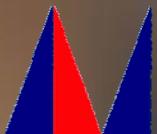


EFSA Scientific  
Colloquium  
on Food Classification  
23 June 2010,  
Parma, Italy

# Strengths and weaknesses of existing food classification systems

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# What is a classification system?

- **Dictionary:** a listing of words and phrases giving information, e.g. definitions, usage, origin, equivalents in other languages
- **Classification/taxonomy:** a structure that organizes concepts into a hierarchy, possibly in a scheme of facets
  - **Facet:** clearly defined, mutually exclusive, and collectively exhaustive aspects, properties or characteristics of a class or specific subject
- **Thesaurus:** a structure that manages the complexities of terminology and provides conceptual relationships, through classification/ontology
  - Descriptors authorized for indexing and searching form a **controlled vocabulary** (index language)
- **Ontology:** a system of entities with the relationships between them explicitly defined, with a system grammar (or syntax) and an inference engine

*Source: D. Soergel (2002), Thesauri in Digital Libraries, JCDL 2002, Portland, OR, USA*





# Food Classifications

## The point of view is important



Classification  
is a point of  
view

*Source:  
Danish Food Hygiene campaign,  
Danish Food Agency 1994*





# Existing food classification systems

## Specific international food classification systems

- Food additives (CIAA, Codex Alimentarius GSFA)
- Pesticides (Codex Classification of Foods and Feeds, CCPR)
- Contaminants (Codex Classification for Contaminants and Toxins, GSC)
- EC Common Nomenclature, PRODCOM (Eurostat), World Trade Organisation, ...
- Global Product Classification (GS1 GPC, GSDN Food and Beverage Extension)
- European Food Groups (Cost Action 99/EFCOSUM) and EFSA Food Categorisation (Concise European Food Consumption Database)
- Food Composition Databases (EuroFIR classification)
- ...

and many, many different national food classifications





# Important questions to ask about Food Classification Systems

Food classification systems are reporting level and purpose specific:

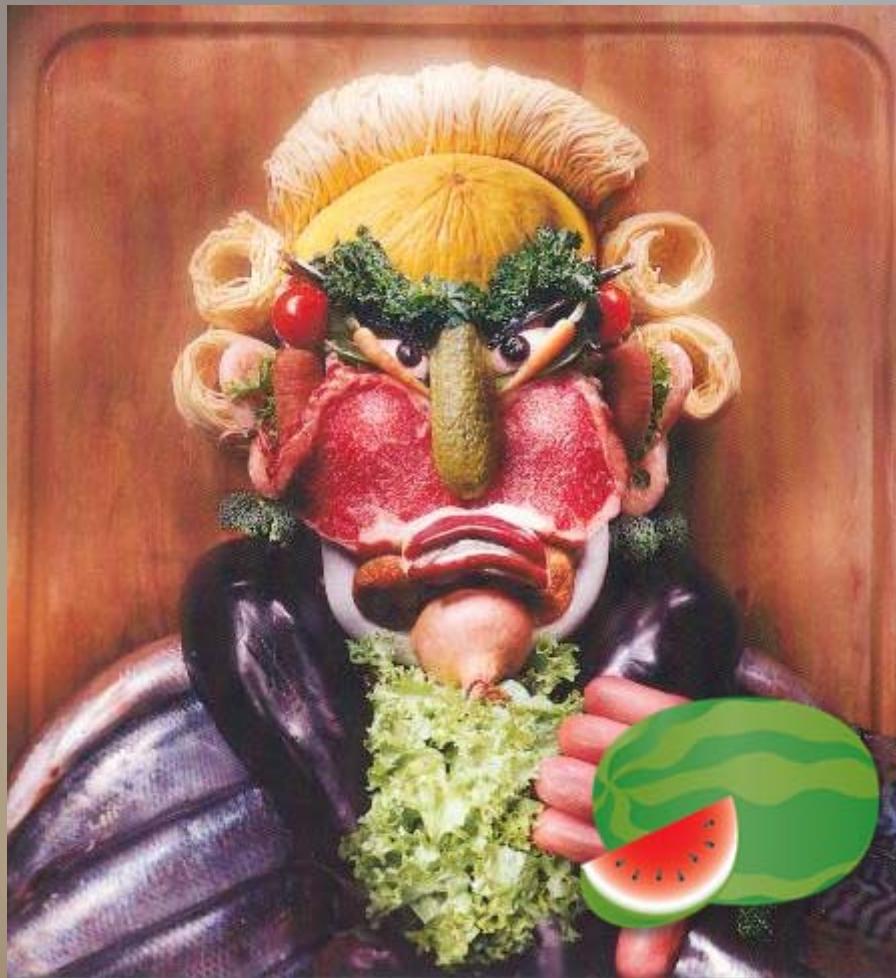
- At what level are the foods recorded?
- What is the purpose of the classification?
- What do we want to classify?  
Foods as consumed, ingredients, commodities, pre-packed foods, or ...?





