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Food data — Structure and interchange format

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National foreword

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Foreword

This document (EN 16104:2012) has been prepared by Technical Committee CEN/TC 387 “Food data”, the secretariat of which is held by SIS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2013, and conflicting national standards shall be withdrawn at the latest by June 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The term *food* generally refers to substances intended for human consumption, normally with exceptions for e.g. medicines, and includes raw or processed food products and substances used in the manufacture. The exact definition, however, may vary depending on legislation and cultural differences. This standard can be used regardless of such variations.

This standard uses *food properties* as a general term when describing food constituents such as nutrients, heavy metals, micro-organisms, but also when describing various physico-chemical properties of foods.

Food data address description and identification of foods and their food properties. They are needed and used for many purposes, e.g. labelling, product development, dietary treatment, nutritional treatment, consumer information, and research. Thus, there are many types of parties that need to generate, compile, interchange, or access detailed information about foods. These include:

— Food manufacturers

— Food analysis laboratories

— Authorities

— Researchers

— Resellers

— Retailers

— Nutritionists/dieticians

— Food distributors

— Consumers

— Restaurants/food service operators

— Software developers

The ability and need to manage food information vary between these parties. There are multiple instances of all parties mentioned, which means that the information is interchanged in a large number of relations between parties. For example, a food manufacturer may have the need to communicate food information with multiple resellers, multiple retailers, multiple distributors and multiple authorities in multiple countries, and so on.

Currently, there are differences among member states and parties in the way food data are expressed with respect e.g. food description, definition of nutrients and other food properties, and methods used to generate compositional values. A common European Standard, established within the CEN framework, is a key tool enabling unambiguous identification and description of food data and its quality in e.g. databases, for dissemination and interchange.

Several European and international initiatives have focused on improving and harmonising food data description and interchange. This standard is based on two initiatives: the EuroFIR project [11] (an EC Network of Excellence funded by the 6th Framework Programme for Research and technological Development) 2005-2010 and Food and Beverage Extension to the GS1 GDSN Trade Item standard [14].

'The Eurofir project mainly concerned specifications for documentation and interchange of data on nutrients and bioactive substances in food composition databases, while the GS1 standard was intended for use by trading partners in both the food service as well as the food retail sector. In addition, a set of use cases were developed and analysed. This standard was also aligned with the EFSA Standard Sample Description [17], and certain elements and specifications were incorporated. As a result, this standard is more innovative and broader in scope - in so far as it should be fit for the purposes of all these parties.

The main aim of the standard is to provide a framework that facilitates and enables generation, compilation, dissemination and interchange of food data that are comparable and unambiguous with respect to the identity of foods, the description of foods and food property measures including their quality. The standard is structured to be robust and flexible enough to incorporate future extensions with respect to various types of data.

This standard will make it possible for any party in a community to send understandable food data to any other receiving party in that community. However, this standard does not include all definitions that are required. For example, the set of food properties that can be used, such as contents of various nutrients and heavy metals, is not included in the standard. These and all other so called controlled vocabularies will be agreed upon within the community. An annex of the standard provides examples of required controlled vocabularies.

The reasons for not including the controlled vocabularies are:

— Most controlled vocabularies, for example with new food properties, will be constantly updated.

— Communities around the world are maintaining and using their own controlled vocabularies.

The exchange of food data among different parties requires an agreement on not only what data to exchange but also on the encoding of the data. This standard includes data encoding rules based on XML which today is the most recognised general technique for data encoding.

Figure 1 illustrates a case where food data is exchanged between databases of partners (1) in some kind of community. They want to use this standard to set up a mutual agreement (2). Apart from selecting the standard (3), such an agreement will contain selections of controlled vocabularies and restrictions on data. Most of the data specified in the standard require a controlled vocabulary to be specified (5). Such controlled vocabularies are maintained by various organisations. An agreement will select the controlled vocabularies to use. Restrictions on data will be defined (4). For example, an agreement may state that a scientific name has to be provided for all foods, despite the fact that it is not required in the standard. In addition, an agreement may specify requirements on what food properties are to be exchanged or what language to use.

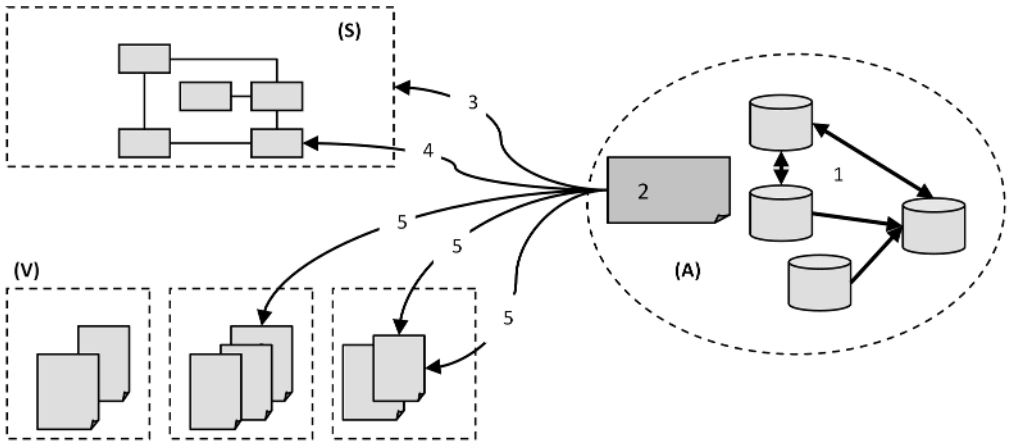

Figure 1 — Agreement for food data exchange (A) that are based on this standard (S) will also specify a set of controlled vocabularies (V).

1 Scope

This European Standard specifies requirements on the structure and semantics of food datasets and of interchange of food data for various applications.

Food data refers to information on various food properties and includes various steps in the generation and publication of such data, e.g. sampling, analysis, food description, food property and value description.

The standard regards food data as datasets covering:

— identification, description and classification of foods including food ingredients,

— qualitative and quantitative food properties that can be measured, calculated or estimated,

— data quality values and other metadata,

— specifications of methods used for obtaining these values,

— references to sources for the information reported.

This standard includes requirements on:

— semantics and data structure for food data,

— content of referenced controlled vocabularies,

— XML encoding for interchange of food data.

This standard does not include:

— food description methods,

— quality assessment methods,

— content of controlled vocabularies, for example controlled vocabularies for nutrients,

— database implementation.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
association
relation between classes

Note 1 to entry: This term refers to ISO/IEC 19501:2005 (Unified Modelling Language)[1].

2.2
attribute
characteristics of a class described by the values it can have

Note 1 to entry: This term refers to ISO/IEC 19501:2005 (Unified Modelling Language)[1].

2.3
class
definition of data for description of a certain concept

Note 1 to entry: Classes as described in ISO/IEC 19501:2005 (Unified Modelling Language) [1] may also describe operations and methods. That possibility is not used in this standard.

Note 2 to entry: A class is used as a specification of a data instance. For example a data instance of an employee may be specified by a class that specifies two attributes: the name and the salary of the employee.

Note 3 to entry: A class can be used by other classes to specify an attribute. For example, a class for dates may be used to specify a delivery date in one class and a birthday in another class.

EXAMPLE 1 A class that defines a data structure with a code representing a language and a text.

EXAMPLE 2 A class that defines a set of codes for representation of languages.

EXAMPLE 3 A class that defines a text as a sequence of characters.

2.4
class diagram
schema of associations between classes

Note 1 to entry: This term refers to ISO/IEC 19501:2005 (Unified Modelling Language) [1].

2.5
controlled vocabulary
carefully selected set of terms such that each concept from the domain of discourse is described using only one term in the set and each term in the set describes only one concept

2.6
data instance
set of data that is specified by a class

2.7
datatype class
class for specification of attributes

2.8
final preparation instruction
instruction for how to prepare a real food product to be ready-to-eat

Note 1 to entry: A food article often includes a final preparation instruction that tells how to prepare it before you can eat it.

2.9
food
substance intended for human consumption

Note 1 to entry: The term food generally refers to substances intended for human consumption, normally with exceptions for e.g. medicines, feed, cosmetics, tobacco, and includes raw or processed food products and substances used in the manufacture. The exact definition, however, may vary depending on legislation and cultural differences.

Note 2 to entry: Codex definition of food: “Food” means any substance, whether processed, semi-processed or raw, which is intended for human consumption, and includes drinks, chewing gum and any substance which has been used in the manufacture, preparation or treatment of “food” but does not include cosmetics or tobacco or substances used only as drugs (CODEX STAN 1-1985 [20]).

Note 3 to entry: EC definition of food: Food means “Any substance or product, whether processed, partially processed or unprocessed, intended to be, or reasonably expected to be ingested by humans. 'Food' includes drink, chewing gum and any substance, including water, intentionally incorporated into the food during its manufacture, preparation or treatment. It includes water after the point of compliance as defined in Article 6 of Directive 98/83/EC and without prejudice to the requirements of Directives 80/778/EEC and 98/83/EC. ‘Food’ shall not include: (a) feed; (b) live animals unless they are prepared for placing on the market for human consumption; (c) plants prior to harvesting; (d) medicinal products within the meaning of Council Directives 65/65/EEC (1) and 92/73/EEC (2); (e) cosmetics within the meaning of Council Directive 76/768/EEC (3); (f) tobacco and tobacco products within the meaning of Council Directive 89/622/EEC (4); (g) narcotic or psychotropic substances within the meaning of the United Nations Single Convention on Narcotic Drugs, 1961, and the United Nations Convention on Psychotropic Substances, 1971; (h) residues and contaminants. (Regulation (EC) No 178/2002).

2.10
food article
real food product distributed in a specific packing

EXAMPLE 1 Canned tomato soup of a certain brand and type.

EXAMPLE 2 Corn flakes package of a certain brand and intended for a specific market.

EXAMPLE 3 Apples labelled with the apple variety and name of the producer.

2.11
food data
data identifying and describing properties of foods

2.12
food dataset
identified, structured collection of records of food data that can be stored or exchanged

2.13
food description system
method for systematic description of food as a combination of characteristics

Note 1 to entry: A food description system may include procedures for capturing and retrieval of information about the food.

Note 2 to entry: A food description system defines a set of aspects to be described and a set of food descriptors for each aspect.

2.14
food descriptor
single term in a controlled vocabulary for food description

2.15
food ingredient
food that is used in production of, and still present in, another food

EXAMPLE 1 According to EC directive 2000/13, an ingredient is any substance, including additives, that is used in, and still present after (even in an altered form), the manufacture or preparation of a food.

EXAMPLE 2 According to Codex Alimentarius “Ingredient” means any substance, including a food additive, used in the manufacture or preparation of a food and present in the final product although possibly in a modified form.

2.16
food ingredient list
list describing the absolute or relative quantity or the ranking of food ingredients in a food

2.17
food label information
information written on the package of a food article

2.18
food property
qualitative or quantitative characteristic for a food that can be measured, calculated or estimated

Note 1 to entry: Content of vitamins, minerals, allergens and micro-organisms as well as physico-chemical properties such as pH and specific gravity are examples of food properties.

Note 2 to entry: Sets of food properties are defined and maintained by organisations such as EuroFIR [11], INFOODS [19], and CODEX [16] .

EXAMPLE Content of vitamin C; content of calcium; pH; viscosity; retention factor of vitamin C after boiling.

2.19
food property measure
value and unit of measure that quantifies or specifies a food property

Note 1 to entry: A food property measure may include statistical properties of the value.

2.20
food recipe
instructions on how to produce or prepare a food from a set of food ingredients

2.21
food sample
portion of a food that is assumed to represent the food

Note 1 to entry: UPAC [21] definition: portion of material selected from a larger quantity of material.

2.22
food sampling
procedure for the selection, withdrawal, preservation, transportation and preparation of the portions to be removed from a population as samples

2.23
food yield factor
value expressing the remaining compared to the original mass of a food after a certain processing or preparation

Note 1 to entry: This standard handles food yield factors as food properties.

2.24
generic food
abstraction of a food based on several occurrences of foods

Note 1 to entry: The description of a generic food is typically based on several occurrences, e.g. several food articles.

EXAMPLE 1 The food properties of a generic food "apple" may be based on samples of apples of different varieties and origin.

EXAMPLE 2 The food properties of a generic food "pasta" may be based on samples of pasta of different types and brands.

2.25
health claim
any representation that states, suggests or implies that a relationship exists between a food category, a food or one of its constituents and health

Note 1 to entry: The definition of health claim may differ somewhat between different legislation: EC 1924/2006 [24]: any claim that states suggests or implies that a relationship exists between a food category, a food or one of its constituents and health CAC/GL 23-1997 [22]: Health claim means any representation that states, suggests, or implies that a relationship exists between a food or a constituent of that food and health. Health claims include Nutrient function claims; Other function claims; Reduction of disease risk claims.

2.26
multi-ingredient food
food that is made from at least two food ingredients

2.27
nutrient claim
any representation which states, suggests or implies that a food has particular nutritional properties

Note 1 to entry: The definition of nutrient claim may differ somewhat between different legislation: EC 1924/2006 [24]: any claim which states suggests or implies that a food has particular beneficial nutritional properties. CAC/GL 23-1997 [22]: Nutrition claim means any representation which states, suggests or implies that a food has particular nutritional properties including but not limited to the energy value and to the content of protein, fat and carbohydrates, as well as the content of vitamins and minerals. The following do not constitute nutrition claims: (a) the mention of substances in the set of ingredients; (b) the mention of nutrients as a mandatory part of nutrition labelling; (c) quantitative or qualitative declaration of certain nutrients or ingredients on the label if required by national legislation.

2.28
primary food sample
portion of a food initially collected from a food

Note 1 to entry: Other definitions: IUPAC [21]: The collection of one or more increments or units initially taken from a population. The portions may be either combined (composited or bulked sample) or kept separate (gross sample). If combined and mixed to homogeneity, it is a blended bulk sample. CAC/GL 50-2004 [23]: A primary sample is the ‘portion of product’ collected from a lot during the first stage of the sampling process, and will normally be in the form of an item (if collected from a lot of prepacked products) or of an increment (if collected from a bulk lot).

2.29
real food product
food that is produced harvested or gathered in a certain way independent of package type

Note 1 to entry: A real food product may be produced using a recipe.

Note 2 to entry: A food article is a real food product that is packaged in a certain way.

Note 3 to entry: A food that is not a real food product, is a generic food.

EXAMPLE The production of a certain potato variety.

2.30
retention factor
value expressing the remaining compared to the original content of a food constituent after a certain processing or preparation

Note 1 to entry: This standard handles retention factors as food properties that are defined in a controlled vocabulary.

EXAMPLE 1 The retention factor of vitamin C after boiling.

EXAMPLE 2 The retention factor of fat after frying.

2.31
XML attribute
name-value pair within an XML element start tag

EXAMPLE The value-pair `currency="USD"` is an attribute in the following XML element:
```
<price currency="USD">12.50</price>
```

2.32
XML element
XML data encoding structure that is delimited by a start tag and an end tag

EXAMPLE
```
<employee>
    <name>John Smith</name>
    <salary>4711</salary>
</employee>
```

Note 1 to entry: In the example above there are three XML elements: *employee*, *name* and *salary*. `<name>` is a start tag and `</name>` is an end tag of the *name* element.

3 Symbols (and abbreviated terms)

3.1 UML notation

This standard uses graphical UML notation in Clause 5 and in Annex B. For a complete description of the UML notation, refer to ISO/IEC 19501:2005, *Information technology -- Open Distributed Processing -- Unified Modeling Language (UML) Version 1.4.2* [1]. For an informative explanation of the UML notation, refer to Annex A.

3.2 Abbreviated terms and acronyms

URI Uniform Resource Identifier

NOTE A URI consists of a string of characters used to identify or name a resource on the Internet. There are two types: URL (Uniform Resource Locator) which is a resources web address and URN (Uniform Resource Name) which is only a unique name of the resource.

UML Unified Modelling Language

XML Extensible Markup Language

4 Data structure

4.1 General

The data structure is specified by three UML class diagrams. The division into three class diagrams is only due to readability. Figure 2 specifies the main data structure, Figure 3 specifies the class for bibliographical references and Figure 4 contains datatype classes to be used when specifying attributes in other classes.

Each class is documented in Clause 5 by a description providing semantics and a table of the attributes and association roles that are specified for the class.

Classes with bold border lines are those that will specify data instances that have an identifier. These data instances can be referred to by other data instances and will be encoded in a special way, as described in Clause 7.

