product Comments	Vegetarian & vegan

Ingredient details Nutrient details

Product id: 10001

Ingredient Name: Organic apple juice Ingredient order: 1

Ingredient %: 60 Composite ingredient: ☐

Ingredient function: Target additive: ☐ Flavouring: ☐

Record: 1 of 2 No Filter Search

Target Additives & Flavourings recorded per country (Phase 2)

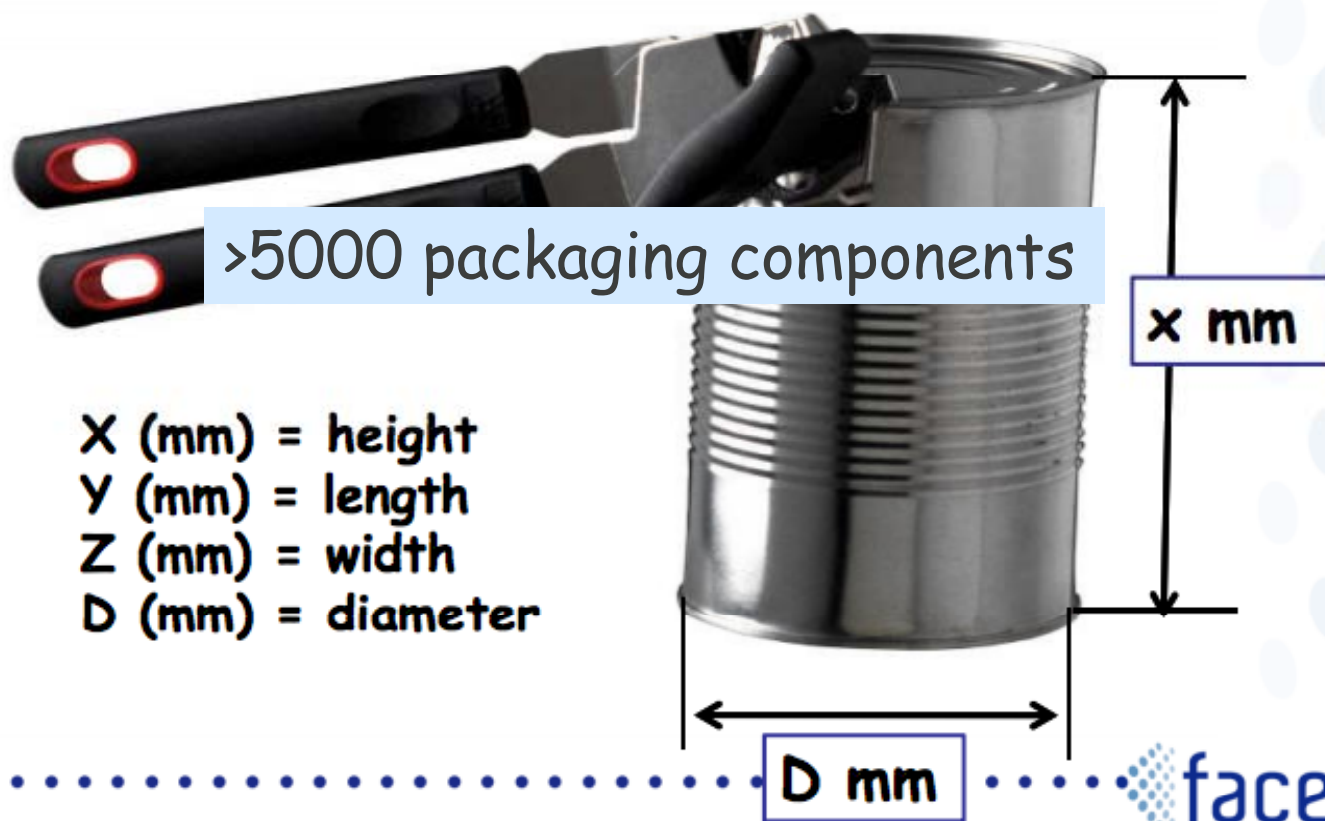
.....