# Food Classifications

## The point of view is important



At what level  
are the foods  
recorded in  
the food  
classification  
system?

*Source:  
Danish Food Hygiene campaign,  
Danish Food Agency 1994*





# Food Classification Systems

At which reporting level ?

Survey Type	Foods as eaten/prepared	Foods as ingredients/purchased/raw	Foods as commodities
Individual	X	X*	X**
Household Budget Survey		X	X**
Food Balance Sheets			X

\* obtained by disaggregating food intake into ingredient

\*\* obtained by disaggregating ingredients into commodities





# The impact of reporting level

- European food consumption survey method (EFCOSUM)

EFG g/day	Intake level	Ingr. level	EFG g/day	Intake level	Ingr. level
Bread and rolls	142	162	Fruits and fruit products excl. juices	108	113
Breakfast cereals	34	14	Fruit juices	156	73
Flour	-	21	Non-alcoholic beverages	587	734
Pasta	17	8	Coffee, tea, cocoa powder	815	815
Bakery products	39	1	Beer	187	187
Rice and other c.p.	15	7	Wine	60	60
Sugar	3	22	Other alcoholic beverages	5	5
Sugar products excl. chocolate	16	1	Red meat and meat products	89	111
Chocolate	7	7	Poultry and poultry products	14	17
Vegetable oils	-	4	Offals and offal products	1	1
Margarine and lipids of mixed origin	16	33	Fish and seafood	22	21
Butter and animal fats	6	8	Eggs and egg products	15	19
Nuts and nut products	2	2	Milk	276	314
Pulses and pulse products	4	8	Cheese	22	31
Vegetables excl. potatoes	80	99	Other milk products	55	71
Starchy roots and potatoes	110	119	Miscellaneous foods	190	5

Source: Dietary habits of the Danes, 1995





# Food Classification Systems

defined by reporting level (1)

## ■ Intake level (food as consumed)

- National food classifications for consumption surveys (DK, SE, UK, etc.)
- International food classification for consumption surveys (EPIC)
- Food classifications for food composition databases (EuroFIR food classification, USDA, etc.)





# Food Classification Systems

defined by reporting level (2)

- Ingredient level (pre-packed foods, foods as purchased, raw foods)
  - Classification systems for food composition databases
  - International food classifications for comparing consumption surveys
    - European Food Grouping (Cost Action 99/EFCOSUM)
    - Eurocode2
  - CIAA Food Categorization System/Codex Food Categorization System for food additives (GSFA)
  - Global Product Classification (GS1 GPC, GSDN Food and Beverage Extension)
  - ...





# Food Classification Systems

defined by reporting level (3)

## ■ Commodity level

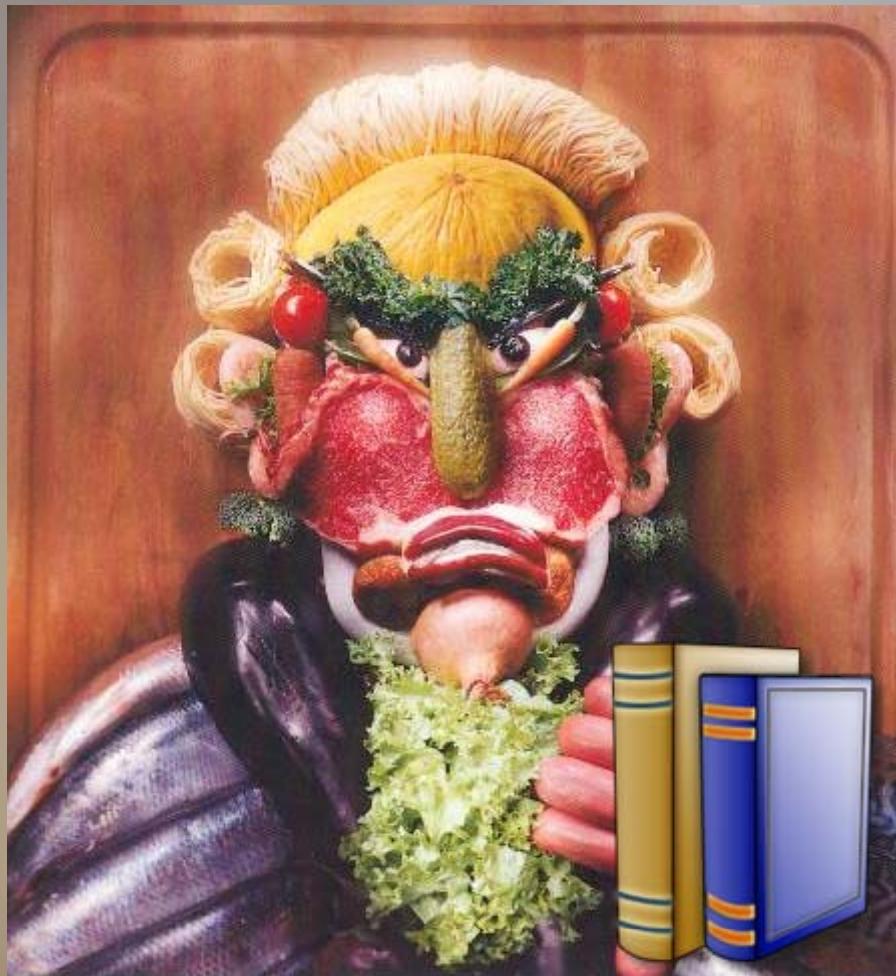
- Harmonized Commodity Description and Coding System (WTO)
- Codex Classification of Foods and Animal Feeds (Codex CCPR)
- Codex General Standard for Contaminants and Toxins in Foods (CCFAC)
- Food Balance Sheets "Presumptive diet"
- other classifications of commodities (PRODCOM, etc.)