The notation of class diagrams is described in Annex A.

NOTE All names of classes, attributes and association roles are symbolic names to be maintained unchanged if this standard is translated.

4.2 Main data structure

The class diagram in Figure 2 specifies the main data structure of a food dataset.

NOTE Annex B provides data instance examples and an informal explanation of the class diagram.

Table 1 lists the classes covered by Figure 2 with a reference to the description of each class.

Table 1 — Classes in Figure 2

Class	Clause
Aggregation	5.7
ArticleInfo	5.9
Composite	5.12
Contributor	5.14
Food	5.16
Ingredient	5.19
Measure	5.21
Method	5.22
MethodStep	5.23
Property	5.29
Recipe	5.32
Sample	5.34
Source	5.35

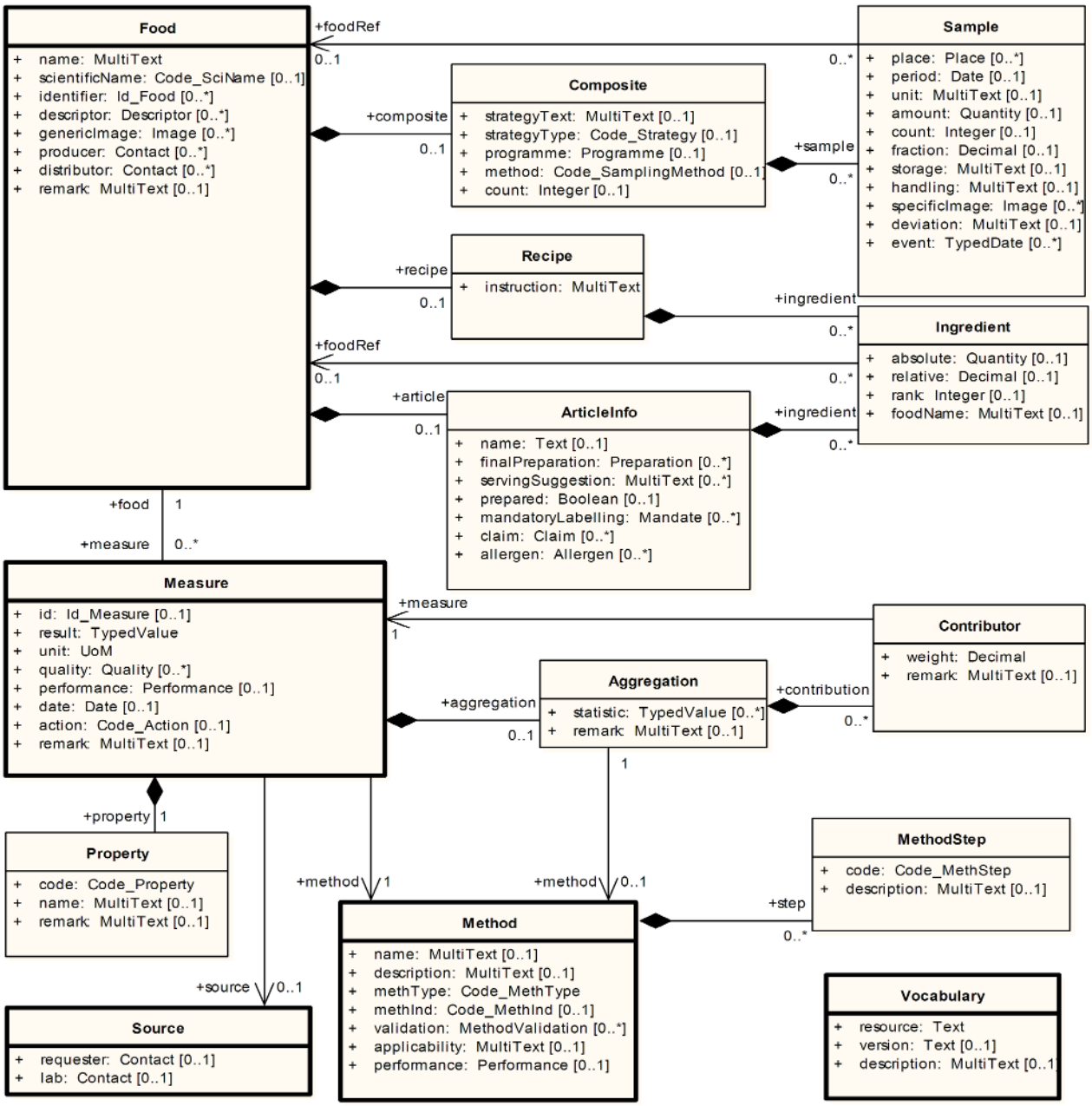

Figure 2 — Main data structure

4.3 Bibliographic references

The class diagram in Figure 3 shows the *Reference* class and the classes that have associations with it.

NOTE These associations are put in a separate class diagram to make the drawing of associations more clear.

Table 2 lists the classes covered by Figure 3 with a reference to the description of each class.

Table 2 — Classes in Figure 3

Class	Clause
Composite	5.12
Measure	5.21
Method	5.22
Recipe	5.32
Reference	5.33
Quality	5.30

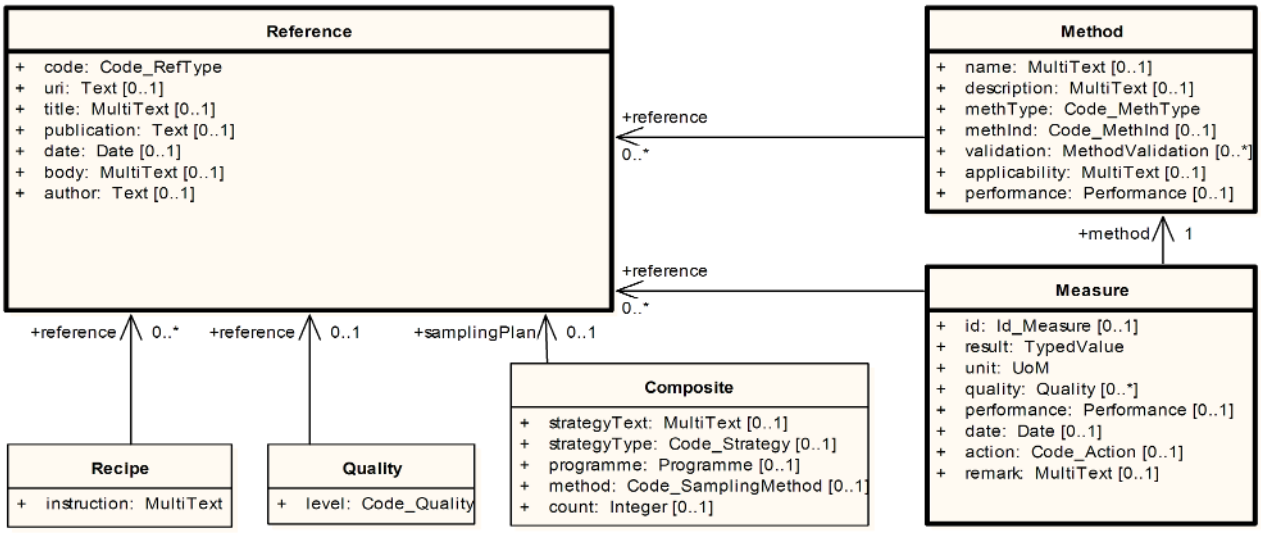

Figure 3 — Associations to the Reference class

4.4 Classes for attribute specification

The class diagram in Figure 4 describes datatype classes, that are classes used for specifying attributes. Table 3 lists the classes covered by Figure 4 with a reference to the description of each class. Classes for terms (see 5.5) and identifiers (see 5.6) are not shown in the diagram.

NOTE 1 These classes are put in a separate class diagram to make the drawing more clear.

NOTE 2 In a dataset, data instances of these classes will become parts of the data instances that are referring to them. Annex B contains many such examples, for example Figure B.5 where each *Property* data instance is part of a *Measure* data instance.

Table 3 — Classes in Figure 4

Class	Clause
Allergen	5.8
AllergenSpec	5.8
Boolean	5.2
Claim	5.10
Contact	5.13
Date	5.4
Decimal	5.2
Descriptor	5.15
Image	5.18
Integer	5.2
LangText	5.3
MethodValidation	5.24

Class	Clause
MultiText	5.3
Performance	5.25
Place	5.26
Preparation	5.27
Programme	5.28
Quality	5.30
Quantity	5.31
UoM	5.38
Text	5.3
TypedDate	5.36
TypedValue	5.37

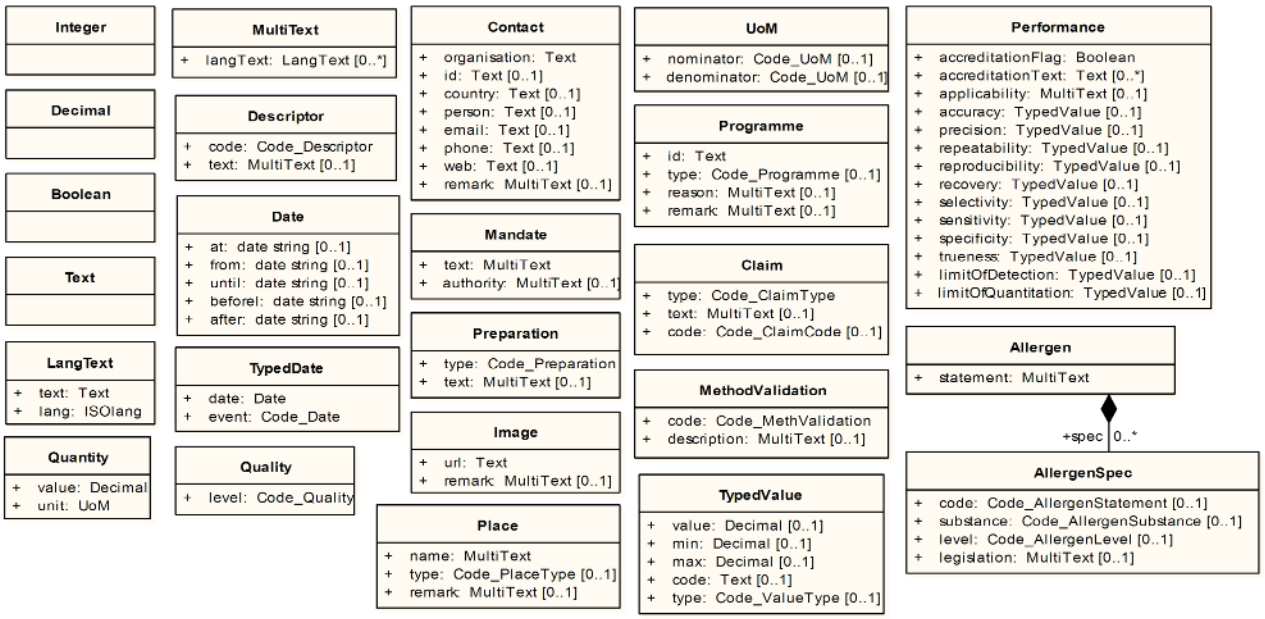

Figure 4 — Classes for attribute specification

4.5 Classes for codes of controlled vocabularies

Some attributes can be assigned codes that are defined as a term of a controlled vocabulary. When a code is assigned to such an attribute, the controlled vocabulary shall also be referred to by its identifier.

A food dataset shall specify the controlled vocabularies that data in the food dataset are referring. The *Vocabulary* class, described in 5.39, shall be used for specification of controlled vocabularies.

In the attribute specifications, each type of controlled vocabulary is a specific data type class with a name beginning with *Code_*.

EXAMPLE Code_ValueType, Code_SamplingMethod and Code_Property are examples of such classes.

NOTE 1 The Code_classes are not shown in the class diagrams.

NOTE 2 Annex D contains a list of controlled vocabularies.

4.6 Classes for identifiers

An identifier is a string of characters that is unique within a certain identifier system.

Identifiers are treated similar to codes. Each type of identifier is a specific data type class with a name beginning with *Id_*.

The *Vocabulary* class, described in 5.39, shall be used for specification of identifier systems.

EXAMPLE Id_Food and Id_Measure are examples of such classes.

NOTE 1 These classes are not shown in the class diagrams.

NOTE 2 This standard does not define any controlled vocabularies.

NOTE 3 This standard does not specify any methods for defining, publishing or accessing a controlled vocabulary. Annex D contains a list of controlled vocabularies.

5 Class descriptions

5.1 General

Clause 5 describes all classes. For most classes, attributes and association roles are described in a separate table with the columns described in Table 4.

Table 4 — Columns of tables for class description

Header	Explanation
Name	Name of the attribute or the role name of an associated class. Role names are written in italics.
Class	Name of the class to be used for the attribute or the name of the associated class. If a data instance of an associated class shall be referred to by its identifier, the class name is written in bold.
Conditions	Restrictions on number of occurrences in a dataset: Mandatory – there shall be one and only one occurrence Optional – there shall be no more than one occurrence Mandatory, repeatable – there shall be at least one occurrence Optional, repeatable – no restrictions Conditional – a more complex condition that is explained in the Semantics column In addition to this information, a condition below the table may state special constraints.
Semantics	Meaning, description and further explanations of the attribute or association.

NOTE 1 The optional condition means that you are conformant with the standard even if you don't provide data that could be provided.

NOTE 2 All names of classes, attributes and association roles are symbolic names to be maintained unchanged if this standard is translated.

5.2 Classes for numerical and logical values

Table 5 lists datatype classes for numerical and logical values.

A decimal number shall be stored and interchanged in a way that makes it possible to find out the number of significant digits.

NOTE 1 The XML encoding of a decimal number is described in Clause 6.

NOTE 2 See also TypedValue class (5.37) for a more general handling of values.

Table 5 — Classes for numerical and logical values

Class	Short description	Example
Decimal	decimal number with a certain number of significant digits	17, 3,45, 0,072
Integer	integer number	1 066
Boolean	true or false	True

NOTE 3 In this document, decimal numbers in the text and tables use a comma as a decimal separator according to ISO Directives Part 2 [7]. However, in XML encoding, a point is used for decimal separator. This is according to the W3C specification XML Schema Part 2: Datatypes [8]. Therefore, XML examples use a point for decimal separator.

5.3 Classes for text

The *Text* datatype class specifies a string of at least one character.

The *Text datatype class* shall be used for texts that are language independent. The *Text* datatype class is also used by the *LangText* datatype class.

EXAMPLE Identifiers are language independent texts.

The *LangText* datatype class, described in Table 6, shall be used to hold text in one specified language and is used by the *MultiText* datatype class only. For multi-lingual texts the *MultiText* datatype class, described in Table 7, shall be used.

Table 6 — LangText class attributes

Name	Class	Condition	Semantics
text	Text	Mandatory	String of characters forming a text in the language specified by the language attribute.
lang	ISOlang	Mandatory	A two-letter code according to ISO 639-1 [2] indicating the language, optionally followed by e dash and a two-letter country code according to ISO 3166-1 [3].

Table 7 — MultiText class attributes

Name	Class	Condition	Semantics
langText	LangText	Mandatory, repeatable	Text in different languages. One data instance of MultiText may only contain one text string in each language.

NOTE The possibilities of handling several languages may affect the selection of character encoding. It is essential that the encoding supports all the characters that may occur.

ISO 639-1 [2] lists codes for languages but does not differentiate between national variants, e.g. British and American English have the same code. Since the name for the same food may differ between language variants, it is recommended that codes for languages be combined with the country code, listed in ISO 3166-1 [3]. See also 6.9.

EXAMPLE "en" for English, "pt" for Portuguese, "en-CA" for Canadian English, "pt-BR" for Brazilian Portuguese.

5.4 Class for date and time

The *Date* class, described in Table 8, shall be used to represent points of time and periods of time. The use of attributes is dependent on what is to be expressed; see the Semantics column of Table 8.

A point of time shall be represented by a string that follows the pattern: CCYY-MM-DDThh:mm:ss where CCYY is the year, including century, MM is the month (01 to 12), DD is the day of the month (01 to 28, 29, 30 or 31), hh is the hour (00 to 23), mm is the minute (00 to 59) and ss is the second (00 to 59).

To give a point of time with less precision, one of the following patterns shall be used:
CCYY-MM-DD, CCYY-MM or CCYY.

