SCIENTIFIC REPORT OF EFSA

Report on the development of a Food Classification and Description System for exposure assessment and guidance on its implementation and use[1]

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ABSTRACT

The role of EFSA as a central repository for pan-European data from national food control and surveillance programs requires extensive harmonisation. A system for unique and universal identification of food items is essential to provide a common link to diverse information sources. A working group was appointed to develop a standardised food classification and description system with general applicability and a preliminary technical system specification. A system is proposed that consists of descriptions of a large number of individual food items aggregated into food groups and broader food categories in a hierarchical parent-child relationship. Several hierarchies are proposed according to the needs of the specific food safety domain. Central to the system is a common 'core list' of food items or generic food descriptions that represent the minimum level of detail needed for intake or exposure assessments. More detailed terms may exist below the core list and these are identified as the 'extended list'. A parent-child relationship exists between a core list food item and its related extended list food items. Facets are used to add further detail to the information provided by the food list term. Facets are collections of additional terms describing properties and aspects of foods from various perspectives. The entire system is code-based. Specific user-friendly software tools need to be developed with an intelligent search function for choosing between alternative terms. Implementation of the system should follow a tiered approach including an initial period for comments by future users, a pilot phase and a final refinement phase. Success of the system will require on-going support and will depend on active contributions from end-users and linking to legislative needs in the different food safety domains at European Union level.

KEY WORDS

Food classification, food description, exposure assessment, food groups, food categories

SUMMARY

The collection and evaluation of numerical data for levels of beneficial or harmful chemical compounds and the presence of biological agents in food and feed are important tasks of the European Food Safety Authority (EFSA). By linking such data to European food consumption information it is possible to provide detailed intake and exposure estimates crucial to any food and feed safety risk assessment or nutrient adequacy analysis. As a result, European Union Member States are asked to provide an increasing volume of data to EFSA and other European bodies. The role of EFSA as a central repository for pan-European data from diverse national control and monitoring programs prompts for an extensive harmonisation effort in data collection. In particular, a system for unique and universal identification and characterisation of food and feed items is essential to provide a common link to all the diverse food and feed databases. The current report deals with the challenge to describe and classify food items.

Although there is general agreement on the importance of standardised food nomenclature, many attempts to describe or classify food lack general applicability. The preparation of reliable data on food requires precise identification, but simple food names are often inadequate or ambiguous. The main problem of food terminology is not the difficulty of finding the best terms or ways of describing food, but the fact that differing, inconsistent, and often incompatible terminologies are used in different areas. Each area has its own description language designed to satisfy the immediate requirements of the initiator. Consequently, it is difficult to exchange data between countries, between organisations within the same country, between scientific disciplines, or even between workers in the same institution.

In an effort to introduce standardised food nomenclature across pan-European data collection activities, a Working Group (WG) including EFSA staff and external experts was established to develop a suitable food classification and description system with general applicability. 'Food classification' is seen as a system for organising different food names into groups in a hierarchical structure, whereas 'food description' should be understood as a collection of terms describing all relevant characteristics of an individual food item. A proposed new food classification and description system has been developed by the WG and is presented together with a preliminary technical system specification.

The food terminology needs for different domains were initially analysed and summarised. In particular the needs in the fields of contaminants, plant toxins, food contact materials, flavourings, pesticide residues, veterinary drug residues, additives (plus enzymes and extraction solvents), food borne microorganisms, food composition and food consumption were reviewed. The analysis highlighted that specific requirements are very much driven by regulatory and other specific details, often differing between domains, and in some cases related to international agreements.

In parallel with the needs analysis, the multitude of existing methods for describing and categorising food were analysed, building on previously published reviews. It was noted that some systems had been developed for scientific or analytical purposes, while others covered statistical classifications of goods used internationally for collecting and disseminating different types of production and trade statistics. Some systems included facet descriptors that could be added to food names to better specify all characteristics of a food item. The WG concluded that, while a comprehensive description system is available, no food classification was built with a scope broad enough to cover the needs of all domains relevant to intake or exposure assessments.

Although the presentation of a single food classification system seems an attractive goal, the WG decided to follow the more practical approach of describing foods as fully as possible at the time that data are collected and provide links to act as translation layers between alternative classification systems. Use of a comprehensive food description language should provide sufficiently detailed

information to allow mapping from food description to an automatic generation of the food categories defined in the various classification systems.

The proposed system consists of descriptions of a large number of individual food items aggregated into food groups and broader food categories in a hierarchical parent-child relationship structure. The description of individual food items can be complemented by additional information through the use of facets and facet descriptors. Some facets inherent to a food item are automatically linked to the entry for convenience. Several hierarchies are proposed according to the needs of the specific food safety domain and may present different aggregation and different levels. Central to the system is a 'core list' of food items that represent the minimum level of detail needed when coding or identifying a food collected in any domain for intake or exposure assessments. The core list comprises of food items or generic food descriptions in common use across domains, including the food consumption domain. More detailed terms may exist below the core list and these are identified as the 'extended list'. There is a parent-child relationship between a core list food item and its related extended list food items. As an exception to the rule, should a core list item not fit into a hierarchy, the corresponding food items in the extended list may link directly to a food group in the hierarchy. If this food group is in common with the food consumption domain, intake or exposure can still be estimated, but with less specificity.

Multiple hierarchies are foreseen, serving the data reporting and data analysis needs of different food safety domains. A specific hierarchy is needed to assess intake or exposure by combining occurrence and food consumption data. A three-level hierarchical system has been created for this purpose linking to the food items in the core list. Other hierarchies have different structures reflecting legislative and other analysis or reporting requirements.

The entire system is code-based. This means that each entry is identified by a unique code for the food item or food grouping, which in turn is associated with a proper description specifying which foods are included in or excluded from the group. These detailed descriptions are indicated as 'scope notes'. A descriptor is then chosen in each national language, to best fit the scope of the term. Apart from bearing a unique alphanumerical code, all terms in the food list should be flagged with attributes defining their applicability in the different domains and their state (e.g. raw commodity, ingredient, simple or composite food).

Facets and facet descriptors are fundamental features of the proposed system. Facets may be defined as collections of terms (facet descriptors) describing properties and aspects of foods from various perspectives. The use of facets allows adding further details to the information recorded for the food list terms. The foods described in the core or extended lists may therefore be further characterised by adding facet descriptors. Food list and facet descriptors share the same unique alphanumerical coding system; in some cases, like 'characterising ingredient' or 'sweetening agent' food list elements may be used as facet descriptors.

Most of the food actually consumed is 'composite food'. This term refers to all food items containing more than one distinct ingredient and having a recipe behind them. It was decided to group composite food as much as possible together with the predominant ingredient, if any. Only a few generic composite food groups are provided to accommodate food items with no predominant ingredient. Composite foods classified with these generic groups should then be better specified providing more information through the 'characterising ingredients' facet.

Many alternative foods, having reached an autonomous status, and no more connected to the imitated food, are present in different categories across the system. For those imitates that are still perceived as alternative to an original food (in particular for dairy and meat products) it was decided to establish a separate group with well recognisable sub-groups.

Specific user-friendly software tools need to be developed for the practical use of the system. The tools must allow browsing through the hierarchies and down to the extended list in order to find the

correct or best fitting term for a particular food. Even more important will be an intelligent search function over the entire system to allow choosing from a list of alternative terms.

Implementation of the new system should follow a tiered approach including an initial period for comments by future users, a pilot phase and a final refinement phase. An active process involving all potential users of the system in refining and completing it is encouraged. This process could involve establishing new ad-hoc hierarchies for domains presently not explicitly addressed. The completed system may be implemented at national level in different ways, either by interfacing with it or by fully adopting it. Interfacing has to be established through appropriate translation tables. Translation tables may also be established for other international data reporting systems. Translation of descriptors and scope notes into national languages is a key element for the disseminated use of the system in individual countries. Ways to support or promote this fundamental activity should be investigated.

Success of the system will depend on on-going support. Proper procedures should be developed to allow active contributions from end-users and linking to legislative needs in the different food safety domains at European Union level.

The FCDS is described in detail in the technical report 'The food classification and description system FoodEx 2 (draft-revision 1)', available online at www.efsa.europa.eu . At the same address, a tool is available to allow browsing and searching the system.

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BACKGROUND AS PROVIDED BY REQUESTOR

The founding regulation (Regulation (EC) No 178/2002[4]) of the European Food Safety Authority (EFSA) establishes that:

> "The Authority shall provide scientific advice and scientific and technical support for the Community's legislation and policies in all fields which have a direct or indirect impact on food and feed safety."

In order to do this:

> "The Authority shall collect and analyse data to allow the characterisation and monitoring of risks which have a direct or indirect impact on food and feed safety."

Collecting, collating, analysing and summarising data on food consumption and chemical and biological occurrence are basic tasks for EFSA. It is tasked to serve as a central repository for pan-European data necessary to the Community's risk managers and to allow risk assessors to evaluate trends in occurrence or undertake exposure assessments based on levels of identified food safety hazards and associated food consumption information.

The functionality of a central repository for pan-European food consumption and occurrence data relies to a large extent on the availability and implementation of a proper Food Classification and Description System (FCDS), providing a common link to all the diverse datasets involved.

Many different systems to systematically define food items are available. Most of them are fit-for-purpose systems, focusing for example on food consumption, like the Data Food Networking system (DAFNE), Eurocode 2 or the classification of the European Prospective Investigation into Cancer and Nutrition (EPIC). Some systems focus on food composition, like the Bundeslebensmittelschlüssel (BLS), the classification system of the European Food Information Resource Network (EuroFIR) and the 'Langua alimentaria - the international framework for food description' (LanguaL). Some other are highly specialised (e.g. on trade, on crops, on customs). So far, no comprehensive system covering the needs of exposure assessment has been internationally adopted. The FCDSs in use in the Member States vary from country to country and are characterised by different levels of detail.

During 2008, EFSA financed a project under Article 36 of Regulation (EC) No 178/2002 (Art.36 project) to develop an FCDS proposal and test it on a pilot scale. This project has recently been concluded and a proposal based on basic terms and facets has been designed, tested and delivered to EFSA for evaluation and possible further development.

It is now timely to further develop and finalise the new tentative FCDS. This task should be performed through a Working Group (WG) composed of both EFSA staff and external experts. EFSA staff should be designated by the units involved in collection and/or management of consumption and occurrence data. The external members should be experts with long-time involvements in FCDS development either in the Member States or in International Organisations, including the European Commission.

TERMS OF REFERENCE AS PROVIDED BY REQUESTOR

The Working Group's tasks are to:

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[4] Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety - OJ L 31, 1.2.2002, p. 1–24

1. Analyse the needs related to a uniform FCDS, based on the present and foreseen activities of the different EFSA units.
2. Evaluate existing proposals and their suitability to satisfy EFSA's needs. The evaluation should cover food classification and/or description systems, food lists (dictionaries) and eventually food classification tools to facilitate the process.
3. Develop an FCDS proposal addressing the identified needs. It should define:

   - A general model and its rules; among the rules a particular section should address the mixed (or composite) foods and their management;

   - The policies to populate the model, including gathering of details for specific local food items;

   - The translation polices, including the identification and management of different local names used for unique single items;

   - The updating procedure;

   - Proposals for implementation and maintenance in Member States willing to adopt the system; and

   - Proposals for linking the FCDS to existing systems in Member States not wanting to migrate to a new system, by introducing a translational layer.

4. Summarise the outcome in a technical specification and guideline document.
5. The resulting proposals should be transmitted to and endorsed by the concerned EFSA Member State networks on data collection regarding food consumption, occurrence of chemical contaminants and residues as well as microbiological hazards. The Scientific Committee of EFSA will be consulted as well.

CONSIDERATION

PREAMBLE

Since there is no universally recognised definition of terms used in the field of food description and classification, definitions were established for this report and consistently used across the document. To facilitate reading of the report brief explanations of the meaning of the terms are as follows:

- **Food classification** is a system organising different food names into groups. The groups are defined based on commonalities or similarities primarily identified from a user viewpoint. The groups may be aggregated further into broader groups, thus building a tree structure.

- **Food description** is a collection of terms describing relevant characteristics of a food item. The information may be recorded in a complex food name or structured in different ways. Food description is used while coding, in order to maintain as much useful information as possible on the food under consideration.

- **Food item** is a term identifying a food commonly considered as a single food or a collection of very similar variants of the same food (e.g. orange).

- **Food group** is a term identifying a collection of food items not commonly being considered to be variants of the same food, but sharing important characteristics in terms of nature, source or use (e.g. bread and rolls).

- **Food sub-group** is a term identifying each of the narrower groups constituting a broader group (e.g. wheat bread, rye bread as sub-groups of bread and rolls)

- **Food category** is a term identifying a collection of food groups and food items, only sharing some general characteristics in terms of nature or use (e.g. grains and grain products or alcoholic beverages). In this document, the term food category is used only for the top-level groups in the hierarchies.

- **Food list** is a sequence of terms each identifying a food item, a food group or a food category. The sequence may consider all terms at the same level (flat food list) or represent a more complex relationship, where some terms are dependent on (included into) others (hierarchical food list).

- **Food hierarchy** is a structure showing logical relationships in a collection of terms. The terms represent food categories, groups, subgroups or items. The relationships are usually of parent-child type. Hierarchies are presented in tree-like structures.

- **Domains** represent different focus areas inside the food safety system. Each domain is a specific view of the food chain restricted by e.g. regulations or other commonly accepted ideas. Examples of domains are pesticides, zoonoses, contaminants, additives, and nutrients. Different domains need different hierarchies in order to handle classification issues.

A complete list of abbreviations used in the report is presented at the end of the document.

1. INTRODUCTION

The role of the European Food Safety Authority (EFSA) in data collection is clearly defined in legislation. Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 in establishing EFSA states that *"The Authority shall provide scientific advice and scientific and technical support for the Community's legislation and policies in all fields which have a direct or indirect impact on food and feed safety."* In order to do this *"The Authority shall collect and analyse data to allow the characterisation and monitoring of risks which have a direct or indirect impact on food and feed safety."*

Article 33 of the above mentioned Regulation provides further details of the data collection activities. These include that *"The Authority shall search for, collect, collate, analyse and summarise relevant scientific and technical data in the fields within its mission. This shall involve in particular the collection of data relating to:*

(a) food consumption and the exposure of individuals to risks related to the consumption of food;

(b) incidence and prevalence of biological risk;

(c) contaminants in food and feed;

(d) residues."

The collection and analysis of numerical data for levels of beneficial or harmful chemical compounds and the presence of biological agents in food and feed are thus important tasks of EFSA and fundamental components of almost any food safety risk assessment. The risk assessment process for food and feed safety includes evaluation of the toxicological or nutritional properties of biological agents and chemical substances on the one hand and calculation of population exposure on the other to quantify the risks or benefits associated with the consumption of food containing such substances or agents. As a result, the European Union (EU) Member States are asked to provide an increasing volume of data to EFSA and other European bodies, particularly for concentrations of chemical contaminants and residues from European and national control and monitoring programs. In addition, data on food consumption in the European population are also collected. Presently, methods for measuring food consumption vary among countries, but EFSA is leading a harmonisation effort to define a common, standard methodology. A pan-European food consumption database would include millions of records referring to tens of thousands of different foods. Such large volumes of data are difficult to manage without a standardised and structured approach. Above all, data must be characterised with harmonised food groups and food descriptions to allow the matching of analytical results with food consumption information.

EFSA, besides the exposure assessments performed in support of scientific advice, has also been requested to act as a collection point for data on the occurrence of zoonotic agents and chemical contaminants and residues at EU level. The functionality of a 'central repository for pan-European data' designed for exposure assessment again relies largely on the availability and implementation of proper food description and classification providing a common link to all the diverse datasets involved.

In order to address these challenges EFSA, in cooperation with EU Member States, developed a harmonised data structure for occurrence data including standard catalogues, described in the guidance document 'Standard Sample Description for food and feed' (EFSA, 2010a). Similarly, a harmonised data structure for the collection and reporting of food consumption data was developed in collaboration with Member States and described in the document 'General principles for the collection of national food consumption data in the view of a pan-European dietary survey' (EFSA, 2009). Still remaining to be solved is a harmonised terminology for the identification and characterisation of food to provide an essential link between analytical data and food consumption information.

Although there is a general agreement on the importance of standardised food nomenclature, many attempts to describe or classify food lack general applicability. The preparation of reliable data on food requires precise identification, but simple food names are often inadequate or ambiguous. A common name may be misleading when the same name is used for different foods in different regions or when it is used for foods having different scientific names. The situation is further confounded by homonyms, synonyms, identical brand names for different food products, and culinary or technological terms. The main problem of food terminology is not the difficulty of finding the best terms or ways of describing food, but the fact that differing, inconsistent, and often incompatible terminologies are used in different domains. Each domain has its own description language designed to satisfy the immediate requirements of the initiator. Consequently, it is difficult to exchange data between countries, between organisations within the same country, between scientific disciplines, or even between workers in the same institution.

Typically, information on foods is held in a range of incompatible datasets reporting data on various aspects of the foods. Estimating the exposure to compounds found in food from data on amounts of foods consumed involve the comparison and matching of corresponding food records in two or more datasets. As the unique and unambiguous identification of foods by name is not practical, food records must be matched using the food description or classification provided in each dataset. In considering approaches to identifying foods in databases, the use of food description and classification systems serve two distinctly different purposes. A food description system seeks to identify the food as precisely as possible, without the necessity of aggregating food items. It is a tool of the data originator. A food classification system, on the other hand, groups foods with similar characteristics; it is a tool of the data analyser.

In reality a purchased food item can be described during data entry with as much information as is available for it, within any constraints of the food description system used. The situation is more complicated for foods as consumed. Since food preparation has almost limitless variations, the final dish cannot usually be absolutely uniquely identified, but has to be characterised with reasonable detail. Even with branded foods, variations may occur in the seasonal use of ingredients and such variations may be significant for nutrient intake and hazard exposure studies. The consumer will not normally be aware of such variations and may only be able to report foods by name and possibly information related to its purchase. However, irrespective of the situation, the objective should be to ensure that sufficient information is recorded at the input stage to enable later mapping to any common food description and classification system.

In here lies the challenge for EFSA when seeking to harmonise the collection and collation of food consumption data across EU Member States and similarly to harmonise the collection of occurrence data, covering contaminants, nutrients, zoonotic agents, pesticides and other relevant agents. The various data collections need to be synchronised, in such a way that information on the foods in each dataset is nterrelated. To estimate dietary intake and exposure it is crucial to be able to match the presence or concentration of a microbiological agent or chemical substance in a specific food with the consumed amount of the same or similar product or product group.

In summary, there is a need to address the harmonisation of food classification and description, by collecting the requirements of the different domains, evaluating the suitability of existing systems in satisfying the needs, proposing a classification and description system that can address the identified needs, and facilitating its adoption or translation into national systems.

2. DEVELOPMENT PROCESS

The development of a common food characterisation system suitable for exposure assessment performed by EFSA and Member States has been guided by different actions taking place during recent years.

- In 2005, an opinion of the Scientific Committee (EFSA, 2005a) related to exposure assessment recommended the establishment of a European framework for the harmonisation of food-related data collection in the European Union.

- This idea was further explored by the Scientific Colloquium 'European Food Consumption Database – current and medium to long-term strategies' (28-29 April 2005, Brussels, Belgium) (EFSA, 2005b). A tiered approach was proposed for the development of a European food consumption database. This involves an increasing level of detail in the description of foods. The Colloquium recommended EFSA to take the lead in the coordination of this approach.

- A simple system using a limited number of 'concise' food categories was initially used as an interim measure by EFSA (for example to establish the EFSA Concise European Food Consumption Database), but the need to develop a more complete system remained.

- EFSA therefore planned a strategy to develop a detailed food classification and description system (FCDS) for data collection, exchange and analysis and for exposure assessment. As a bridging solution, an improved system (FoodEx), including far more food categories than the 'concise', though not yet addressing all the needs, was developed internally. This temporary classification was also used to build the EFSA Comprehensive European Food Consumption Database.

- During 2008, EFSA financed an Article 36 project to develop an FCDS proposal and test it on a pilot scale. A proposal based on basic terms and facets was designed, tested and delivered to EFSA for evaluation and possible further development.

- In response, at the end of 2009 EFSA formed a Working Group (WG) on a food classification and description system for exposure assessment to analyse the needs of different domains and to propose a uniform FCDS following the principles established in the Article 36 project (see next chapter).

- Additionally, a harmonised data structure for the collection and reporting of food consumption data was developed in collaboration with Member States and described in the document 'General principles for the collection of national food consumption data in the view of a pan-European dietary survey' published in 2009.

- Similarly, EFSA in cooperation with the EU Member States developed a harmonised data structure for occurrence data including standard catalogues, the Standard Sample Description (SSD) described in the document 'Guidance on Standard Sample Description' released in 2010 (EFSA, 2010a).

The success of both harmonisation initiatives mentioned in the last two bullet points very much rely on the effectiveness of the FCDS under development.

2.1. Working Group activities

The WG on a food classification and description system for exposure assessment was formed with both external experts and EFSA staff.

As a starting point, a review and analysis of existing FCDSs and the generation of a summary paper was contracted out, to provide a clear understanding of the achievements of many different scientific groups in the area of food characterisation. The paper prepared by the contractor served as a basis for the further process of actual system development.

A very important aspect of any proposal is the ease of use of the system at EU Member State level, by either adopting it in full or linking it to national systems. To support the development of a harmonised food classification and description system, EFSA organised a Scientific Colloquium (23-24 June 2010, Parma, Italy) (EFSA, 2010b). The objective of the colloquium was to have an open scientific debate

on the requirements of such a system and to build on experiences gained from the development of existing systems. Consideration was given to different approaches to classify foods and the diversity of needs for the various domains of food safety. It was also an opportunity to evaluate the concept developed so far by the working group.

Based on the Colloquium recommendations the system was further developed and reached an advanced status. Before finalising the system proposal, a summary paper describing the main principles embedded in the system (green paper) was prepared and circulated for consultation to the EFSA networks active in different data collection domains. This provided an opportunity for Member State organisations to provide comments on the draft system.

The final proposal was then formalised taking into considerations all the inputs and comments received. Priority was generally given to the needs related to performing exposure assessment at EU level using the EFSA food consumption database, and in perspective the future harmonised food consumption data that also will be available to the Member States.

2.2. Summary of review of existing systems

As one of the first tasks, the WG reviewed the multitude of existing methods for describing and categorising food. However, most methods address only a limited domain and lack general applicability. National food categorisation systems are designed to meet local needs and, when defining food groups, take into account local criteria such as traditions and legal requirements. International food categorisation systems support international trade requiring harmonised commodity and product description and food standards based on these for various legislative, trade and monitoring purposes. Various code systems for products and services exist, including those used in bar codes, food balance sheets and household budget surveys.