# Food Classifications

## The point of view is important



What is the purpose of the classification system?

*Source:  
Danish Food Hygiene campaign,  
Danish Food Agency 1994*



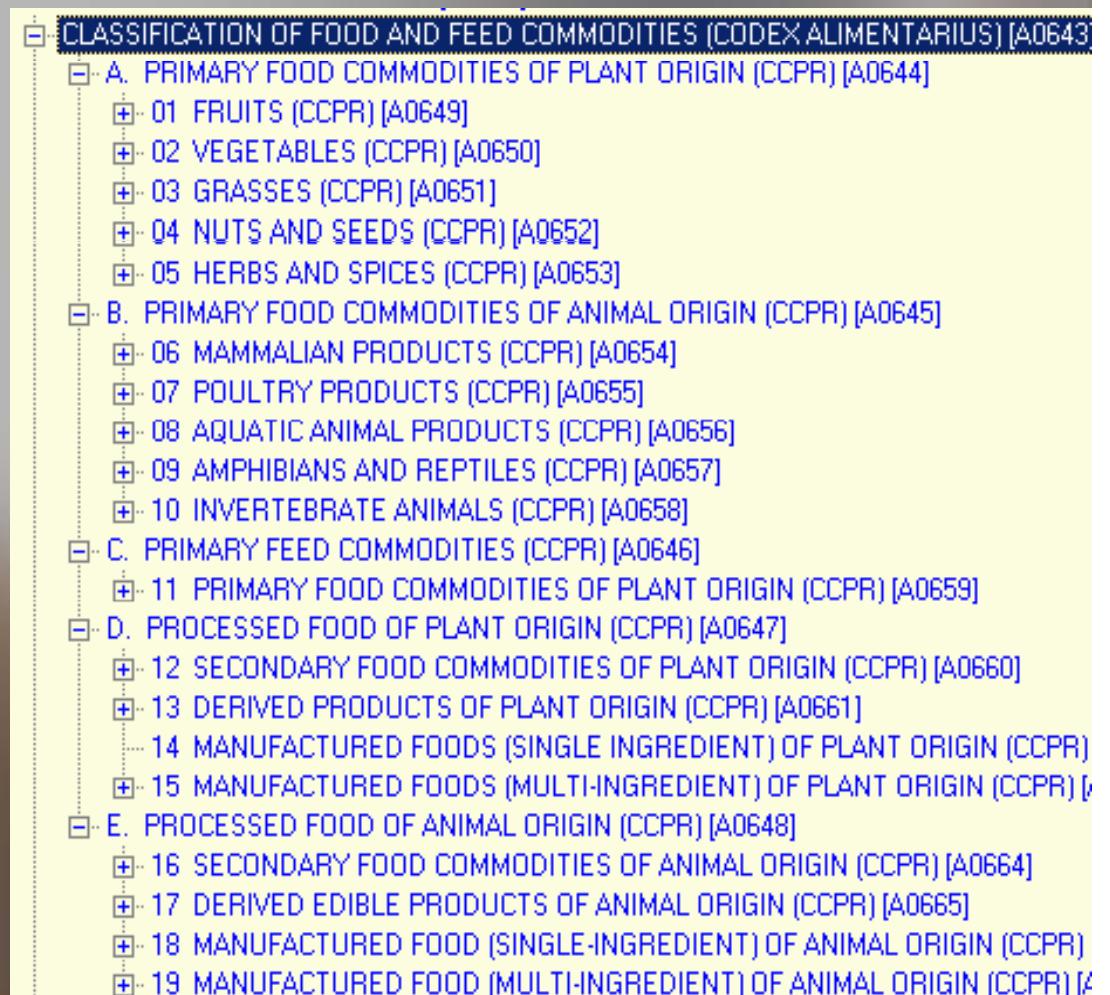


# Food Classification Systems

## International systems for exposure studies

- **Based on commodities' similar potential for pesticide residues or contaminants**