		Additives	Flavourings
Hungary		407	794
Finland		510	851
France		387	681
Ireland		422	726
Italy		201	589
Poland		354	624
Portugal		359	461
UK		580	1270
Total		3220	5196

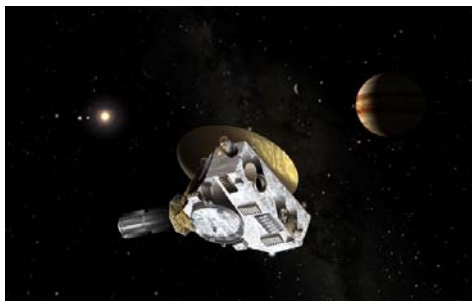


Samples of all packaging were analysed for material in contact with food and for pack dimensions

..... **Classic end, 3-piece can**



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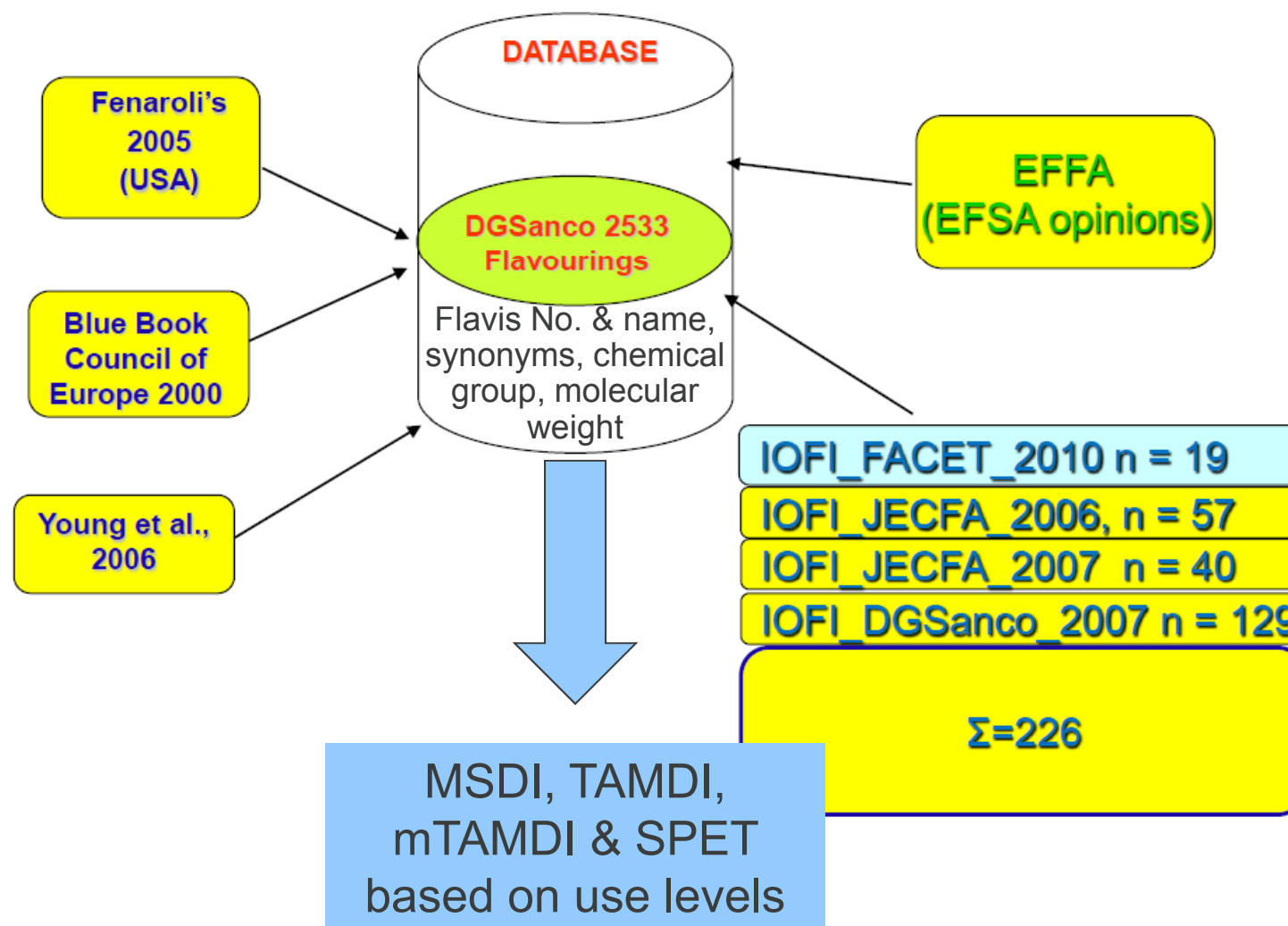
Validated and publicly available exposure modeling software