Food categorisation systems have been the subject of several comprehensive reviews. Pennington (1995) reviewed various national food grouping systems, as well as international systems like the Eurocode 2 food classification system (Poortvliet et al., 1992), the LanguaL food description language (Hendricks, 1992) and the guidelines for describing foods of the International Network for Food Data Systems INFOODS (Truswell et al., 1991). Ireland and Møller (2000) separated classification systems from description systems. They pointed out the different needs addressed by different classification systems reflecting differences in legislation or purpose, for example relating to additives or contaminants, making them incompatible for general use. An extended review of FCDSs was produced by Ireland and Møller (2006) as part of the EuroFIR project. Key existing systems were also reviewed as part of the work to enhance the ADV Catalogues (Otto et al., 2008). Unwin, in an unpublished report to EFSA, summarised the previous reviews for the WG. An abridged version of this report is presented in Appendix I.

It can be concluded that classification systems like Eurocode 2 that was intended for use with food consumption surveys for nutritional epidemiology in Europe, Euro Food Group (EFG) that was designed for use in food consumption and food availability studies, and EuroFIR that produced a harmonised system for use in all European food composition databases all serve their objectives well, but do not provide a universal system with enough detail for exposure assessment purposes. Use of EuroFIR is only practical in conjunction with LanguaL indexing. LanguaL is a multilingual thesaurus using faceted classifications that provide a very flexible, but slightly unwieldy system with a multitude of choices. The same lack of general applicability is true for a range of international classification systems like the Codex Classification of Foods and Animal Feeds covering pesticide residues, the Codex General Standard for Contaminants and Toxins in Foods, the Codex General Standard for Food Additives, and the International Network for Food Data Systems (INFOODS) for food composition databases.

Supplementary to the food categorisation systems described above, several statistical classifications of goods are used internationally for collecting and disseminating different types of statistics. They cover a wide range of products, including food products. Examples are COICOP (Classification Of Individual Consumption by Purpose), set up by the United Nations Statistical division (UNSD) and adapted for use within the EU in Household Budget Surveys and in the DAFNE[5] project to obtain good estimations of food consumption in Europe. The Harmonised System (HS) and the Combined Nomenclature (CN) are used for collecting data on external trade of goods. PRODCOM, the list of PRODucts of the European COMmunity, the Central Classification of Products (CPC) and the Statistical Classification of Products by Activity (CPA) all focus on collecting production statistics for manufactured goods. Neither of these systems was considered suitable for exposure assessment, but the WG noted that Eurostat, the statistical office of the EU, keeps updated correspondence tables between the above mentioned classifications that could be of future use.

Although the presentation of a single food classification system seems an attractive goal, the WG decided to follow the more practical approach of describing foods as fully as possible at the time that data are collected and provide links to act as translation layers between alternative classification systems. Use of a comprehensive food description language should provide sufficiently detailed information to allow mapping from food description to an automatic generation of the food categories defined in the various classification systems.

2.3.   Summary of need and requirement analysis

The design of a multi-purpose harmonised FCDS requires first of all understanding and summarising of the needs the system has to serve. For this reason an analysis of the regulatory framework and expected needs in term of food classification was performed with focus on the food safety domains within the remit of EFSA.

The following domains were considered:

- chemical contaminants,
- inherent plant toxins,
- pesticide residues,
- veterinary drug residues,
- food contact materials,
- additives, enzymes and extraction solvents,
- flavourings,
- food-borne microorganisms,
- food composition and
- food consumption.

Moreover, the intrinsic needs of an FCDS and of the tools for its implementation were investigated and summarised. The detailed analysis of needs is compiled in Appendix II.

As a result of this analysis, a list of different types of information needed was drafted, together with a list of requirements for the system. The lists are presented in Table 1 and 2.

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[5] DAFNE: DAta Food Networking, project financed by the European Commission.

Table 1: Types of information needed to identify food in one or more of the different food safety domains (in alphabetical order).

Amount of food contained in the pack

Brand name

Conditions of treatment/processing/preparation (e.g. temperature, time, pressure)

Cooking method

Distinction between natural and artificial flavouring

Fat content

Final preparation method in case the food is to be re-heated by the consumer while still in the pack

Food source (plant, animal or other)

Food type/nature

Fortification

Geographical origin

Information on whether the food has been characterised by addition of flavours only (e.g. yoghurt with banana flavour), ingredients only (e.g. yoghurt with banana pieces) or both

Intended use (e.g. intended to be eaten raw, intended to be eaten cooked)

Packaging format (e.g. bottle, wrapper, bag) and material (e.g. plastic, aluminium, paperboard)

Part being analysed or consumed

Part of plant or animal

Physical state/aspect of the food (e.g. dry powder, moist paste, liquid, frozen)

Post harvest treatment, e.g. drying

Preparation method before consumption

Presence of coatings/glazes/fillings

Presence of herbs and spices

Preservation method

Pre-treatment before analysing (like washing or peeling)

Primary production method/place (e.g. organic, conventional)

Processing the food underwent when already in the pack (e.g. hot-fill, pasteurisation, sterilisation)

Recipe level detail in case of composite food

Sampling stage/point (e.g. processing plant, retail)

Season (in particular harvesting season)

Species, subspecies, varieties

Status of the food at the point of sampling (e.g. raw, frozen, cooked)

Storage conditions (time, temperature, humidity, etc)

Sugar/sweetening information

Surface area of the pack making direct or indirect contact with the food

Surrounding medium if any (e.g. if the food in the package is surrounded by brine or oil)

Target consumer

Type of fat used

Type of liquid used

Type of treatment/processing/preparation (e.g. heat treatment, smoking, salting)

Table 2: Additional requirements for the system or the tools to implement it (in alphabetical order).

A standardised designation of foods to a food list
Allow a quick identification of the searched food
Allow application of recipe fractions, compositional fractions and processing factors
Allow conversion between food as consumed and raw
Allow multiple domain-specific hierarchies
Avoiding repetitions
Being at the same time as simple as possible and as detailed as possible
Being expandable
Distinction between RAC, ingredient, simple and composite food
Include food groups defined by regulations in specific areas
Possibility of grouping at different levels of detail to fit to the available information
Possibility to record descriptive properties (facet descriptors)
Providing flexibility in data capture and data retrieval
Providing unambiguous alphanumerical coding, independent from languages
Providing unequivocal food descriptions

The needs summarised in Table 1 were analysed from the point of view of data collection on both occurrence and food consumption.

At the point of identifying and describing a specific food item (e.g. a food sample being analysed or a portion of food being consumed), all this information should be collected and recorded, if available. At the stage of analysing data, some of this information is absolutely necessary to identify food at a minimum level, some additional information is desirable to enable better data analysis and finally some information may be needed to satisfy special refined analysis demands. The ranking of importance of the information needed is expected to be partly different in different domains.

It may be discussed whether it is more correct to consider information like geographical origin, storage conditions, packaging and processing technology as descriptors of food classes or of single samples. The conclusion would most probably be that it is not possible to draw a clear line between what should be treated more systematically (i.e. included in the FCDS) and what can be considered as property of single samples or portions. A choice was arbitrarily made based on the expected availability of the data (i.e. how often is it expected to be available at the time of coding single food entries) and the expected frequency of use during data analysis.

It was concluded that most of the needs listed in Table 1 need to be addressed in the food classification. However, some exceptions were identified, as summarised in Table 3.

Table 3: Information needed in different food safety domains but proposed to be addressed outside the FCDS

Information	*How to deal with this information*
Amount of food contained in the pack	This information is rarely available. It should anyway be addressed outside the FCDS.
Brand name	Good information concerning brand names can be obtained for some of the food commodities (e.g. soft drinks) within dietary surveys. Brand is also included in the SSD.
Conditions of treatment/processing/preparation (e.g. temperature, time, pressure)	This is a level of detail that can be obtained only under strictly controlled conditions in ad-hoc research. In normal occurrence or consumption surveys these data are not reported. They could be retrieved in Total Diet Studies.
Geographical origin	Already included in the SSD, difficult to retrieve in consumption surveys for the large majority of foods.
Recipe level detail in case of composite food	Standard recipes are routinely used in food consumption surveys to disaggregate household recipes into raw agricultural commodities. Recipes for data analysis should be developed outside the FCDS.
Sampling stage / point (e.g. processing plant, retail)	This is a level of detail that can only be obtained occasionally or in ad-hoc research. Sampling stage/point is anyway available in the SSD.
Season (in particular harvesting season)	Dates of analysis or consumption are available in the SSD and in the food consumption surveys, respectively.
Status of the food at the point of sampling (e.g. raw, frozen, cooked)	This information is available in the SSD. For consumption surveys it is partly addressed in the 'cooking procedures' field.
Storage conditions (time, temperature, humidity, etc)	This is a level of detail that can be obtained only under strictly controlled conditions in ad-hoc research. In normal occurrence or consumption surveys these data are not reported. They could be retrieved in Total Diet Studies.
Surface area of the pack making direct or indirect contact with the food	This information can be partially estimated by the packaging format information (see Table 1).

All the needs summarised in Table 1, apart from those listed in Table 3, were considered while developing the FCDS proposal. The additional requirements summarised in Table 2 were specifically related to the FCDS, therefore all of them were considered as an objective to fulfil while developing the system.

2.4. Scientific colloquium

In support of the WG activity, EFSA organised a Scientific Colloquium to involve a broader audience in debating the development of the food description and classification system. On 23 and 24 June 2010

some 90 scientists and stakeholders from 33 countries, including the USA and Australia, gathered in Parma to attend EFSA's 'Scientific Colloquium on Food Classification: unambiguous ambiguity – the challenge of describing food', held in Parma.

The objective of EFSA's Colloquium was to bring together international experts from different sectors for an open scientific debate on the classification of food and to provide suggestions for the FCDS for exposure assessment under development in EFSA. The participants met in smaller groups to discuss minimum food description requirements for different end-users, EFSA's working group proposal for a food classification system, challenges posed by composite foods, and the necessary detail of food consumption data for risk assessment purposes.

The Colloquium recognised that it was appropriate, as suggested by the WG and despite the considerable challenge, to develop a multi-faceted system that should enable end-users to analyse the data from different perspectives. It was emphasised that EFSA's food classification system should be able to provide central linking serving as a translational function between current disparate systems to promote more accurate exposure calculations.

Recurrent issues addressed in the discussions were the need for flexibility of the system in order to meet future and unanticipated demands for risk assessment as well as innovative food products. Whilst such a system should retain a high degree of flexibility, this has to be balanced against the need for controlled use. Other issues discussed were: the importance of detail versus practicability of data collection and the challenge to conform to the different legislative needs. It was also suggested that the food industry could make food information stored behind the barcode available for other users.

A number of specific recommendations were made to EFSA's WG and are summarised in the final report of the Colloquium:

1. The creation of a basic food list complemented by a number of facets/descriptors was supported, but the right balance between information held in the food list versus the information captured in facets/descriptors needs to be further explored;

2. The use of pre-combined terms to facilitate data entry should be explored, and for such a system to remain pragmatic, the list should aim not to exceed ~1 000 foods;

3. A tiered system linking foods at different reporting levels (raw agricultural commodity level, ingredient, food) should be further explored;

4. The mapping/linking of this system with existing databases, e.g. WHO/GEMS/Food, CODEX food classification, EuroFIR etc. should be considered. For this purpose, the use, or partial use of comprehensive systems, such as LanguaL as a bridging classification system should be further explored;

5. The system should facilitate the addition of quantitative information (i.e. recipes, conversion factors). The internal or external facilitation of such data needs to be further discussed. Incorporation of additional information into the system would be beneficial and could aid harmonisation on a broader level;

6. Comprehensive guidelines and/or training need to be provided to support end users in the implementation of the system to be developed. The question of ease and speed of classifying foods should be considered;

7. The system should be compatible with the recently developed guidelines on the Standard Sample Description system;

8. Administration and management of the system should be centralised. Maintenance of the food classification system should be centrally controlled to ensure ongoing consistency across Member States;

9. Within the classification system, composite foods should be grouped in a separate hierarchy (or group) and not together with single ingredient foods;

10. The use of ontology as an alternative to a hierarchical system should be further explored, looking for example at the Australian experience with this as it develops;

11. The system needs to be flexible enough to address continuing changes in food products and emerging and unanticipated hazards.

In conclusion, participants welcomed the first outline of an FCDS for exposure assessment purposes. There was general support for the system to include a food list with the possibility of adding facets and descriptors. The ideal length of the food list and number of facets/descriptors will need to be determined and it will be important to consult with Member States and possibly other stakeholders. In building user-friendly coding software, it will be advisable to build on useful experiences and existing systems. Finally, it was acknowledged that EFSA should foresee the need for updating and maintaining the system, provide clear guidance on its use and possibly provide training.

3. PROPOSED NEW SYSTEM

After analysing the needs in different domains, evaluating existing food classification and description systems and gathering suggestions from the scientific community, the WG worked out a proposal intended to represent a good compromise for addressing many needs in one system. The proposal is described in its diverse aspects in the following chapters.

As highlighted, a harmonised food characterisation system including

1) detailed identification and description of individual foods and

2) aggregation of related foods in a hierarchical classification structure

is needed for many reasons.

The WG on a food classification and description system for exposure assessment has drafted a system that combines these two functions and is convinced that it will serve the needs identified.

3.1. Reasons for the proposed structure

Building a food characterisation system suitable for harmonising data collection and data exchange at EU level in the different domains related to food safety is a difficult task. It is a common view that a system covering all needs does not exist. In reviewing existing food characterisation systems, it was noted that the main differences involved the amount of information to be recorded and the structure of the hierarchical grouping of food items. However, during the development of the now proposed system it was also realised that different hierarchies must coexist due to legislation and user needs.

The main concept behind the present proposal is therefore to introduce in the system enough information and flexibility to meet the needs identified and at the same time allow for 'adaptation' to different uses.

Five concepts were identified as fundamental pillars of the system:

1. The narrower the demarcation, the better the food item is defined. Broad food groups are usually domain-specific. The system aims to define, as much as possible, food items that are common to all domains. Each domain may then have its own preferred hierarchical grouping ('view' of the system).

2. Dietary exposure is calculated using a food consumption database. This database is in general common to all domains, as in the case of the Comprehensive European Food Consumption Database of EFSA. A specific hierarchy, including a minimum or preferred level of detail for coding food consumption, is proposed. Occurrence data for intake or exposure assessment must be compatible with this hierarchy.

3. For some specific domains, food descriptors and food groups are defined by legislation. For this reason, the 'view' of the system for regulated domains shall provide the food groups as defined in the regulatory acts. Additional detail may be provided, if needed.

4. The name of any food group may be interpreted by different persons in a slightly different way, due to the intrinsic ambiguity of language; therefore the system is based on codes that are independent of languages. However the 'scope' of the entry, that is meaning of the code explaining which food items are covered by the code and which are not, must be accurately described. Once the scope of each entry is clearly defined, the names attributed to the codes in the different languages become only a support. They are tentative and may be refined, provided that the scope of the food entry remains unchanged.

5. Data from different domains have been collected and reported by Member States for many years. The system aims to be compatible with as many as possible of the existing systems, including GEMS/Food, which is currently used to assess exposure at JECFA level.

The system intends to be:

1. **Reasonably comprehensive**, meaning that the system aims to have a reasonable balance between known needs and completeness;

2. **Simple**, referring to the ease of use, presenting only the information needed in different applications;

3. **Flexible**, meaning that ways of describing foods as well as grouping and presenting them should enable the use in different domains;

4. **Expandable**, meaning that the system must be designed to grow and evolve according to the needs while respecting the general principles (this avoids striving for completeness in initially constructing the system, since the needs emerging during the use will drive the evolution of the system);

5. **Unambiguous**, meaning that every term must be present only once, and have a clear definition (additional descriptors linked to the same term may change in different domains);

6. **Easy to translate into different national languages**, meaning that the system has to be code-based, and every food item, food group or facet descriptor must be represented by a unique code or combination of codes (the name then becomes a language-specific attribute of the unique code and the system may easily be translated into each language while keeping compatibility);

7. **Compatible with as many as possible of the present international reporting needs**, meaning that a link should be achievable, if not conflicting with other requirements, with the main international systems for which the Member States have reporting needs.

Additional drivers for the system development were:

• allow detailed descriptions when needed;

• avoid repetitions across the system;

• provide the possibility to distinguish between RAC, ingredient, simple and composite foods;

- allow for application of recipe fractions, compositional fractions and processing factors.

The system is intended to be revised, adjusted, and improved during the use in data collections. Maintenance must be easy and fully documented in order to enable tracing of all changes in the system.

3.2. General structure of the proposed FCDS

According to these principles, definitions, and drivers a structure for the FCDS was developed, as schematically shown in Figure 1 using an abstract model.
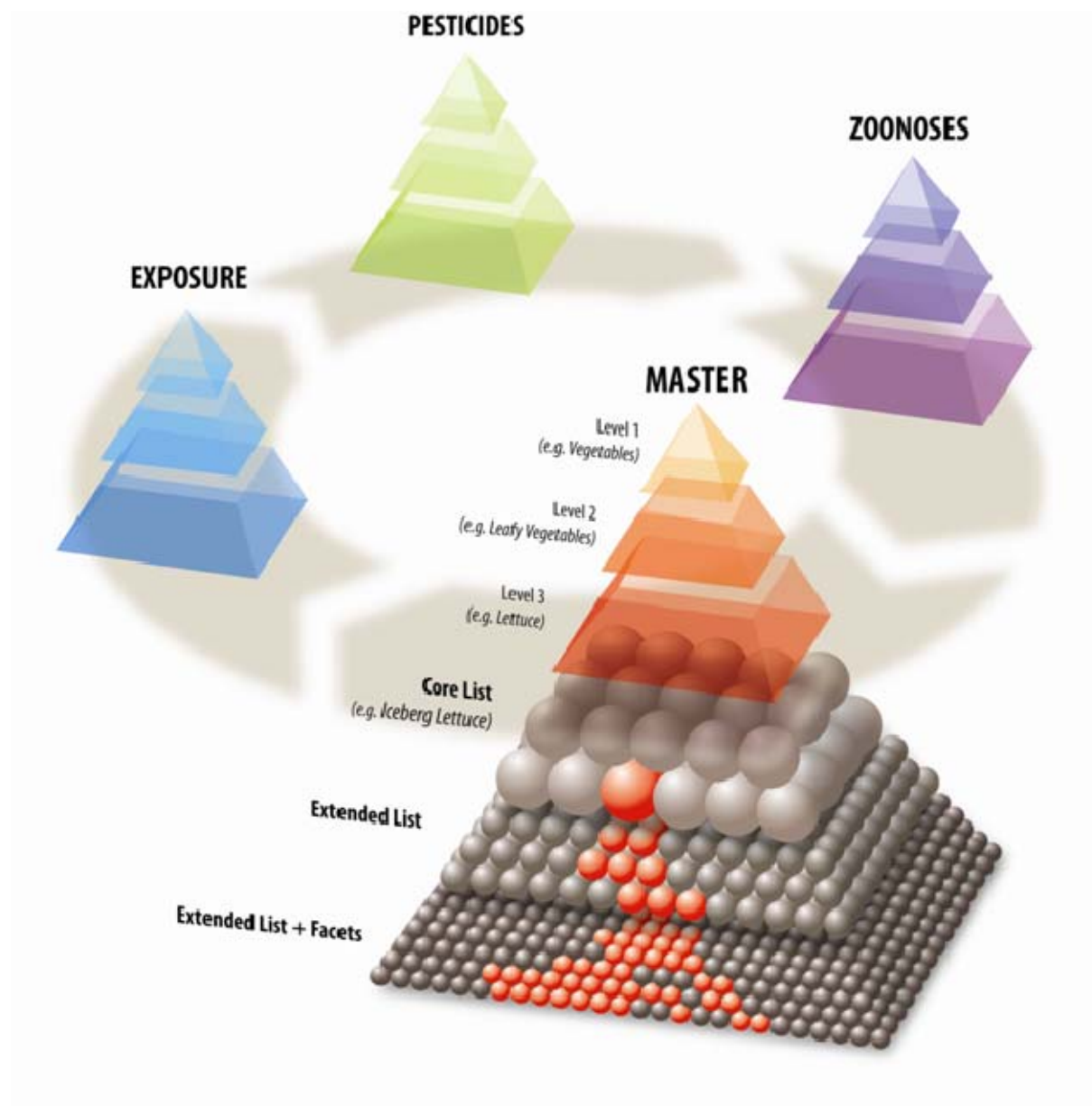
Figure 1: Model representation of the system structure, showing how the same group of detailed terms (eventually further expanded with facets) may be connected to different domain-specific top hierarchies

The system consists of the following building blocks, which will be described in more detail in the subsequent chapters:

1.   A master hierarchy used for browsing
2.   Several additional hierarchies
3.   A core food list
4.   An extended food list
5.   Several facets with their descriptors

The master hierarchy together with the core food list provides the main structural order of the terms, where each term is the 'child' of another, more aggregated 'parent' term. A few broad terms are defined at the top of the hierarchy, and moving down from the top more terms are included at subsequent levels, each with a more precise and restrictive meaning.

In moving from the narrowest items and progressively aggregating up to broader groups, a specific level, the **core food list** has been defined as reference level for exposure assessment. The more detailed entries available at levels below the core list constitute the **extended food list**. The terms of the core list and those of the extended list may be further specified with additional information by adding **facet descriptors**.

Depending on the domain, the core and extended list terms may be aggregated in different hierarchies. This multi-hierarchical approach is explained graphically in Figure 2 (the example does not correspond to a real case, but is only to illustrate the concept). The same set of meat food items, defined here as core foods, is aggregated into two different hierarchies. The first is based on the use (type of food), the second is based on the animal source. This approach allows for a more flexible analysis and presentation of the data, depending on the requirements of the food safety domain in question.
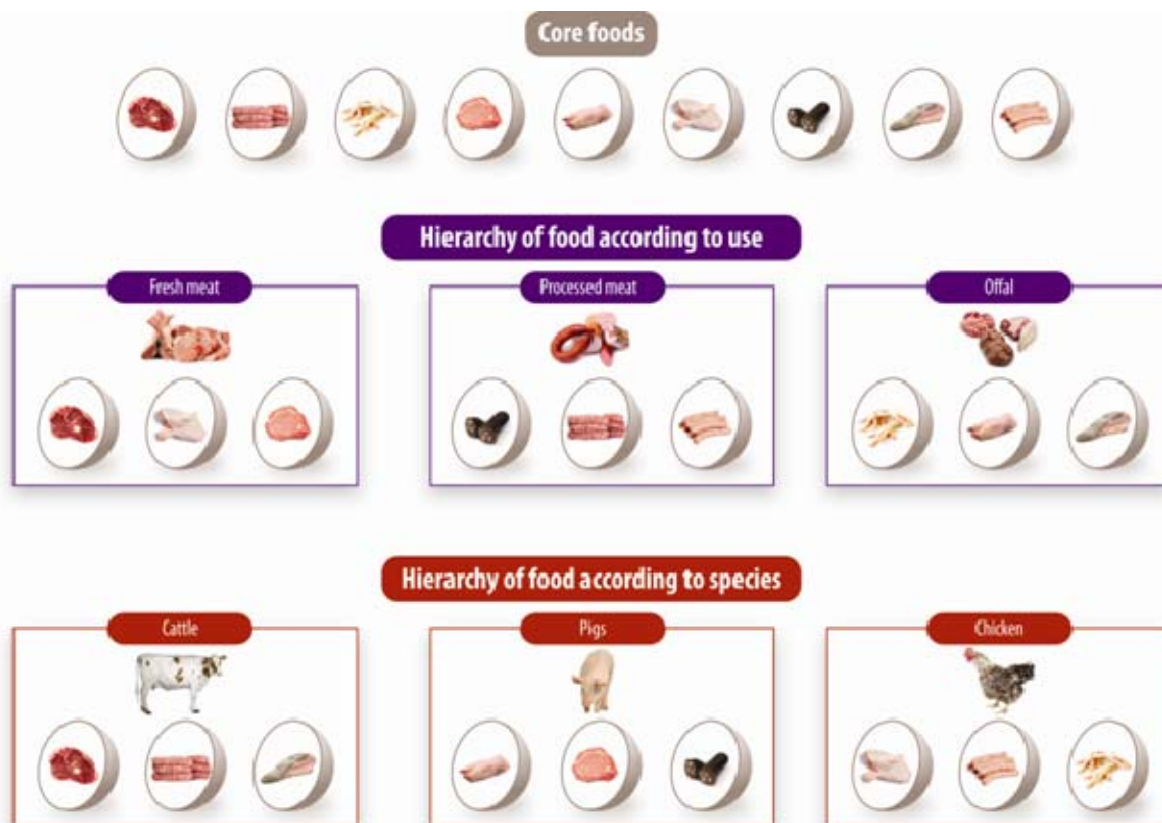
Figure 2: Graphical representation of the multi-hierarchical FCDS model. The picture shows how the same meat food items may be organised in a hierarchy based on their use or in another hierarchy based on the animal species.