EXAMPLE 1 2009-12-24

EXAMPLE 2 2010-01

EXAMPLE 3 2012-01-13T17:45:00

Table 8 — Date class attributes

Name	Class	Condition	Semantics
at	string representing a point of time	Conditional	When the Date data type shall be used to specify a certain point of time, the *at* attribute shall hold the date string.
from	string representing a point of time	Conditional	When the Date data type shall be used to specify a limited period of time, the *from* and *until* attributes shall hold the date strings for the start and end of the period.
until	string representing a point of time	Conditional	When the Date data type shall be used to specify a limited period of time, the *from* and *until* attributes shall hold the date strings for the start and end of the period.
before	string representing a point of time	Conditional	When the Date data type shall be used to specify a period of time without a defined start, the *before* attribute shall hold the date string for the first point of time after the period.
after	string representing a point of time	Conditional	When the Date data type shall be used to specify a period of time without a defined end, the *after* attribute shall hold the date string for the last point of time before the period.

NOTE See 6.8 for more examples and 5.36 for the use of Date in TypedDate.

5.5 Code_ classes, for attributes based on controlled vocabularies

Attributes that may be assigned a code from a limited set of possible codes, have the datatype specified by a class with a name beginning with *Code_*. Such a class has attributes specifying the code, the controlled vocabulary and, optionally, the set of valid codes.

The specification of the controlled vocabulary shall be an identifier containing any printable characters (excluding space, tab, etc.). In the dataset, a data instance of the *Vocabulary* class shall bind the identifier to a source where the set of codes is specified. The source may be used by an application when validating a code.

However, since an XML schema is used for validation of a dataset, it is also possible to extend the XML schema by defining a set of valid codes to the dataset. This makes it possible to validate the codes prior to the processing of an application and may be suitable for small and stable controlled vocabularies, such as the set of value types (e.g. "as reported", "average", "maximum"). As an alternative, it is possible to specify, rather than the complete set of terms, a character pattern that can be used to check that a term is likely to be valid.

See 6.12 for how to make such an extension of the XML schema.

Table 9 — Code_ classes attributes and associations

Name	Class	Condition	Semantics
cv	Vocabulary	Mandatory	Identifier for the controlled vocabulary. Shall be bound by the use of the Vocabulary class to a source where the codes are specified.
code	Text	Mandatory	The code identifying the term.
type	See 6.12	Optional	Specification of valid codes.

NOTE 1 A controlled vocabulary contains a set of terms. The code provided is the identifier of the term.

NOTE 2 It is possible to use more than one controlled vocabulary for a certain datatype class.

NOTE 3 This standard does not specify the controlled vocabularies to use.

NOTE 4 Annex D lists examples of controlled vocabularies.

NOTE 5 The encoding of Code_ classes is different from the encoding of other classes; see 6.12.

EXAMPLE 1 Tables B.1 to B.12 in Annex B contain examples of data instances of the Vocabulary class.

EXAMPLE 2 A character pattern for LanguaL Facet A would be the letter A followed by four digits.

EXAMPLE 3 6.11 shows how a set of terms optionally can be bound to the Code_ValueType data type: To the right is the source for the controlled vocabulary, in this case a list of codes and explanations maintained by EuroFIR. The codes are listed in a new XML declaration (CV_EFV) that can be used instead of the original declaration (Code_ValueType). The dataset (to the left) contains data that refers to the controlled vocabulary as well as to the new XML declaration.

5.6 Id_ classes, for identifiers

Attributes that may be assigned an identifier that belongs to a certain identifier system, have the datatype specified by a class with a name beginning with *Id_*. Such a class has attributes specifying the code, the identifier system and, optionally, the character pattern of valid identifiers.

NOTE The encoding is described in 6.13.

EXAMPLE *Id_Food* is a datatype class for Food identifiers. An implementation may restrict the identifiers to be five digits by providing a datatype class named *Id_MyLab* based on *Id_Food*.

Table 10 — Id_ classes attributes and associations

Name	Class	Condition	Semantics
sys	Vocabulary	Mandatory	Identifier of the identifier system which is regarded as a controlled vocabulary. Shall be bound by the use of the Vocabulary class to a source where the identifier system is specified.
id	Text	Mandatory	The identifier string.
type	See 6.13	Optional	Specification of valid identifiers.

5.7 Aggregation class

The *Aggregation* class, described in Table 11, provides a way to give detailed information about the data that were used to produce a resulting food property measure. It shall be used to document the methods used for calculation, analysis and selection of a food property measure together with various statistical results.

To document all contributing and aggregated measures, associations to data instances of the *Contributor* class shall be made. This documentation is optional.

Table 11 — Aggregation class attributes and associations

Name	Class	Condition	Semantics
statistic	TypedValue	Optional, repeatable	Statistical values about the set of contributing measures in the aggregation, such as mean, median and standard deviation
remark	MultiText	Optional	Any remark of the aggregation.
contribution	Contributor	Optional, repeatable	Measures contributing to the resulting measure.
method	**Method**	Optional	Specification of the method that was used to produce the food property measure from the set of contributing measures in an aggregation.

5.8 Allergen class, AllergenSpec class, Code_Allergen classes

The *Allergen* class, described in Table 12, shall be used to specify an allergen statement.

The allergen statement shall be specified as a text and one or more allergens related to that statement.

Table 12 — Allergen class attributes

Name	Class	Condition	Semantics
statement	MultiText	Mandatory	Allergen statement
spec	AllergenSpec	Optional, repeatable	Specification of allergens

The *AllergenSpec* class, described in Table 13, shall be used to specify an allergen.

The *Code_AllergenStatement* class shall be based on a controlled vocabulary with codes identifying allergen statements.

The *Code_AllergenSubstance* class shall be based on a controlled vocabulary with codes identifying allergens.

The *Code_AllergenLevel* class shall be based on a controlled vocabulary with codes identifying levels of allergen content.

EXAMPLE "may contain traces of".

Table 13 — AllergenSpec class attributes

Name	Class	Condition	Semantics
code	Code_AllergenStatement	Optional	Code for allergen statement
substance	Code_AllergenSubstance	Optional	Code for allergen substance
level	Code_AllergenLevel	Optional	Code specifying the level
legislation	MultiText	Optional	Text specifying the allergen legislation

5.9 ArticleInfo class

The *ArticleInfo* class, described in Table 14, shall be used to document food article information. Typically this is information provided for the customer, such as the information on the package.

Table 14 — ArticleInfo class attributes

Name	Class	Condition	Semantics
name	Text	Optional	Language independent name such as brand name or other commercial name that is associated with the article.
finalPreparation	Preparation	Optional, repeatable	Final preparation instruction.
servingSuggestions	MultiText	Optional, repeatable	Serving suggestions.
prepared	Boolean	Optional	True if the food is ready-to-eat as it is, false otherwise.
mandatoryLabelling	Mandate	Optional, repeatable	Mandate or regulatory text and the authority behind it.
claim	Claim	Optional, repeatable	Food claim(s), for example about health and nutrition.
allergen	Allergen	Optional, repeatable	Allergen information.
ingredient	Ingredient	Optional, repeatable	Ingredients that are provided as food article information.

5.10 Claim class, Code_ClaimType class, Code_ClaimCode class

The *Claim* class, described in Table 15, shall be used to specify a claim related to a food article. The claim shall be specified as a text and/or a code.

Allergen related information shall be specified using the *Allergen* class and shall not be treaded as claims.

The *Code_ClaimType* class shall be based on a controlled vocabulary with codes identifying a certain type of claim.

EXAMPLE "claim of health" , "claim of nutrition"

The *Code_ClaimCode* class shall be based on a controlled vocabulary with codes identifying a certain claim.

Table 15 — Claim class attributes

Name	Class	Condition	Semantics
type	Code_ClaimType	Mandatory	Code for type of claim.
text	MultiText	Optional	Text expressing the claim.
code	Code_ClaimCode	Optional	Code specifying the claim.

At least one of attributes *text* and *code* shall be used.

5.11 Code_SciName class

This class shall be used for scientific food names. Values shall be defined by a controlled vocabulary or, when agreed, as a text that should adhere to the following format: Genus species Author[, Year] e.g. Gadus morhua Linnaeus, 1758.

5.12 Composite class, Code_Strategy class, Code_SamplingMethod class

The *Composite* class, described in Table 16, shall be used to describe a food composite.

Table 16 — Composite class attributes and associations

Name	Class	Condition	Semantics
strategyText	MultiText	Optional	Brief description of the sampling strategy.
strategyType	Code_Strategy	Optional	Type of strategy.
programme	Programme	Optional	Control programme or sampling programme to which the food composite belongs.
method	Code_SamplingMethod	Optional	Sampling method that was used.
count	Integer	Optional	Number of individual samples in the composite.
sample	Sample	Optional, repeatable	Food samples of the food composite.
samplingPlan	**Reference**	Optional	Reference to document describing the sampling plan.

The *Code_Strategy* class shall be specialised for a controlled vocabulary with terms describing representing various sampling strategies.

EXAMPLE Sampling strategies may be "by market shares" or "equal parts".

The *Code_SamplingMethod* class shall be specialised for a controlled vocabulary with terms representing various sampling methods.

5.13 Contact class

The *Contact* class, described in Table 17, shall be used to identify an organisation and provide information of a point of contact in that organisation.

Table 17 — Contact class attributes

Name	Class	Condition	Semantics
organisation	Text	Mandatory	Name of the organisation
id	Text	Optional	Coded identity of the organisation
country	Text	Optional	Country of the organisation
person	Text	Optional	Name of a person in the organisation
email	Text	Optional	E-mail address to be used for contact
phone	Text	Optional	Telephone number to be used for contact
web	Text	Optional	URL to be used for contact
remark	MultiText	Optional	Remark about the point of contact

5.14 Contributor class

The *Contributor* class, described in Table 18, shall be used to document contribution of a food property measure to the resulting food property measure.

EXAMPLE A set of measures of vitamin C of food samples from different apples can contribute to a mean value calculation to provide a quantity of vitamin C for a generic apple.

Table 18 — Contributor class attributes and associations

Name	Class	Condition	Semantics
weight	Decimal	Mandatory	A factor that is used to make different contributions have different influences on the result.
remark	MultiText	Optional	Remarks about the contribution.
measure	**Measure**	Mandatory	A reference to the contributing food property measure.

NOTE A weighted mean value can be calculated as the sum of each value multiplied by its weight, followed by a division by the sum of all weights.

5.15 Descriptor class, Code_Descriptor class

A food description system defines methods for systematic description of various aspects of foods. Each aspect is described by selection from a set of food descriptors.

The *Descriptor* class, described in Table 19, shall be used for specifying a food descriptor.

The *Code_Descriptor* class shall be based on a controlled vocabulary with terms representing food descriptors of a food description system. In addition to a code and an explanatory text, the term shall also

include a descriptive name in one or more languages. In order to avoid misinterpretation, the name shall be unique within the vocabulary for a selected language. In addition to this, there may be other information.

EXAMPLE LanguaL [12] is a food description system with several food description vocabularies called LanguaL facets. LanguaL facet C addresses a food descriptor type for "part of plant or animal" including food descriptors such as leaf, fruit and organ meat.

NOTE This standard does not define any food description vocabularies.

Table 19 — Descriptor class attributes

Name	Class	Condition	Semantics
code	Code_Descriptor	Mandatory	Food descriptor code.
text	MultiText	Optional	Text that can be used for further explanation of the food descriptor.

5.16 Food class

The *Food* class, described in Table 20, shall be used to describe and identify a food.

NOTE For example, a generic food, a food article, or a multi-ingredient food may be described.

Table 20 — Food class attributes and associations

Name	Class	Condition	Semantics
name	MultiText	Mandatory	The name of the food in one or several languages.
scientificName	Code_SciName	Optional	Scientific food name that should adhere to the following format: Genus species Author[, Year] e.g. Gadus morhua Linnaeus, 1758
identifier	Id_Food	Optional, repeatable	Identifier of the food in a selected identification system, for example an article numbering system. The identifier system is regarded as a controlled vocabulary. Identifiers for different identification systems may be provided but no more than one identifier shall be provided for each identification system.
descriptor	Descriptor	Optional, repeatable	Food descriptors characterising the food.
genericImage	Image	Optional, repeatable	The URI of an image showing foods similar to the described food.
producer	Contact	Optional, repeatable	Contact information of the manufacturer or producer of the food. NOTE A farmer is regarded as a manufacturer.
distributor	Contact	Optional, repeatable	Contact information of the distributor of the food.
remark	MultiText	Optional	Any further information about the food.
article	ArticleInfo	Optional	Food article information, for example documented on the package.
recipe	Recipe	Optional	Food recipe with instructions for how to produce the food from the food ingredients.
composite	Composite	Optional	Food composite consisting of food samples.
measure	**Measure**	Optional, repeatable	Food property measures of the food.

5.17 Id_Food class

One main purpose of a food identification system is to provide a means for registering a search of real food products as well as generic foods. A food identification system is supposed to include a systematic method to assign each food an identifier. In this standard, the set of identifiers of a food identification system is regarded as a controlled vocabulary. This class shall be used to represent an identifier of a food defined in such a food identification system.

EXAMPLE 1 GS1 article numbering system [15] is a food identification system for e.g. food articles.

EXAMPLE 2 Codex Alimentarius Food Standards [16] is a food identification system.

NOTE This standard does not define any food identifiers.

5.18 Image class

The *Image* class, described in Table 21, shall be used to address an image using a URI.

Table 21 — Image class attributes

Name	Class	Condition	Semantics
uri	Text	Mandatory	Internet identification of the image file.
remark	MultiText	Optional	Remark about the image.

5.19 Ingredient class

The *Ingredient* class, described in Table 22, shall be used to represent a food ingredient in a food recipe, on a food ingredient label of a food article package or any kind of food ingredient list. Each food ingredient shall be identified either by a name or by a reference to a data instance of the *Food* class.

The food contribution may be specified either by an absolute quantity, a relative quantity, or by a ranking number.

EXAMPLE 1 400 g is an absolute quantity.

EXAMPLE 2 45 % is a relative quantity.

EXAMPLE 3 A food ingredient with a ranking index of 1 gives a greater contribution than one with the ranking index of 2.

Table 22 — Ingredient attributes

Name	Class	Condition	Semantics
absolute	Quantity	Optional	Absolute quantity of the food ingredient.
relative	Decimal	Optional	Relative quantity of the food ingredient.
rank	Integer	Optional	Ranking index. A low ranking index indicates a greater contribution than a high one.
foodName	MultiText	Optional	Name of the food constituting the food ingredient.
foodRef	**Food**	Optional	Reference to a Food data instance of the food constituting the food ingredient.

Either *foodName* or *foodRef* shall be provided.

NOTE The relative quantity may be provided as a fraction, a percentage or as an integer value, but it is essential that all relative quantities be provided the same way for a certain list of food ingredients.

5.20 Mandate class

The *Mandate* class, described in Table 23, shall be used for a mandate or regulatory text and the for the authority behind it.

Table 23 — Mandate class attributes

Name	Class	Condition	Semantics
text	MultiText	Mandatory	Mandate or regulatory text.
authority	MultiText	Optional	The authority behind the mandate or regulatory text.

5.21 Measure class, Id_Measure class, Code_Action class

The *Measure* class, described in Table 24, shall be used to represent food property measures, that is, the quantities of food properties. A data instance of the class documents a measure of a food property of a food.

The *Id_Measure* class shall be specialised for a specific identifier system.

The *Code_Action* class shall be specialised for a controlled vocabulary with terms describing various actions that can be taken.

Table 24 — Measure class attributes and associations

Name	Class	Condition	Semantics
id	Id_Measure	Optional	Identifier of the food property measure.
result	TypedValue	Mandatory	Resulting value of the food property measure.
unit	UoM	Mandatory	Unit of measure that together with the resulting value describes the food property measure.
quality	Quality	Optional, repeatable	Data quality reports regarding the food property measure.
performance	Performance	Optional	Laboratory performance values.
date	Date	Optional	Date when the result was generated.
action	Code_Action	Optional	Action to be taken due to the result.
remark	MultiText	Optional	Remarks about the food property measure.
aggregation	Aggregation	Optional	Documentation of data and methods that was used to produce the food property measure.
property	Property	Mandatory	Measured food property.
food	**Food**	Mandatory	The food that this food property measure is describing.
method	**Method**	Mandatory	Description of method that was used to get the result.
source	**Source**	Optional	Laboratory and/or other body that provided the food property measure information.
reference	**Reference**	Optional, repeatable	Bibliographical references, e.g. journal article or laboratory report.

5.22 Method class, Code_MethType class, Code_MethInd class

The *Method* class, described in Table 25, shall be used to describe the analytical, mathematical or other type of method for producing a food property measure. The method itself as well as its laboratory performance is described.