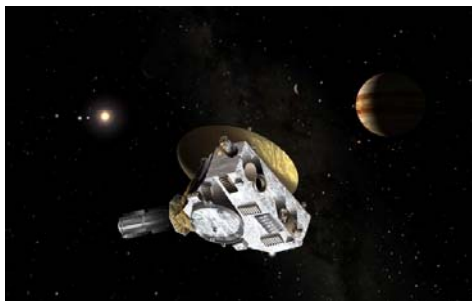
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Development of a database of reported use levels for 2700 flavouring substances



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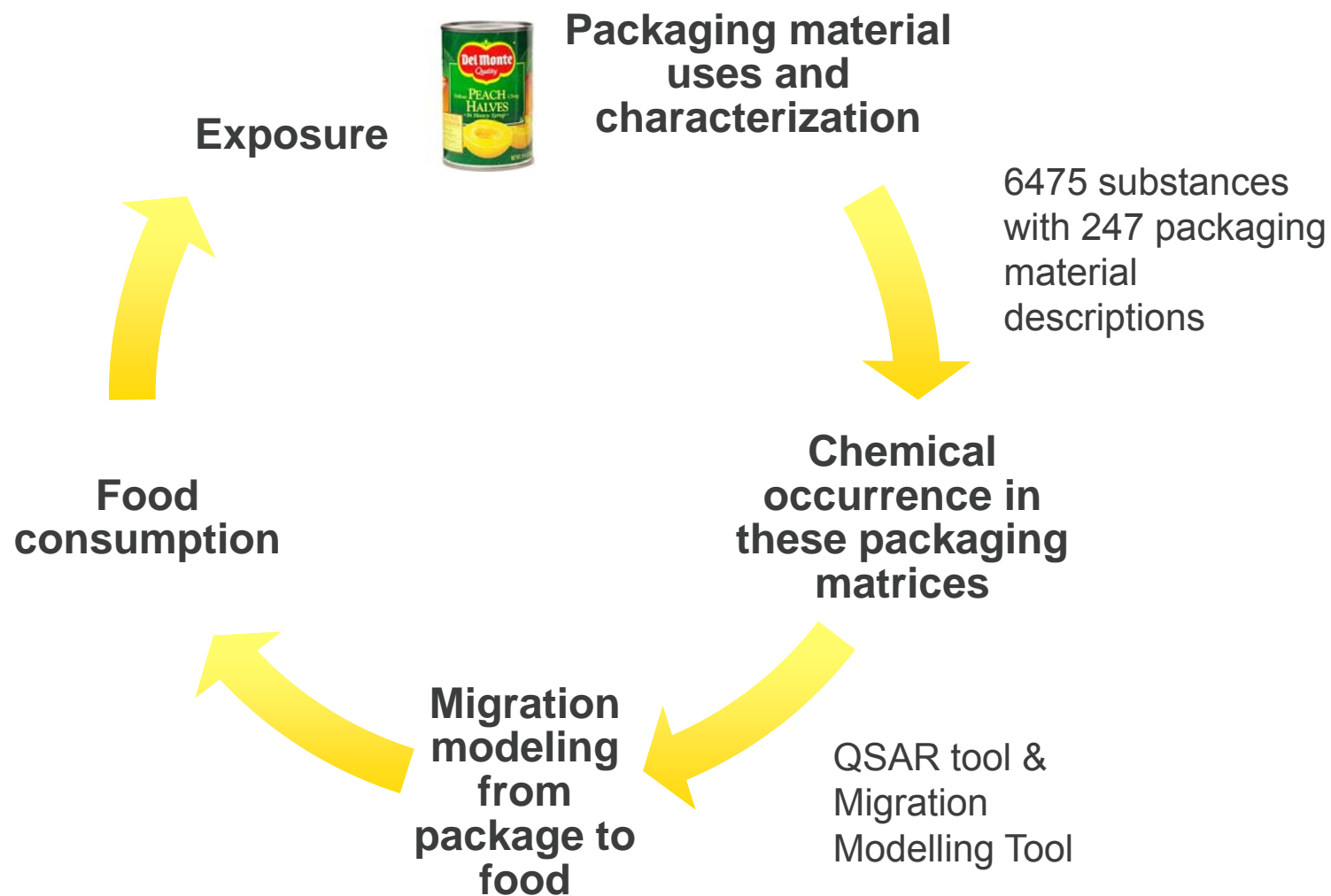
Validated and publicly available exposure modeling software