In addition to the structural characteristics, two rules are applied consistently across the system:

- All terms (names) are unique and cannot be repeated, even in a different context; and
- Each term has a unique code, derived from a single sequence.

The system structure is suitable to cover both food and feed. The present mandate is focused on food, therefore the feed terms will not be introduced at the moment, but will stay separate. However, recently Regulation (EU) No 575/2011[6] established a comprehensive list of feed materials and related processing facet descriptors. It would be beneficial for the data collection process to integrate the two systems in the future, possibly using the same tools. Some feed materials are actually also food materials, though sometimes with different specifications. Thus, integrating feed materials in the same classification is recommended as a next harmonisation step.

3.3. Core food list

The core food list is the central part of the system, being the **minimum** level of detail that should be aimed at when coding or identifying a food for exposure assessment. While coding, all efforts should be made to never use broader terms than those in the core list; this is in particular the case for reporting non-aggregated occurrence data. Narrower or more specific food items are often available below the core list items and their use may even be preferred as a first choice in many cases. These narrower terms constitute the extended food list.

The core food list can be defined as a comprehensive list; therefore, any food can be related to one of its terms. It has a level of detail that can be realistically achieved in consumption surveys while providing a reasonable homogeneity for each food description.

The terms in the core food list:

- Should be used for coding when reporting consumption or occurrence data, when no item in the extended food list may be clearly identified;
- Can be supplemented with additional facet descriptors;
- Are connected to scientific names (when applicable) and synonyms; and
- Have parent-child relationships with the relevant terms in the extended food list and the hierarchies.

3.4. Extended food list

The need for details varies within different domains. Some terms well representing a single 'homogeneous' food in one case may, in other cases, need to be split further with more detailed descriptions. As an example, in one case the use of the term 'salad plants' could be enough whereas in another case 'lettuce', 'corn salad', 'endive' and similar terms could be needed. In some cases, even the distinction between '*Lactuca sativa var. crispa*' and '*Lactuca sativa var. romana*' could be required.

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[6] Commission Regulation (EU) No 575/2011 of 16 June 2011 on the Catalogue of feed materials Text with EEA relevance. OJ L 159, 17.6.2011, p. 25–65

The extended food list should contain the lowest-level terms required by the most demanding application. In other words, it is a highly detailed subset of the total hierarchical food list. The names in the extended food list contain more information than the terms in the core list. The use of extended food list terms is in particular necessary in case of core list elements that are aggregated at a level not compatible with all domains (e.g. those grouping minor or less common items into 'others').

The terms of the extended food list:

- Should be used for coding when needed, particularly when in a specific domain the corresponding core list element is not applicable;
- Can be supplemented with additional facet descriptors;
- Are connected to scientific names (when applicable) and synonyms; and
- Have parent-child relationships with the relevant terms in the core food list and possibly to other entries in the extended food list.

3.5. Facets and facet descriptors

Most often, the description of a food is a combination of words describing that specific item. For example a beefsteak is a steak (slice of meat) obtained from a bovine muscle. In order to be able to describe the whole variety of foods the system should theoretically include an extremely high number of word combinations. Although this would allow a very detailed description of food, it would not be of practical use. The WG identified the concept of food list supplemented with facets as a way to solve this problem. The foods described in the core or extended lists may therefore be further characterised by adding facet descriptors.

Facets are collections of terms describing properties and features of foods from various perspectives. The terms are called '**facet descriptors**'. 'Processing**'** is a facet, including descriptors like 'concentrated', 'fermented', 'canned' and similar. 'Fat content (qualitative)' is another facet, with descriptors like 'low fat', 'half fat', and 'full-fat'. Applicable facets and their respective descriptors vary among different food groups.

Descriptors in one facet may have a hierarchical structure, but in our proposal we chose to limit, as much as possible, the depth of the hierarchies inside facets. Consequently, most of the facets have a flat list of descriptors, others a very limited hierarchy.

The facet descriptors:

- Should be used to add available information whenever possible;
- Will be mandatory in specific cases (e.g. 'heat treatment' in acrylamide monitoring); and
- Are connected to synonyms and, in the case of 'plant or animal source' also to scientific names.

The terms occurring throughout the 'tree' of the system, in particular the core and extended lists, implicitly entail some facet descriptors, like those from 'plant or animal source' and 'part or nature'. These facets with their descriptors are defined as 'implicit facets' and are associated with the term, without the need to insert them at the time of coding. As an example, choosing 'duck egg' automatically means that the source is duck (*Anas platyrhynchos*) and the part or nature is 'whole egg'. A proper table of implicit facets and their descriptors for all the explicit list terms in the system has to be developed during the implementation phase. This will facilitate analysing the data not only through the defined food groups, but also through facet descriptors across the system.

A further important consideration with respect to facets is applicability. Not all facets or individual descriptors are equally applicable to all terms in the lists. As an example, 'fat content' is not applicable

to pure water or the processing descriptor 'extruded' is not applicable to a fresh fruit. Again, when implementing the system, a table should be created, defining which facet descriptors are applicable to which list element. This would significantly simplify the data entry process by removing unneeded options.

Facets and descriptors will be updated and expanded according to needs in the future maintenance process.

Due to the fact that LanguaL is a fully faceted system, that it provides a solution for capturing food descriptions, and that it has been proven as a tool for the exploitation of data, the LanguaL codes are provided as parallel codes to the facet descriptors wherever possible. These LanguaL codes may help setting up translation tables, but are not used when coding a food sample.

The WG proposal for facets and facet descriptors is reported in Appendix IV, where facet names, explanatory notes and some examples of descriptors are provided. The whole system is separately available.

3.6.   Hierarchies

The hierarchies are built up mainly by the high-level (more aggregated) building blocks of the system, grouping the core food list terms into broader categories. As an exception to the rule, should a core list item not fit into a hierarchy, the corresponding food items in the extended list may link directly to a food group in the hierarchy.

The groups in the hierarchies are less homogeneous than the low-level terms but prove to be useful to browse the system or organise the collected and analysed information in a more compact way. Browsing and grouping for reporting or presentation purposes are the main tasks of the hierarchies.

Different hierarchies are normally preferred for different tasks; therefore, the system allows the coexistence of multiple independent (or partially interconnected) hierarchies.

The terms having a role in a hierarchy:

- Must not be used for coding when reporting consumption or occurrence data, exceptions are domain-specific groups provided for reporting of aggregated data (e.g. carcase of animals in the microbiological domain) and composite foods;
- Must not be supplemented with facet descriptors, with the same exceptions as in the previous bullet point;
- Can be connected to synonyms; and
- Are part of the parent-child relationships in the system.

For some specific domains, food descriptors and groups are defined by legislation. The 'view' of the system for regulated domains shall provide food descriptors, the food groups and their hierarchy as defined in the regulatory acts. Additional detail may be provided, if needed.

For the time being, the hierarchies that have been envisaged for this system are:

1. A general purpose building hierarchy serving as a master for the management of all the terms contributed by the different domains;

2. An exposure hierarchy arbitrarily defined but based on food science. It will particularly focus on the needs of data collection and analysis in the domain of chemical contaminants and on exposure calculation;

3. A specific hierarchy for pesticide residues data reporting and analysis; and

4. A specific hierarchy for zoonoses and microbiological data reporting and analysis.

Representatives of the different domains contributed to drafting the hierarchy for the respective domain. These hierarchies will also be refined during the implementation phase.

The system is designed to be updated and expanded according to emerging needs; therefore, other hierarchies may be implemented later.

3.7. Inherent attributes defining types of food

Additional information is attached to each element in the core and extended lists. This information is stored together with the food list entry in the form of attributes. Filtering according to these attributes allows separation of different types of food entries and treating and using them in different ways.

The most important attributes are:

a. State of food

- Raw foods
    - like e.g. chicken, banana, nuts;
- Simple derivatives (ingredients),
    - e.g. flour, sugar;
- Simple composite,
    - e.g. chocolate, bread;
- Aggregated/complex composite,
    - e.g. sandwiches, lasagne, pizza.

b. Relevance in chemical contaminants domain

- Hidden
- Available

c. Relevance in biological domain

- Hidden
- Available

d. Relevance in pesticide domain

- Hidden
- Available

In the context of this chapter 'relevance' means whether in a particular domain a specific term is required or not. The relevance attribute is needed in order to build the different hierarchies in different domains.

3.8. Domain-specific entries

The presence of attributes defining the relevance of each food list entry facilitates introduction of domain specific entries in the hierarchies and in the extended list. These are used for describing particular food items or groups having a meaning in one context but not in another one. A relevant example of this concept is provided by the numerous 'Other…' required by the pesticide residues data collection (all pesticide codes ending with 990). These entries are defined on the basis of MRLs and may not be appropriate for chemical or microbiological contaminants. Similarly, food of plant or animal origin may be grouped based on MRLs, but also according to other criteria. Flagging some

'grouping' entries as relevant for pesticides, but not for chemical contaminants, would allow different groupings of the latter.

3.9. Generic entries

The FCDS will provide generic entries in order to handle the problems of a) lacking information on a particular food or b) gaps in the FCDS ('unspecified' and 'other' foods, respectively).

'Unspecified' means that detailed information on the particular food is missing. For example a group 'apples' could include terms like 'green apple', 'red apple', 'pink apple' and 'unspecified apple'. In this case, unspecified means that the data refer to an apple, but it is not known whether this apple was green, red or pink.

Unspecified entries may occur especially in food consumption surveys since it is impossible to always obtain the requested information from all consumers due to the following reasons:

- Consumers sometimes do not remember all the details of what they consumed in the preceding day(s);
- Consumers sometimes are not motivated enough to write down all the details of what they consumed during the day(s) of registration;
- For the general population, and especially for children, registration of out-of-home consumption is usually less detailed. It requires adequate information and enough information from proxies, which are usually less involved in the study. Sometimes details of foods consumed are not available, as might be the case in restaurants;
- Sometimes the interviewer may forget to ask the participants for more details about the foods consumed both during the interview and or during control of completed dietary records.

'Other' has a different meaning than 'unspecified'. It means that the information on a particular food is available, but the FCDS does not provide the correct term to describe this food. E.g., a yellow apple should be coded, but there is no entry 'yellow apple' in the system, while the information is available. So the apple would be 'other' than the apples listed.

The system for classifying and describing food could include in each group both, 'unspecified' and 'other'. This approach would allow a clear specification and would provide the 'right place' for any food in a given classification system. However, this option has some clear disadvantages:

1. The classification system may end up in including dozens or even hundreds of 'unspecified' and 'other', increasing the complexity of use and interpretation.
2. The use of 'other' may be justified by the absence of a proper term, but might also represent a quick and easy alternative to time-consuming searching for the right term.
3. 'Other' and 'unspecified' are always related to a parent group. In a system with multiple hierarchies, multiple 'others' would be necessary for the same food group. This would be confusing on the one hand and make mapping of national databases very difficult, on the other.

The proposed system addresses the need for generic or undefined entries while avoiding the related disadvantages. To this purpose a facet 'type of generic entries' will be used and the entries 'other' and 'unspecified' will be the descriptors within the facet.

3.10. National and local foods

The system in its first draft already includes some food items that are not widespread across all of Europe, but have some importance at national or regional level. However, the presence of local food items is far from complete.

Simplicity and completeness are conflicting needs. The extended list might in principle be expanded, with the contribution of all European countries, until covering most of the existing different food items, but this would increase the number of terms in the food lists considerably, up to one or two orders of magnitude. Evaluating on a case-by-case basis the addition in the lists of missing national and local foods seems to be a wise solution. The inclusion of a specific food should be dependent on:

- The relevance on the market; and
- The connection to particular food safety issues.

Names of specific local food items may be included separately in the food lists or, alternatively, they may be introduced in the system as aliases (common names) of existing terms, if they fit well into the scope of those terms.

Examples of local food items with high relevance in very limited areas are some cheeses having the highest scores in the consumers' preferences, but only in one country. Examples of foods with relatively low consumption figures, but showing particular food safety issues are some spices or seafood items. During the process of implementing the system, the different countries may identify the need and propose to include local foods. The group responsible for maintaining the system will propose based on the above mentioned rules the form of introduction into the system. Rules for updating the FCDS shall include criteria for inclusion in or exclusion from the list.

3.11. Composite foods

3.11.1. Definition of a composite food

For the purpose of this classification and description system composite foods are defined as all foods containing more than one distinct ingredient and having a recipe behind them.

3.11.2. Approaches for classification of composite foods

Classification of composite foods is problematic due to the number of different ingredients, and a number of options have been considered. The advantages and disadvantages of two options are discussed here, with a view to provide the reasoning underlying the chosen option.

Option 1: All composite foods are classified into one group 'composite foods' (incl. pizza, banana milk, bread, sausages, etc.). In the other food groups only single ingredients or individual foods remain (apple, yoghurt, minced pork meat, wheat flour, etc).

Advantages:	Disadvantages:
— Easy grouping of all composite foods for assessment of the data; — Clear and unambiguous classification; — The other main groups contain only unprocessed and/or processed foods from one origin.	— Most foods are in the group 'composite foods'; — The group 'composite foods' contains very diverse foods (bread and pizza are in the same main group); — Difficulties to group and retrieve specific information, e.g. all meat products.

Option 2: Whenever possible, sensible and useful, composite foods are classified into the group of the main characteristic ingredient (bread → grains and grain products; banana milk → milk products; breaded pork → meat products; etc.). Only foods for which this approach is not possible are classified into the group 'composite foods'.

Advantages:	Disadvantages:
— Similar foods are in the same group according to their origin (breaded pork and sausages in meat products); — Number of foods classified into the composite food group is much smaller; — Smaller number of entries facilitates sub-grouping and easier management of composite foods, as well as purpose-based grouping if required.	— Foods with more than one main/characteristic ingredient remain and cannot be grouped easily (e.g. lasagne, which contains meat and pasta in equal amounts).

The WG is of the opinion that option 2 is the preferred option.

3.11.3.   *Classification of composite food*

According to the definition and in accordance with the preferred option 2, most 'composite foods' are classified into the respective main food categories. In addition to 'simple' composite foods (such as breaded pork) there are composite foods with several components and which are of a homogeneous nature (the parts can't be separated easily, e.g. bread or banana milk). If possible, these products will also be classified into the relevant main category.

If this is not possible, because the ingredients are too diverse and no relevant main category can be identified, they are classified in the separate food category 'composite foods'. As a clear demarcation for the cases is not possible, all composite foods are flagged as such.

Examples:

- Raw potato → potatoes
- Pommes frites → potato products
- Mashed potato (with milk and butter) or potato pancake → potato products (composite but homogeneous products)
- Potato zucchini gratin or potato pancake with apple puree → 'composite foods' sub-group dishes

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- Wheat grain → grains
- Wheat flour → grain products
- Pizza base/dough → grain products (composite but homogeneous product)
- Pizza → 'composite foods' sub-group dishes

- Cows' milk → milk
- Cows' milk standardised, homogenised and pasteurised milk → milk
- Mascarpone → milk and dairy products (composite but homogeneous product)
- Milk soup with croutons→'composite foods' sub-group soups

All composite foods will be attributed a flag that identifies them as a food made from different ingredients. The flag facilitates selection of composite foods across all food groups and linking to a relational recipe database. At the same time, if a composite food has already been disaggregated into its ingredients at the time of data entry, a flag will identify those data as such and a link to the original recipe is retained.

3.11.4. Main category 'Composite foods'

In the proposed food list, the category 'Composite foods' comprises the following two groups and respective primary sub-groups:

1. Dishes, incl. ready to eat meals (excluding soups and salads)
   o Dishes, excluding pasta or rice dishes, sandwiches and pizza);
   o Sandwiches, pizza and other stuffed bread-like grain products;
   o Pastas and rice (or other grains) –based dishes.
2. Soups and salads;
   o Soups;
   o Salads.

To facilitate capture of composite food details in exposure assessment-related activities, additional core and extended food list elements are also pre-defined below these two primary levels.

3.11.5. The use of facets in combination with composite foods

Facet descriptors may have to be used, for further structuring of sub-groups and to describe individual composite foods in more detail.

Proposed facets:

1. Treatment/process steps (grilled, fried, braised, boiled, cooking 'au gratin' etc.);
2. Physical aspects (liquid, powder, granules);
3. Characterising ingredients (with this facet the ingredients which determine the value or character of the food can be shown);
4. Production facet (was it home prepared, industrially prepared, prepared by baker, etc).

3.12. Food alternatives

The concept of food imitates is traditionally related to the need of finding alternatives for specific ingredients (e.g. coffee, cocoa...) in periods when such ingredients were difficult to obtain. For example, coffee and chocolate imitates were quite common during and soon after the Second World War. Some of these products survived on the market even when the need for alternative ingredients had disappeared. Coffee imitates are an example of products having reached a well-established autonomous status, independently from the food they imitate. In the recent decades, in connection with particular dietary trends or due to the popularity gained by exotic food items, additional imitates appeared on the European market especially in the dairy or meat area. Nowadays a range of foods, generally based on ingredients of plant origin, intended as alternatives to dairy or meat products are present on the market.

Many questions can be raised when inserting these alternative foods in a food classification. From the point of view of consumers, these food items are 'similar' to the product they resemble, though with different characteristics. From the point of view of exposure to contaminants, these food items are expected to inherit their characteristics from the source materials. In some cases, it is even questionable what the corresponding traditional product is, for example whether plant based curds are intended to imitate meat or cheese.

The WG has chosen to put food imitates in a separate group with well recognisable sub-groups. It is strongly recommended to always provide additional information through facets like 'characterising ingredients', to allow a more precise data analysis.

3.13. Codes in the proposed system

The use of the proposed system to describe and classify a food item will in the end result in a code to be inserted in the proper field of a food-related database. For instance, in the Standard Sample Description used by EFSA this code will be recorded in the field S.12 – EFSAProdCode.

Both, food list terms and facet terms, are identified by a code that is unique across all the system. The food list code and the applicable facet codes are combined into the complex code of each specific food entry that has to be introduced in a food database. The code will be a complex code containing many elements. It shall be possible to parse the code, to allow analysing and grouping food according to different aspects.

The structure of the information in the code is a task for the technical working group dealing with the implementation of the system and the actual form of the code will be technically defined at that stage. Figure 3 provides an example of a complex alphanumerical code joining the unique food code with different facet descriptors.
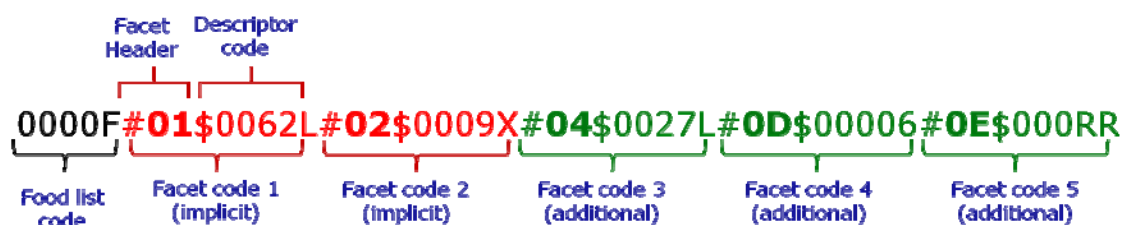
Figure 3: Example of hypothetical code, showing the structure

Every code will start with a food list code, generally referring either to an item in the core list or one in the extended list. The food list code itself provides a basic identification of the food, sufficient for many purposes. The food list code will be followed by facet entries, providing additional detail.

Some facet entries are pre-defined in the system (the ones flagged as implicit in the example), because they specify in a faceted view the information already implied by the list term. They are named in this system 'implicit facets'. Typical implicit facet entries are 'Plant or animal source' and 'Part-Nature'. An example is 'Chamomile flowers'; this list term has at least two implicit facets: source = 'Chamomile (*Matricaria recutita*)' and part of the source = 'flower'. Additional facets may then be added, to provide information not included in the food list term. For the example above, 'treatment' = 'dehydrated' could be an option. Any additional facet would appear (like the ones flagged as additional in Figure 3) in the full code together with the implicit ones.

The inclusion of implicit facets in the string recorded for each food database record is not encouraged. By contrast, the WG suggests identifying and recording in a table the implicit facet descriptors of the core and extended food list. This activity should be performed during the implementation phase. Implicit facets could thus be visible during coding and would be anyway available during data analysis. Not writing implicit facets explicitly in the definition of a food accompanying data in databases facilitates later updating or improving their definition, (like adding implicit descriptors not considered earlier.

The presence of facets enables specialised queries, thus providing a very flexible tool for data analysis. Grouping of food according to specific facet descriptors (e.g. 'treatment' = 'smoked') enables data analyses to cut across the standard hierarchies of the system.

To facilitate the use of facets, it would be helpful, during the implementation phase, to define which facets or facet descriptors would most probably need to be applied to each food list term. A selected

list of facets and their descriptors could be made available in a context-sensitive way, thus speeding up the coding process.

3.14. How the requirements are addressed or met

The design of the system was driven by a multiplicity of considerations in relation to the identified needs and is the result of compromises between different options. In checking how the initially set requirements (see chapter 2.3) are met it can be concluded that all of them are addressed and most of them have been met by the FCDS proposal. The system provides the flexibility needed to address the necessary domains. At its centre it has the core list of foods that can be captured in food consumption surveys and linked to occurrence data. It can capture important characteristics of foods not intrinsic to the food name by the use of facets and thus address specific questions in relation to source, processing parameters or packaging conditions among many other options. Some information are automatically included when making the primary choice of a food group, sub-group or item, some have to be additionally reported, but the system provides access to the proper descriptors. The capability of the FCDS to meet the requirements is summarised in Table 4.