A method shall be described by the *methType* attribute and, when more details about the method are required, by the *methInd* attribute. The *Code_MethType* class and the *Code_MethInd* class shall be specialised for controlled vocabularies.

Table 25 — Method class attributes and associations

Name	Class	Condition	Semantics
name	MultiText	Optional	Name of the method.
description	MultiText	Optional	Textual description of the method.
methType	Code_MethType	Mandatory	Code for type of method that was used to obtain the associated value, e.g. analytical, calculated and imputed or estimated values. More specific information on the method can be specified using the indCode attribute and other attributes.
methInd	Code_MethInd	Optional	Code for further specification of the method used to obtain a measure, including analysis, calculation and imputation.
validation	MethodValidation	Optional, repeatable	Description of means for validation of the method, for example quantification procedure, confirmation procedure, quality control and use of reference materials and methods.
applicability	MultiText	Optional	Substances, foods, and concentrations for which the method may be used satisfactorily.
performance	Performance	Optional	Laboratory performance values.
step	MethodStep	Optional, repeatable	For an analytical method, a description of each step that is executed, for example extraction, separation, detection and quantification.
reference	**Reference**	Optional, repeatable	Publication providing information about the method.

One data instance of the *Method* class can be referred by several data instances of other classes. Figure 2 in 4.2 shows the classes that refer the *Method* class.

5.23 MethodStep class, Code_MethStep class

The *MethodStep* class, described in Table 26, shall be used to specify an analytical step of a method.

The *Code_MethStep* class shall be specialised for a controlled vocabulary with terms describing method steps.

Table 26 — MethodStep class attributes

Name	Class	Condition	Semantics
code	Code_MethStep	Mandatory	Code for method step.
description	MultiText	Optional	Further description of the method step.

5.24 MethodValidation class, Code_MethValidation class

The *MethodValidation* class, described in Table 27, shall be used to specify a means of validation for a method.

The *Code_MethValidation* class shall be specialised for a controlled vocabulary with terms describing means of validation.

Table 27 — MethodValidation class attributes

Name	Class	Condition	Semantics
code	Code_MethValidation	Mandatory	Code for means of validation.
description	MultiText	Optional	Further description of the means of validation.

5.25 Performance class

The *Performance* class, described in Table 28, shall be used to document the laboratory performance.

Table 28 — Performance class attributes

Name	Class	Condition	Semantics
accreditationFlag	Boolean	Mandatory	Is true when a laboratory is accredited.
accreditationText	Text	Optional, repeatable	Abbreviation for accreditation organisation or system, or official method. EXAMPLE EN 12821
applicability	MultiText	Optional	Substances, foods, and concentrations for which the method may be used satisfactorily.
accuracy	TypedValue	Optional	Laboratory performance value expressing the closeness of agreement between a measurement result using the method and the true value.
precision	TypedValue	Optional	Laboratory performance value for the closeness of agreement between independent measurement results using the method and obtained under stipulated conditions.
repeatability	TypedValue	Optional	Laboratory performance value that with a probability of 95 % will be greater than the absolute difference between two single test results obtained using the method under repeatability conditions such as same sample, same operator, same apparatus, same laboratory, and during a short interval of time.
reproducibility	TypedValue	Optional	Inter-laboratory performance value that with a probability of 95 % will be greater than the absolute difference between single test results obtained when using the method on identical material but by operators in different laboratories.
recovery	TypedValue	Optional	Laboratory performance value that indicates the proportion of the amount of the analyzed constituent present or added to the test material which is extracted and presented for measurement using the method.
selectivity	TypedValue	Optional	Laboratory performance value expressing the extent to which the method can determine the analyzed constituent in a food sample without interferences from other components of similar behaviour.
sensitivity	TypedValue	Optional	Laboratory performance value expressing the quotient of the change in the indication of a measuring system and the corresponding change in the value of the quantity being measured.
specificity	TypedValue	Optional	Laboratory performance value expressing the freedom from interference effects. It reflects the ability of the instrumentation to measure only the signal of the determined element.
trueness	TypedValue	Optional	Closeness of agreement between the average value obtained from a large series of test results and an accepted reference value (IMEKO [18])”
limitOfDetection	TypedValue	Optional	Measured quantity value, obtained by a given measurement procedure, for which the probability of falsely claiming the absence of a component in a material is β, given a probability α of falsely claiming its presence (IMEKO [18])
limitOfQuantitation	TypedValue	Optional	Lowest amount of an analyte in a sample that can be quantitatively determined with suitable precision and accuracy.

5.26 Place class, Code_PlaceType class

The *Place* class, described in Table 29, shall be used to specify a location where a food sample was purchased, harvested, etc.

The *Code_PlaceType* class shall be based on a controlled vocabulary with codes identifying various types of locations.

EXAMPLE Type of locations may be "retailer", "wholesaler", "market place", "field".

Table 29 — Place class attributes

Name	Class	Condition	Semantics
name	MultiText	Mandatory	Name of a geographical location where sampling took place, e.g. a town, a lake, a river or a sea.
type	Code_PlaceType	Optional	Type of location of sampling.
remark	MultiText	Optional	Other remarks about the place.

5.27 Preparation class, Code_Preparation class

The *Preparation* class, described in Table 30, shall be used to specify a preparation of a food.

The *Code_Preparation* class shall be based on a controlled vocabulary with codes identifying various types of preparations.

EXAMPLE Type of preparation may be "in a soup" or "as a main dish".

Table 30 — Preparation class attributes

Name	Class	Condition	Semantics
type	Code_Preparation	Mandatory	Code for type of preparation.
text	MultiText	Optional	Text describing preparation.

5.28 Programme class, Code_Programme class

The *Programme* class, described in Table 31, shall be used to specify a control programme or sampling programme.

Table 31 — Programme class attributes and associations

Name	Class	Condition	Semantics
id	Text	Mandatory	Programme identification.
type	Code_Programme	Optional	Type of programme.
reason	MultiText	Optional	Description of the reason for initiating the programme.
remark	MultiText	Optional	Other remarks.

The *Code_Programme* class shall be specialised for a controlled vocabulary with terms describing types of programmes.

5.29 Property class, Code_Property class

The *Property* class, described in Table 32, shall be used to represent a certain food property.

Each food property shall be defined in a controlled vocabulary.

NOTE 1 For maintenance reasons, food properties may be organised into groups, each listed in a controlled vocabulary. For example, nutrients could be such a group and the food property vocabulary could contain terms such as fructose and folic acid.

NOTE 2 This standard does not define any food property vocabularies.

The *Code_Property* class shall be specialised for a controlled vocabulary with terms describing food properties.

Table 32 — Property class attributes

Name	Class	Condition	Semantics
code	Code_Property	Mandatory	Food property code.
name	MultiText	Optional	Name of the food property.
remark	MultiText	Optional	Remarks in the context of the specific food.

5.30 Quality class, Code_Quality class

A quality assessment system provides methods for evaluating and documenting various aspects of data quality. The *Quality* class, described in Table 33, shall be used to describe a data quality level according to a specific quality assessment system.

The *Code_Quality* class shall be used for describing data quality levels according to a specific quality assessment system and shall be specialised for a controlled vocabulary with terms describing quality levels of a quality assessment system or specialised for a continuous range of level values.

Table 33 — Quality class attributes

Name	Class	Condition	Semantics
level	Code_Quality	Mandatory	Quality level.
reference	**Reference**	Optional	Reference to quality assessment system documentation.

EXAMPLE 1 A quality system may have grades A, B, C and D. This set of grades can be described as a controlled vocabulary.

EXAMPLE 2 A quality system may have any value between 0 and 1. This range can be described as a restriction of values.

NOTE 1 This standard does not define any quality assessment systems.

NOTE 2 A system for quality assessment and quality index attribution to original data from scientific literature and laboratory reports is proposed by EuroFIR [8]. The quality evaluation addresses aspects such as food description, food

property identification, sample handling and analytical method. Each aspect receives a score: 5 for high quality, 3 for intermediate quality, and 1 for low quality. All scores are then summed to form a quality index.

5.31 Quantity class

The *Quantity* class, described in Table 34, shall be used for describing a quantity using a numerical value and a unit of measure.

Table 34 — Quantity class attributes

Name	Class	Condition	Semantics
value	Decimal	Mandatory	Value
unit	UoM	Mandatory	Unit of measure

5.32 Recipe class

The *Recipe* class, described in Table 35, shall be used to document a food recipe.

Table 35 — Recipe class attributes and associations

Name	Class	Condition	Semantics
instruction	MultiText	Mandatory	Instruction on how to produce a food from a set of ingredients.
ingredient	Ingredient	Optional, repeatable	Ingredients of the recipe.
reference	**Reference**	Optional, repeatable	Publication on which the recipe was based.

5.33 Reference class, Code_RefType class

The *Reference* class, described in Table 36, shall be used to document bibliographical information.

The *Code_RefType* class shall be specialised for a controlled vocabulary with terms representing the categories of bibliographical references.

NOTE In this standard, terms from a reference type vocabulary are used for documents that are sources of data for methods, food recipes, food property measures, etc.

Table 36 — Reference class attributes

Name	Class	Condition	Semantics
code	Code_RefType	Mandatory	Code for the category of bibliographical reference
uri	Text	Optional	Internet identification of the publication
title	MultiText	Optional	Title of publication
publication	Text	Optional	
date	Date	Optional	Publication date
body	MultiText	Optional	
author	Text	Optional	

At least one of attributes *uri* and *title* shall be provided.

One data instance of the *Reference* class can be referred by several data instances of other classes.

5.34 Sample class

The *Sample* class, described in Table 37, shall be used to describe a primary food sample.

Table 37 — Sample class attributes and associations

Name	Class	Condition	Semantics
place	Place	Optional, repeatable	Place name of location where the food sample was purchased, harvested, etc.
period	Date	Optional	Start and end dates of the period of time when the food samples were taken open periods without a defined start or without a defined end may also be specified.
unit	MultiText	Optional	The part of the food that was used as a food sample. For example a piece of a fruit or a loaf of bread.
amount	Quantity	Optional	The quantity that constitutes the primary food sample. For example 50 grams.
count	Integer	Optional	The number of units that constitutes the primary food sample. For example 10 fruits.
fraction	Decimal	Optional	The fraction that constitutes the primary food sample. For example 0,1 for 10 % of the composite.
storage	MultiText	Optional	Storage conditions and duration in the laboratory before the start of the analytical process.
handling	MultiText	Optional	Handling of food samples before arrival at laboratory, e.g. transport, storage conditions and duration.
specificImage	Image	Optional, repeatable	The location of an image showing the sample.
deviation	MultiText	Optional	Description of a deviation from the sampling plan.
event	TypedDate	Optional, repeatable	Dates of events associated with the sample, e.g. arrival of food samples at the laboratory and "best before".
foodRef	**Food**	Optional	The real food product that the sample was taken from.

5.35 Source

The *Source* class, described in Table 38, shall be used to document the information source of a food property measure.

Table 38 — Source class attributes

Name	Class	Condition	Semantics
requester	Contact	Optional	Body that initially requested the analysis.
lab	Contact	Optional	Laboratory that made the analysis.

5.36 TypedDate class, Code_Date class

The *TypedDate* class, described in Table 39, shall be used to represent the date of a specified event.

EXAMPLE "Arrival date", "best before date" and "use by date" dates of a sample.

The *Code_Date* class shall be specialised for a controlled vocabulary with terms representing various types of dates or events.

Table 39 — TypedDate class attributes

Name	Class	Condition	Semantics
date	Date	Mandatory	The date of an event.
event	Code_Date	Mandatory	Code for the type of event.

5.37 TypedValue class, Code_ValueType

The *TypedValue* class, described in Table 40, shall be used to represent a value including a type, that is, information of its relation to a food property measure.

The value shall be either a single numerical value (attribute *value*), an interval represented by a pair of numerical values (the *min* and *max* attributes) or a text of a codified value (attribute *code*).

When relevant, the *mu* attribute may be used to provide a symmetrical measurement uncertainty of the value.

EXAMPLE 5,25 ± 0,02 is specified by a *value* attribute of 5,25 and a *mu* attribute of 0,02.

The *Code_ValueType* class shall be specialised for a controlled vocabulary with terms representing various types of values.

Table 40 — TypedValue class attributes

Name	Class	Condition	Semantics
value	Decimal	Conditional	The value, mandatory if it is a single numerical value.
min	Decimal	Conditional	The minimum value, mandatory if it is an interval.
max	Decimal	Conditional	The maximum value, mandatory if it is an interval.
code	Text	Conditional	The code, mandatory if it is a codified value.
mu	Decimal	Optional	Measurement uncertainty of value(s).
type	Code_ValueType	Optional	Code for characterising the type of value.

5.38 UoM class, Code_UoM class

The *UoM* class, described in Table 41, shall be used to represent a unit of measure.

There are two attributes: one for nominator units and one for denominator units.

EXAMPLE 1 If the unit of measure is joules per 100 g, the denominator unit is 100 g and the nominator unit is joule.

When the nominator attribute is omitted, the nominator shall be assumed to be 1.

When the denominator attribute is omitted, the denominator shall be assumed to be 1.

EXAMPLE 2 If the denominator unit is omitted and the nominator unit is joule, the unit of measure is joule.

EXAMPLE 3 If the denominator and nominator unit s are omitted, the unit of measure is without dimension.

The *Code_UoM* class shall be specialised for a controlled vocabulary where each term represents a unit of measure.

NOTE The controlled vocabulary for nominator and denominator attributes may be different.

Table 41 — UoM class attributes

Name	Class	Condition	Semantics
nominator	Code_UoM	Optional	Nominator unit code or acronym.
denominator	Code_UoM	Optional	Denominator unit code or acronym.

5.39 Vocabulary class

The *Vocabulary* class, described in Table 42, shall be used to specify a controlled vocabulary. Data instances shall have an identity that can be used by data instances of *Code_* classes or *Id_* classes.

Table 42 — Vocabulary class attributes

Name	Class	Condition	Semantics
resource	Text	Mandatory	Resource of the controlled vocabulary or where to find the definition of the controlled vocabulary.
version	Text	Optional	Version of the controlled vocabulary.
description	MultiText	Optional	Description of the controlled vocabulary and other remarks.

6 Data encoding

6.1 General

XML encoding is a method for encoding of data using structures of XML elements. This clause states the rules for how to encode food data into a structure of XML elements. The encoding is based on structure and names from the class diagram.

Annex C provides recommendations on how to make an XML schema and a short XML document example.

NOTE The possibilities of handling several languages may affect the selection of character encoding. It is essential that the encoding supports all the characters that may occur.

6.2 Data instances with identity

A food dataset shall be encoded as one XML document containing the root element which in turn contains the following XML elements:

1) one XML element with mark-up tag *vocabulary* for each data instance of class *Vocabulary*;

2) one XML element with mark-up tag reference for each data instance of class *Reference*;

3) one XML element with mark-up tag method for each data instance of class *Method*;

4) one XML element with mark-up tag source for each data instance of class *Source*;

5) one XML element with mark-up tag food for each data instance of class *Food*;

6) one XML element with mark-up tag measure for each data instance of class *Measure*.

The encoding of the content of these data instances shall be contained in the structure of the corresponding XML elements.

6.3 Sequential order of XML elements

The sequential order of XML elements shall be the sequential order indicated by the tables describing the classes in Clause 5.

6.4 References to data instances

Each data element mentioned in 6.2 shall have an XML attribute named *id.* The XML attribute shall be used as an identifier for the data instance and shall be unique within the root element.

Instances of the following classes shall have an identity: *Vocabulary*, *Reference*, *Method*, *Source*, *Food* and *Measure*.

A reference to a data instance with identity shall be encoded as an XML element. The mark-up tag of the XML element shall be the association role name. The content of the XML element shall be empty. The XML element shall have an XML attribute named *idref* with a value that is the identifier of the referenced data instance.

EXAMPLE In the *Sample* class there is an association role name *food* that is a reference to a data instance of the *Food* class, for example the data instance with start tag `<food id="f007">`. The encoding of that reference is `<food idref="f007"/>`. Figure 5 shows this example.