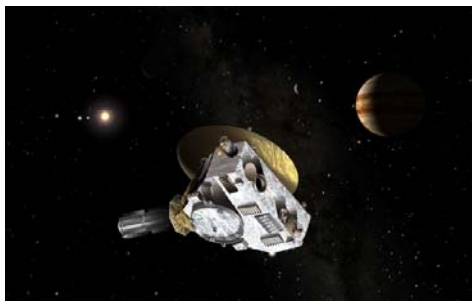
Food packaging material



Food packaging material



New horizons in food chemical exposure



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Deterministic exposure

Food additive intake =

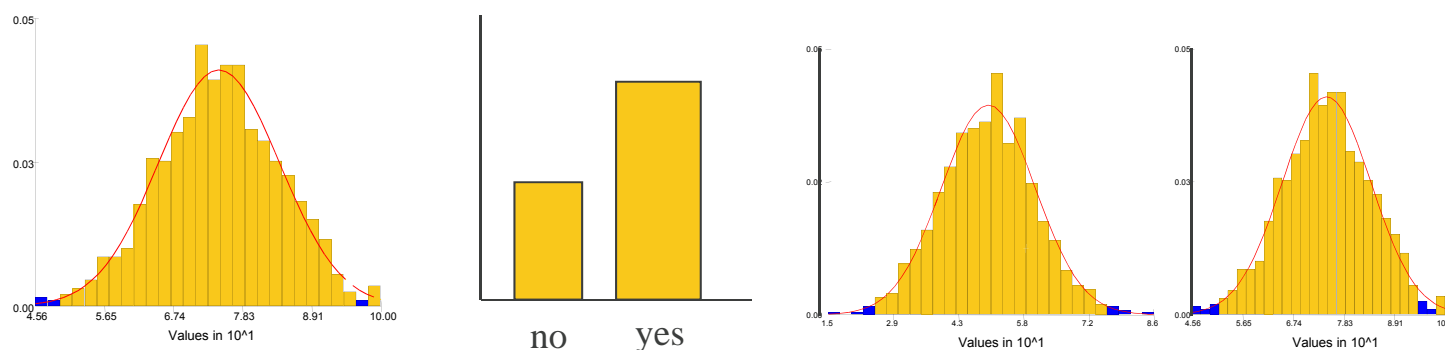
$$\sum \text{Raw Food Amount} \times \text{Occurrence} \times \text{Chemical Concentration}$$

Dietary Survey databases **100% if legally permitted** **Maximum Permitted level**

Probabilistic Modelling



Iterative Monte Carlo simulation



	Model 1	Model 2	Model 3	Model 4
Food intake data	Full	Full	Full	Full
Occurrence data	100%	True	Max	True
Concentration data	Max	Max	True	True



	Model 1	Model 2	Model 3	Model 4
Food intake data	Full	Full	Full	Full
Occurrence data	100%	True	Max	True
Concentration data	Max	Max	True	True

Intake at the 97.5th %tile (mg/kg/d)

E 104 (QY)	3.4	0.12	0.74	0.05
E110 (SY)	2.6	0.07	0.47	0.03
E124 (P4R)	2.6	0.04	0.90	0.01



	Model 1	Model 2	Model 3	Model 4
Food intake data	Full	Full	Full	Full
Occurrence data	100%	True	Max	True
Concentration data	Max	Max	True	True

Intake at the 97.5th %tile (mg/kg/d)

			% diff		% diff		% diff
E 104 (QY)	3.4	0.12	96.5%	0.74	78.2%	0.05	98.5%
E110 (SY)	2.6	0.07	97.3%	0.47	81.9%	0.03	98.8%
E124 (P4R)	2.6	0.04	98.5%	0.9	65.4%	0.01	99.6%