- Codex Classification of Food and Animal Feed Commodities (CCPR)  
<ftp://ftp.fao.org/codex/ccpr38/pr38CxCl.pdf>
- Codex General Standard for Contaminants and Toxins in Foods (GSC)  
<https://apps.who.int/fsf/Codex/GENERALSTANDARDCONTAMINANTSANDTOXINSInFOODS.pdf>
- EC Classification of Products of Plant and Animal Origin  
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:029:0003:0025:EN:PDF>





# Food Classification Systems

## International systems for exposure studies

### ■ Allocation tools for food additives

- CIAA Food Categorization System  
<http://www.ciaa.be/asp/index.asp>

- Codex Food Categorization System for food additives  
<http://www.fao.org/docrep/meeting/005/X7137E/x7137e1v.htm>

### ■ Ingredient level (products)

FOOD CLASSIFICATION FOR FOOD ADDITIVES (CODEX ALIMENTARIUS) [A0355]	
BAKERY WARES (CCFAC) [A0632]	
BEVERAGES, EXCLUDING DAIRY PRODUCTS (CCFAC) [A0639]	
CEREALS AND CEREAL PRODUCTS (CCFAC) [A0631]	
COMPOSITE FOODS (CCFAC) [A0641]	
CONFECTIONARY (CCFAC) [A0630]	
DAIRY PRODUCTS, EXCLUDING FATS AND OILS, FAT EMULSIONS (CCFAC) [A0626]	
EDIBLE ICES, INCLUDING SHERBET AND SORBET (CCFAC) [A0628]	
EGG AND EGG PRODUCTS (CCFAC) [A0635]	
FATS AND OILS, AND FAT EMULSIONS (TYPE WATER-IN-OIL) (CCFAC) [A0627]	
FISH AND FISH PRODUCTS (CCFAC) [A0634]	
FOODSTUFFS INTENDED FOR PARTICULAR NUTRITIONAL USES (CCFAC) [A0638]	
FRUITS AND VEGETABLES (CCFAC) [A0629]	
MEAT AND MEAT PRODUCTS (CCFAC) [A0633]	
READY-TO-EAT SAVORIES (CCFAC) [A0640]	
SALTS AND SPICES, SOUPS, SAUCES AND SALADS, PROTEIN PRODUCTS ETC. (CCFAC)	
SWEETENERS (CCFAC) [A0636]	





# Food Classification Systems

## International systems for products in commerce

### ■ Global Product Classification (GS1 GPC)

<http://www.gs1.org/productssolutions/gdsn/gpc/>

- Data synchronisation between manufacturers and distributors
- Ingredient level (products)
- Support logistics
- Reflects potential for microbiological contaminants: shelf life, origin





# Food Classification Systems

## Dietary surveys

### ■ European Prospective Investigation into Cancer and Nutrition (EPIC)

- 10 countries (DK, FR, DE, GR, IT, NL, NO, ES, SW, UK)
- EPIC SOFT software
- Consumption level

1 - Potatoes and other Tubers	5 - Dairy Products
2 - Vegetables	6 - Cereals and Cereal Products
02 01 - Leafy Vegetables (Except Cabbages)	7 - Meat and Meat Products
02 02 - Fruiting Vegetables	8 - Fish and Shellfish
02 03 - Root Vegetables	9 - Eggs and Egg Products
02 04 - Cabbages	10 - Fat
02 05 - Mushrooms	11 - Sugar and Confectionery
02 06 - Grain and Pod Vegetables	12 - Cakes
02 07 - Onion, Garlic	13 - Non Alcoholic Beverages
02 08 - Stalk Vegetables, Sprouts	14 - Alcoholic Beverages
02 09 - Mixed Salad, Mixed Vegetables	15 - Condiments and Sauces
3 - Legumes	16 - Soups, Bouillon
4 - Fruits and nuts	17 - Miscellaneous

Slimani et al (2000) Standardization of the 24-hour diet recall calibration method used in the European Prospective Investigation into Cancer and Nutrition (EPIC) : general concepts and preliminary results. European Journal of Clinical Nutrition, 54, 900-917





# Food Classification Systems

## Dietary surveys

### ■ EFG European Food Grouping

- EU Cost Action 99/Eurofoods & EFCOSUM
- Classification for international comparisons of food consumption & food availability surveys
- Ingredient level

Ireland J et al (2002): Selection of a food classification system and a food composition database for future food consumption surveys. European Journal of Clinical Nutrition, 56 Supplement 2, S33-S45

