

On Transforming FoodEx2 to a Standardized and Interoperable Thesaurus

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Outline



Introduction

2'



Motivation

1'



Constructing SKOS-FoodEx2

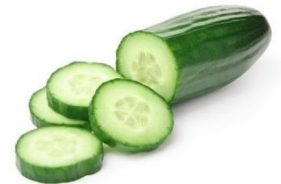
6'



Conclusion

1'

Introduction



Τζατζίκι

Cacık

Tzatziki

Tarator

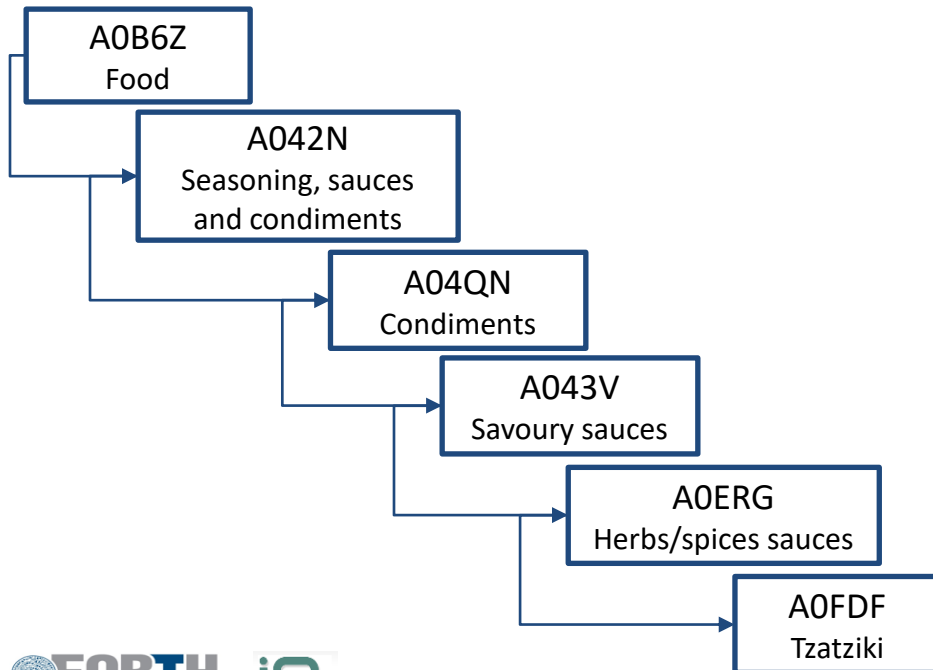
Yogurt and cucumber sauce

Yogurt and garlic sauce

Tsatsiki

Introduction

- FoodEx2 provides an **hierarchical system** to **classify** and **describe** food products. Designed to facilitate the harmonization and categorization of food-related data
- Organized into terms (food items or commodities) and facets (descriptive features or qualifiers)
- Food items are assigned a 5-digit code



The screenshot shows the FoodEx2 interface with a hierarchy tree on the left and a details panel on the right. The hierarchy tree is expanded to show 'Tzatziki [A0FDF]' under 'Savoury sauces [A043V]'. The details panel on the right shows the following information:

Term naming and definition		Implicit facets	Reportability
Type of term	Composite food simple	Level of detail	Core term
Term code	A0FDF		
Term extended code	A0FDF#F02.A0EPPSF04.A02NE		
Term name	Tzatziki		
Term extended name	Tzatziki, PART-NATURE = Herbs/spices sauces (as part-r		
Scope notes and links			
The group includes any type of Tzatziki sauces, i.e. a Greek dressing-type sauce typically made with 10% fat yoghurt, cucumber, garlic and olive oil. However nowadays different variations of Tzatziki			
en.wikipedia.org - google.co.uk			
Implicit attributes:			
Label	Value		
foodexOldCode	A.01.001665		

Motivation

- FoodEx2 has **several limitations** (as it is)
- Missing global, unique and public identifiers
 - FoodEx2 use codes (e.g. A02MB for goat milk) instead of Uniform Resource Identifiers (URIs) (e.g. http://purl.obolibrary.org/obo/FOODON_03305803 for goat milk)
- Limited interoperability
 - Difficult to connect with other public knowledge bases (e.g. FOODON, GO, NCBI, etc.)
- Not machine readable
 - Does not use a formal structure with clear semantics (i.e. an ontology)
- Dedicated applications tailored for accessing FoodEx2
 - Catalogue browser, FoodEx2-SCA

Member of the EFSA Advisory Forum (Aug, 23 2023)