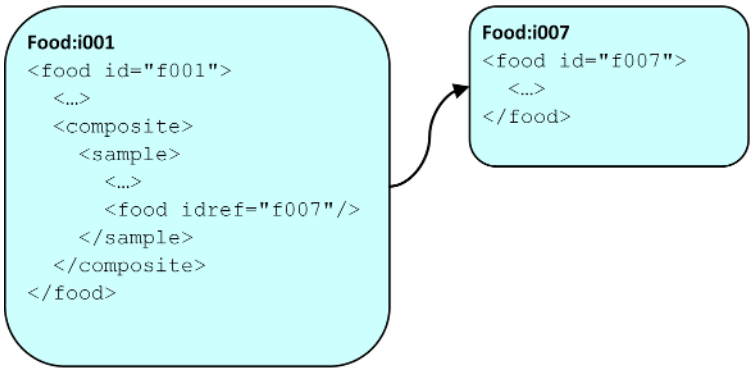

Figure 5 — Example of encoding of a reference

6.5 Data instances of class attributes

A data instance of an attribute (of a class) shall be encoded as an XML element. The mark-up tag of the XML element shall be the name of the attribute. The content of the XML element shall be the content of the data instance.

EXAMPLE 1 The *Quantity* class has an attribute named *value* that can hold a decimal value, for example 314. The encoding of that data instance is `<value>314</value>`.

EXAMPLE 2 The *Food* class has an attribute *genericImage* that is specified by the *Image* class. The *Image* class has an attribute *uri* that can hold an URL to an image, for example http://foodimg.com/img4711. The encoding of the data instance is

```
<genericImage>
<uri>http://foodimg.com/img4711.jpg</uri>
</genericImage>
```

6.6 XML schema datatypes

A data instance that is of class Text, Integer, Decimal or Boolean, shall be encoded according to a specification known as an XML schema datatype. These are specified in XML Schema Part 2 Datatypes [8]. Table 43 lists the classes and the corresponding XML schema datatypes.

Table 43 — Classes and the XML schema datatypes

Class referred to in class diagram	Corresponding XML schema datatype
Text	string
Integer	integer
Decimal	decimal
Boolean	boolean

6.7 Encoding of Decimal datatype class

In XML encoding, a point shall be used for decimal separator. This is according to the W3C specification XML Schema Part 2: Datatypes [8].

EXAMPLE `<value>3.1415</value>`

NOTE In this document, decimal numbers in the text and tables use a comma as a decimal separator according to ISO Directives Part 2 [7].

6.8 Encoding of Date datatype class

An attribute of type Date shall be encoded in one of three ways.

1) For a point of time, the date string shall be marked up with the <at> tag.

EXAMPLE 1 `<date><at>2012-01-01T12:00:00</at></date>`

2) For a period of time, the date strings shall be marked up with the <from> and <until> tags.

EXAMPLE 2 `<date><from>2012-01-01</from><until>2012-01-31</until></date>`

3) For a period of time before a certain date, the date string shall be marked up with the <before> tag.

EXAMPLE 3 `<date><before>2012-01</before></date>`

4) For a period of time after a certain date, the date string shall be marked up with the <after> tag.

EXAMPLE 4 `<date><after>1999</after></date>`

6.9 Encoding of MultiText datatype class

An attribute of type MultiText shall be encoded by assigning a language code to the XML attribute *lang* in an XML element with the tag *string*. The text itself shall use the character encoding selected for the entire XML document.

EXAMPLE An attribute *name* is of type *MultiText.*

```
<name>
  <string lang="en-GB">jam</string>
  <string lang="en-US">jelly</string>
  <string lang="fr">confiture</string>
  <string lang="de">Konfitüre</string>
  <string lang="fi">hillo</string>
  <string lang="sv">sylt</string>
</name>
```

6.10 Encoding of Vocabulary class

Instances of a vocabulary class shall follow the pattern (where *cv* is the identifier of the controlled vocabulary and *reference* is a reference to a resource that holds a definition of the controlled vocabulary):

```
<vocabulary id="cv">
  <resource>reference</resource>
  <version> </version>
  <remark> </remark>
</vocabulary>
```

XML elements version and remark are optional.

EXAMPLE
```
<vocabulary id="vEFV">
  <resource>http://www.eurofir.org/ EuroFIR Value types</resource>
</vocabulary>
```

6.11 Encoding of Code_ classes

Attribute values that are instances of classes beginning with *Code_* shall refer to a controlled vocabulary that shall be defined as a data instance of the *Vocabulary* class in the same XML document.

In an XML document, an XML element follows the pattern (where *attr* is the name of the attribute and *cvcode* is the value selected from the controlled vocabulary identified by *cvname*):

```
<attr cv="cvname" code="cvcode"/>
```

EXAMPLE
```
<measure id="m1234">
  <result>
    <value>18.2</value>
    <code cv="vEFV" code="AR"/>
  ...
```

6.12 Encoding of list of valid values

To a *Code_* class, it is possible to bind one or more lists specifying the valid codes.

NOTE 1 This method adds automatic validation of values when an XML document is received.

In an XML document, an XML element will follow the pattern (where *attr* is the name of the attribute, cv*code* is the value selected from the controlled vocabulary identified by *cvname* and *codelist* is the XML declaration that defines the list of valid codes):

```
<attr cv="cvname" code="cvcode" xsi:type="codelist"/>
```

EXAMPLE (referring to Figure 6)
```
<measure id="m1234">
  <result>
    <value>18.2</value>
    <code cv="vEFV" code="AR" xsi:type="CV_EFV"/>
  ...
```

The XML declaration for valid codes shall be added to an XML schema using the pattern code below. In the pattern code, *class* shall be replaced with the name of the *Code_* class (e.g. *Code_ValueType*), and *codelist* shall be replaced with the name to be assigned to the controlled vocabulary (e.g. *CV_EFV*).

The list of valid code values of the controlled vocabulary shall be provided by replacing *first*, *second*, etc.

```
<xs:complexType name="codelist">
  <xs:complexContent>
    <xs:restriction base="class">
      <xs:attribute name="code" use="required">
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:enumeration value="first"/>
            <xs:enumeration value="second"/>
             ...
            <xs:enumeration value="last"/>
          </xs:restriction>
        </xs:simpleType>
     </xs:attribute>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>
```

NOTE 2 This way, multiple lists of valid codes can be bound to the same *Code_* class.

EXAMPLE (referring to Figure x)

```
<xs:complexType name="CV_EFV">
  <xs:complexContent>
    <xs:restriction base="Code_ValueType">
      <xs:attribute name="code" use="required">
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:enumeration value="AR"/>
            <xs:enumeration value="AV"/>
            <xs:enumeration value="BL"/>
            ...
            <xs:enumeration value="W"/>
          </xs:restriction>
        </xs:simpleType>
     </xs:attribute>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>
```

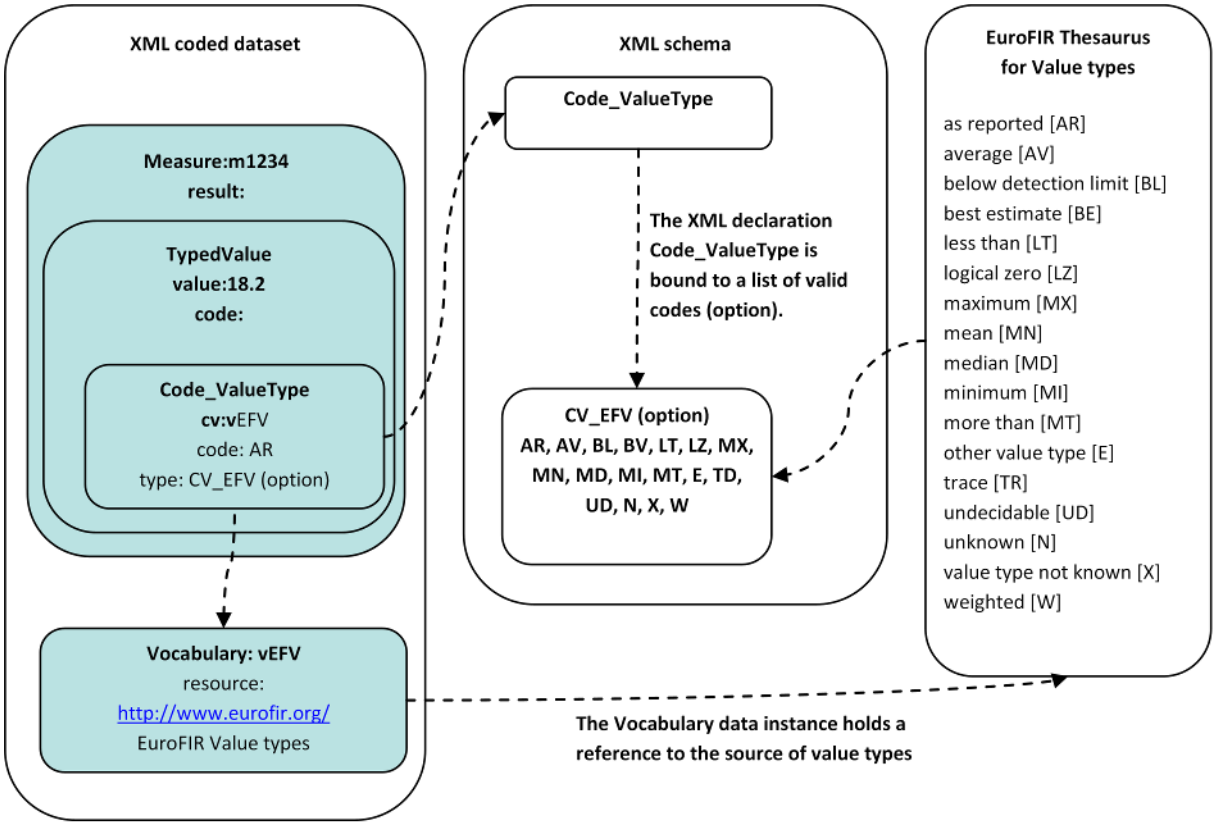

Figure 6 — Example of handling of controlled vocabularies and lists of valid codes

When so agreed, a string pattern for valid values can be set up rather than specifying individual values.

NOTE 1 For a description of how to set up a text pattern, refer to the rules for XML schema. See also6.13.

NOTE 2 The rules for XML schema makes it possible to use the <xs:annotation> element to add documentation about the controlled vocabulary and each individual value.

6.13 Encoding of identifiers

To classes with a name beginning with *Id_*, an identifier system and rules for the format of the identifiers shall be bound by specialisation using the code pattern below, with the name of the identifier system class replacing *system*, the name of the *Id_* class replacing *class* and a pattern (according to XML schema rules) replacing *pattern*.

```
<xs:complexType name="system">
  <xs:complexContent>
    <xs:extension base="class">
      <xs:attribute name="code">
        <xs:simpleType>
          <xs:restriction base="xs:string">
             <xs:pattern value="pattern"/>
          </xs:restriction>
        </xs:simpleType>
     </xs:attribute>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

EXAMPLE The GS1-13 identifier system has 13-digit numbers. The XML schema for specialising the *Id_Food* class is:

```
<xs:complexType name="EAN_13">
  <xs:complexContent>
    <xs:extension base="Id_Food">
      <xs:attribute name="code">
        <xs:simpleType>
          <xs:restriction base="xs:string">
             <xs:pattern value="[0-9]{13}"/>
          </xs:restriction>
        </xs:simpleType>
     </xs:attribute>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

An attribute *id* will have the following encoding: `<id xsi:type="EAN_13" idref="vGS1" code="4005401548072"/>`

It is assumed that the XML document contains the following element (which provides a reference to the identifier system or the controlling body of such a system):

```
<vocabulary id="vGS1">
  <resource>http://gs1.com</resource>
</vocabulary>
```

Annex A
(informative)

UML notation

Figure A.1 illustrates the subset of UML class diagram notation that is used in this standard. It shows a set of classes with attributes and relations.

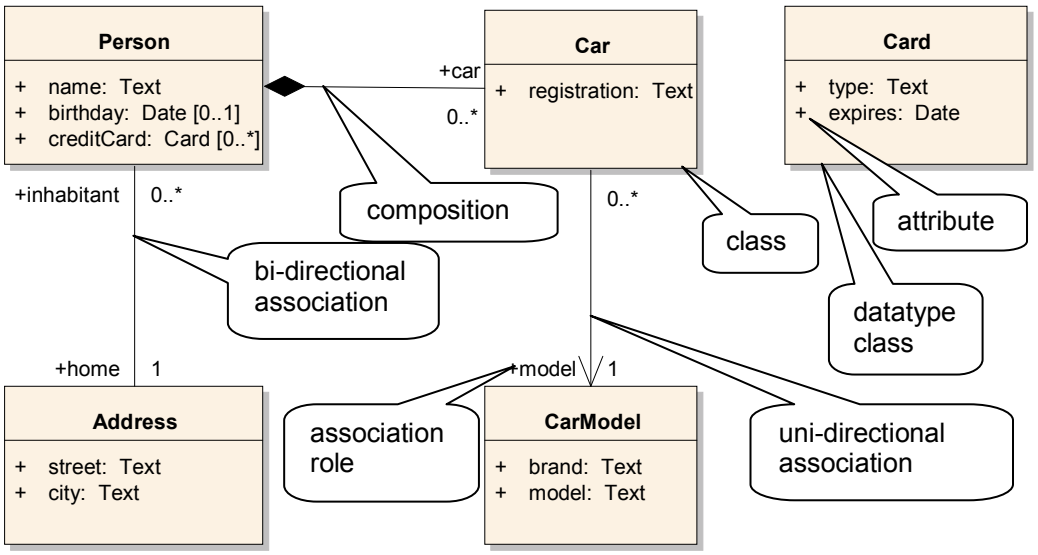

Figure A.1 — Illustration of UML notation

The *Person* class has three attributes: a mandatory name (named *name* and of class *Text*), an optional (0..1) birthday (named *birthday* and of class *Date*) and an optional set of (0..*) credit cards (named *creditCard* and of class *Card*).

Card is a datatype class. It is used for specification of attributes, such as the *creditCard* attribute of the *Person* class. *Text* and *Date* are also datatype classes.

The *Person* class has an association with the *Address* class where an *Address* data instance can be shared by several *Person* data instances. The association is bi-directional, meaning that each *Person* data instance (role name *inhabitant*) "knows" its *Address* data instance (role name *home*), and each *Address* data instance "knows" its *Person* data instances. These data instances can exist independent of each other.

The *Person* class has a composition association with the *Car* class with a meaning that is the same as if it were an attribute named *car*. A *Car* data instance is always "owned" by one and only one *Person* data instance and cannot exist on its own.

The relation between the *Car* class and the *CarModel* class is uni-directional meaning that there may be several cars of the same model but a *CarModel* data instance, which exists independent of the *Car* data instances, does not "know" the *Car* data instances relating to it.

The different types of associations have impact on encoding and storage of data. In the illustration, data instances of *Person*, *Address* and *CarModel* will be stored in an XML document as individual XML elements while data instances of *Car* and *Card* will be embedded in the other XML elements. The individual XML elements need identities so other XML elements can refer to them. These identifiers are not a part of the class diagram.

Annex B
(informative)

Examples of data instances

B.1 Overview

The examples of this annex illustrate the possibilities of the standard by:

— showing a simplified class diagram as a relevant sub-set of the normative class diagram in 4.2;.

— describing the example;

— illustrating the data instances, parts of their content and their relations;

— listing details of some of the data instances as tables.

The examples are primarily selected to illustrate possibilities with the standard and neither to be realistic nor to be exhaustive.

In the text, class names, attribute names and role names are in italics.

Figure B.1 explains the notation of the data instance diagrams.

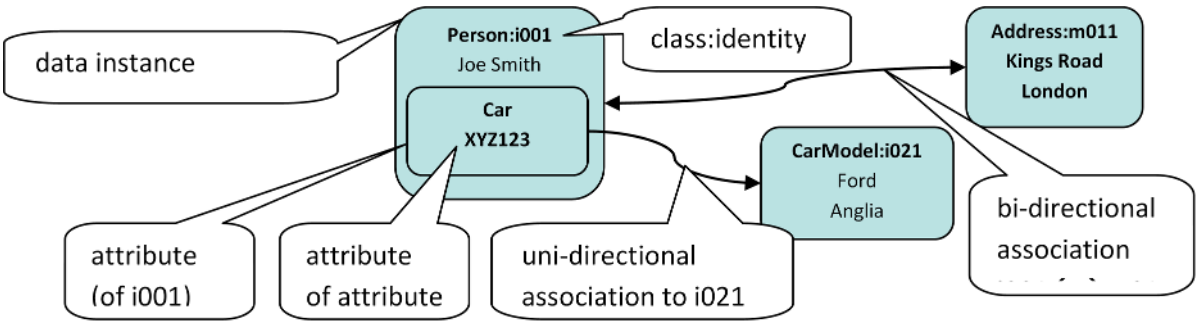

Figure B.1 — Explained data instance diagram based on the class diagram in Figure A.1

B.2 Agreements between actors

The examples are all assumed to be in scenario where a group of actors agree on conditions to be applied in order to be able to exchange data.