#### EUROPEAN FOOD GROUPS (EFG) [A0690]

- 01 BREAD AND ROLLS (EFG) [A0691]
- 02 BREAKFAST CEREALS (EFG) [A0692]
- 03 FLOUR (EFG) [A0693]
- 04 PASTA (EFG) [A0694]
- 05 BAKERY PRODUCTS (EFG) [A0695]
- 06 RICE AND OTHER CEREAL PRODUCTS (EFG) [A0696]
- 07 SUGAR (EFG) [A0697]
- 08 SUGAR PRODUCTS, EXCLUDING CHOCOLATE (EFG) [A0698]
- 09 CHOCOLATE (EFG) [A0699]
- 10 VEGETABLE OILS (EFG) [A0700]
- 11 MARGARINE AND LIPIDS OF MIXED ORIGIN (EFG) [A0701]
- 12 BUTTER AND ANIMAL FATS (EFG) [A0702]
- 13 NUTS (EFG) [A0703]
- 14 PULSES (EFG) [A0704]
- 15 VEGETABLES, EXCLUDING POTATOES (EFG) [A0705]
- 16 STARCHY ROOTS AND POTATOES (EFG) [A0706]
- 17 FRUITS (EFG) [A0707]
- 18 FRUIT JUICES (EFG) [A0708]
- 19 NON-ALCOHOLIC BEVERAGES (EFG) [A0709]
- 20 COFFEE, TEA, COCOA POWDER (EFG) [A0710]
- 21 BEER (EFG) [A0711]
- 22 WINE (EFG) [A0712]
- 23 OTHER ALCOHOLIC BEVERAGES (EFG) [A0713]
- 24 RED MEAT AND MEAT PRODUCTS (EFG) [A0714]
- 25 POULTRY AND POULTRY PRODUCTS (EFG) [A0715]
- 26 OFFALS (EFG) [A0716]
- 27 FISH AND SEAFOOD (EFG) [A0717]
- 28 EGGS (EFG) [A0718]
- 29 MILK (EFG) [A0719]
- 30 CHEESE (EFG) [A0720]
- 31 OTHER MILK PRODUCTS (EFG) [A0721]
- 32 MISCELLANEOUS FOODS (EFG) [A0722]
- 33 PRODUCTS FOR SPECIAL NUTRITIONAL USE (EFG) [A0723]

### ■ Eurocode 2

- FLAIR Eurofoods-Enfant & COST Action 99
- Classification of foods according to groups and subgroups useful in dietary studies

<http://www.ianunwin.demon.co.uk/eurocode/docmn/ec99/ecmgintr.htm>

#### EUROCODE 2 FOOD CLASSIFICATION [A0642]

- 01 MILK AND MILK PRODUCTS (EUROCODE2) [A0724]
- 02 EGG AND EGG PRODUCTS (EUROCODE2) [A0725]
- 03 MEAT AND MEAT PRODUCTS (EUROCODE2) [A0726]
- 04 FISH AND FISH PRODUCTS (EUROCODE2) [A0727]
- 05 FATS AND OILS (EUROCODE2) [A0728]
- 06 GRAINS AND GRAIN PRODUCTS (EUROCODE2) [A0729]
- 07 PULSES, SEEDS, KERNELS, NUTS AND PRODUCTS (EUROCODE2) [A0730]
- 08 VEGETABLES AND VEGETABLE PRODUCTS (EUROCODE2) [A0731]
- 09 FRUIT AND FRUIT PRODUCTS (EUROCODE2) [A0732]
- 10 SUGAR, CHOCOLATE AND RELATED PRODUCTS (EUROCODE2) [A0733]
- 11 BEVERAGES (NON-MILK) (EUROCODE2) [A0734]
- 12 MISCELLANEOUS FOODS (EUROCODE2) [A0735]
- 13 PRODUCTS FOR SPECIAL NUTRITIONAL USE (EUROCODE2) [A0736]





# Food Classification Systems

## Dietary supplements

- CEN/TC387 Project Committee:  
"Food Data" (SIS/NFA, 2008)
  - Requirements on data structure of FCDBs and interchange of food composition data
  - Identification, description, classification & labelling of foods and ingredients
- Databases on dietary supplements
  - Europe: Finland, the Netherlands, France, Denmark, Ireland
  - US: Office of Dietary Supplements