Outputs exported

Examine raw data

Survey	Additive / F...	Intake Type	Consumer T...	FACET Cate...	FACET Cate...	S
58	Irish NSIFCS 1999	E110	Per unit body weight	Total Population	A.1	DAIRY PRODUCTS A Mean
80	Irish NSIFCS 1999	E110	Per unit body weight	Food Consumers	A.1	DAIRY PRODUCTS A Mean
146	Irish NSIFCS 1999	E110	Per unit body weight	Total Population	A.2	FATS AND OILS AND MEAN
168	Irish NSIFCS 1999	E110	Per unit body weight	Food Consumers	A.2	FATS AND OILS AND MEAN
234	Irish NSIFCS 1999	E110	Per unit body weight	Total Population	A.3	FRUITS, NUTS AND SEEDS MEAN
256	Irish NSIFCS 1999	E110	Per unit body weight	Food Consumers	A.3	FRUITS, NUTS AND SEEDS MEAN
322	Irish NSIFCS 1999	E110	Per unit body weight	Total Population	A.4	VEGETABLES, STARCHES AND MEAN
344	Irish NSIFCS 1999	E110	Per unit body weight	Food Consumers	A.4	VEGETABLES, STARCHES AND MEAN
410	Irish NSIFCS 1999	E110	Per unit body weight	Total Population	A.5	CHOCOLATE PRODUCTS MEAN
432	Irish NSIFCS 1999	E110	Per unit body weight	Food Consumers	A.5	CHOCOLATE PRODUCTS MEAN
4	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	4	0.5	NULL
5	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	5	0.05	NULL
6	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	6	0.5	NULL
7	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	7	0.05	NULL
8	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	8	0.5	NULL
9	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	9	0.5	NULL
10	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	10	0.5	NULL
11	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	11	0.5	NULL
12	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	12	0.5	NULL
13	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	13	0.5	NULL
14	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	14	0.5	NULL
15	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	15	0.5	NULL
16	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	16	0.05	NULL
17	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	17	0.5	NULL
18	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	18	0.5	NULL
19	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	19	0.05	NULL
20	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	20	0.05	NULL
21	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	21	0.05	NULL
22	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	22	0.05	NULL
23	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	23	0	NULL
24	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	24	0	NULL
25	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	25	0	NULL
26	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	26	0	NULL
27	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	27	0.5	NULL
28	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	28	0.05	NULL
29	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	29	0.5	NULL
30	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	30	0.05	NULL
31	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	31	0.5	NULL
32	F.1.1.3	Dairy-based drinks, 19024	Isopentyl acetate	32	0.05	NULL

Model new packaging types

New Assessment Wizard

Select Assessment Type ☒ Use pre-installed FACET data.

Select Migrant ☒ Select Migrant

Select Pack Types

Select Food Categories

Select Surveys

Assessment Options

Assessment Summary

Search

FACET	CAS Number	Chemical Name	Alternative Name	Molecular F	Molecular We
1001	0000108-05-4	Acetic acid, vinyl ester	Vinyl acetate	C4H6O2	86
1054	0000514-10-3	Abietic acid	Abietate	C20H30O2	302
1084	0000080-05-7	2,2-Bis(4-hydroxyphenyl)propane	Bisphenol A	C15H16O2	228
1085	0001675-54-3	2,2-Bis(4-hydroxyphenyl)propane	Bisphenol A	C15H16O2	228
1334	0000100-42-5	Styrene			
1401	0000103-23-1	Adipic acid, bis(2-ethylhexyl) est			
1443	0000119-61-9	Benzophenone			
1617	0031570-04-4	Phosphorous acid, tris(2,4-di-ter			
3431	0042978-66-5	Tri(propylene glycol) diacrylate			

No substances selected.

☒ Use my concentration data

Select Concentration Table

My Data

- My Additive Data
- My Flavouring Data
- My Migration Data
- My Packaging Data
- My Pre-Population Data

Name	Date Created	Date Access
------	--------------	-------------

☐ Use in combination with pre-installed FACET data



Sustaining FACET



Project Management Committee

AUGUST 2012						
SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Software
de-bugging

February 2013						
Sun	Mon	Tues	Wed	Thurs	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

www.calendarsdesigns.com

Training
on software



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