The standard provides a framework for the data structure and for some of the semantics of food data. In addition to the standard, agreements have to be made on such items as:

— food description systems;

— food identification systems;

— controlled vocabularies of food properties;

— data quality assessment systems;

— units of measures;

— mandatory data (even if the data are optional in the standard);

— languages to use.

For the examples of this annex, it is assumed that the agreement is as follows:

— For food descriptors, use LanguaL facet A to Z, where facet A is mandatory.

— For food identifiers, use EAN from GS1 and PLU from IFPC.

— For food properties, use EuroFIR Component Thesaurus.

— For units of measure, use EuroFIR Unit and Matrix Unit Thesaurus.

— For value types, use EuroFIR Value Type Thesaurus.

— For data quality, use USDA original data quality assessment system.

— For multi-lingual texts, use English as mandatory language.

In the dataset, the controlled vocabularies are specified as data instances of class Vocabulary.

Table B-1 to B-12 show example of such data instances.

Table B.1 — Vocabulary:vTYPE (Product type)

Name	Value
resource	http://www.langual.org
description.langText[1].text	LanguaL Facet A, Product type
description.langText[1].lang	en

Table B.2 — Vocabulary:vPART (Part of plant or animal)

Name	Value
resource	http://www.langual.org
description.langText[1].text	LanguaL Facet C, Part of plant or animal
description.langText[1].lang	en

Table B.3 — Vocabulary:vIFPC (PLU identifier)

Name	Value
resource	http://www.plucodes.com
description.langText[1].text	Price look-up codes managed by the International Federation for Produce Standards (IFPS)
description.langText[1].lang	en

Table B.4 — Vocabulary:vEFU (Nominator unit)

Name	Value
resource	http://eurofir.org
description.langText[1].text	EuroFIR Unit Thesaurus
description.langText[1].lang	en

Table B.5 — Vocabulary:vEFM (Denominator units)

Name	Value
resource	http://www.eurofir.org
description.langText[1].text	EuroFIR Matrix Unit Thesaurus
description.langText[1].lang	en

Table B.6 — Vocabulary:vUSDA (Data quality)

Name	Value
resource	http://usda.gov
description.langText[1].text	USDA Data Quality Evaluation System
description.langText[1].lang	en

Table B.7 — Vocabulary:vEFV (Value types)

Name	Value
resource	http://www.eurofir.org
description.langText[1].text	EuroFIR Value Type Thesaurus
description.langText[1].lang	en

Table B.8 — Vocabulary:vEFC (Food property)

Name	Value
resource	http://www.eurofir.org
description.langText[1].text	EuroFIR Component Thesaurus
description.langText[1].lang	en

Table B.9 — Vocabulary:vMFP (Food property)

Name	Value
resource	Ad hoc
description.langText[1].text	FYF (food yield factor); VCRB (vitamin C retention factor after boiling)
description.langText[1].lang	en

Table B.10 — Vocabulary:vEFMT (Method types)

Name	Value
resource	http://www.eurofir.org
description.langText[1].text	EuroFIR Method Type Thesaurus
description.langText[1].lang	en

Table B.11 — Vocabulary:vEFMI (Method indicators)

Name	Value
resource	http://www.eurofir.org
description.langText[1].text	EuroFIR Method Indicator Thesaurus
description.langText[1].lang	en

Table B.12 — Vocabulary:vEFR (Reference types)

Name	Value
resource	http://www.eurofir.org
description.langText[1].text	EuroFIR Reference Type Thesaurus
description.langText[1].lang	en

Table B.13 — Vocabulary:vSN (Scientific Name)

Name	Value
resource	None
description.langText[1].text	Scientific names, no controlled vocabulary is used
description.langText[1].lang	en

B.3 Data instances and dataset

In a dataset there are data instances with an identifier and data instances without an identifier.

Data instances of the following classes will have identifiers: *Food*, *Measure*, *Vocabulary*, *Method*, *Reference*.

These data instances will exist on their own and/or be referred to by more than one class. The identification of data instances in the examples is made using identifiers f001, f002, etc. This is just an example of how to format identifiers for internal references within a dataset. In the data instance diagrams, such data instances are boxes that are not within other boxes and the identifier is added to the class name.

Data instances without identity are incorporated in those with identity. When such a data instance is shown in the data instance diagrams, it appears as a box inside another box. It is also shown in the tables. For example, a *Food* data instance lists the producer organisation as *producer.organisation* since class *Food* has an attribute named *producer* that is of type *Contact*, and class *Contact* has an attribute named *organisation*.

Repetitions of data instances are shown in the data instance diagrams as several boxes inside another box and in the tables using an index within square brackets. For example, a food composite contains many samples and the unit (part of food) that was taken as a sample can be described in several languages so the first *langText* of *unit* of second *sample* of a *composite* will be expressed as:

composite.sample[2].*unit.langText*[1].*text* .

References to data instances with identity are drawn as arrows in the data instance diagrams and in the tables, the identifier is provided. Bi-directional arrows indicate that references are both ways.

B.4 Food description and food property measures

A food can be a real food product, such as a commercial available food article, or a generic food.

A *Food* data instance describes a food. The food is identified by various names, by identifiers from various food identification systems and by a set of food descriptors, each one describing a certain aspect such as food source or cooking method.

A set of food property measures may be recorded for the food by assigning *Measure* data instances to the *Food* data instance. Each such data instance specifies the food property using the *Property* class and provides a value for that food property.

Figure B.2 shows the relations between the classes.

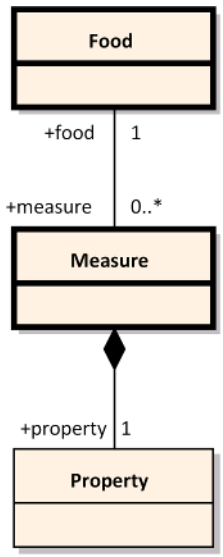

Figure B.2 — Simplified class diagram for food property measures

In the example in Figure B.3, two apple varieties are described by two *Food* data instances. For each apple variety, two food data properties are recorded, one for vitamin C and one for pH. Each such record is a *Measure* data instance. The example also includes a reference to an analytical method (classes *Method* and *Reference*).

Table B.14 lists the details of one of the *Food* data instances and Table B.15 and B.16 lists the details of the corresponding *Measure* data instances. Note that the *Food* data instances are referring to the *Measure* data instances and vice versa. The *Method* and *Reference* data instances are listed in Table B.17 and B.18.

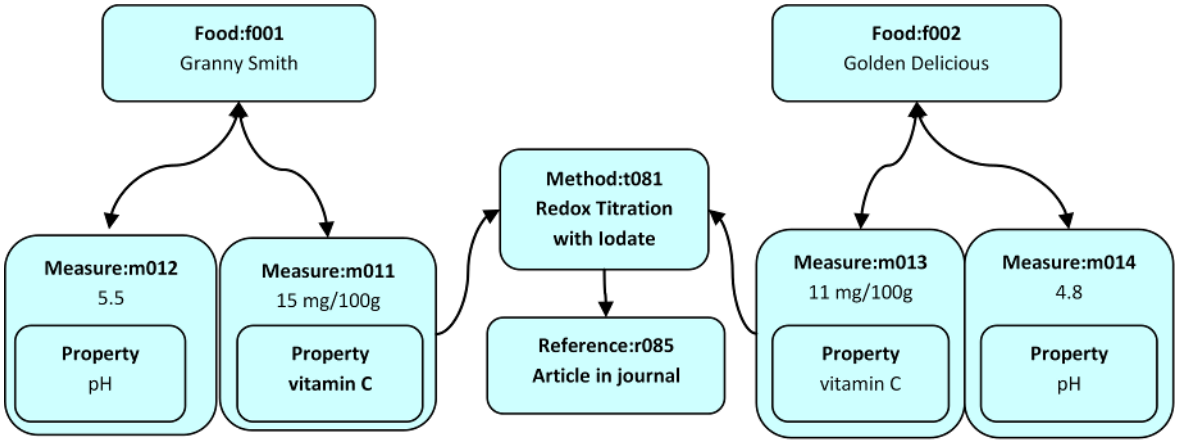

Figure B.3 — Data instances for food property measures and how they relate to each other

Table B.14 — Food:f002 (data instance from Figure B.3)

Name	Value	Note
name.langText[1].text	Golden Delicious	
name.langText[1].lang	en	English
scientificName.code	vSN	
scientificName.	Malus Domestica	
identifier[1].id	4020	price lookup code
identifier[1].sys	IFPC	price look-up codes managed by IFPS
descriptor[1].code.code	A1224	pome fruit
descriptor[1].code.cv	vTYPE	LanguaL Facet A
descriptor[2].code.code	C0139	fruit, peel present, core, pit or seed removed
descriptor[2].code.cv	vPART	LanguaL Facet C
genericImage	http://applewiki.org/golden.jpg	URL for an image
measure[1]	m013	reference to vitamin C measure
measure[2]	m014	reference to pH measure

Table B.15 — Measure:m013 (data instance from Figure B.3)

Name	Value	Note
result.value	11	
result.type.code	AR	as reported
result.type.cv	vEFV	EuroFIR value type thesaurus
unit.nominator.code	mg	mg
unit.nominator.cv	vEFU	EuroFIR units thesaurus
unit.denominator.code	W	/100 g
unit.denominator.cv	vEFM	EuroFIR matrix units thesaurus
quality.level.code	A	A=highest quality
quality.level.cv	USDA	USDA Data Quality Evaluation System
property.code.code	VITC	vitamin C
property.code.cv	vEFC	EuroFIR component thesaurus
food	f002	reference to "Golden Delicious"
method	t081	

Table B.16 — Measure:m014 (data instance from Figure B.3)

Name	Value	Note
result.value	4,8	(in XML, a point is used for decimal separator)
result.code	AR	as reported
result.ns	vEFV	EuroFIR value type thesaurus
unit.nominator		1 (no unit)
unit.denominator		/1 (no unit)
quality.level.code	A	A=highest quality
quality.level.cv	vUSDA	USDA Data Quality Evaluation System
property.code.code	PH	pH
property.code.cv	vEFC	EuroFIR component thesaurus
food	f002	reference to "Golden Delicious"
method	t000	method is mandatory

Table B.17 — Method:t081 (data instance from Figure B.3)

Name	Value	Note
name.langText[1].text	Redox Titration with Iodate	Name of the method
name.langText[1].lang	en	English
methType.code	A	Analytical
methType.cv	vEFMT	
methInd.code	MI1053	Titrimetry
methInd.cv	vEFMI	
reference	r085	

Table B.18 — Reference:r085 (data instance from Figure B.3)

Name	Value	Note
code	WW	Web page
ns	vEFR	
uri	http://www.outreach.canterbury.ac.nz/chemistry/vitamin_C_iodate.shtml	Web address
title.langText[1].text	Determination of Vitamin C by Redox Titration with Iodate	
title.langText[1].lang	en	English

B.5 Aggregation of food property measures

Food property measures from different sources or from similar foods may be mathematically aggregated and the resulting measure as well as references to the contributing measures may be recorded.

Figure B.4 shows how the class *Aggregation* specifies a set of *Contributor* data instances, each referring to a contributing *Measure* data instance. Each such *Measure* data instance also has information about what food (association role *food,* addressing a data instance of *Food* class) it describes. This makes it possible to find the food that was providing a contributing measure.

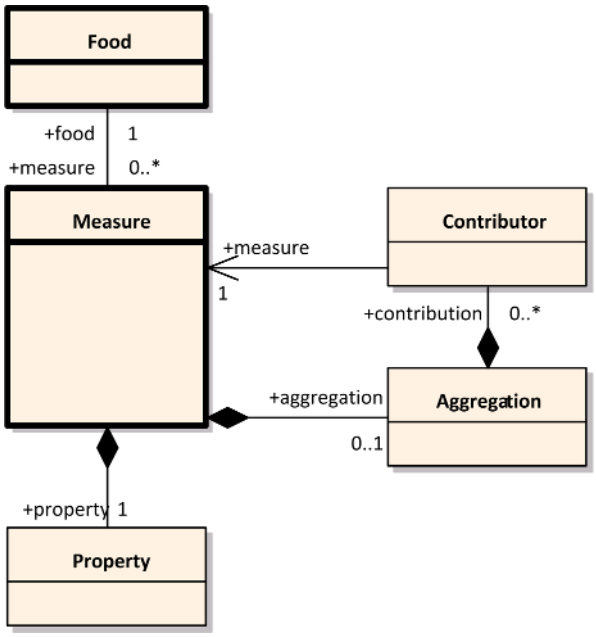

Figure B.4 — Simplified class diagram for aggregation

Figure B.5 shows the data instances involved in an aggregation for creation of food data for a generic apple. The food property measures of three apple varieties are contributing to the food property measures of the generic apple. Tables B.19 and B.20 provides details for two of the created data instances.

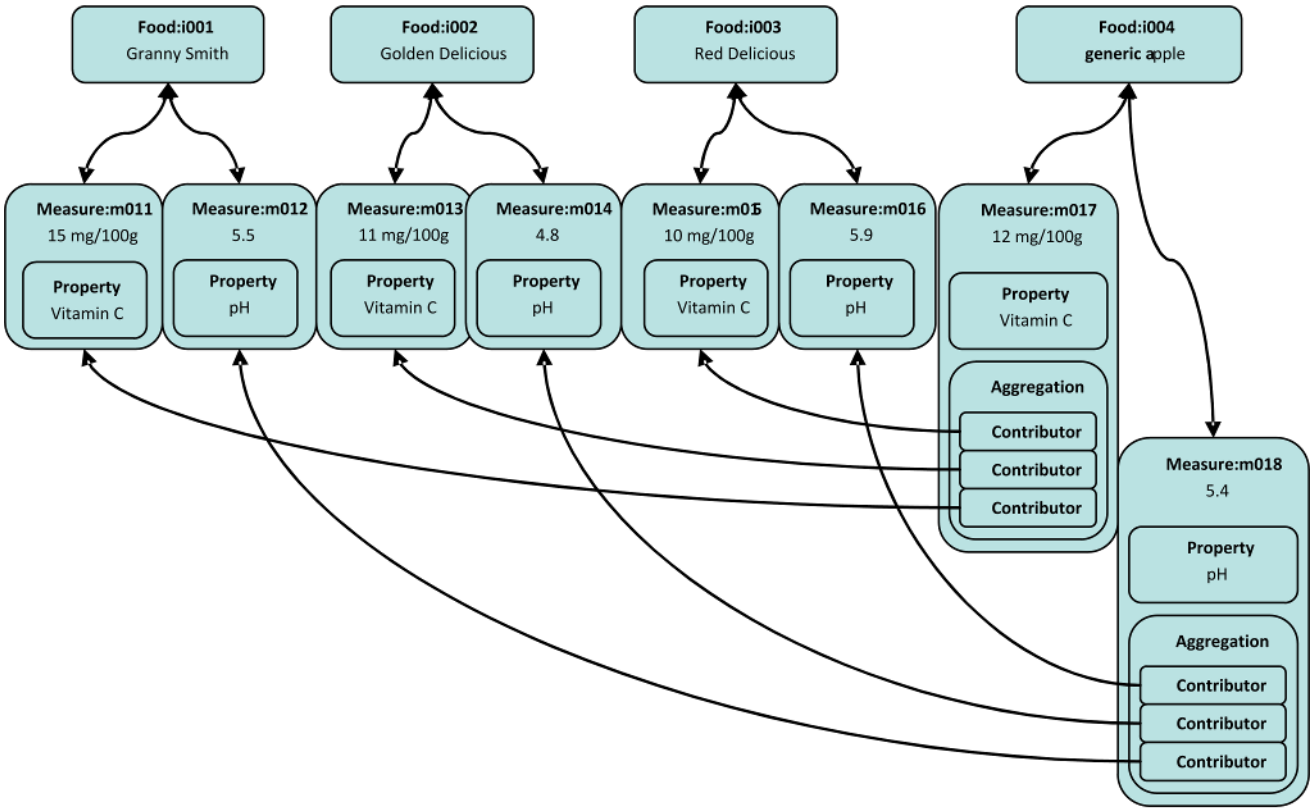

Figure B.5 — Food property measures from three apple varieties are aggregated to make a generic one

Table B.19 — Food:f004 (data instance from Figure B.5)

Name	Value	Note
name.langText[1].text	generic apple	
name.langText[1].lang	en	English
descriptor[1].code.code	A1224	pome fruit
descriptor[1].code.cv	vTYPE	LanguaL Facet A
descriptor[2].code.code	C0139	fruit, peel present, core, pit or seed removed
descriptor[2].code.cv	vPART	LanguaL Facet C
measure[1]	m017	reference to vitamin C measure
measure[2]	m018	reference to pH measure

Table B.20 — Measure:m017 (data instance from Figure B.5)

Name	Value	Note
result.value	12	
result.type.code	MN	mean value
result.type.cv	vEFV	EuroFIR value type thesaurus
unit.nominator.code	mg	mg
unit.nominator.cv	vEFU	EuroFIR units thesaurus
unit.denominator.code	W	/100 g
unit.denominator.cv	vEFM	EuroFIR matrix units thesaurus
aggregation.statistic[1].value	10	
aggregation.statistic[1].type.code	MI	minimum
aggregation.statistic[1].type.cv	vEFV	EuroFIR value type thesaurus
aggregation.statistic[2].value	15	
aggregation.statistic[2].type.code	MX	maximum
aggregation.statistic[2].type.cv	vEFV	EuroFIR value type thesaurus
aggregation.contribution[1].weight	1	
aggregation.contribution[1].measure	m011	vitamin C of Granny Smith
aggregation.contribution[2].weight	1	
aggregation.contribution[2].measure	m013	vitamin C of Golden Delicious
aggregation.contribution[3].weight	1	
aggregation.contribution[3].measure	m015	vitamin C of Red Delicious
property.code.code	VITC	vitamin C
property.code.cv	vEFC	EuroFIR component thesaurus
food	f004	reference to "generic apple"
method	f004	reference to "generic apple"

B.6 Food composite and food samples

A Food data instance for a food that is created as a homogenous mix of food samples may include data that describes the foods of the food samples. Figure B.6 describes the relation between the *Food*, *Composite* and *Sample* classes and Figure B.7 is an example where a food "green apple" is created as a mix of two apple varieties. Table B.21 shows the details of the data instance of "green apple".