# Food Classification Systems

## Dietary supplements - DRAFT

- **Proposed classification for Dietary Supplements (Langual facet A)**
  - AMINO ACID OR PROTEIN SUPPLEMENT
  - BOTANICAL OR HERBAL SUPPLEMENT
  - MINERAL SUPPLEMENT
    - MULTI MINERAL SUPPLEMENT
    - SINGLE MINERAL SUPPLEMENT
  - METABOLITE, EXTRACT OR ISOLATE SUPPLEMENT
    - FATTY ACID OR FAT SUPPLEMENT
    - ENZYME SUPPLEMENT
    - PHYTOESTROGEN SUPPLEMENT
  - VITAMIN SUPPLEMENT
    - MULTIVITAMIN SUPPLEMENT
    - SINGLE VITAMIN SUPPLEMENT
  - DIETARY SUPPLEMENT, COMBINATION
    - VITAMIN-MINERAL COMBINATION SUPPLEMENT
      - MULTIVITAMIN/MINERAL SUPPLEMENT
      - SINGLE VITAMIN/SINGLE MINERAL SUPPLEMENT
    - BOTANICAL SUPPLEMENT WITH VITAMINS OR MINERALS
    - MULTI VITAMIN-MINERAL AND AMINO ACID COMBINATION SUPPLEMENT
    - MULTI VITAMIN-MINERAL AND FATTY ACID COMBINATION SUPPLEMENT
    - VITAMIN- FATTY ACID COMBINATION SUPPLEMENT
  - DIETARY SUPPLEMENT, OTHER
    - CARBOHYDRATE SUPPLEMENT
    - FIBER SUPPLEMENT
    - ELECTROLYTE SUPPLEMENT
  - DIETARY SUPPLEMENT TYPE UNKNOWN





# Food Classification Systems

Purpose and food level specific

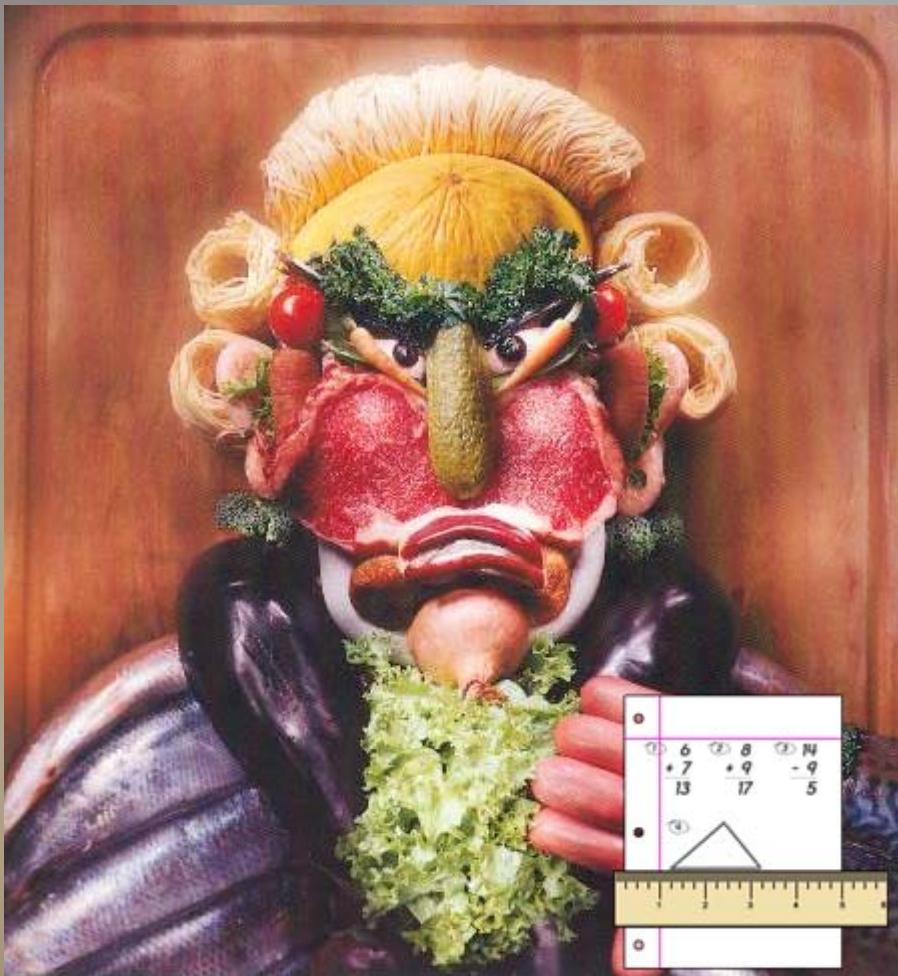
- **Food classification systems are purpose specific** (reflect specific characteristics, e.g. from legislation) and must exist in parallel
- A food (and food group) can exist on all reporting levels, but the **characteristics of the food change from level to level**
- **Food classification systems are food level specific** (for exposure assessment, a classification system cannot cover several food levels at the same time)
- **Food classification systems are related**, but not necessarily (i.e. almost never) compatible





# Food Classifications

## The point of view is important



If classification systems are so different, how can information be retrieved?

How can data be compared?