Table 4: How the FCDS meets the requirements listed in chapter 2.3

Requirement	How the requirement was met
Cooking method	A specific 'cooking method' facet is present in the system and can be optionally reported while coding. Additionally, a facet 'extent of cooking (doneness)' is also available for coding.
Distinction between natural and artificial flavouring	This information can be provided while coding using the facet 'flavour note (when obtained by means of intensive flavours)'.
Fat content	A specific facet with pre-defined numerical values is available in the system ('fat content quantitative' facet) Additionally, qualitative fat-related descriptors are available in the facet 'qualitative nutrients and ingredients related information'. Both facets/facet descriptors can be optionally reported while coding.
Final preparation method in case the food is to be re-heated by the consumer while still in the pack	This information is available through the facet 'final preparation method', that can be optionally reported while coding.
Food source (plant, animal or other)	This information is addressed by the facet 'source' and is normally implicit in the elements of the food list.
Food type and nature	This information is included in the designation of each element of the food list. Moreover a specific facet collects descriptors on nature/part (of plant or animal).
Fortification	This information is provided through the facet 'characterising ingredient', that can be optionally reported while coding, by referring to the specific fortifying ingredients included in the food list.
Information on whether the food has been characterised by addition of flavours only (e.g. yoghurt with banana flavour), ingredients only (e.g. yoghurt with banana pieces) or both	This information can be provided while coding with the combined use of the facets 'characterising ingredient' and 'flavour note (when obtained by means of intensive flavours)'.

Requirement	How the requirement was met
Intended use (e.g. intended to be eaten raw, intended to be eaten cooked)	A specific 'intended way of use' facet is present in the system and can be optionally reported while coding.
Packaging format (e.g. bottle, wrapper, bag) and material (e.g. plastic, aluminium, paperboard)	Two separate facets are available in the system: 'packaging format (container or wrapping by form)' and 'packaging material'. The two facets were kept separate in order to allow a more flexible and targeted data analysis.
Part being analysed or consumed	This information is provided by the facet 'part consumed/analysed' and can be optionally reported while coding. In domains where the part analysed is defined by regulation, the facet could be automatically pre-set by the implementation tools.
Part of plant or animal	This information is included in the designation of each element of the food list. Moreover a specific facet collects descriptors on nature/part (of plant or animal).
Physical state/aspect of the food (e.g. dry powder, moist paste, liquid, frozen)	A specific 'physical state' facet is present in the system and can be optionally reported while coding.
Post harvest treatment, e.g. drying	No specific facet has been created for post-harvest treatment. However, the appropriate facet descriptors are available in the facets 'preservation and hygienic improvement methods' and 'treatment related to the structure or nature of food'. These facets/facet descriptors can be optionally reported while coding.
Preparation method before consumption	A specific 'final preparation method' facet is present in the system and can be optionally reported while coding.
Presence of coatings/glazes/fillings	Descriptors for this are included in the facet 'treatment related to the structure or nature of food' and can be optionally reported while coding.
Presence of herbs and spices	This information is available through the facet 'characterising ingredient', that can be optionally reported while coding.
Preservation method	A specific 'preservation and hygienic improvement methods' facet is present in the system and can be optionally reported while coding.
Pre-treatment before analysing (like washing or peeling)	No specific facet has been created for the treatment prior to analysing. However, the appropriate facet descriptors are available in the facets 'preservation and hygienic improvement methods' and 'part consumed/analysed'. These facets/facet descriptors can be optionally reported while coding.

Requirement	How the requirement was met
Primary production method/place (e.g. organic, conventional, etc)	This information is available through the facets 'production method' and 'preparation/production place' and can be optionally reported while coding.
Processing the food underwent when already in the pack (e.g. hot-fill, pasteurisation, sterilisation)	This kind of information is also included in the 'preservation and hygienic improvement methods' facets mentioned above.
Species, subspecies, varieties	This information is addressed by the 'scientific name' information (available for all food list elements for which it is applicable).
Sugar/sweetening information	This information is provided by the use as facet descriptors of the sweet foods included in the food list. A facet header 'sweetening agent' is provided for this purpose.
Surrounding medium if any (e.g. if the food in the package is surrounded by brine or oil)	A specific 'surrounding medium in the package' facet is present in the system and can be optionally reported while coding.
Target consumer	A specific 'target consumer group' facet is present in the system and can be optionally reported while coding.
Type of fat used	This information is available through the facet 'characterising ingredient', that can be optionally reported while coding.
Type of liquid used	This information is available through the facet 'characterising ingredient', that can be optionally reported while coding.
Type of treatment/processing / preparation (e.g. heat treatment, smoking, salting)	Different processing facets are available, in particular 'preservation and hygienic improvement methods', 'cooking method' and 'treatment related to the structure or nature of food'. These facets/facet descriptors can be optionally reported while coding.
A standardised designation of foods to a food list	The food list has a standard definition, as highlighted in the previous point, and is reasonably comprehensive. Therefore virtually any food item on the market may be coded in a standard way, with the choice among different levels of aggregation.
Allow a quick identification of the searched food	The proposed FCDS includes a lot of different information, like attributes, facets, names, scientific names and aliases that can be used by the implementing tools to create filters and lookups, thus enabling a very efficient search for the right entry.
Allow application of recipe fractions, compositional fractions and processing factors	The distinction between raw and processed, simple or composite food is possible using different processing facets and the state attribute of the food list. The application of factors and recipes is therefore possible, though it is not done inside the system. The FCDS has been designed to be a tool to allow external applications elaborate data with the use of factors or fractions.

Requirement	How the requirement was met
Allow conversion between food as consumed and raw	The separate identification is possible using different processing facets. The conversion is therefore possible, though it is not done by the system.
Allow multiple domain-specific hierarchies	The system is actually multi-hierarchical.
Avoiding repetitions	The system avoids repetitions (no term can have the same name as another with different scope). On the other side, the system manages aliases for the same name in the field 'common name' of the food list. When a term needs to be used in a different context (like some descriptors appearing in different facets like 'cooking method' and 'final preparation method') they are actually the same descriptor (i.e. with same code, name and scope) and the different facet header may be associated with that single descriptor.
Being at the same time as simple as possible and as detailed as possible	This need of the system was addressed by offering a comprehensive, but easy to browse, list including the most crucial elements of food identification. The use of additional facets (differently available for each food list term based on an applicability table to be built into the implementing tools) will allow a reasonably high level of detail with a quite easy access to the needed descriptors.
Being expandable	The system has been designed to be maintained and expanded flexibly depending on the needs.
Distinction between RAC, ingredient simple and composite food	The food list includes an attribute defining for each entry the status as RAC, ingredient (derivative), simple or composite food.
Include food groups defined by regulations in specific areas	Regulatory definitions have been included, especially for biological monitoring and pesticides.
Possibility of grouping at different levels of detail to fit to the available information	The different hierarchies allow coding at different level of detail according to the available information. The preferred coding is always at the most detailed level, avoiding broader categories, if the data allow this.
Possibility to record descriptive properties (facet descriptors)	This is guaranteed by 25 facets.
Providing flexibility in data capture and data retrieval	The multiple hierarchies and the concepts of core and extended lists provide this flexibility.
Providing unambiguous alphanumerical coding, independent from languages	All the terms used throughout the system are primarily defined by a unique alphanumerical code (same code series across all terms) and a scope of the term (scope notes). The name is an attribute that can change from language to language (or even between domains, by using aliases). So the system is perfectly language independent.

Requirement	How the requirement was met
Providing unequivocal food descriptions	This requirement is taken care of by the food list, particularly by avoiding repetitions and with the help of the scope notes of each term.

It has still to be investigated how to efficiently add further domains to the multiple hierarchies, in particular for additives. The information needed is already present to a large extent and the flexibility of the system should allow such extension, but this might require expanding the extended list significantly in some food categories, thus increasing the complexity of the system. The additives hierarchy and eventually others will be addressed as future steps during the implementation phase.

4. HOW TO USE THE PROPOSED SYSTEM

The proposed system includes both narrower (highly detailed) and broader (aggregated) terms. The narrower food item terms are easily recognised in all domains, whereas aggregated terms are, in general, specific to one, or a few domains. The applicability information associated with food items designate the hierarchies to which they belong. The use of narrow terms to identify food items in databases is encouraged, because they are less arbitrarily defined than broader food groups.

The operation of the system is based on domain-specific 'views', offering only the codes that are relevant for that domain for coding and analysis including detailed terms at the lowest possible level. Based on the domain, the use of specific additional facets and descriptors may be required and, depending on the data collection, even mandatory. Grouping food items into broader groups using the term 'other' may sometimes be necessary according to legislation. However, while such groups may be useful for data analysis, their use in data collection should be limited since they generally cannot be linked to consumption data and used for calculating exposure.

The main goal of the system is to facilitate the needs of most domains relevant to EFSA and be acceptable to the EFSA networks on data collection regarding food consumption and composition, occurrence of chemical contaminants and residues as well as microbiological hazards.

The multi-faceted system will enable end-users to analyse the data from different perspectives and thus satisfy a multitude of different needs.

4.1. Handling of generic entries

For coding 'unspecified' or 'other' foods a tiered approach is suggested. First of all, the use of one of the existing terms at the lowest level in the food list tree should be tried for coding the food in question. Therefore it is very important that a procedure is implemented that encourages local data managers to first look within the extended food list. If the food is not found in this list, due to lack of details, then it should be possible to classify it in the core food list or exceptionally in a hierarchy above. In these cases, flagging them by means of a facet as 'unspecified' or 'other' will be necessary. When flagging an item as 'other', the coder should be allowed to enter extra information available about the particular food item, which is not yet present in the system. This will consent to the administrators of the system to decide whether or not to create a new entry (and the relative code). In case a new entry is created, it will be possible to reclassify this food item afterwards thus capturing the extra information.

4.2. Disaggregation of composite food

Depending on the substance to be evaluated, there are different needs concerning the aggregation or disaggregation of composite foods. Whilst from a microbiological point of view, consumption of a particular composite food as a whole may be of interest, from a chemical point of view often specific ingredients are of greater interest. Some of the captured ingredients may need to undergo even further

conversion to raw agricultural commodity level, e.g. to satisfy the needs within the pesticides domain. Therefore, the classification system enables capture of the composite food and its ingredients at the same time. For data retrieval it provides options to easily retrieve either the composite food or its separate ingredients.

The system makes a clear distinction between single foods and foods as an ingredient of a composite food. Users are actively encouraged to provide ingredient data (recipe data, etc.) and report data on the most disaggregated level possible. In case the recipe for a composite dish is known, both the ingredients and the recipe have to be classified within the system and a link between both will be kept by the system. Whilst the ideal disaggregation level is difficult to define (for example should bread be disaggregated into ingredients), disaggregation is not always feasible or may introduce too much uncertainty (for example disaggregation of dry soup powder). Nonetheless, to reduce uncertainty and overestimation in exposure assessment, capture of ingredient details will be imperative in many cases. To that end, the collection of recipe data and food ingredient data (from ingredient lists on labels) can prove useful. Food labels also provide details on ingredients often not captured by recipe data (e.g. additives, flavourings, spices) and would enable more refined intake estimates of such substances. However it should be noted that the latter does not only depend on the willingness of the local database managers, but also matching to the level of detail reported by the consumer. Therefore, standard recipes will be important complements to the reported information when performing exposure analyses.

While disaggregation of composite foods is strongly encouraged, the system nonetheless enables the user to easily find the correct codes to describe composite foods. However, no solution can be offered that avoids all ambiguity, because similar foods may be very diverse and even the same food name may have different interpretations in different regions.

5. POSSIBILITIES FOR USE OF THE PROPOSED SYSTEM

As the system shall satisfy all needs identified earlier and stated by the different domains represented in EFSA, the main uses and possibilities of the system will be discussed including:

- Exchange of data between Member States and EFSA;
- Exposure calculation;
- Support to legislative activities; and
- Data generation and input in Member States.

The system will provide comfortable and flexible options for all uses. Users with different knowledge about food should be able to use the system properly. Flexibility enables the users to handle different degrees of detail in the available information. The system might be feasible to use also outside the food safety domains, but this will not be further elaborated.

5.1. Exchange of data between Member States and EFSA – interface with existing systems

The exchange of data between Member State organisations and EFSA is a collaborative process involving many steps, as shown in Figure 4. Different EFSA scientific units are involved in data exchange with Member States, in particular the Biological Monitoring Unit (BIOMO), the Dietary and Chemical Monitoring Unit (DCM) and the Pesticides Unit (PRAS). Therefore, as they previously contributed in developing the SSD, so they were now involved in building the FCDS. The FCDS will become part of the SSD used to transfer data to the EFSA Data Collection Framework (DCF). The SSD will need to be updated accordingly.
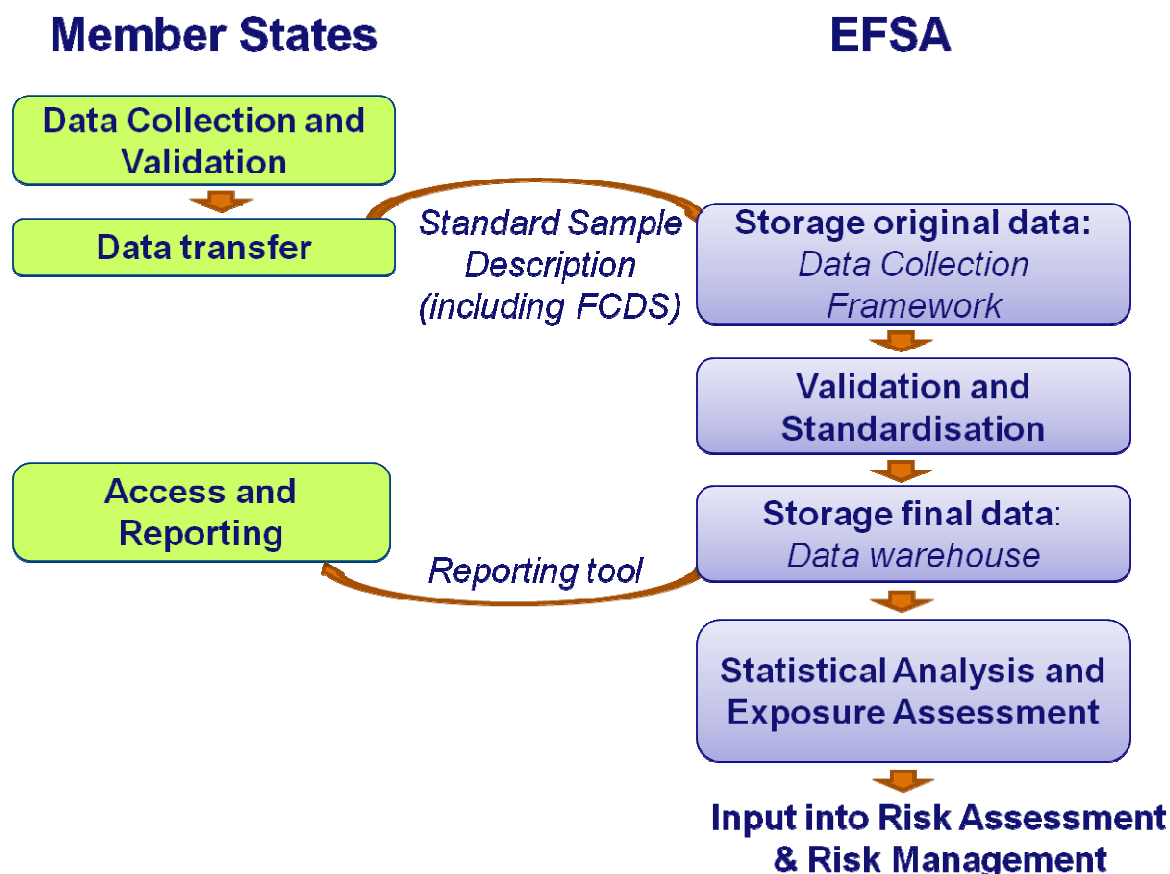
Figure 4: Standardisation of data collection, validation, transfer and storage

Depending on the food lists implemented in Member States the data must be 'translated' into the vocabulary of the FCDS before transferring them to EFSA. Translation tables will be needed and used as interfaces between the national and the pan-European systems. They can be combined with tools to convert national data into the format of the SSD. It is envisaged that EFSA will provide translation tables between FoodEx and the present FCDS proposal. In analogy to what happened with the SSD, detailed issues on implementation will be discussed with Member State IT-experts when the FCDS is finalised.

When planning a new data collection request or program, the information specifically required (including the degree of detail of the food description) will be communicated to the Member States in advance. During sampling or laboratory analysis, this information should be recorded to subsequently be available for reporting to EFSA. This process could be facilitated by integrating the new FCDS in the Laboratory Information Management Systems (LIMS) or in the applications for the national collection of data.

It is expected that the new system will not only serve the data requirements of EFSA and Member States for exposure calculations (see next chapter), but also support other data analysis needs. Centrally stored standardised data will be available for the needs of the European Commission in support of legislative and risk management activities. Additionally, they can be sent to the World Health Organization (WHO) or the Joint FAO/WHO Expert Committee on Food Additives (JECFA) releasing Member States from the task of sending data to these international bodies.

Food classification and description system for exposure assessment

5.2. Exposure calculation

There are a number of different purposes for performing exposure assessments, including their use in risk assessments, status and trend analysis, and epidemiology. EFSA's Scientific Panels perform risk assessments for a variety of agents: biological components such as microorganisms (BIOHAZ Panel, AHAW Panel), a variety of chemical substances such as nutrients (NDA Panel), additives, food contact materials and flavourings (ANS and CEF Panels), pesticides (PPR Panel), additives used in animal feeding (FEEDAP Panel), substances produced from GM microorganisms (GMO Panel) and contaminants (CONTAM Panel). Exposure assessment of chemicals is generally aimed at identifying situations where exposure in segments of the population may exceed safety limits; in the case of nutrients, situations where intake may be under the requirements are also of interest.

In order to reliably estimate amounts of a specific agent or compound ingested through the diet, three elements have to be taken into account:

- Levels and fate of the agent in food;
- Food consumption patterns; and
- Linking of these elements to determine exposure.

Ideally, dietary exposure to chemical substances should be assessed by combining data on their concentration in all food products with data on consumption of the same food products. However, with the exception of duplicate-diet studies, surveys are not performed based on consumption, occurrence and concentration data related to the same individuals within a population. Thus, assessments of exposure to dietary components usually require some extent of modelling in an attempt to create a representation of the real-life exposure situation. A crucial step is the ability to match the presence or concentration of the beneficial or harmful agents or compounds in a specific food product with the consumed amount of the same or similar product or product group. As the unique and unambiguous identification of foods by name is not practical, food records must be matched using the food description or classification provided in each dataset. Depending on the domain, specific suggestions on how to better match food entries have been proposed, like in the 'INFOODS Guidelines for Food Matching' in the domain of nutrients (FAO, 2011).

Exposure assessments are often performed using a stepwise approach with an initial screening of aggregated data followed, if necessary, by refined methods. For screening purposes, foods are often aggregated into broad groups resulting in a sufficiently large sample to ensure an accurate statistical evaluation of exposure. However, this can only give an indication of whether or not a problem might exist. The situation is different for refined exposure assessments, where on the one hand the use of broad food groups should be avoided whilst on the other splitting foods into too specific groups will diminish the statistical precision. This puts stringent demands on the structure of a food classification system. For these reasons, the FCDS has a hierarchical structure with the possibility of matching foods at broad food group levels like vegetables, dairy products or fruits, whilst also allowing refined groupings to be used for some or all of the broad categories. A core food level (reflected in the core food list) is suggested as a standard refined level common to both occurrence and consumption data. When matching results are available at this level it would be the preferred basis for refined exposure calculations. In specific cases, even more refined exposure calculations may be required, using terms of the extended food list or additional facets. To this purpose, the corresponding consumption data must be available.

5.3. Support to legislative activities

An important aspect of the food classification system is to service regulatory needs. Unfortunately, the EU food legislation doesn't use a uniform system for grouping food and this poses a considerable challenge. Maximum levels for contaminants, maximum residue levels for pesticides and veterinary medicine drugs and maximum use levels for additives and flavourings all refer to different groupings

of food. Even within the same regulation, there might be different levels of detail presented for foods for different compounds. Despite such anomalies, when adjusting regulated levels from time to time, feedback from exposure assessments and occurrence levels prove necessary.

The only way to address such disparate structures through a uniform classification and description system would be to introduce translation layers linking the entries in the system to food descriptions in the legislation.

The FCDS seeks to take into consideration the legislative needs by providing enough detail in the core and extended food lists in critical domains and, through its flexibility, allow for further improvements when broader or narrower groups are needed.

5.4.   Data input in Member States and additional advantages of the new system

The most elegant solution for data management would be to use a uniform food terminology from the very start to the end of the process, which means from the planning of a program, over data capture, data storage, data retrieval, data assessment to reporting and statistical evaluation. Member States are invited to check whether they can use the proposed FCDS in this way.

Provided that the FCDS is translated into national languages, it could be integrated fully in the IT-systems used in food control activities. As already mentioned above, if the FCDS would be integrated e.g. into a sampling schema or a LIMS, food might be described and coded in the required way already at the sample entry stage. No re-coding would be necessary for data transmissions to EFSA. Modern options exist, e.g. using mobile devices for data capture during sampling at the enterprise level. In such cases, the standardised coding would start even before the sample has reached the laboratory.

EFSA is currently running an exploratory project, which shall clarify the options for the integration of the FCDS into LIMS products on the European market.

In the case of collections of consumption data, appropriate elements of the FCDS could be used for data capture during the interview stage.

Servicing needs from such potential uses of the FCDS will be taken into account during further development of the system.

With the new system in place, complying with various reporting duties will be much easier for Member States. Data in a harmonised format could be transferred to DG Health and Consumers, Eurostat and also WHO/FAO without a need for recoding at national level.

Member States could also use the central repository for pan-European data (the data warehouse) to perform their own analyses and national exposure assessments, as long as data are based on a common food classification. Statistical reporting tools for such use (as mentioned in Figure 4) are under development by EFSA and could also be of advantage for the Member States.

In addition, the introduction of a common FCDS covering foods with both chemical and microbiological contamination, could serve as an inspiration for standardisation of data sampling and collection.

The main benefit of the proposed system would be an increased quality of exposure assessments, performed both by EFSA and the Member States. In addition to this, one could in a slightly longer perspective, envisage a better cost-effectiveness in performing exposure assessments in general.

6.   SYSTEM IMPLEMENTATION

The FCDS will be integrated into the EFSA Standard Sample Description. It will also be implemented in a European data warehouse storing data for further analysis and sharing.