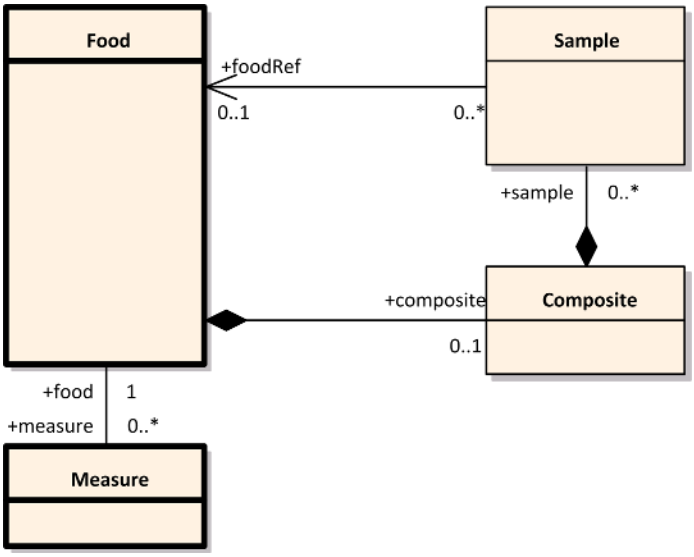

Figure B.6 — Simplified class diagram for a food as a composite of primary food samples

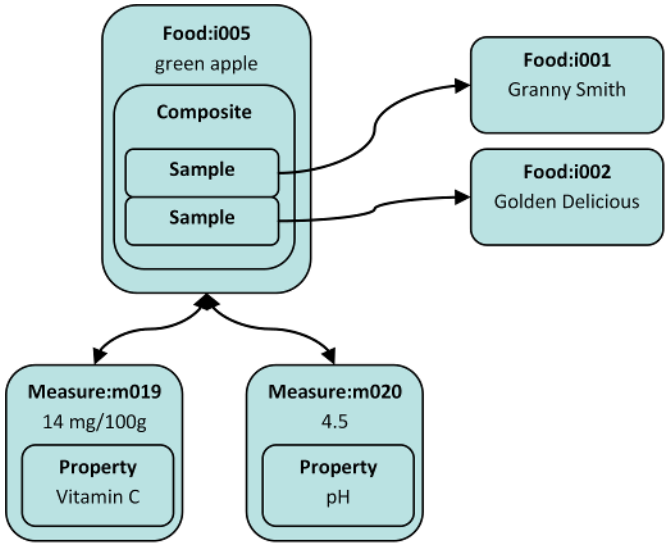

Figure B.7 — Data instances for creating "green apple" as a composite of two primary food samples

Table B.21 — Food:f005 (data instance from Figure B.7)

Name	Value	Note
name.langText[1].text	green apple	
name.langText[1].lang	en	English
descriptor[1].code.code	A1224	pome fruit
descriptor[1].code.cv	vTYPE	LanguaL Facet A
descriptor[2].code.code	C0139	fruit, peel present, core, pit or seed removed
descriptor[2].code.cv	vPART	LanguaL Facet C
composite.strategyText. langText[1].text	Take equal weight of all eatable parts of each fruit.	
composite.strategyText. langText[1].lang	en	English
composite.sample[1].place. langText[1].text	retailer	
composite.sample[1].place. langText[1].lang	en	
composite.sample[1].unit. langText[1].text	whole fruit with seeds removed	
composite.sample[1].unit. langText[1].lang	en	English
composite.sample[1].date. date	2009-10-20	
composite.sample[1].date. event.code	arrival	
composite.sample[1].date. event.cv	vEVENT	
composite.sample[1].foodRef	f001	Granny Smith
composite.sample[2].place. langText[1].text	retailer	
composite.sample[2].place. langText[1].lang	en	
composite.sample[2].unit. langText[1].text	whole fruit with seeds removed	
composite.sample[2].unit. langText[1].lang	en	English
composite.sample[2].date. date	2009-10-16	
composite.sample[2].date. event.code	arrival	
composite.sample[2].date. event.cv	vEVENT	
composite.sample[2].foodRef	f002	Golden Delicious
composite.samplingPlan	r031	reference to a Reference data instance specifying the sampling plan
measure[1]	m019	reference to vitamin C measure
measure[2]	m020	reference to pH measure

B.7 Food recipes

A *Food* data instance may, in addition to other descriptions, describe a food recipe with food ingredients; see Figure B.8. Each food ingredient can either be described by a name (not shown in figure) or by pin-pointing another *Food* data instance (association role *foodRef*).

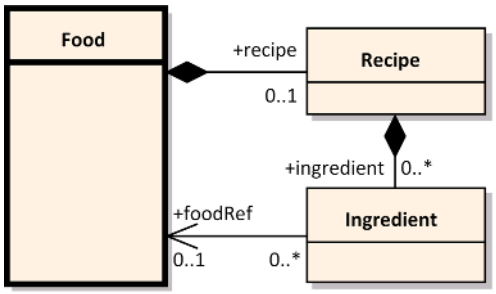

Figure B.8 — Simplified class diagram for describing food recipes using a set of food ingredients

The example contains two food recipes:

1) A simple food recipe for pure apple juice that is extracted from apples. The apples and the apple juice are generic foods, that is, they are of no specific variety or origin.

2) A food recipe for a commercial apple drink that is produced in an industrial way. It has apple juice as one of its ingredients and the recipe is based on the amounts needed for one bottle.

The example data instances in Figure B.8 provide data on both food recipes. The details of the *Food* data instances for generic apple juice and for the apple drink are listed in Tables B.22 and B.23. The details of the *Measure* data instance for food yield factor is listed in Table B.24. Other data instances are not listed.

B.8 shows an extension of the Food data instance which also includes article information.

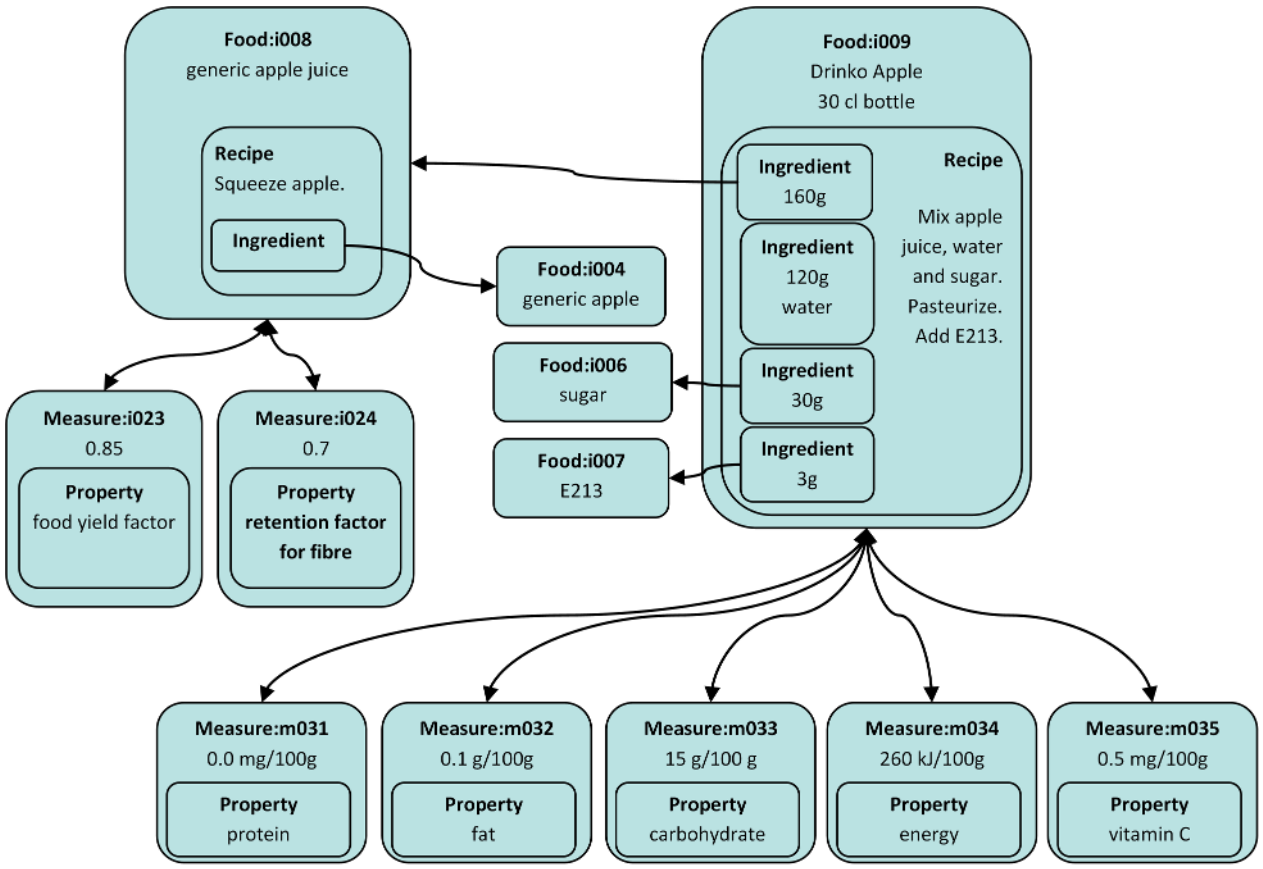

Figure B.9 — Recipes and ingredients

The "Drinko Apple" is a food with a recipe that lists other foods as ingredients. Figure B.9 shows the recipe and the ingredients. One of the ingredients, "generic apple juice", is itself described by a recipe. Another one, "water", is described just as a food name.

Table B.22 — Food:f008 (data instance from Figure B.9)

Name	Value	Note
name.langText[1].text	generic apple juice	
name.langText[1].lang	en	English
descriptor[1].code.code	A0766	fruit juices
descriptor[1].code.cv	vTYPE	LanguaL Facet A
recipe.instruction. langText[1].text	Squeeze apple.	
recipe.instruction. langText[1].lang	en	English
recipe.ingredient[1].relative	1	only one ingredient
recipe.ingredient[1].rank	1	
recipe.ingredient[1].foodRef	f004	reference to generic apple
measure [1]	m023	food yield factor
measure[2]	m024	retention factor for fibre

Table B.23 — Measure:i023 (data instance from Figure B.9)

Name	Value	Note
result.value	0,95	(in XML, a point is used for decimal separator)
result.code.code	BE	best estimate
result.code.cv	vEFV	EuroFIR value type thesaurus
unit.nominator		1 (no unit)
unit.denominator		/1 (no unit)
property.code.code	FYF	food yield factor
property.code.cv	vMFP	miscellaneous food properties
food	f008	reference to "generic apple juice"
method	t081	

Table B.24 — Food:f009 (data instance from Figure B.9)

Name	Value	Note
name.langText[1].text	Drinko Apple 30 cl	
name.langText[1].lang	en	English
identifier[1].id	20123451	EAN
identifier[1].cv	vGS1	article number
descriptor[1].code.code	A0919	juice, ready to drink
descriptor[1].code.cv	vTYPE	LanguaL Facet A
descriptor[2].code.code	F0022	heat treated
descriptor[2].code.cv	vCOOK	LanguaL Facet F
genericImage	drinko2.com/img22.jpg	URL for an image
producer.organisation	Drinkodrinko	
producer.email	info@drinko2.com	
article		see Table B.9
recipe.instruction.langText[1].text	Mix apple juice, water and sugar. Pasteurise. Add E213.	
recipe.instruction. langText[1].lang	en	English
recipe.ingredient[1].absolute.value	160	
recipe.ingredient[1].absolute. unit.nominator.code	g	
recipe.ingredient[1].absolute. unit.nominator.cv	vEFU	

Name	Value	Note
recipe.ingredient[1].foodRef	f008	reference to generic apple juice
recipe.ingredient[2].absolute. value	120	
recipe.ingredient[2].absolute. unit.nominator.code	g	
recipe.ingredient[2].absolute. unit.nominator.cv	vEFU	
recipe.ingredient[2].foodName. langText[1].text	water	food by name, no reference is provided in foodRef
recipe.ingredient[2].foodName. langText[1].lang	en	
recipe.ingredient[3].absolute. value	30	
recipe.ingredient[3].absolute. unit.nominator.code	g	
recipe.ingredient[3].absolute. unit.nominator.cv	vEFU	
recipe.ingredient[3].foodRef	f006	reference to sugar
recipe.ingredient[4].absolute. value	3	
recipe.ingredient[4].absolute. unit.nominator.code	g	
recipe.ingredient[4].absolute. unit.nominator.cv	vEFU	
recipe.ingredient[4].foodRef	f007	reference to E231
measure[1]	m031	reference to protein measure
measure[2]	m032	reference to fat measure
measure[3]	m033	reference to carbohydrate measure
measure[4]	m034	reference to energy measure
measure[5]	m035	reference to vitamin C measure

B.8 Food article with article information

For food articles there may be article information (class *ArticleInfo*) that contain food ingredient information; see Figure B.10.

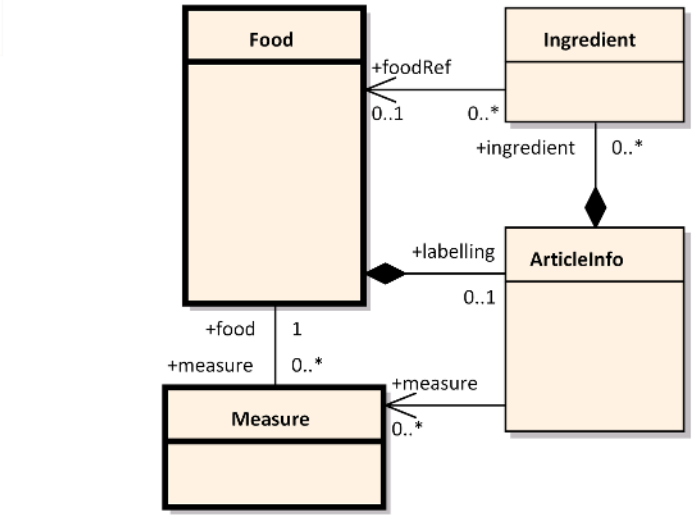

Figure B.10 — Simplified class diagram for a food article

This example in an extension of the example in B.7. The article information details are listed in Table B.17 which addresses only the attributes not listed in Table B.25.