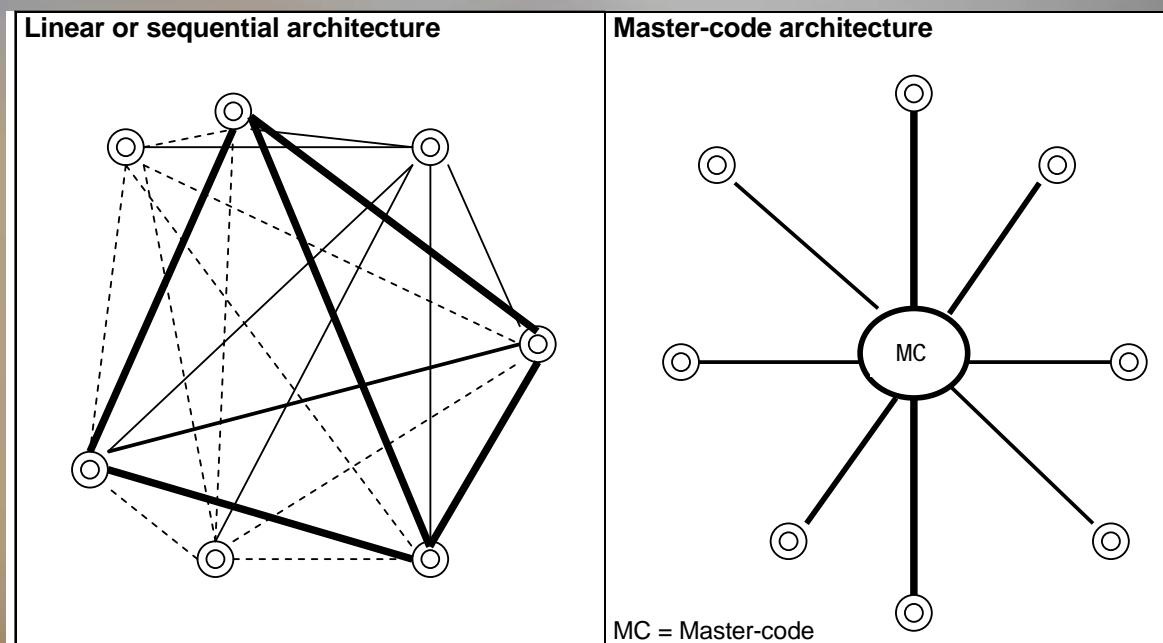
Source:  
*Danish Food Hygiene campaign,  
Danish Food Agency 1994*





# Solution: Mapping between classification systems

- Create links between food identification systems, by “mapping” one system to another
- Architecture for code translation systems:



Example: CARE Food Safety Project

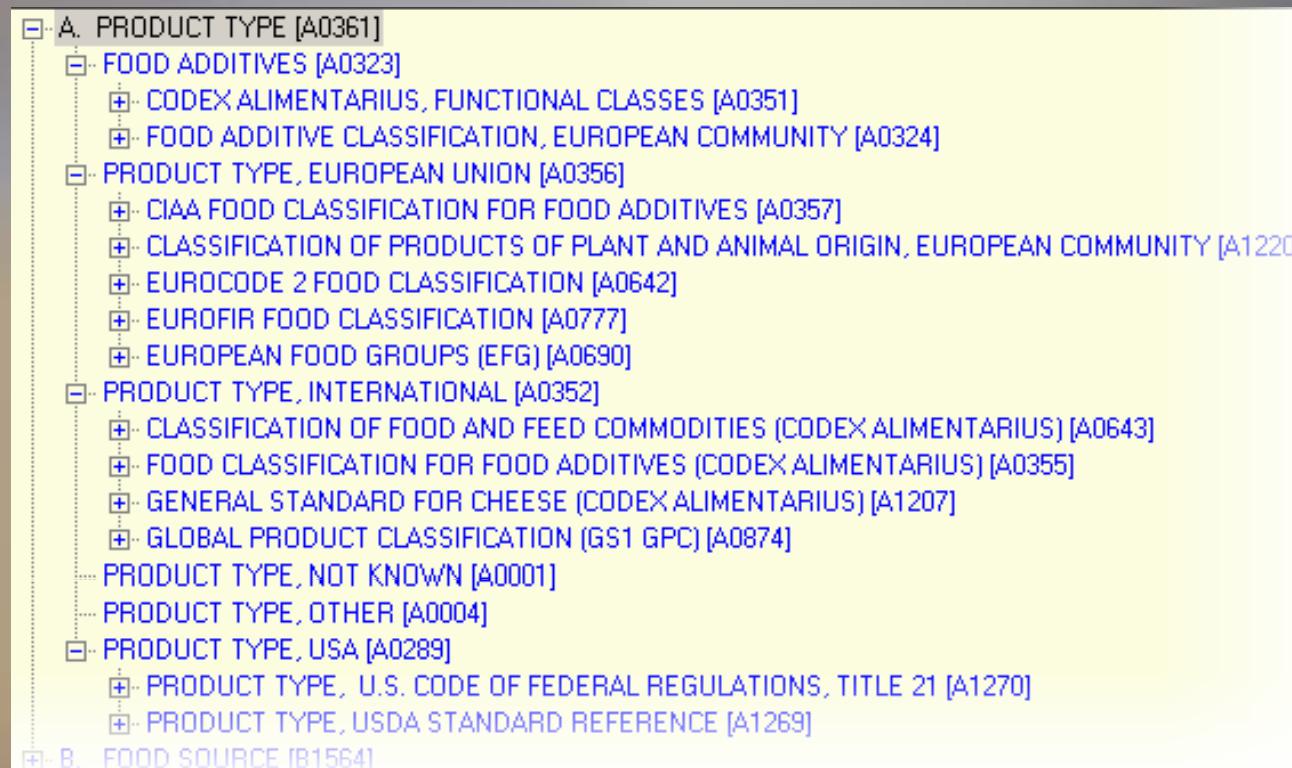
Weigert P, Conti M, Lia F, Meigs G. (1994). *International Synonyms System – A Software Approach to Merge Different Coding Systems*. CARE Telematics Project within the European Nervous System (ENS), EUR/HFA target 22, World Health Organization, Copenhagen.