For organisations providing data to EFSA, the system users will have two main options:

- Interfacing with the FCDS; or
- Fully adopting the FCDS.

Interfacing of a well-established national system with the FCDS involves creating translation tables to connect local codes to the FCDS codes. In this case, translating the terms of the FCDS into the national language is not necessary.

Adopting the FCDS in full may be an option if a national system needs to be established or revised. In this case, a translation of all terms in the FCDS into the national language is required.

A tiered approach is proposed for the overall process of implementing the new FCDS:

1. Together with the present report, a draft proposal of the system is made available to Member States. The draft includes some different 'views', that is specific hierarchies organising the same food items and generic food descriptions (the food list elements having the narrowest scope and including more detail) into different broader groups for the particular data reporting or data analysis needs of different domains. The draft will include a hierarchy suitable for contaminant exposure assessment and food consumption. Additional hierarchies are provided for pesticide residues and biological monitoring.
2. The potential users are invited to evaluate the system and identify possible issues and needs for refinement. The results of the initial assessment are provided to the update and maintenance group for evaluation and eventual implementation of the suggestions.
3. Establishment of an implementation and maintenance technical group, including EFSA staff and volunteers from Commission services, Eurostat and Member State organisations. Ideally, the technical working group should deal with all the standard terminologies (catalogues) of the SSD. Proper procedures shall be developed to allow active contribution of all Member States in this process. The EFSA Risk Assessment and Scientific Assistance networks will be the principal reference for establishing the implementation and maintenance working group.
4. The WG on FCDS would also welcome a pilot phase for transfer of existing data from some Member States. Such data should be coded with the new FCDS as accurately as possible. Based on the outcome of the pilot, the system would undergo further refinement.
5. After the initial consultation and the pilot, the system is expected to reach a relatively stable status, only needing some regular maintenance. Local or national food items should also be assessed and eventually included in the system by the end of this phase.
6. After the fine-tuning, full system implementation can start.

The full system will be implemented gradually for new data that are generated after launching of the FCDS. The plan for further implementation will be agreed upon based on the outcome of the pilot. If needed, the features of the system may be introduced progressively, in parallel with the development of adequate tools for using and maintaining the system.

6.1.   Translation to national languages

The EU language policies aim to protect linguistic diversity and promote knowledge of languages. EU regulations and other legislative documents are published in the official and working languages, as is the Official Journal. Also, documents may be sent to EU institutions and a reply received in any of

these languages. However, due to time and budgetary constraints, relatively few working documents are translated into all languages. As an example, 'Europa' web site policy is the following:

- General and stable information should be available in all official languages;
- Specialised information can be published in fewer languages depending on the audience;
- Information where speed of publication is essential can be published in fewer languages depending on the technical constraints.

The food classification system is based on a numerical nomenclature of foods and food classes at every level of the hierarchy. The names of foods and the facets and descriptors are provided in the English language. In addition, basic foods of animal or vegetable origin are provided with a scientific name, when appropriate. Common names and synonyms are also provided, where appropriate, in English.

Definitions of every code, facet and descriptor of the classification system need to be provided in English. The nomenclature of the system will be translated at a later stage to the EU languages, if resources will be provided, but the master definition in English has to be present as well, in order to reduce the risk of misinterpretation in the translation. However, this translation is important to ease adoption of the FCDS by Member States.

Most of the local food lists are already provided by the Member States in English. However, the correctness of the naming needs to be checked, before mapping towards the new food classification system. Collaborative efforts with the Member States are needed to confirm mapping of the foods to the classification system. Food lists in local languages will remain an important tool at the local level.

6.2.   Linking with international systems

As described in Chapter 3, different classifications of goods, including food products, are used internationally for collecting and disseminating different types of statistics. They include the COICOP, the HS, the CN, the PRODCOM, the CPC and the CPA. Other systems are internationally used for collection of food data, like LanguaL, the CODEX classification for food and animal feed and the classification included in the Codex General Standard for Food Additives (Codex Stan 192-1995). When applicable and technically feasible, a link should be established between the proposed system and these international systems.

The joint FAO/WHO Codex classification of food and animal feeds (draft version 2006) was taken into account while developing the system. This should guarantee a good compatibility between the two systems. A link could be established by creating translation tables with other international classification systems as well.

7.   UPDATING AND MAINTENANCE

As mentioned above, a decision has to be taken on updating and maintenance, defining who should be involved and what procedures should be used. A decision should also to be taken on the financing of this task. The WG has put forward a number of suggestions in the document. The most important are summarised below:

- EFSA should take on the responsibility for updating and maintenance;
- Procedures for involving Member States and the European Commission in maintenance and update of the system have to be defined. Introduction of amendments and allowing for comments, decision-making and implementation are all aspects to be covered by such procedures;

- A network with representatives for the Member States, European Commission and possibly other stakeholder organisations should be set up. Suitable members might be found in the networks on data collection regarding food consumption, occurrence of chemical contaminants and residues as well as microbiological hazards.

- A procedure for implementing new versions of the FCDS should be set up. It should ensure that Member-States users are kept informed on the amendments and the adoption of each new release is synchronised among users.

8.   SPECIFIC TOOLS FOR THE USE AND MANAGEMENT OF THE FCDS

As the FCDS will be more complex than a simple hierarchical list, user-friendly tools for its use will be essential. The tools must allow browsing through the hierarchy and down to the extended list in order to find the correct or best fitting term for a particular food.

Even more important will be an intelligent search function over the entire system providing alternative terms to be considered. The development of such tools is not a task of the working group and must be commissioned when the structure of the FCDS is agreed upon.

As many users of the system will need only a limited number of terms in their daily work, personalised favourite lists will make the use easier and increase the acceptance of the FCDS.

Apart from supporting the use of the FCDS, additional functions will be required (either integrated in one tool or in separate tools):

- To manage administration and update of the FCDS master (including keeping track of all changes); and
- To provide all users with the current version of the FCDS in different formats (export interface, download, web services), either in real time or at defined intervals.

Computer friendly tools will also be essential in order to allow Member States to recode data automatically into the FCDS, by limiting human resources.

CONCLUSIONS

- Calculation of population exposure to hazardous chemicals or biological agents or intake of nutrients requires the use of a common food classification and description system that connects information from disparate sources across different food safety domains.

- Available food classification and description systems are mainly driven by regulatory or other specific needs with each domain emphasising their unique aspects. General applicability across different domains is thus limited and none of the existing systems satisfied all needs identified.

- Consequently, a modified food classification and description system is proposed that builds on the best aspects of existing systems and includes additions of innovative concepts to provide compatibility with as many as possible of the international and national reporting systems used in the domains relevant to food safety risk assessments.

- The proposed system consists of descriptions of a large number of individual food items aggregated into food groups and broader food categories in a hierarchical parent-child relationship structure. Central to the exposure assessment functionality of the system is a 'core list' of food items or generic food descriptions that represent the minimum level of detail needed when coding or identifying a food collected in any domain for intake or exposure assessments.

- More detailed terms may exist below the core list items and these are collected in the 'extended list'. There is always a parent-child relationship between a core list food item and its related extended list food items.

- Several hierarchies are proposed that may present different levels of aggregation of food items according to the individual data analyses and reporting needs of different food safety domains. The hierarchies in use in different domains including the food consumption domain should be based on the core list.

- As an exception to the rule, when a core list item does not fit into a specific hierarchy, the depending extended list items may link directly to a food group in the aggregated hierarchy. If this food group is in common with the food consumption domain, intake or exposure can still be estimated, but with less specificity.

- The description of individual food items in the core and extended lists can be complemented by additional information through the use of facets and facet descriptors. Use of a comprehensive food description language should provide sufficiently detailed information to allow mapping from food description to an automatic generation of the food categories defined in the various classification systems.

- The entire system will be code-based. This means that each entry is identified by a unique code for the food item or food grouping, which in turn is associated with a proper description specifying which foods are included in or excluded from the group. These detailed descriptions are indicated as 'scope notes'. A descriptor is then chosen in each national language, to best fit the scope of the term. Apart from bearing a unique alphanumerical code, all terms in the food list should be flagged with attributes defining their applicability in the different domains and their state (e.g. raw commodity, ingredient, simple or aggregated composite food).

- Composite food, that is food items containing more than one distinct ingredient, should be kept together with its predominant ingredient in the hierarchy. Only a few generic composite food groups are provided to accommodate food items with no predominant ingredient. Composite foods classified with these generic groups can then be better specified providing more information through the 'characterising ingredients' facet.

- Alternative foods that are no more seen as imitating an existing food are present in different categories across the system. However, a separate group with well recognisable sub-groups was established for substitute foods that are still perceived as alternatives or imitates of original foods (in particular for dairy and meat products).

RECOMMENDATIONS

- Implementation of the new system should follow a tiered approach including an initial period for comments by future users, a pilot phase and a final refinement phase. An active process involving all potential users of the system in refining and completing it is encouraged. This process could involve establishing new ad-hoc hierarchies for domains presently not explicitly addressed.

- Specific user-friendly software tools need to be developed for the practical use of the system. The tools must allow browsing through the hierarchies and down to the extended list in order to find the correct or best fitting term for a particular food. Even more important will be an intelligent search function over the entire system to allow choosing between suggestions of alternative terms.

- The completed system may be implemented at national level in different ways, either by interfacing with it or by fully adopting it. Interfacing has to be established through appropriate translation tables. Translation tables may also be established for other international data reporting systems. Translation of descriptors and scope notes into national languages is a key element for the disseminated use of the system in individual countries. Ways to support or promote this fundamental activity should be investigated.

- It is strongly recommended to always code at the most detailed possible level, including the use of facets, in order to keep in the food databases as much as possible of the information available at the time of coding. Appropriate recommendations should be developed for each specific data collection regarding the kind of information to collect about the food nature and characteristics.

- It is recommended to set-up an implementation-maintenance technical working group, involving all relevant stakeholders. Ideally, the technical working group should deal with all the standard terminologies (catalogues) of the Standard Sample Description (SSD). Proper procedures shall be developed to allow active contribution of all stakeholders in this process.

- It is also recommended to complement the food classification with the most recent feed classification, as provided by Regulation (EU) No 575/2011. It is suggested to keep the food and feed lists separate, by adopting proper unambiguous names (referring to the specific use for food or feed). The process facet descriptors can be integrated in the list for food.

- Success of the system will depend on on-going support. Proper procedures should be developed to allow active contributions from all stakeholders and linking to legislative needs in the different food safety domains at European Union level.

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APPENDIX I

I - REVIEW OF EXISTING SYSTEMS

There exists a multitude of methods for categorising foods, serving several different purposes. A food classification system is a tool important for the data end-user to group or aggregate foods with similar characteristics for assessment and presentation purposes. In contrast, a detailed food description system is a tool important for the data originator, who wants to describe a reported food as precisely as possible. National food categorisation systems are designed to meet local needs and, when defining food groups, take into account local criteria such as traditions and legal requirements. International food categorisation systems support international trade requiring harmonised commodity and product description and food standards based on these for various legislative, trade and monitoring purposes. Various code systems for products and services exist, including those used in bar codes, food balance sheets and household budget surveys.

Food categorisation systems have been the subject of several comprehensive reviews. Pennington (1995) reviewed various national food grouping systems, as well as international systems like the Eurocode 2 (Poortvliet et al., 1992) food classification system, the LanguaL food description language and the guidelines for describing foods of the International Network for Food Data Systems INFOODS (Truswell et al., 1991). Ireland and Møller (2000) separated classification systems from description systems. They pointed out the different needs addressed by different classification systems reflecting differences in legislation or purpose, for example relating to additives or contaminants, making them incompatible for general use. An extended review of FCDSs was produced by Ireland and Møller (2006) as part of the EuroFIR project. Key existing systems were also reviewed as part of the work to enhance the ADV Catalogues (Otto et al., 2008). Unwin, in an unpublished report to EFSA, summarised the previous reviews for the EFSA Working Group for Food Classification and Description System for Exposure Assessment. The following is an abridged version of the Unwin report.

The **Eurocode 2 system** was originally conceived as one of three components, namely Eurocode 1 for the identification of specific food products at the brand-name level, Eurocode 2 as a hierarchical coding and classification system, and a Descriptor system for coding supplementary information about the foods as consumed (Arab et al., 1987). It was intended for use with food consumption surveys for nutritional epidemiology in Europe and related work. It used a structured code and comprised 13 main food groups and a 'core classification' of 150 sub-groups across four fields for main group, first level subgroup, second level subgroup and an optional mixed foods code. A mixed dish was defined as comprising two or more foods except salt assigned according to the principal ingredient. Eurocode 2 has undergone a lengthy development process in which various options have been considered, introduced and tested, providing a range of experience as the basis for the finalisation of this and other systems of food classification.

The Eurocode evaluation (Van Kappel, 1993) identified a range of difficulties. In particular, it has been difficult to get a good description of composite foods without information loss. In addition, it has been put forward that the cost of implementing the extended codes in the system has been high due to the absence of a user friendly software tool for data entry. Some of these drawbacks have been eliminated or ameliorated in the more recent versions, but others are intrinsic to the use of a classification for the description of foods, particularly mixed foods, without information loss.

The **Euro Food Groups (EFG) classification system** was the result of a project within the COST Action 99 / Eurofoods activity. Two publications from the work of the EFCOSUM project described the development of the EFG system, compared it to other classification systems, and reported its testing in different European countries (Ireland et al., 2002; Verger et al., 2002). The 33 EFG food groups were chosen as those that were the most specific ones common to the evaluated food classification schemes. The definitions of the groups were based on those for the corresponding

Eurocode 2 groups, because Eurocode was the most fully documented system at the time. The EFG system was designed for comparing existing food classification systems used in food consumption and food availability studies at main group level. The increased number of EFG categories compared to the number of main groups in other systems allows more differentiation of disparate foods, for example separating liquid milk from more concentrated milk products.

As a flat (non-hierarchical) list of 33 food groups, the EFG system records a level of detail that is intermediate between the first and second levels of the many classifications that define approximately a dozen main groups. The system itself does not include categories designed to accommodate mixed foods. The original 33 groups do not include any distinction on the processing involved. With the final two groups covering 'Miscellaneous foods' and 'Products for special nutritional use', most foods can probably be assigned to a group. However, it does not follow that the resulting aggregations are useful and further consideration might be given to any products, for example novel and functional foods, that might difficult to assign to traditional groups. Since the initial EFG system used the Eurocode 2 definitions for food categories the drawbacks of EFG resemble those of Eurocode 2.

The **EuroFIR food classification** originated from the review of classification and discussion with food composition data compilers within the EuroFIR project (Ireland and Møller, 2006a; Ireland and Møller, 2006b), as well as earlier work such as the Eurocode review and the EFG system development. The objective was to produce a harmonised food classification suitable for use in all European food composition databases. The EuroFIR food classification is a hierarchical grouping, using the Eurocode 2 main groups as the basis for its top level. The classification is supported in the LanguaL thesaurus, using its facilities for managing the hierarchy and term codes. It was developed by mapping the national food groups to EFG and Eurocode 2, which yielded a compromise food classification consisting of the most common food groups in European food composition databases.

The top level consists of 13 main groups, largely following the Eurocode 2 top categories. One exception is the placing of pulses with vegetables, rather than with nuts and seeds. The main groups are divided into 42 sub-groups and these into 52 third-level sub-groups. Currently, use of the system is only practical within LanguaL indexing, since it has no independent codes that represent the hierarchical relationships between categories. Also, to make the descriptors unique as LanguaL terms, the name of the system has to form part of the descriptor text.

The **Codex Classification of Foods and Animal Feeds** was developed within the framework of the Codex Committee on Pesticide Residues and was first adopted at the 18th Session of the Codex Alimentarius Commission in 1989 (CAC, 1993). A revision process is now ongoing. The primary classification is into foods and feeds of plant origin and those of animal origin. The classification is intended to be as complete a listing of food commodities in trade as possible, classified into groups on the basis of the commodity's similar potential for pesticide residues. It is intended primarily to ensure the use of uniform nomenclature and secondarily to classify foods into groups and / or sub-groups for the purpose of establishing group maximum residue limits for commodities with similar characteristics and residue potential.

The system aims to classify commodities, but this is hampered by a mismatch between commodities and food products. The five classes are subdivided into 19 types and 93 groups. Within these, commodities are generally defined in terms of the source organism, with a bias to those that are traded. Multi-ingredient manufactured foods containing ingredients of both plant and animal origin are listed as plant or animal origin depending upon the main ingredients. The thesaurus and coding have also other features that detract from usability. Groups are generally represented by two-letter codes, but are also listed with a three-digit number. Access to the detailed documentation for descriptors is not straightforward as it is ordered by commodity number (within group), whereas cross-references, for example in the alphabetical index of commodities, give the descriptor name.

The **Complementary food categorisation system** for the Codex General Standard for Contaminants and Toxins in Foods was published in 1995 and its food categorisation system is described in Annex

IV of the Standard (CAC, 1995). It uses the system which was developed in the framework of the pesticide classification as described above adding further commodities, mainly processed, derived and multi-ingredient foods. The complementary classification significantly extends the coverage of mixed foods by adding groups for products such as 'Manufactured meat products (multi-ingredient)' (e.g. sausage), 'Alcoholic multi-ingredient beverages', 'Condiments' and 'Multi-ingredient foods for special dietary uses' (as a new type). The food categorisation system is designed as a logical structure that enables a clear and systematic presentation of Maximum Levels for contaminants and toxins in foods.

With a system having parts maintained under different initiatives, problems may arise when particularly the core system is enhanced. At present, groups are often defined only through the reference to a specific Codex standard, whereas users would be better served by a summary in the documentation, hyperlinked to the relevant standard.

The **CIAA food categorisation system** (CIAA, 1994; Ireland and Møller, 2006B) is a European approved and accepted system, developed by the Confédération des Industries Agro-Alimentaires de l'UE (CIAA) now FoodDrinkEurope. The CIAA Food Categorisation System is a hierarchical food classification system designed to serve as an allocation tool for food additives as a basis for their authorisation at the European Community level. The system laid the basis for the Codex General Standard for Food Additives food category system.

The **Codex General Standard for Food Additives food category system** is a tool for indicating the additives that may be used for the groups of foods specified by the category system. It simplifies the reporting of the food additive uses designated by the Standard. It is hierarchical, so that when an additive is recognised for use in a general category or broader group, it is recognised for use in all the underlying groups and sub-groups. The top level consists of 16 main groups with the last one used for prepared or composite dishes in which additives are directly added to the composite food. The main groups are divided into 83 sub-groups and these into 108 third-level sub-groups. The fourth level sub-groups total 69, although they are very unevenly spread between the main groups.

The grouping system is based on product descriptors of food as marketed, unless otherwise stated. Each group links to a note describing its scope and providing examples. The main drawback from an exposure calculation viewpoint is that the defined groups do not differentiate between types of food that are normally grouped separately, a major example being in the 'Meat and meat products' group. This differentiates between fresh and processed meats, but not between muscle meat and offal.

The **ADV Catalogues** are the basis for collecting harmonised data from an extensive range of German federal and regional control programs. Data management of the information is based on controlled language defined in the 27 so-called ADV (Automatisierte Datenverarbeitung) Catalogues. The ADV Catalogues cover not only food description (one aspect of which provides a food classification), but also parameter (component and property) identification and value documentation (e.g. units and methods), together with administrative and regulatory aspects. Thus the collection of catalogues has much in common with the EuroFIR specifications for food composition data management and interchange.

The food product catalogue has 51 main groups in a comprehensive mono-hierarchical, three-level classification of food products. Being a classification, its groups are pre-coordinated and coding a product involves assigning it to a single existing group. The classification provides a comprehensive set of groups to which products can be assigned. Some weaknesses of the existing food product catalogue have been noted (BVL, 2008; BVL, 2009). Although hierarchical classification has inherent limitations, the constraints imposed by the strict three-level coding structure exacerbate these. Each new aspect of a product requires a new entry in the catalogue. The descriptors are pre-coordinated and therefore inflexible. These issues are being addressed by moving to a faceted approach as part of a major upgrade of the ADV Catalogues system with the matrix (food) catalogue broken down into basic foods and a catalogue of properties (facets).

The **International Network for Food Data Systems (INFOODS) food description system** was set up to improve the quality and accessibility of food composition databases. It provides for free text descriptors to record specific characteristics of foods. The system includes six major facets: source of food name and descriptive terms; name and identification of the food; description of 'single' foods; description of 'mixed' foods; customary uses of food (optional), and sampling and laboratory handing of food. Although the system was originally designed for food composition data, it was considered applicable to other food-related information (e.g. food sales, inventory, imports and exports).

The system is a broad, multifaceted, and open-ended description mechanism using a string of free-text descriptors assigned by the data generator unconstrained by a controlled language. Criteria are proposed for deciding whether a food is 'single' or 'mixed' (multi-ingredient), and different sets of descriptive facets are provided for these two classes of foods. The system does accommodate one or more names for a food, unlike the LanguaL system that only allows controlled language descriptors that might not have the correct level of specificity to identify fully the reported food.

A separation between single and composite foods is basic to the data specified for describing a food. Recipe procedure, are additional to those required to describe a single food, but the contents of these general aspects do not have a specified structure and thus contribute little to the computer handling of information on mixed foods. The system does not achieve its stated aim of facilitating the international interchange of data because, other than for food names, it does not standardise or specify the language for descriptors.

LanguaL is a multilingual thesaurus using faceted classification. Each food is described by a set of standard, controlled terms chosen from facets characteristic of the nutritional and / or hygienic quality of a food, such as the biological origin, the methods of cooking and preservation, and technological treatments. Each descriptor is identified by a unique code and thus the encoded description is language-independent. LanguaL currently consists of 14 facets, 12 of which index a particular aspect of the food and its processing. Within each facet, terms are organised hierarchically, as shown in the systematic listing of the thesaurus.

Software support of the LanguaL thesaurus provides several options for the format in which the thesaurus can be output. However, LanguaL only supports a non-meaningful code to identify categories, together with a unique descriptor text. It follows that a classification system using LanguaL, does not have structured codes to enable its effective use outside the LanguaL environment. Sibling categories (i.e. those at the same level linked to the same broad term) can only be listed in alphabetical order, not logically. Since 1996, the European LanguaL Technical Committee has administered the thesaurus, supported from 2005 by the EuroFIR project.

Supplementary to the food categorisation systems described above, several statistical classifications of goods are used internationally for collecting and disseminating different types of statistics. They cover a wide range of products, including food products:

- The COICOP (Classification Of Individual Consumption by Purpose), set up by the United Nations Statistical division (UNSD) is internationally used in the framework of the National System of Accounts. It is a hierarchical 4-digits classification. A more detailed 5-digits classification is used within the EU in the Household Budget Surveys to collect data on the expenditure of households and also to compile the Harmonised Indices of Consumer Prices. Many EU countries collect also food quantities from their Household Budget Surveys. The version used at EU level (5-digits) includes a list of approximately 70 categories of food products and beverages. The DAFNE[7] project used the data collected from the Household Budget Surveys and obtained good estimations of food consumption in Europe;

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[7] DAFNE: DAta Food Networking, project financed by the European Commission.