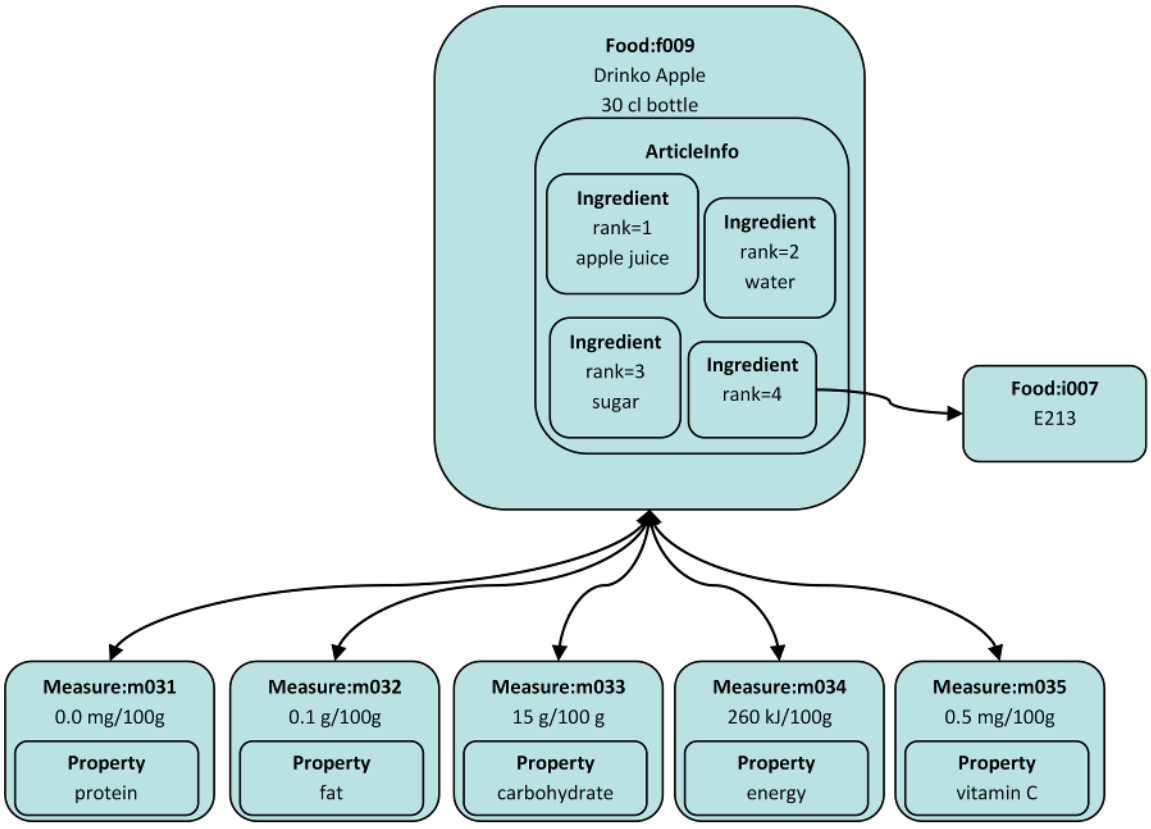

Figure B.11 — Article information of "Drinko Apple, 30 cl bottle"

Table B.25 — Food:f009 (data instance from Figure B.11)

Name	Value	Note
article.ingredient[1].rank	1	
article.ingredient[1].foodName.langText[1].text	apple juice	
article.ingredient[1].foodName.langText[1].lang	en	
article.ingredient[2].rank	2	
article.ingredient[2].foodName.langText[1].text	water	
article.ingredient[2].foodName.langText[1].lang	en	
article.ingredient[3].rank	3	
article.ingredient[3].foodName.langText[1].text	sugar	
article.ingredient[3].foodName.langText[1].lang	en	
article.ingredient[4].rank	4	
article.ingredient[4].foodRef	f007	reference to E231

Annex C
(informative)

XML schema and example of XML encoding

C.1 General

This informative annex contains implementation recommendations for the XML schema and an example of an XML document implementing data instances described in Annex B.

C.2 XML schema

The XML schema should be made as two files:

— The *en16104codes.xsd* which contains all XML element declarations for codes and identifiers. This XML schema may be modified for a certain application.

— The *en16104types.xsd* which includes *en16104codes.xsd* and contains all XML element declarations for the food data structure. This XML schema is not meant to be modified.

An XML document should refer to *en16104types.xsd* or to an XML schema that imports or includes it.

The XML schema *en16104types.xsd* should declare a root element named *foodData*. This should be made in a way that allows the elements in the root element to come in any order.

The *en16104codes.xsd* should contain declarations for external identifiers (Id_Food and Id_Measure) and all identifiers to be used for referring one instance from another instance (see 6.4). These identifiers should be based on the XML schema types xs:ID and xs:IDREF [8]. In order to be able to validate that an identifier refers to the right type of instance, the identifier should have a certain first letter according to Table C.1.

Table C.1 — Vocabulary class attributes

Class	First letter	Example
Vocabulary	v	v_ValueTypes
Reference	r	r005
Method	t	t_X43
Source	s	s14459
Food	f	f000000034
Measure	m	m_67

An example of how to use IDREF and ID to declare identifiers (fIDREF and fID) for Food instances:

```
<!-- Food id -->
   <xs:simpleType name="fIDREF">
      <xs:restriction base="xs:IDREF">
         <xs:pattern value="f\c*"/>
      </xs:restriction>
   </xs:simpleType>

<xs:simpleType name="fID">
   <xs:restriction base="xs:ID">
      <xs:pattern value="f\c*"/>
   </xs:restriction>
</xs:simpleType>
```

The *en16104codes.xsd* should contain declarations for all controlled vocabularies.

Optionally, the *en16104codes.xsd* should contain declarations for valid codes of controlled vocabularies according to 6.12.

C.3 XML document example

This example is an encoding of the example described in B.4. Note that all vocabulary elements are not shown.

```
<?xml version="1.0" encoding="UTF-8"?>
<foodData xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://www.cen.org/16104"
xsi:schemaLocation="http://www.cen.org/16104 en16104types.xsd">
    <vocabulary id="vTYPE">
        <resource>http://www.langual.org/langual_thesauri.asp</resource>
        <description>
            <string lang="en">LanguaL Facet A, Product type</string>
        </description>
    </vocabulary>
    <vocabulary id="vPART">
        <resource>http://www.langual.org/langual_thesauri.asp</resource>
        <description>
            <string lang="en">LanguaL Facet C, Part of plant or animal</string>
        </description>
    </vocabulary>
    <vocabulary id="vIFPC">
        <resource>http://www.plucodes.com/</resource>
        <description>
            <string lang="en">Price look-up codes managed by the IFPS</string>
        </description>
    </vocabulary>
    <vocabulary id="vEFU">
        <resource>http://www.eurofir.org</resource>
        <description>
            <string lang="en">EuroFIR Unit Thesaurus</string>
        </description>
    </vocabulary>
    <vocabulary id="vEFM">
        <resource>http://www.eurofir.org</resource>
        <description>
            <string lang="en">EuroFIR Matrix Unit Thesaurus</string>
        </description>
    </vocabulary>
    <vocabulary id="vEFV">
        <resource>http://www.eurofir.org</resource>
        <description>
            <string lang="en">EuroFIR Value Type Thesaurus</string>
        </description>
    </vocabulary>
    <vocabulary id="vEFC">
        <resource>http://www.eurofir.org</resource>
        <description>
            <string lang="en">EuroFIR Component Thesaurus</string>
        </description>
    </vocabulary>
    <vocabulary id="vEFMT">
```

```
    ...
    <food id="f002">
        <name>
            <string lang="en">Golden Delicious</string>
        </name>
        <scientificName cv="vSN" code="Malus Domestica"/>
        <identifier sys="vIFPC" id="4020"/>
        <descriptor>
            <code cv="vTYPE" code="A1224"/>
        </descriptor>
        <descriptor>
            <code cv="vPART" code="C0139"/>
        </descriptor>
        <genericImage>
            <uri>http://applewiki.org/golden.jpg</uri>
        </genericImage>
        <measure idref="m013"/>
        <measure idref="m014"/>
    </food>
    <measure id="m013">
        <result>
            <value>11</value>
            <type cv="vEFV" code="AR" xsi:type="CV_EFV"/>
        </result>
        <unit>
            <nominator cv="vEFU" code="mg"/>
            <denominator cv="vEFM" code="W"/>
        </unit>
        <quality>
            <level cv="vUSDA" code="A"/>
        </quality>
        <property>
            <code cv="vEFC" code="VITC"/>
        </property>
        <food idref="f002"/>
        <method idref="t081"/>
    </measure>
    <measure id="m014">
        <result>
            <value>4.8</value>
            <type cv="vEFV" code="AR" xsi:type="CV_EFV"/>
        </result>
        <unit></unit>
        <quality>
            <level cv="vUSDA" code="A"/>
        </quality>
        <property>
            <code cv="vEFC" code="PH"/>
        </property>
        <food idref="f002"/>
        <method idref="t000"/>
    </measure>
    <method id="t081">
        <name>
            <string lang="en">Redox Titration with Iodate</string>
        </name>
        <methType cv="vEFMT" code="A"/>
        <methInd cv="vEFMI" code="MI1053"/>
        <reference idref="r085"/>
    </method>
    <method id="t000">
        <description>
            <string lang="en">no info</string>
        </description>
        <methType cv="vEFMT" code="A"/>
    </method>
    <reference id="r085">
        <code cv="vEFR" code="WW"/>
        <uri>http://www.outreach.canterbury.ac.nz/chemistry/vitamin_C_iodate.shtml</uri>
        <title>
            <string lang="en">Determination of Vitamin C by Redox Titration with Iodate</string>
        </title>
    </reference>
</foodData>
```

Annex D
(informative)

Examples of controlled vocabularies

D.1 General

Around the world, communities with interest in food data are maintaining and using their own controlled vocabularies. This is one reason why it is important that this standard be neutral to the selection of controlled vocabularies.

This annex provides a set of lists of controlled vocabularies. The lists are non-exhaustive, non-prioritised and sometime overlap, but nevertheless provide important examples of controlled vocabularies concerning food data. The lists include information on where to find the corresponding controlled vocabularies.

D.2 Background

Controlled vocabularies are inherent parts of indexing systems, thesauri, used to systematise information to be organised and retrieved in information systems. A definition of *controlled vocabulary* is “carefully selected set of terms - words and phrases - such that each concept from the domain of discourse is described using only one term in the set and each term in the set describes only one concept”[1].

With respect to food data, a series of commonly used controlled vocabularies exists – some vocabularies as international standards or legislative definitions. The vocabularies cover very different subjects, such as general food description and classification, food property description, analytical methods, geographical places and languages, to name a few. The controlled vocabularies are not necessarily mutually exclusive, but often overlapp, depending on the purpose of the specific controlled vocabulary. For example, LanguaL contains a long range of classification systems, taxonomic as well as legislative definitions, geographical places and other vocabularies.

D.3 Food description

Authority	Controlled vocabulary
FAO	FAO ISCAAP ASFIS List of Species for Fishery Statistics Purposes.
ITIS	Integrated Taxonomic Information System.
LanguaL	The LanguaL 2008 Thesaurus. An automated method for describing, capturing and retrieving data about food.
USDA ARS	GRIN Taxonomy for Plants.

1) http://en.wikipedia.org/wiki/Controlled_vocabulary

D.4 Food classification

Authority	Controlled vocabulary
CIAA	CIAA Food Classification for Food Additives. CIAA ADD/385/90E Rev 5 (available in LanguaL)
Codex	Codex Alimentarius - Classification of cheeses. General standard for cheeses. CODEX STAN A-6-1978, Rev.1-1999, Amended 2006.
Codex	Codex Alimentarius - Classification of Food And Feed Commodities
Codex	Codex Alimentarius - Food Classification for Food Additives. General Standard for Food Additives. CODEX STAN 192-1995 (Rev. 10-2009)
Codex	Codex Class Names and the International Numbering System (INS) for Food Additives (CAC/GL 36-1989).
Codex	Food Categorisation System of the Codex General Standard for Contaminants and Toxins in Foods. CODEX STAN 193-1995 (Rev.1-1997).
COST Action 99 /Eurofoods	European Food Groups (EFG) classification system
EC	Classification of Products of Plant and Animal Origin, European Community COMMISSION REGULATION (EC) No 178/2006 of 1 February 2006 (pesticides).
EC	Food Additive Classification, European Community. European Council Directive 95/2/EC.
EFSA	European Food Safety Authority Standard Model for Chemical Analytical Data. Appendix 2: EFSA Matrix catalogue.
EuroFIR	EuroFIR Food Classification Classification system for foods in food composition databases.
Eurofoods	EUROCODE 2 Food Classification Classification systems for recording food consumption data.
GS1	Global System 1 (GS1) Global Product Classification (GPC)
Jowitt	A Classification of Foods and Physical Properties Food Science Publishers, London, 1989
CPA	The European statistical classification of products by economic activities. The regulation (EC) N:o 451/2008 of the European Parliament and of the Council establishing a new statistical classification of products by activity
Eurostat	The European statistical classification of goods used for the purpose of foreign trade statistics
PRODCOM	Production Communautaire

D.5 Food property description

Authority	Controlled vocabulary
CAS	Chemical Abstracts Service's Registry Numbers
Codex	Codex Alimentarius - International Numbering System (INS) for Food Additive. General Standard for Food Additives. CODEX STAN 192-1995 (Rev. 10-2009)
EC	European Food Additive legislation – E number lists
EFSA	European Food Safety Authority Standard Model for Chemical Analytical Data. Appendix 1: EFSA Parameter catalogue.
EMBL-EBI	Chemical Entities of Biological Interest (ChEBI)
EuroFIR	EuroFIR Component Thesaurus, version 1.0, 2008. EuroFIR Thesauri 2008.
INFOODS	INFOODS Food Component Tag Names.

D.6 Analytical methods

Authority	Controlled vocabulary
AOAC	AOAC Official Analytical Methods. AOAC International.
CEN	Analytical Methods
EFSA	European Food Safety Authority Standard Model for Chemical Analytical Data. EFSA Analytical Method Catalogue.
EuroFIR	EuroFIR Method Indicator Thesaurus. EuroFIR Thesauri 2008.
ISO	Analytical Methods
NMKL	Nordisk Metodikkomité for Næringsmidler (Nordic Committee on Food Analysis) Analytical Methods.

D.7 Geographic places and languages

Authority	Controlled vocabulary
EFSA	European Food Safety Authority Standard Model for Chemical Analytical Data. EFSA Country Catalogue.
EFSA	European Food Safety Authority Standard Model for Chemical Analytical Data. EFSA Languages Catalogue.
EFSA	European Food Safety Authority Standard Model for Chemical Analytical Data. EFSA Fishing Area Catalogue.
FAO	FAO major fishing areas.
IETF	Internet Engineering Task Force, RFC 4646: Tags for Identifying Languages, and RFC 4647: Matching of Language Tags.
ISO	ISO 3166-1 Country codes.
ISO	ISO 639-1:2002 Codes for the representation of names of languages -- Part 1: Alpha-2 code.
ISO	ISO 639-2:1998 Codes for the representation of names of languages - Part 2: Alpha-3 code.

D.8 Units of measure

Authority	Controlled vocabulary
EFSA	European Food Safety Authority Standard Model for Chemical Analytical Data. EFSA Unit of Measurement Catalogue.
EuroFIR	EuroFIR Matrix Unit Thesaurus, version 1.0, 2008. EuroFIR Thesauri 2008.
EuroFIR	EuroFIR Unit Thesaurus, version 1.0, 2008. EuroFIR Thesauri 2008.
ISO	SI units and recommendations for the use of their multiples and of certain other units. International Standard, ISO 80000-1:2009.

D.9 Other controlled vocabularies

Authority	Controlled vocabulary
EC	Corrigendum to Regulation (EC) No 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods.
EC	Directive 2003/89/EC of the European Parliament and of the Council of 10 November 2003 amending Directive 2000/13/EC as regards indication of the ingredients present in foodstuffs.
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - AllergenTypeCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - DietTypeCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - DietTypeSubCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - LevelOfContainmentCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - ProductYieldTypeCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - PhysiochemicalCharacteristicCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - PhysiochemicalCharacteristicCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - MicrobiologicalOrganismCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - MeasurementPrecisionCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - PreparationTypeCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. -
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. -
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - StateOFPreparationCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - PreservationTechniqueCodeList
GS1	Business Message Standard (BMS), Align Trade Item Extension for Food and Beverage, Release 2.3. - NutritionalClaimCodeList
ISO	Codes for the representation of currencies and funds - ISO 4217:2008

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