# Food classification in the LanguaL thesaurus

LanguaL (<http://www.langual.org>) includes important food classifications in parallel in Facet A, and provides Related Terms for the different classifications



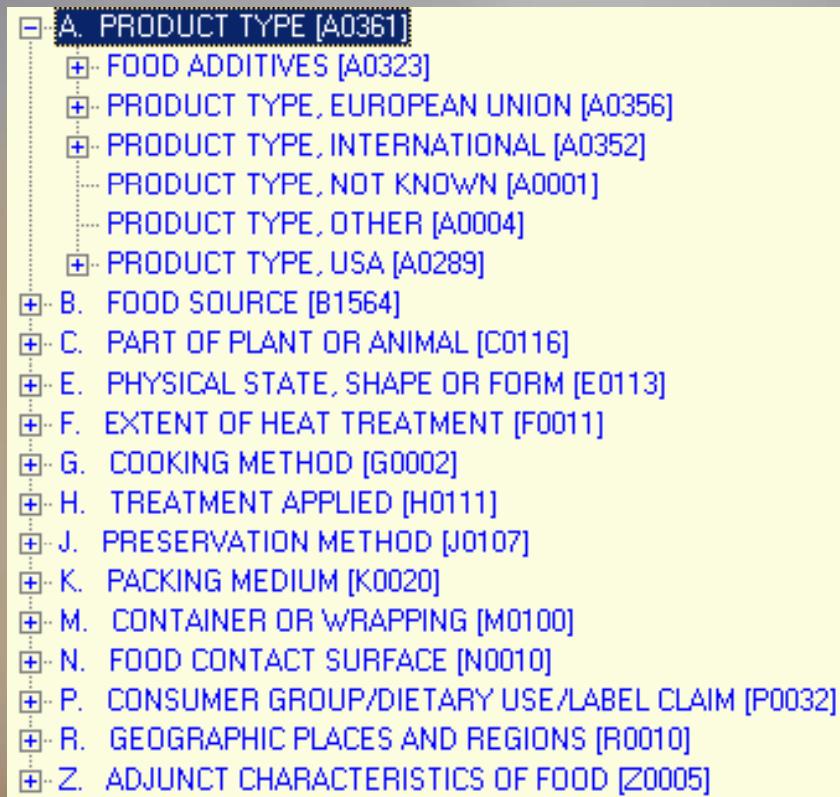
Classification for Dietary Supplements and EFSA Main Food Categories are proposed for inclusion in LanguaL 2010





# Food classification in the LanguaL thesaurus

Multiple facets and languages make the LanguaL thesaurus a good choice for “Master Code” for mapping classification systems





# Conclusions

- **All classifications are purpose driven**
  - Created for a specific purpose/use
  - Fit for purpose
- **This is both a strength and a weakness**
  - A classification system often cannot be used for another purpose than the one it was designed for
  - A classification system cannot be used for foods at all levels (foods as eaten, ingredients, commodities)
  - Mono-hierarchical classifications lack flexibility, both for indexing and for retrieval
- **Mapping is necessary**
  - A faceted classification or thesaurus can be used as "Master code" to map between classification systems
  - Recipe/processing factors





# Food classifications depend on the point of view



Thank you  
for your  
attention!

*Source:  
Danish Food Hygiene campaign,  
Danish Food Agency 1994*