- The Harmonised System (HS) and the Combined Nomenclature (CN), subdivision of the previous-one used within the EU, used for collecting data on the external trade of goods. The HS is a 6-digit classification used by all countries of the world for collecting and disseminating data on the external trade of goods. The CN is the correspondent 8-digit classification used within the EU. Both include an extensive list of products and provide a very detailed description of the traded goods;

- PRODCOM, the List of PRODucts of the European COMmunity, is the classification used within the EU to collect the production of manufactured goods, from manufacturing enterprises. PRODCOM includes a list of approximately 300 categories of food products and beverages;

- The Central Classification of Products (CPC) and the CPA (Statistical Classification of Products by Activity), subdivision of the previous-one used within the EU, are «production oriented». They are both hierarchical classifications including goods and services. The CPC is a 5-digit classification and the CPA is a 6-digit classification which includes approximately 300 groups of food products and beverages.

Eurostat, the statistical office of the EU, keeps updated the correspondence tables between the above mentioned classifications. They allow combining data from different sources, like production and external trade, in order to make further analysis. Eurostat also developed a hierarchical structure of product groupings to integrate in a single database all data on food and feed controls, including feed, animals, food products, food additives, materials in contact with food and water.

Recently, EFSA developed **FoodEx**, as a bridging solution in the framework of the strategy to develop an FCDS for data collection, exchange and analysis and for exposure assessment. FoodEx is a hierarchical system based on 20 main food categories that are further divided into subgroups up to a maximum of 4 levels. Most food names are generic to allow the user to classify several similar foods under one name. The main drawback is that it does not currently use a catalogue of properties (facets) in order to further describe food and beverages. In total, FoodEx comprises about 1,700 different end-points (food names) at the lowest level of detail. FoodEx builds on different food description and classification systems and although the level of detail required in FoodEx cannot always be reached by food consumption data, emphasis has been put on creating a level of precision that allows a detailed analysis of occurrence data. FoodEx was used to codify all foods and beverages present in the EFSA Comprehensive Food Consumption Database (EFSA, 2011c).

In conclusion, there exists a number of food description and classifications systems, all fit for their specific purpose. However there is not any specific system that addresses the need of EFSA. A new harmonised approach is required for the description and classification of foods reported in databases associated with the consumption, composition and contamination of foods to facilitate the interrelation of data for equivalent or similar foods when needed. Food description can record a range of information about a food, limited only by constraints of its availability, of thesauri for controlled language, and of natural language for free text. Classification is a user-oriented representation of information on foods and different users may require foods to be classified in different ways, not necessarily predictable when data are captured.

Use of a comprehensive food description language should provide sufficiently detailed information to allow mapping from food description to an automatic generation of the food categories defined in the various classification systems. Although the presentation of a single food classification system seems an attractive goal, a more practical approach would be to develop the means to describe foods as fully as possible at the time that data are collected and provide links to act as translation layers between alternative classification systems.

APPENDIX II

II - NEEDS ANALYSIS

II.1 - Needs analysis - requirements related to food classification

Exposure assessments are important components of EFSA's and MS´s risk assessment process. The exposure assessments that EFSA performs in support of requested scientific advice involve the collection of a growing volume of analytical data on chemical or biological hazards and of data on food consumption in the EU Member States. These data must be characterised in food groups or by common food names to allow for the matching of analytical results with food consumption information. Currently the aggregated food categories used in the Comprehensive European Food Consumption database (EFSA, 2011c) provide the required links, but there is an urgent need to develop an FCDS at a more detailed level which allows for a better match between foods consumed and those analysed. There are already a multitude of alternative food description and classification systems available for different purposes. However, none seems ideal in connecting food consumption data with a multitude of different occurrence data to calculate dietary exposure.

Future procedures for estimating intake and exposure from food consumption data may require additional information in the identification of food, like type of agricultural production, country of origin and brand, time of production and geographical area of production. To date, specifications for food identification information have developed in particular contexts, e.g. national composition databases or in the assessment of exposure to food additives. As the need to interrelate data from different sources (analytical laboratory, dietary survey, retailing, food monitoring, etc.) increases, it will be necessary to develop an overall, consistent framework of food description to allow reported foods to be identified using descriptors coming from all different sources of information.

Food datasets may contain either qualitative data, reporting the presence or absence of constituents (chemical compounds, ingredients, zoonoses, etc.) in a food, or quantitative data, reporting the amount of food constituents present or of the food consumed. A harmonised food categorisation system must support requirements for management of both qualitative and quantitative data. This consideration is of particular concern for the handling of data on composite foods, where information on the presence or amount of different ingredients is, in some applications, necessary. In most cases it is necessary to convert the consumption of a composite food into consumption of raw agricultural commodities (RAC) or into the basic ingredients.

The design of an FCDS requires therefore an analysis of the type of information needed at all levels for the different domains served by the system followed by implementing a structure suitable for gathering and managing all this information.

II.2 - Requirements related to food classification of contaminants

Contamination of food may occur at source, be inherent or may be related to the preparation and processing of food and can hence be found both at composite food or at single ingredient level.

The term 'contaminant' is defined in legislation (Regulation (EC) No 315/93 [8]) as "any substance not intentionally added to food which is present in such food as a result of the production, manufacture, processing, preparation, treatment, packing, packaging, transport or holding of such food, or as a result of environmental contamination".

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[8] Council Regulation (EEC) No 315/93 of 8 February 1993 laying down Community procedures for contaminants in food. OJ L 37, 13.2.1993, p. 1–3.

Chemical contaminants can broadly be grouped into three groups. However, certain chemical contaminants can belong to more than one group, depending on where and how the contamination occurs:

- Environmental and industrial contaminants
  - e.g. lead, cadmium, mercury, arsenic, persistent organic pollutants;
- Agricultural contaminants
  - e.g. mycotoxins, nitrate ;
- Processing contaminants
  - e.g. acrylamide, 3MCPD.

The presence of such substances in food must be kept to a minimum because of their potential adverse effects on health, and a comprehensive legislative framework has been put in place at Community level and implemented in national legislation to ensure this. Regulation (EC) No 315/93 established the principle of maximum levels for contaminants in foodstuffs in order to protect public health. Commission Regulation (EEC) No 1881/2006[9] establishes maximum levels for a number of contaminants in food.

To assess exposure to contaminants, the following information is of interest but will vary in importance depending on the type of contaminant:

- Geographical origin;
- Primary production method (e.g. organic, conventional, etc);
- Season;
- Storage (time, temperature, humidity, etc);
- Processing / Preparation (temperature, time, pressure, etc).

Due to the ubiquitous possibility of contamination in the entire food chain, the food classification system must be sufficiently flexible to facilitate data capture and classification at RAC, ingredient and composite level.

While not an integral part of the classification system itself, the system should allow/facilitate conversion of foods, such as

- From 'as consumed' to raw and vice versa, to allow the matching of occurrence and food consumption data;
- Application of recipe fractions to capture ingredients;
- Application of compositional fraction factors, such as fat fractions;
- Processing factors such as concentration, dilution, weight loss, weight gain, yield factors.

The system should furthermore enable different end users to group entries depending on their needs, for example the creation of food groups in order to retrieve data matching legislative specifications.

Some contaminants, e.g. Persistent Organic Pollutants are analysed also in the fat part of foods. Such data need to be converted to food items present in the classification system.

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[9] Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs (Text with EEA relevance). OJ L 364, 20.12.2006, p. 5–24, OJ L 314M , 1.12.2007, p. 558–577.

Moreover, for some other contaminants, analysis are performed on an 'indicator matrix' (e.g. liver which bio-accumulates some contaminants). Thus, in order to link these analysis data with food consumption data, it is important to also link this indicator matrix of occurrence data with the corresponding matrix consumed in consumption data (e.g. meat).

II.3 - Requirements related to food classification of inherent plant toxins

Inherent plant toxins are chemicals that are produced as secondary metabolites in plants for protection against microorganisms, parasites, insects, other plants and grazing animals. They are presently not regulated at Community level. The reason for this is in many instances the lack of information, both regarding toxicity and occurrence. Many inherent plant toxins are important in traditional and herbal medicine.

To assess exposure to inherent plant toxins, the following information is of interest but will vary in importance depending on the type of toxin:

- Geographical origin;
- Species, subspecies, varieties;
- Part of plant;
- Cultivation methods;
- Post harvest treatment, e.g. drying;
- Storage conditions.

II.4 - Requirements related to food classification of pesticide residues

Pesticides residues, according to the Regulation (EC) No 396/2005[10] definition, include active substances, metabolites and/or breakdown or reaction products of active substances currently or formerly used in plant protection products as defined in Article 2, point 1 of Directive 91/414/EEC[11], which are present in or on the products covered by Annex I to Regulation (EC) No 396/2005, including in particular those which may arise as a result of use in plant protection, in veterinary medicine and as a biocide.

Regulation (EC) No 396/2005 regulates the maximum residue limits (MRLs) of pesticide residues in or on food and feed of plant and animal origin in the European Community. MRLs for pesticide residues are established for the RAC. Before establishing MRLs risk assessment is performed by EFSA.

The exposure of agricultural products to pesticides occurs during the growth of the crop, just after harvest or during storage of the products. Occurrence data of pesticide residues are usually collected on the RACs and primary transformed products, mainly because MRLs are set at RAC level. Hence official control of pesticide residues is mainly performed early in the food chain at auction, harbour, or distribution centre of fruit and vegetables.

The assessment of dietary exposure to pesticides residues as part of Regulation (EC) No 396/2005 is performed in several occasions:

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[10] Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EECText with EEA relevance. OJ L 70, 16.3.2005, p. 1–16.
[11] Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market. OJ L 230, 19.8.1991, p. 1–32.

- At the establishment of new higher MRLs due to new or changed uses of the pesticide or due to different import tolerances. For every change of an MRL the European Commission has to request EFSA for an opinion on whether the requested change of the MRL is safe for the consumer according Article 10 of Regulation (EC) No 396/2005.
- At the assessment of existing MRLs according to Article 12 of Regulation (EC) No 396/2005, EFSA has to perform risk assessments. The risk assessment is requested by the European Commission
- When, due to new toxicological evaluations, the toxicological reference values (Acceptable daily intake (ADI) and Acute Reference Dose (ARfD)) are lowered leading to uses of the plant protection product that may not be safe for the consumer anymore or when residues are found, which could be of concern to the consumer. The Commission or Member States may request an opinion from EFSA on the risk of the existing MRL (Article 43).
- When in an official control sample the MRL is exceeded for a pesticide. The safety of the lot has to be assessed in order to decide on the following steps to be taken (e.g. RASSF (Rapid Alert System for Food and Feed) notification, recall of the product from the market). This assessment is performed on a national level.
- In the annual report EFSA has to perform an analysis of the chronic and acute risk to the health of consumers of pesticide residues (Article 32 of Regulation (EC) No 396/2005).

According to Article 32 of Regulation (EC) No 396/2005 EFSA has to draw up the annual report on pesticide residues on the bases of data coming from official controls and provided by Member States.

EFSA draft reasoned opinions and peer reviews in which dietary intake predictions are performed respectively for the application of new MRLs, re-evaluations of current MRLs, and for specific cases (Articles 10, 12 and 43 of Regulation (EC) No 396/2005) or for initial risk assessments. These opinions are published by EFSA.

The food classification system used is established in Annex I of the Regulation (EC) No 600/2010[12]), and it lists the food commodities for which MRLs apply. This list is intended to be a complete listing of RACs in trade, classified into groups on the basis of commodities with similar potential for pesticide residues.

The list contains about 315 commodities of plant and animal origin. It is a hierarchical system classifying commodities in groups and subgroups and allocating a specific code for each commodity, commodity group and commodity subgroup. Also the commodities are defined by their scientific name and the part of the commodity for which the MRL applies (roots, leaves, whole product). Examples of related varieties of commodities are given for which the same MRL applies..

It is necessary that a new description and classification system include the raw agricultural commodities listed in Annex I of Regulation (EC) No 396/2005. A classification hierarchy at RAC level is also needed.

In order to calculate exposure it is important to develop a database of conversion factors from food as consumed to RACs.

Likewise, addition of specific species of fish and seafood products others than those contained in the present Regulation would be useful. The present Regulation contains only one code for all of these products and the European Commission is revising Annex I in which feed commodities and specific

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[12] Commission Regulation (EU) No 600/2010 of 8 July 2010 amending Annex I to Regulation (EC) No 396/2005 of the European Parliament and of the Council as regards additions and modification of the examples of related varieties or other products to which the same MRL applies (Text with EEA relevance). OJ L 174, 9.7.2010, p. 18–39.

species of fish will be included. Moreover, processed commodities can also be directly collected and analysed within certain studies to assess consumer exposure. This is for instance the case of Total Diet Studies (TDS) in which commodities are analyzed as consumed, i.e. processed. Supplementary information on processing and on recipes of composite foods are needed, also from a pesticide residue perspective. Some other further information on analyzed products can also be useful to assess exposure:

- Was the commodity peeled or washed before the analysis?
- Which part of the product is analyzed (edible part or all)?
- What is the fat content of the product (lipophilic pesticides are analysed on fat)?
- Is the food coming from an organic production or labelled as organic (Regulation (EC) No 834/2007)

Other pesticides residue levels in food are established in Directive 2006/125/EC[13] on processed cereal-based food and baby foods for infants and young children. In this Directive no specific requirements for reporting or performing risk assessments are included.

II.5 - Requirements related to food classification of veterinary drug residues

Commission Regulation (EU) No 37/2010[14] on pharmacologically active substances and their classification regarding maximum residue limits in foodstuffs of animal origin specifies the following target tissues to which maximum limits apply: liver, kidney, fat, muscle, muscle and skin, skin and fat, milk, honey and eggs. Council Directive 96/23/EC[15] on measures to monitor certain substances and residues thereof in live animals and animal products specifies the animal groups and product categories to be sampled in the annual monitoring plan: bovines, pigs, sheep and goats, equine animals, poultry (broiler chickens, spent hens, turkeys and other poultry), aquaculture products, bovine milk (raw), milk from other species (ovine, caprine, equine), hen eggs, eggs from other species of poultry, rabbit meat, wild game meat, farmed game meat and honey. Apart from the edible tissues, in the control of veterinary drug residues other matrices can be analysed as well (blood, blood serum, plasma, urine, faeces, hair, eye retina, feed, drinking water). This requirement should be taken into account to enable reporting.

For the assessment of veterinary medicinal product residues in food, the food classification should enable a clear specification of the animal species or product category and the target tissue analysed.

II.6 - Requirements related to food classification of food contact materials

Food contact materials are described as "all materials and articles intended to come into contact with foodstuffs, including packaging materials but also cutlery, dishes, processing machines, containers etc.". The term also includes materials and articles which are in contact with water intended for human consumption but it does not cover fixed public or private water supply equipment. The harmonisation at EU level of the legislation on food contact materials fulfils two essential goals: 1) the protection of

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[13] Commission Directive 2006/125/EC of 5 December 2006 on processed cereal-based foods and baby foods for infants and young children (Codified version) (Text with EEA relevance). OJ L 339, 6.12.2006, p. 16–35, OJ L 338M , 17.12.2008, p. 766–794.
[14] Commission Regulation (EU) No 37/2010 of 22 December 2009 on pharmacologically active substances and their classification regarding maximum residue limits in foodstuffs of animal origin (Text with EEA relevance). OJ L 15, 20.1.2010, p. 1–72.
[15] Council Directive 96/23/EC of 29 April 1996 on measures to monitor certain substances and residues thereof in live animals and animal products and repealing Directives 85/358/EEC and 86/469/EEC and Decisions 89/187/EEC and 91/664/EEC. OJ L 125, 23.5.1996, p. 10–32.

the health of the consumer and 2) the removal of technical barriers to trade. The transfer of constituents from food contact materials into food is called migration and this should not occur in unacceptable quantities.

The overall requirements for all food contact materials are specified in the framework Regulation (EC) No 1935/2004[16], with separate legislation for specific materials (e.g. plastics, ceramics and regenerated cellulose film) and Directives on individual substances (e.g. nitrosamines and vinyl chloride monomer).

Currently available food classification systems for food contact materials at EU level are outlined in Directive 85/572/EEC[17] and Annex III of Regulation (EU) No 10/2011[18]. The extent of chemical migration from the packaging into the food depends on their mutual interaction, and this food classification is based on the characteristics of the food with respect to how it influences migration. The essential considerations are if the food is aqueous, fatty, acidic, alcoholic, or dry.

As well as depending on the characteristics of the food, chemical migration is a complex phenomenon that is influenced by a number of physical and chemical parameters including time- and temperature-dependent diffusion kinetics and partitioning behaviour. In order to assess exposure to food contact materials, the following information should be provided:

- Source;
- Packaging format/material i.e. a description of the type of package: plastic bottle, beverage carton, tray and lid, flexible plastic bag, paper wrapper, etc.;
- Physical state of the food (dry, moist, liquid, frozen) and its fat content;
- Surrounding medium if any i.e. is the food in the package surrounded by brine or oil;
- If available, processing conditions the food underwent when already in the pack (e.g. hot-fill, pasteurisation, sterilisation);
- Storage conditions of the packed food: time and temperature;
- Final preparation method in case the food is to be re-heated by the consumer while still in the pack;
- Production method / place;
- Surface area of the pack that makes direct or indirect contact with the food and the amount of food contained in the pack.

II.7 - Requirements related to food classification of additives, enzymes and extraction solvents

Food additives are substances added intentionally to foodstuffs to perform certain technological functions, for example to colour, to sweeten or to preserve. Food additives are defined in EU legislation as "any substance not normally consumed as a food in itself and not normally used as a characteristic ingredient of food whether or not it has nutritive value, the intentional addition of which

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[16] Regulation (EC) No 1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food and repealing Directives 80/590/EEC and 89/109/EEC. OJ L 338, 13.11.2004, p. 4–17.
[17] Council Directive 85/572/EEC of 19 December 1985 laying down the list of simulants to be used for testing migration of constituents of plastic materials and articles intended to come into contact with foodstuffs. OJ L 372, 31.12.1985, p. 14–21.
[18] Commission Regulation (EU) No 10/2011 of 14 January 2011 on plastic materials and articles intended to come into contact with food Text with EEA relevance. OJ L 12, 15.1.2011, p. 1–89.

to food for a technological purpose results in it or its by-products becoming directly or indirectly a component of such foods" (for full definition see: Article 1(2) of Directive 89/107/EEC[19]).

EU legislation consists of the framework Directive 89/107/EEC covering additives in general and three specific Directives on colours (Directive 94/36/EC[20]), sweeteners (Directive 94/35/EC[21]) and other food additives (Directive 95/2/EC[22]) (listing the permitted additives and their conditions of use), respectively. However, the authorised additives must also comply with the purity criteria within three additional Directives. In December 2008, the new Regulations of the Package on Food Improvement Agents were adopted. This included Regulation (EC) No 1333/2008[23] on food additives, Regulation (EC) No 1332/2008[24] on food enzymes, along with Regulation (EC) No 1331/2008[25] for establishing a common authorisation procedure for food additives, food enzymes and food flavourings.

When assessing exposure to additives, enzymes and extraction solvents, varying levels of detail are required, with some exposure estimates required at the food item level, whilst others are required at the food category level. For some food items e.g. bakery wares, the presence of coatings and glazes are important when assessing exposure, therefore precise details are required. The ability to have a system where food can be disaggregated into ingredients is of importance for assessing exposure to additives, enzymes and extraction solvents. Current classification systems are guided by EU Directives and Regulations on the levels permitted in foods, in conjunction with the Codex General Standard for Food Additives (Codex Stan 192-1995), however there is currently no EU wide harmonised system. In order to fully optimise assessing exposure to additives, enzymes and extraction solvents, the following information would be required:

- Recipe level detail;
- Physical aspect;
- Presence of coatings / glazes / fillings;
- Cooking method;
- Fat content;
- Sugar/sweetening information;
- Preparation method;
- Preservation method;
- Packaging format and surrounding medium.

[19] Council Directive 89/107/EEC of 21 December 1988 on the approximation of the laws of the Member States concerning food additives authorized for use in foodstuffs intended for human consumption. OJ L 40, 11.2.1989, p. 27–33.
[20] European Parliament and Council Directive 94/36/EC of 30 June 1994 on colours for use in foodstuffs. OJ L 237, 10.9.1994, p. 13–29.
[21] European Parliament and Council Directive 94/35/EC of 30 June 1994 on sweeteners for use in foodstuffs. OJ L 237, 10.9.1994, p. 3–12.
[22] European Parliament and Council Directive No 95/2/EC of 20 February 1995 on food additives other than colours and sweeteners. OJ L 61, 18.3.1995, p. 1–40.
[23] Regulation (EC) No 1333/2008 of the European Parliament and of the Council of 16 December 2008 on food additives (Text with EEA relevance). OJ L 354, 31.12.2008, p. 16–33.
[24] Regulation (EC) No 1332/2008 of the European Parliament and of the Council of 16 December 2008 on food enzymes and amending Council Directive 83/417/EEC, Council Regulation (EC) No 1493/1999, Directive 2000/13/EC, Council Directive 2001/112/EC and Regulation (EC) No 258/97 (Text with EEA relevance). OJ L 354, 31.12.2008, p. 7–15.
[25] Regulation (EC) No 1331/2008 of the European Parliament and of the Council of 16 December 2008 establishing a common authorisation procedure for food additives, food enzymes and food flavourings (Text with EEA relevance). OJ L 354, 31.12.2008, p. 1–6

II.8 - Requirements related to food classification of flavourings

Flavourings are substances naturally present or added to food in order to impart or modify odour and/or taste. EU Legislation defines different types of flavourings, such as flavouring substances (natural, natural-identical and artificial flavouring), flavouring preparations, thermal process flavourings and smoke flavourings. Many flavour components have been found to be naturally present in food, like 'raspberry chetone' in raspberries or 'methyl eugenol' in basil.

The Regulation (EC) No 1334/2008[26] on flavourings and certain food ingredients with flavouring properties for use in and on foods applies from January 2011 and repealed Council Directive 88/388/EEC[27] and Commission Directive 91/71/EEC[28]. The Regulation specifies general requirements for the safe use of flavourings and provides definitions for different types of flavourings, as well as the source materials and flavourings for which evaluation and approvals are required. Additional previous legislation includes Regulation (EC) No 2232/96[29] and Regulation (EC) No 1565/2000[30]. Flavourings are also considered in the common authorisation procedure for food additives, food enzymes and food flavourings under Regulation (EC) No 1331/2008[31].

Similar to assessing exposure to additives, varying levels of precision are required, ranging from the food item level to the food category level. For example the exact type of fruit is of particular importance when assessing exposure to flavourings. Furthermore, information on whether the food has been characterised by addition of flavours only (e.g. yoghurt with banana flavour), ingredients only (e.g. yoghurt with banana pieces) or both is of particular importance. It is also important to have a system where foods can be disaggregated into ingredients. In order to fully assess exposure to naturally occurring chemicals in fruit, herbs and spices it would be important to have a system whereby this information could be highlighted or flagged.

The classification of food to evaluate exposure to flavourings should take into account the categories used when defining the 'use level' (i.e. the concentration of the flavour in the food or food category). Currently, the concentration data on added flavours (use levels) are available from different sources: International Organisation of the Flavour Industries (IOFI), European Flavour and Fragrance Association (EFFA), Flavour and Extract Manufacturers Association (FEMA) and Council of Europe (CoE). In addition, specific food categories are considered in the Regulation (EC) No 1565/2000 in Annex III.

In order to assess exposure to flavourings, the following information should be provided;

- Recipe level detail;

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[26] Regulation (EC) No 1334/2008 of the European Parliament and of the Council of 16 December 2008 on flavourings and certain food ingredients with flavouring properties for use in and on foods and amending Council Regulation (EEC) No 1601/91, Regulations (EC) No 2232/96 and (EC) No 110/2008 and Directive 2000/13/EC (Text with EEA relevance). OJ L 354, 31.12.2008, p. 34–50.

[27] Council Directive 88/388/EEC of 22 June 1988 on the approximation of the laws of the Member States relating to flavourings for use in foodstuffs and to source materials for their production. OJ L 184, 15.7.1988.

[28] Commission Directive 91/71/EEC of 16 January 1991 completing Council Directive 88/388/EEC on the approximation of the laws of the Member States relating to flavourings for use in foodstuffs and to source materials for their production. OJ L 42, 15.2.1991, p. 25–26.

[29] Regulation (EC) No 2232/96 of the European Parliament and of the Council of 28 October 1996 laying down a Community procedure for flavouring substances used or intended for use in or on foodstuffs. OJ L 299, 23.11.1996, p. 1–4.

[30] Commission Regulation (EC) No 1565/2000 of 18 July 2000 laying down the measures necessary for the adoption of an evaluation programme in application of Regulation (EC) No 2232/96 of the European Parliament and of the Council (Text with EEA relevance). OJ L 180, 19.7.2000, p. 8–16.

[31] Regulation (EC) No 1331/2008 of the European Parliament and of the Council of 16 December 2008 establishing a common authorisation procedure for food additives, food enzymes and food flavourings (Text with EEA relevance). OJ L 354, 31.12.2008, p. 1–6.

- Physical aspect;

- Presence of coatings/glazes/fillings;

- Cooking method, fat content;

- Sugar/sweetening information;

- Preparation method;

- Preservation method;

- Packaging format;

- Surrounding medium;

- Artificially or naturally flavoured;

- Presence of herbs and spices.

II.9 - Requirements related to food classification of food borne microorganisms

Microorganisms include bacteria, viruses, yeasts, moulds, algae, parasitic protozoa, microscopic parasitic helminths, and their toxins and metabolites (Regulation (EC) No 2073/2005[32]).

A zoonotic agent is defined as any microorganism that is likely to cause a zoonosis. Zoonoses are infections and diseases that are naturally transmissible directly or indirectly, for example via contaminated foodstuffs, between animals and humans (Directive 2003/99/EC[33]).

The monitoring of zoonoses and zoonotic agents aims to provide information to support public health and identify and prioritize intervention strategies and risk management decisions. Surveillance data are particularly needed to identify the most important sources of food borne disease (through source attribution models) and to estimate the impact of different interventions in the food chain on the final burden of food borne disease (through risk assessments). Both approaches are frequently used to address questions of the EFSA's BIOHAZ Scientific Panel.

Contamination of foods with microorganisms may take place at all levels of the food chain (from 'farm to fork'), the food classification system must therefore be sufficiently flexible to facilitate data capture and classification at the primary food-animal source (reservoir level), raw agricultural commodity, ingredient level and composite-food level, thus allowing flexibility in the assessment.

To assess exposure to zoonotic agents from food, the following additional information is of importance:

- Provenance
  - i.e. geographical origin of food;
- Primary production method
  - e.g. organic, conventional, etc. ;
- Nature of the food
  - e.g. for meat: carcase, fresh meat, minced meat, meat preparations, meat products;
- Sampling stage - where the samples have been collected

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[32] Commission Regulation (EC) No 2073/2005 of 15 November 2005 on microbiological criteria for foodstuffs (Text with EEA relevance). OJ L 338, 22.12.2005, p. 1–26.
[33] Directive 2003/99/EC of the European Parliament and of the Council of 17 November 2003 on the monitoring of zoonoses and zoonotic agents, amending Council Decision 90/424/EEC and repealing Council Directive 92/117/EEC. OJ L 325, 12.12.2003, p. 31–40.

- e.g. at processing plants / at retail;
- Treatment/Processing/Preparation
  - e.g. heat treatment, smoked, frozen, dried, etc.;
- Status of the food at the point of sampling
  - e.g. raw, frozen, cooked, etc.;
- Intended use
  - e.g. intended to be eaten raw, intended to be eaten cooked;

Some of this information is included in the Standard sample description and does not need to be addressed by the food classification system.

Animal and food contamination data are collected from all Member States and analysed by the Commission and EFSA. In some cases, data collected through routine monitoring are insufficient. Co-ordinated monitoring programmes for one or more zoonotic agents may prove necessary in order to assess specific risks or establish base-line values at MS level (Article 5 of Directive 2003/99/EC), the results of which inform of the need for an EU-wide intervention.

The EU system for the monitoring and collection of information on zoonoses is based on the Zoonoses Directive 2003/99/EC, which obligates Member States to collect relevant and, where applicable, comparable data of zoonoses, zoonotic agents (including at the primary production stage or in foods, and other microbiological contaminants in foods), antimicrobial resistance and food borne outbreaks. In addition, Member States assess trends and sources of these agents as well as outbreaks in their territory, transmitting an annual report to the European Commission and EFSA, covering the data collected. In collaboration with the European Centre for Disease Prevention and Control (ECDC), EFSA analyses the data and produces annual EU Summary Reports (Article 9 of Directive 2003/99/EC).

Food classification used in collating data on zoonotic agents and other microbiological contaminants employs a hierarchical system based on food categories and subcategories described in the legislation along with descriptors of the exact nature of the food.

The description can include

- Species of origin
  - food animal/plant;
- Type of food
  - e.g. for 'cheese', hard, semi-soft or soft and the detail type, e.g. Camembert;
- Treatment
  - e.g. smoked, cooked, frozen, low-fat, raw / ready-to-eat, etc.;
- Further details of the product.

Annex I of Regulation (EC) No 853/2004[34] lists the foods of animal origin and processed products thereof.

Annex 1 of Regulation (EC) No 2073/2005 (as amended by Regulation (EC) No 1441/2007[35]) lists the food categories for which the microbiological food safety criteria and process hygiene criteria apply to foodstuffs.

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[34] Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin. OJ L 139, 30.4.2004, p. 55–205.

Chapters 6 and 9 of the Technical report of EFSA 'Manual for Reporting on Zoonoses, Zoonotic Agents and Antimicrobial Resistance in the framework of Directive 2003/99/EC and of some other pathogenic microbiological agents for information derived from the year 2010' (EFSA, 2011a) provides the food categories and details to be reported on.

Annex 1 of the Updated technical specifications for harmonised reporting of food borne outbreaks through the European Union reporting system in accordance with Directive 2003/99/EC (EFSA, 2011b) lists the categories for food vehicles.

Microbial contamination of foodstuffs may occur at different points along the food chain, including at production, distribution and sale. The food classification system should therefore be sufficiently flexible to accommodate different levels of detail required for different purposes, including factors affecting contamination, growth, and exposure along the farm-to-fork continuum. The system should also allow for the application of food consumption data and recipes for composite foods to assess exposure to zoonotic agents. The food classification system should allow for aggregation of data at different levels, depending on the public health question to be addressed and/or on the data availability to answer the question.

II.10 - Requirements related to classification of food composition data

Data on the composition of food is gathered in food composition databases in order to serve several tasks, ranging from documentation of content to calculation of nutritional intake.

Sampling of data for food composition may occur at different source level. A food composition database can have data coming from

- Bulk commodities;
- Wholesale commodities;
- Retail foods;
- Field, garden or wild foods;
- Foods as consumed.

The domain of food composition is not regulated by any legislation when it comes to food classification. Furthermore there is no golden standard for food classification, and all kinds of classification systems are available. Most food composition databases have between 10 and 25 food groups. The actual classification of food has been shown to be highly culturally dependent and most national databases have unique parts. These systems range from proprietary classification systems over various adaptations of established classification systems used in other domains to strict use of international classification systems developed for other areas of food information. The classification used may often reflect the most probable use of food composition data, which is calculation of nutrient content in either foods or diets, or may reflect that the data comes from an analytical process and is derived from the classification system used in a particular Laboratory Information Management System (LIMS). For the persons compiling food composition data food description is an important task, the most predominant system for this being the Langua alimentaria - the international framework for food description (LanguaL) (Møller A. et al.,2008).

[35] Commission Regulation (EC) No 1441/2007 of 5 December 2007 amending Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs (Text with EEA relevance). OJ L 322, 7.12.2007, p. 12–29.

Although many European food composition databases are indexed by LanguaL, this system is seldom, if at all, used as a classification system for the presentation of a national database. The LanguaL indexing is present, but is a 'behind the scenes' system, which facilitates the description of foods and allows systems such as eSearch of the European Food Information Resource Network (EuroFIR) to perform its searching and allows for better understanding of which foods are dealt with when data is exchanged between food composition databases.

EuroFIR have taken the initiative to develop a EuroFIR food classification system, which has also become integrated in the facets of the LanguaL description system. When indexing in LanguaL, it is not compulsory to use the EuroFIR classification, but for the datasets involved in EuroFIR this has been done.

For the calculation of nutrient intake, it is necessary to interpret the food as recorded in consumption surveys into food composition table entries, to enable calculations on a one-to-one basis. As the level of details in food consumption and food composition tables are rarely the same, some adjustment is needed, either by finding the common level of detail - e.g. aggregating the composition data at level of broader groups or by using recipes to translate composite food into ingredients corresponding to food composition database entries.

A new description and classification system should enable identification of food items and food groups at a level of detail at least comparable with the Eurofir classification system and furthermore allow for easy matching between foods recorded in food composition databases and foods recorded in food consumption databases.

II.11 - Requirements related to classification of food consumption data

The availability of detailed, harmonized and high quality food consumption data at European level is a primary long term objective for EFSA which has been recognized as a top priority for collaboration with the EU Member States. EFSA will use these data to assess intake of nutrients, dietary exposure to biological agents and chemical substances considered by the Scientific Panels.

At present, the collection of food consumption data is aimed at assessing food and nutrient intakes in the reference population or specific population groups. The final objective is to evaluate whether the population in general or the specific population groups meet the recommended dietary intakes in terms of nutrient and/or foods. Food consumption data are primarily collected to guide and evaluate nutrition policies, rather than to perform exposure assessment, although they are more and more used to assess dietary exposure to chemical substances and biological agents too.

Currently, only food availability data from household budget surveys are comparable at the European level in Data Food Networking (DAFNE) (Trichopoulou and Lagiou, 1998). Food consumption data on an individual level from national food consumption surveys are not harmonized at the European level (Merten et al., 2011), neither the way to classify the foods consumed.

Within the European food consumption survey method project (EFCOSUM) (EFCOSUM Group, 2001) it was generally agreed that foods can only be made comparable at the 'raw edible' ingredient level. The EFCOSUM project recommended starting to regroup available food consumption data according to the European Food Group (EFG) system established in the context of the Research action on food consumption and composition data of the European cooperation in the field of scientific and technical research (COST Action 99) (Schlotke et al., 2000). In this way food intake data can be made comparable at the 'raw edible' ingredient level. The project recommended using the EFG system as a minimum level of comparability among the Member States. Furthermore, EFCOSUM recommended to start with four food groups considered to be the most important food groups for health monitoring purposes, namely 1) vegetables (potatoes excluded), 2) fruits (fruit juices excluded), 3) bread, and 4) fish (shellfish included).

Food classification systems and food composition databases are developed to be used for specific purposes at the national level. Although efforts have been made to develop methods for standardized and harmonized food consumption data capture in Europe like the software of the European Prospective Investigation into Cancer and Nutrition (EPIC-SOFT) (Slimani et al., 1999), food groups and food lists for the purpose of the assessment of food and nutrient intakes are usually constructed according to practical aspects during field work (e.g. easy retrieval of food items in the list during 24-hour recall face-to-face interview) or to facilitate later management of collected data (e.g. link with food composition databases, assignment of food items to food groups as defined in the food-based dietary guidelines). There are currently no general rules which can be applied for building the food list and defining the food groups to be used during food consumption surveys. The lists are country-specific and context-specific in most cases. However in order to improve the comparability of the collected data it is possible (e.g. when using EPIC-SOFT) to build in some rules to harmonize data collection among countries (e.g. type of information collected using facets / descriptors, items to be put in the food list or the recipe list).

Extra information is added in the food names or some facets / descriptors are attached to specific food items or food groups / subgroups to capture extra information. This information is needed to be able to assess nutrient intakes afterwards. After the collection phase, the consumption data are linked to food composition databases, which are also country-specific, and which contain information on nutrient composition of food items, for both macro- and micronutrients.

In order to link the foods consumed with the correct food items in the food composition database, extra information is needed on

- Fat content;
- Brand name;
- Type of liquid used;
- Type of fat used;
- Preparation method;
- Form quantified of the foods consumed.

Different methods exist to assess food consumption: dietary record and 24-hour recall are the most used methods and dependent on the context and population group under study, both can be used. In a dietary record the respondent records the foods and beverages and the amounts consumed over one or several days. During a 24-hour recall the respondent is asked to remember and report all the foods and beverages consumed during the preceding 24 hours. Portion sizes can be measured with scales, household measures or estimated with pictures or models. The limiting factor to collect detailed information in food consumption surveys is motivation of the respondents (mostly in case of dietary record) or capacity to remember (in case of 24-hour recall). Sometimes consumers don't know or don't remember several aspects of the foods they consumed. Furthermore, it can be burdensome or annoying for the respondents if too much detail is asked for. It can also be more costly to collect more details.

EFSA need to use the food consumption data collected through national food consumption surveys for exposure assessment. In this case, often more details are necessary than when the data are only used for calculation of nutrient intakes.

In the general EFSA guidance for the collection of national food consumption data in the view of a pan-European dietary survey it is recommended to collect supplementary information, in particular on:

- Brand name;
- Physical characteristics of the packaging;

- Cooking procedures;

- Other specific information, such as fortification.

Detailed information on the use of nutritional supplements by respondents should also be covered as well as physical measures of the survey participants (weight and height) and an estimate of their physical activity level.

II.12 - Overall requirements of a system for food description and classification

To perform exposure assessments, as part of risk assessments, consumption and concentration data need to be linked. For this it is imperative that both sources of data are recorded at the same level. It is apparent from the previous sections that the requirements for assessing the exposure to microbiological or chemical hazards, and for collection of food consumption data this are not always the same. For example, food consumption data have been and are still often collected primarily from a nutrition point of view and not from a food safety point of view. Due to this, information gathered in a food consumption survey may not be optimal for risk assessment purposes. Information on primary production methods, storage conditions, processing, fat content and characteristic ingredient may not always be present in enough detail needed for exposure assessments. Furthermore, the needs differ with the agent under assessment. For example, for microbiological hazards information is needed on storage conditions, whereas for pesticides, information on processing practices is important.

To make it possible to link food consumption data and concentrations of a microbiological or chemical hazard optimally for exposure assessment purposes an FCDS is needed that meets the different requirements. Such an FCDS should cover all these requirements, and could thus also potentially serve as guidance on the information to be collected when conducting food consumption surveys and concentration data collection.

Based on the previous descriptions on chemical and microbiological hazard and food consumption data, the main requirements of an FCDS are:

1. Unequivocal food descriptions;

2. A standardised designation of foods to a food list;

3. Possibility to record descriptive properties (facet descriptors);

4. Possibility of grouping foods into broader food categories.

The FCDS should include two main parts: food description (requirements 1-3) and food classification (requirement 4).

II.12.1 - Food description

The food description part of the FCDS should make it possible to include as much detail as possible of the foods, expressed both as composite foods, ingredients and RACs, consumed and analysed to make use of the data for exposure assessments as universal as possible. This information is recorded when data is collected and put into the system. General needs on food description are:

- As simple as possible – as detailed as possible;

- As few repetitions as possible;

- Simple to expand;

- Simple and flexible to use for data capture <u>and</u> for data retrieval;

- Facilitated data aggregation;
- Descriptors must be possible to code in alphanumerical terms.

An important part of the food description system is the food list. This list should capture the requirements for exposure assessment of all domains mentioned in the previous sections. The whole list should be composed of terms which are used in different domains with their common names, scientific names and / or synonyms. Depending on the level of detail needed, terms of the food list may, by default, be connected with one or more facet descriptors to include extra information related to e.g. agricultural production, labelling, parts as eaten, and parts analysed. The items of the food list should be usable as such, without pre-linking, and expandable with selectable descriptive terms as well.

II.12.2 - Food classification

Food classification is a tool to group foods with similar characteristics into broader and more aggregated food groups, so called hierarchies. Broader groups are less homogeneous than narrower ones but are useful for browsing the system or organise the collected and analysed information in a more compact way. Browsing and grouping for reporting or presentation purposes are the main tasks of the hierarchies. However, hierarchies can be useful when matching food consumption and concentration data that are not recorded at the same level of detail. Different hierarchies are normally preferred for different tasks; therefore, the system should allow for the coexistence of multiple independent or partially interconnected hierarchies.

II.13 - Requirements related to tools for using a food classification and description system

To ensure that potential users will use the system it is important that the FCDS is, on the one hand, user friendly and intuitive and, on the other hand, computer friendly and easily automated. Furthermore, it is important that it provides advantages above other systems (e.g. covering different domains), so that potential data providers and data analyzers are willing to use it.

When using an FCDS in practice, tools need to be developed to facilitate this. For this purpose, an electronic data processing system consisting of a database plus software will be needed for the following purposes:

- To make the FCDS available to potential users;
- To administer and manage the current and historical versions of the FCDS;
- To administer a web connection;
- To provide search / retrieval functions, e. g. for coding of a particular food item or creating a query; this should also include a smart search function which do not find only terms in which the word or part of a word occurs, but also similar sounding terms and synonyms;
- To generate and process proposals for expansions and further development of the FCDS and make them available to the users.

Some tools could help to make the use of the FCDS easier:

- Input aid to accelerate and simplify data input by pre-linkages. It should contain frequent, commonly used food names. Each term would be automatically combined to an appropriate food item, linked with characteristic facet values and ordered into the multiple hierarchical relationships;

- Aids for data retrieval could eventually be needed too, in addition to the multiple hierarchies that will be provided from the start;

- A tool to ensure restricted permission of facet descriptors to different food groups in order to facilitate selection of adequate terms or values. These restrictions will also improve the overview of possible combinations.

APPENDIX III

III- FOOD LIST: EXAMPLES OF ENTRIES

The following pictures show elements from the exposure hierarchy. This hierarchy is structured into four main levels.
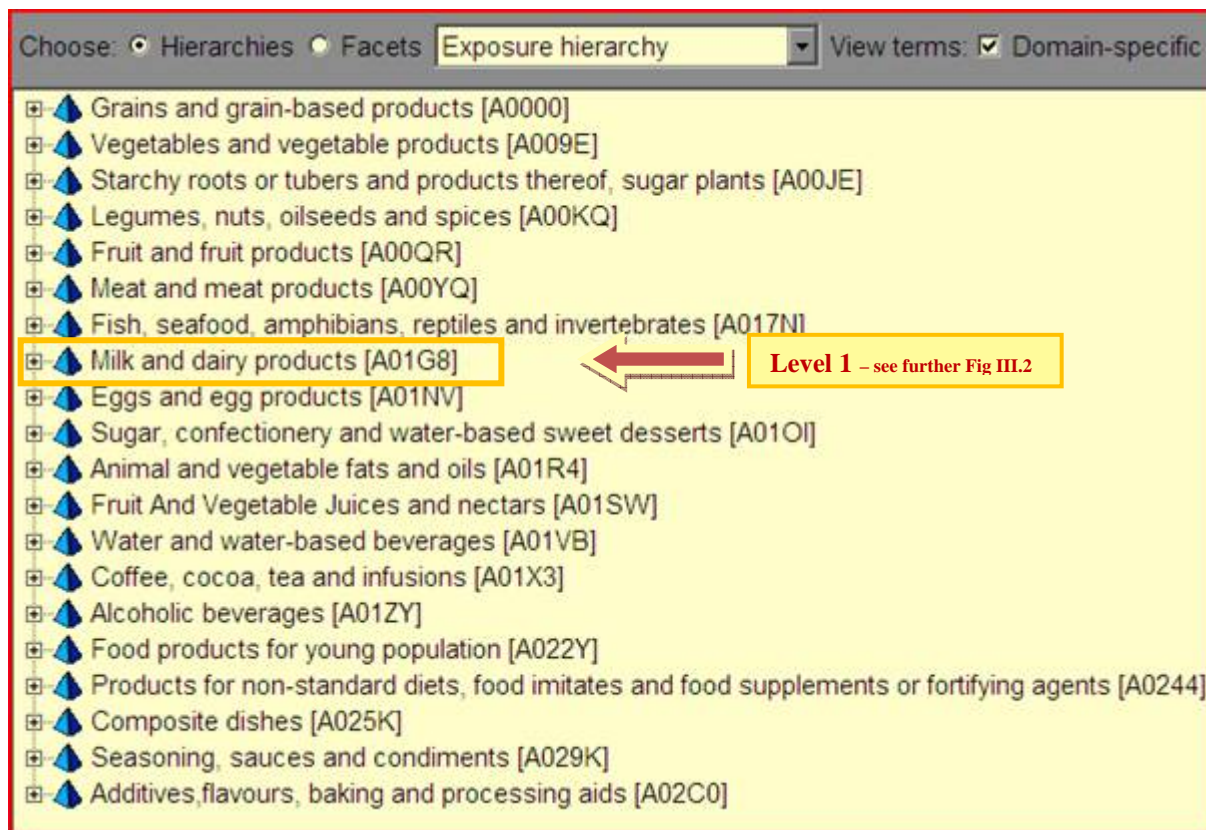
Figure III.1:   The exposure hierarchy is aggregated at the top level into 20 categories (the blue pyramid indicates that these are hierarchy elements)
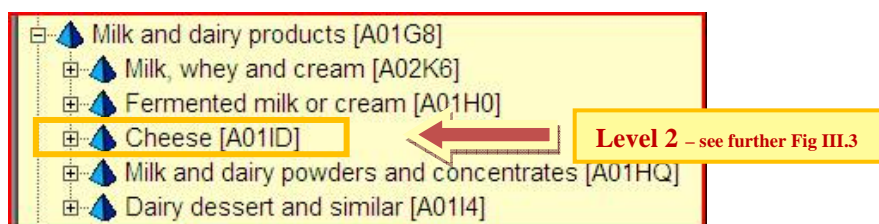
Figure III.2:   Example of level 2 groups: the five groups constituting the'Milk and dairy products' category categories (the blue pyramid indicates that these are hierarchy elements)
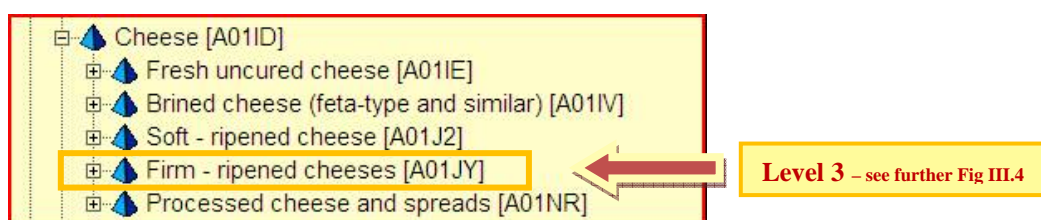
Figure III.3:   Example of level 3 sub-groups: the five subgroups of the level 2 group 'Cheese' categories (the blue pyramid indicates that these are hierarchy elements)
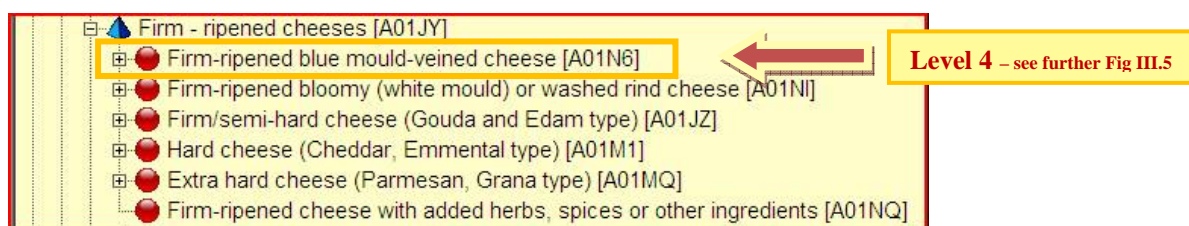
Figure III.4: Example of level 4 sub-groups: the six subgroups of the level 3 group 'Firm – ripened cheeses'. The level 4 groups correspond, in the exposure hierarchy to the core list elements categories (the red point indicates that these are core list elements)
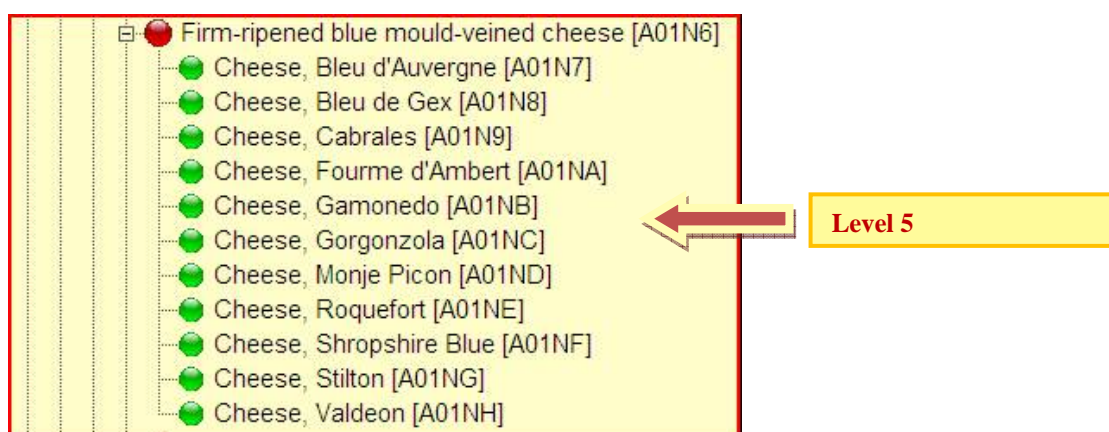
Figure III.5: Many core list elements are actually aggregating a number of extended list elements, like in the case of the different cheese types included in the 'Firm – ripened blue mould-veined cheese' group. The green point indicates the extended list elements.

Different grouping may be present in other hierarchies, though the core and extended list elements are common. As an example, in the master hierarchy, the cheese group is split in a slightly different way, introducing a new group 'Ripened cheese', aggregating the soft-ripened and firm ripened cheeses, as shown in Figure III.6

Figure III.6: Partial view of the cheese group in the master hierarchy. The group 'Ripened cheese' is present in this hierarchy but not in the exposure hierarchy.

The whole system, including different area-specific views of the system, facets and facet descriptors, is described in a specific Technical Report (EFSA, 2011d). A tool is also provided at www.efsa.europa.eu, to allow browsing through the catalogues of the FCDS and searching for specific terms.

IV- FACETS WITH EXAMPLES OF DESCRIPTORS

In this appendix the facets that were envisaged during the system development are listed. For each of them, some examples of facet descriptors are provided[36].

Source

This facet describes the plant or animal source of a food.

Usually, one descriptor from this facet can be added to each entry.

CODE	Langual code	Descriptors			Scientific name
A03B1	B1457		Chicken		Gallus gallus domesticus L.
A03B2	B1236		Turkey		Meleagris gallopavo L.
A03B3	B1316		Duck		Anas platyrhynchos domesticus L., Cairina moschata momelanotus L.
			…		
A03B4		Spinach & similar (leaves)			
A03B5	B1420		Spinach		Spinacia oleracea L.
A03B6	B1732			New Zealand spinach	Tetragonia expansa Kuntze
A03B7	B1732			New Zealand spinach	Tetragonia tetragonioides (Pallas) Kuntze
A03B8	B1717			Amaranthus	Amaranthus L. spp.
A03B9	B1150			Spinach, Indian	Basella alba L.
A03C0	B1642		Purslane		Portulaca oleracea L.
			…		

Nature / Part (of plant or animal)

This facet describes the nature of the food item or the part of plant/animal it represents.

Usually, one descriptor from this facet can be added to each entry.

CODE	Langual code	Descriptors		
A03C9		Processed vegetables		
A03D0			Primary derivatives	
A03D1	C0142			bran
A03D2				flour/meal
A03D3	C0142			germ
A03D4				groat
				…

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[36] The reported codes in the CODE field are put as an example and are not the final ones.

A03D7		Raw fish products		
A03D9	C0173		whole fish	
A04C1	C0125		fish meat	
A03D8	C0218		fish offals	
A03D6	C0176			fish liver
A03DA	C0202			fish roe
				…

Physical State

This facet describes the form of the food as reported by the consumer (Consumption Data) or as expressed in the analysis results in the laboratory (Occurrence Data). Only one descriptor in this facet should be chosen per food, apart from the specification 'with solid particle'.

This facet should only be used in case of raw foods and ingredients (not for composite foods).

CODE	Langual code	Descriptors
A0218	E0150	Whole/natural form
A021B	E0137	Slices
A021F	E0136	Powder-grounds
A021L	E0103/E0144	Semisolid-semiliquid
A021M	E0130	Liquid
		…

Characterising ingredient

This facet serves the purpose of providing information on ingredients of a composite food being important from some point of view, like allergic reactions, hazards, but also aspect, taste...

This facet only provides the header. The descriptors are taken from a selected subset of the main list (food list). More descriptors from this facet can be added to each entry.

Flavour note (when obtained by means of intensive flavours, in absence of flavouring ingredient)

This facet allows providing information on flavour or taste notes, when obtained by exclusive use of chemical or extracted flavours instead of using the named ingredient (e.g. banana flavour obtained by using commercial flavour instead of real banana). This facet only provides the header. The descriptors are taken from a selected subset of the main list (food list).

Usually, one descriptor from this facet can be added to each entry, except the case of multiple flavouring.

CODE	Langual code	Descriptors
		Fruit flavour
		…
		Chocolate flavour
		Cinnamon flavour
		Kiwi flavour

		Citrus flavour
		…

Surrounding medium in the package

This facet is intended for food packed in any container, together with any additional (usually fluid) medium. This facet is needed to allow understanding the chemically/microbiologically relevant condition of the food (intended as the food surrounded by the medium).

Usually, one descriptor from this facet can be added to each entry.

CODE	Langual code	Descriptors 1. level	Descriptors 2. level
A021S	K0021	In vegetable oil	
A021Y	K0035	In gelatine-jelly	
A021Z			In savoury gelatine
A0220			In sweet gelatine (jelly)
A0232	K0023	In sweet sauce	
A0235	K0018	In salt brine	
			…

Fat content quantitative

This is a facet with numerical descriptors, to allow providing the fat content (as percentage w/w) of a food item. This facet provides the header. The descriptor is a number to be picked from a positive list of numbers (approx. 200). It proposes numbers from 0 to 10 at interval of 0.1 and from 11 to 100 at interval of 1.

Only one descriptor from this facet can be added to each entry.

CODE	Langual code	Descriptors
		Fat content 7.5%
		Fat content 10 %
		Fat content 30%
		…

Sweetening agent

This facet allows providing information on the added ingredient(s) used to impart sweetness to a food item. This facet only provides the header. The descriptors are taken from a selected subset of the main list (food list)

More descriptors from this facet can be added to each entry.

Qualitative nutrients and ingredients related information

This facet provides some principal claims related to important nutrients / ingredients, like fat, sugar etc. It is not intended to include health claims or similar. More descriptors from this facet can be added to each entry.

CODE	Langual code	Descriptors
A02CJ		Full fat
A02CL	H0324	Low fat

A02CN		Double cream	
A02CR	H0209	With added sugar	
A02CT	P0056	Sugar free	
		…	

Alcohol content quantitative

This is a facet with numerical descriptors, to allow providing the alcohol content (as percentage v/v) of a food item. The European Union follows recommendations of the International Organization of Legal Metrology (OIML). OIML's International Recommendation No. 22 (1973) 4 provides standards for measuring alcohol strength by volume and by mass. A preference for one method over the other is not stated in the document, but in this case alcohol strength by volume is used, expressed as a percentage (%) of total volume, assuming that the water/alcohol mixture have a temperature of 20°C when measurement is done.

This facet provides the header. The descriptor is a number to be picked from a positive list of numbers (approx. 200). It proposes numbers from 0 to 10 at interval of 0.1 and from 11 to 100 at interval of 1. It should also be allowed to enter <1 for alcohol-free beer and similar.

Only one descriptor from this facet can be added to each entry.

CODE	*Langual code*	*Descriptors*
		Alcohol content 3.7 %
		Alcohol content 7.5 %
		Alcohol content 35%
		…

Dough – mass type

This facet is proposed to provide information on the original dough / mass, for bakery products. This facet only provides the header. The descriptors are taken from a selected subset of the main list (food list).

Usually, one descriptor from this facet can be added to each entry.

Cooking method

This facet allows recording the way a food item has been heat treated before consumption.

In many cases, one descriptor from this facet is added to each entry, though multiple descriptors are also a possible option in case of sequential treatments.

CODE	*Langual code*	*Descriptors 1. level*	*Descriptors 2. level*
A02CW	G0013	Cooked in water	
A02CX	G0020		Poached
A02CY	G0020		Simmered
A02CZ	G0042		Scalded
A02D0	G0014		Boiled
A02D9	G0005	Baked	
A02DC	G0008	Griddled	
A02DF	G0037	Reheated	
A02DG	G0039		Oven reheated
A02DH	G0038		Microwave reheated

| A02DI | G0041 | | Pan reheated |
| | | | ... |

Final preparation method

This facet is particularly needed for consumption surveys and includes preparation (like battering or breading) as well as heat treatment steps. It allows recording the way a food item has been prepared for final consumption.

In many cases, one descriptor from this facet is added to each entry, though multiple descriptors are also a possible option in case of sequential treatments.

CODE	Langual code	Descriptors 1. level	Descriptors 2. level
A02DL	G0013	Cooked in water	
A02DM	G0020		Poached
A02DN	G0014		Boiled
A02DS	G0025	Cooked in fat	
A02DT	G0035		Pan fried/shallow fried
A02DU	G0028		Stir fried
A02DV	G0029		Deep fried
A02E6		Caramelized	
A02EB	H0355	Chocolate coated	
			...

Preservation and hygienic improvement methods

This facet allows recording different preservation treatments a food item underwent.

More descriptors from this facet can be added to each entry, in case of preservation by combined methods.

CODE	Langual code	Descriptors 1. level	Descriptors 2. level
A02ED	J0120	Thermal treatment (heating)	
A02EG	J0135		Pasteurised
A02EI	J0147		UHT
A02ES	J0109	Treatment with chemical substances/ingredients	
A02ET	J0149		Acidified
A02EV	J0103		Preserved by salt
A02F0	H0172		Smoked
A02FG	J0142	Lowered temperature	
A02FH	J0131		Chilled
A02FI	J0136		Frozen
			...

Treatment related to the structure or nature of food

This facet allows recording different technological steps or treatments applied while producing a food item. Preservation treatments are excluded, because collected separately in another facet.

More descriptors from this facet can be added to each entry.

CODE	Langual code	Descriptors 1. level	Descriptors 2. level
A02FK		Physical division/dimension reduction	
A02FM	E0137		Sliced
A02FS	H0130	Physical/chemical modification	
A02G1	E0130		Juiced
A02GJ		Separation of fractions/subtraction of components	
A02GS			Crystallized
			...

Extent of cooking (doneness)

This facet describes the intensity of heat treatment having been applied to a food item in the categories meat, fish-seafood, vegetables, eggs, bread and similar

Only one descriptor in this facet should be chosen per food, apart from the specification 'Meat/fish/bakery/vegetables: presence of burned spots-parts'.

CODE	Langual code	Descriptors
A02H0		Meat inside 'medium
A02H1		Meat inside 'well done'
A02HC		Egg white solid
A02HD		Egg yolk liquid
		...

Packaging format (container or wrapping by form)

This facet is used for packaged food and allows recording the container or wrapping form.

Only one descriptor from this facet can usually be added to each entry.

CODE	Langual code	Descriptors
A02HG	M0197	Bag, sack or pouch
A02HH	M0213	Box
A02HI	M0214	Bottle
A02HS		Flexible formed container
A02HU	M0200	Tube
		...

Packaging material

This facet is used for packaged food and allows recording the material constituting the packaging containing the food. In case of combined material, it describes all the material, not only the part in contact with food.

Only one descriptor from this facet can be added to each entry.

CODE	Langual code	Descriptors
A02HY	M0130	Glass
A02I3	M0159	Paper

A02I8	M0172	Plastic
A02IC	M0157	Textile or fabric
		…

Part consumed / analysed

When reporting food analysed or consumed, this facet allows specifying in which form the food item was analysed or consumed.

More descriptors from this facet can be added to each entry.

CODE	Langual code	Descriptors
A02IJ	C0137	With peel
A02IN	C0140/C0230	With stone
A02IP	C0243	With bone
A02IT	C0265/C0267/C0105/C0275	With skin
		…

Production method

The facet production method describes the method used to produce the food. It is mainly applicable for foods from plant or animal origin. More than one descriptor of this facet could be chosen per food (for instance: an outdoor and organic production). This facet should only be used in case of raw foods and ingredients (not for composite foods).

Only one descriptor in this facet should be chosen per food, apart from the specification 'Use of genetically modified organisms'.

CODE	Langual code	Descriptors
A02JJ	Z0154	Domesticated / cultivated / aquaculture
A02JL	Z0153	Wild or gathered
A02JM	Z0208	Outdoor/free-range growing condition
A02JR	Z0210/Z0213	Organic production
		…

Preparation / production place

This facet allows recording the place where the food was prepared for consumption.

Only one descriptor in this facet should be chosen for each food item.

CODE	Langual code	Descriptors 1. level	Descriptors 2. level
A02JU	Z0112	Food industry prepared	
A02JW	Z0119	Restaurant or fast food prepared	
A02K0	Z0110		Restaurant prepared
A02K1		Canteen / localized catering prepared	
A02K7		Prepared by artisan	
A02K8			Prepared by bakery
			…

Target consumer group

This facet allows recording different preservation treatments a food item underwent.

More descriptors from this facet can be added to each entry, in case of preservation by combined methods.

CODE	Langual code	Descriptors 1. level	Descriptors 2. level	Descriptors 3. level
A02KC	P0024	Human food		
A02KD	P0188		Adult food	
A02KJ			Children food	
A02KK				Children food 4-8 years
A02KL				Children food 9-15 years
A02KM	A0871/A0464	Special diets		
A02KN	P0198		Diabetics	
			…	

And, for laboratory uses when reporting analyses for feed:

CODE	Langual code	Descriptors 1. level	Descriptors 2. level	Descriptors 3. level
A02KR	P0021	Animal feed		
A02KS	P0015		Feed for food animals	
A02KT	P0019			Cattle feed
A02KZ	P0158			Rabbit feed
A02L2	P0013		Food for non-food animals	
A02L4	P0028			Cat food
A02L5	P0031			Dog food
				…

Intended way of use (only for microbiological monitoring)

This facet allows recording different preservation treatments a food item underwent.

More descriptors from this facet can be added to each entry, in case of preservation by combined methods.

CODE	Langual code	Descriptors
A02L8		Ready-to-eat
A02L9		Non-ready-to-eat
A02LC		Raw and intended to be eaten raw
A02LD		raw but intended to be eaten cooked
		…

Info on microbiologically high risk ingredients (only for Microbiological monitoring)

This facet allows recording different preservation treatments a food item underwent.

More descriptors from this facet can be added to each entry, in case of preservation by combined methods.

CODE	Langual code	Descriptors
A02LE		Made from pasteurised milk
A02LG		Containing raw cream
A02LH		Containing heat-treated cream
A02LI		Containing raw eggs
		…

Type of generic entries

This facet allows recording whether the food list code was chosen because of lack of information on the food item or because the proper entry in the food list was missing.

Only one descriptor from this facet can be added to each entry.

CODE	Langual code	Descriptors	
A02LK		Unspecified	No more information was available at the time of coding than what described by the chosen term
A02LL		Other	The food item could be better specified, as more information is available than what described by the chosen term but no suitable term was found in the food list below this term. Possible need to add a new food list element.

The whole system, including different area-specific views of the system, facets and facet descriptors, is described in a specific Technical Report (EFSA, 2011d). A tool is also provided at www.efsa.europa.eu, to allow browsing through the catalogues of the FCDS and searching for specific terms.

ABBREVIATIONS AND GLOSSARY

ABBREVIATIONS

Acronym	Explanation
ADI	Acceptable daily intake
ADV	Automatisierte Datenverarbeitung
ANS	EFSA's Panel for food additives and nutrient sources added to food
ARfD	Acute Reference Dose
Art.36 project	Project granted under article 36 of Regulation (CE) No 178/2002 of the European Parliament and of the Council of 28 January 2002, laying down the general principles and requirements of food law, establishing the European Food SafetyAuthority and laying down procedures in matters of food safety.
BIOHAZ	EFSA's Panel for biological hazards
BIOMO	Biological Monitoring Unit of EFSA
BLS	Bundeslebensmittelschlüssel
CEF	EFSA's Panel for food contact materials, enzymes, flavourings and processing aids
CIAA	Confédération des Industries Agro-Alimentaires de l'UE (now FoodDrinkEurope)
CN	Combined Nomenclature
CoE	Council of Europe
COICOP	Classification Of Individual Consumption by Purpose
CONTAM	EFSA's Panel for contaminants in the food chain
COST Action 99	Research action on food consumption and composition data of the European cooperation in the field of scientific and technical research
CPA	Statistical Classification of Products by Activity
CPC	Central Classification of Products
DAFNE	Data Food Networking
DCF	EFSA's Data Collection Framework
DCM	Dietary and Chemical Monitoring Unit of EFSA
ECDC	European Centre for Disease Prevention and Control
EFCOSUM	European food consumption survey method project
EFFA	European Flavour and Fragrance Association
EFG	Euro Food Groups
EFSA	European Food Safety Authority
EPIC	European Prospective Investigation into Cancer and Nutrition
EU	European Union
EUROFIR	European Food Information Resource Network
Eurostat	EU Directorate-General – The Statistical Office of the European Communities
FAO	Food and Agriculture Organization of the United Nations
FCDS	Food classification and description system
FEEDAP	EFSA's Panel for additives and products or substances used in animal feed

FEMA	Flavour and Extract Manufacturers Association
GEMS/Food	Global Environment Monitoring System - Food Contamination Monitoring and Assessment Programme of WHO
GM	Genetically modified
GMO	EFSA's Panel for genetically modified organisms
HS	Harmonised System
INFOODS	International Network for Food Data Systems
IOFI	International Organisation of the Flavour Industries
JECFA	Joint FAO/WHO Expert Committee on Food Additives
LanguaL	Langua alimentaria – the international framework for food description
LIMS	Laboratory Information Management System
MRL	Maximum residue level
MS	Member State
NDA	EFSA's Panel for dietetic products, nutrition and allergies
PRAS	Pesticides Unit of EFSA
PRODCOM	List of PRODucts of the European COMmunity
RAC	Raw Agricultural Commodities
RASSF	Rapid Alert System for Food and Feed
SSD	EFSA's Standard Sample Description for food and feed
TDS	Total Diet Study
WG	Working Group
WHO	World Health Organization

GLOSSARY

Many different terms are used in this Guidance to identify food. A brief explanation of the meaning of such terms in the context of this document is provided:

Food Classification

A food classification is a system organising different food names into groups. The groups are defined based on commonalities or similarities primarily identified from a user viewpoint. The groups may be grouped further into broader groups, thus building a tree structure.

Food description

Food description is a collection of terms describing relevant characteristics of a food item. The information may be recorded in a complex food name or structured in different ways. Food description is used while coding, in order to maintain as much useful information as possible on the food under consideration.

Food item

Food item is a term identifying a food commonly considered as a single food or a collection of very similar variants of the same food (e.g. orange, oyster, sugar).

Food group

Food group is a term identifying a collection of food items not commonly being considered to be variants of the same food, but sharing important characteristics in terms of nature, source or use (e.g. bread and rolls)

Food sub-group

Food sub-group is a term identifying each of the narrower groups constituting a broader group (e.g. Wheat bread, Rye bread as sub-groups of Bread)

Food category

Food category is a term identifying a collection of food groups and food items, only sharing some general characteristics in terms of nature or use e.g. cereal and cereal products, alcoholic beverages. In this document, the term food category is used only for the top level groups in the hierarchies

Food list

A food list is a sequence of terms each identifying a food item, a food group or a food category. The sequence may consider all terms at the same level (flat food list) or represent a more complex relationship, where some terms are dependent (included into) on others (hierarchical food list).

Food hierarchy

A food hierarchy (also named hierarchical food list or simply hierarchy) is a structure showing logical relationships in a collection of terms. The terms represent food categories, groups, subgroups or items. The relationships are usually of parent-child type. Hierarchies are presented in tree-like structures.

Domains

Domains represent different focus subjects inside the food safety system. Each domain is a specific view of the food chain restricted by e.g. regulations or other commonly accepted ideas. Examples of domains are pesticides, zoonoses, contaminants, additives, nutrients. Different domains need different hierarchies in order to handle classification issues.