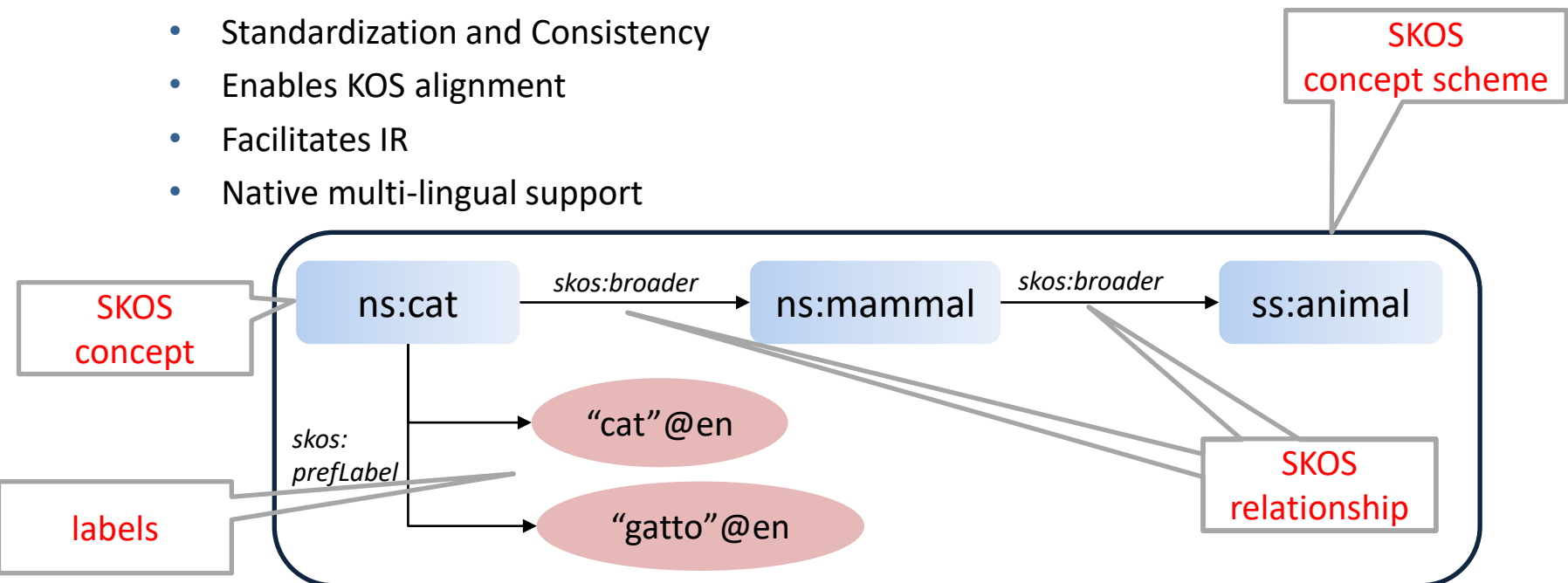
In an Horizon Europe project, called HOLiFOOD, an early question was how to classify foods and hazards:

*For the food classification, the answer was FoodON, because it is a **machine readable, standardised, open ontology**, and even though it is far from being perfect, and also there is less automatic connection possibilities to EFSA contaminants and consumption data, still, it is **easy to implement**.*

SKOS-FoodEx2

Why SKOS?

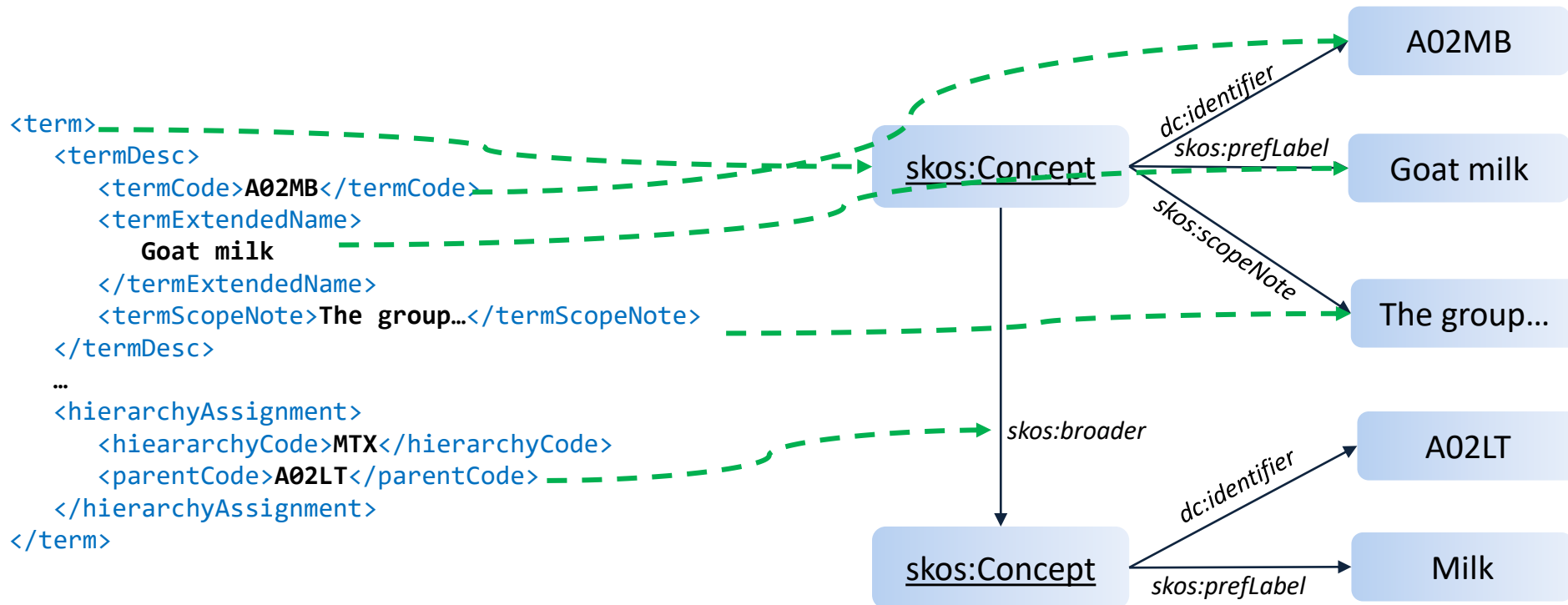
- Simple Knowledge Organization System (SKOS) is a W3C recommendation designed to represent and share knowledge organization systems in a machine-readable format on the web
- Key features:
 - Interoperability
 - Semantic Web Background
 - Standardization and Consistency
 - Enables KOS alignment
 - Facilitates IR
 - Native multi-lingual support



SKOS-FoodEx2

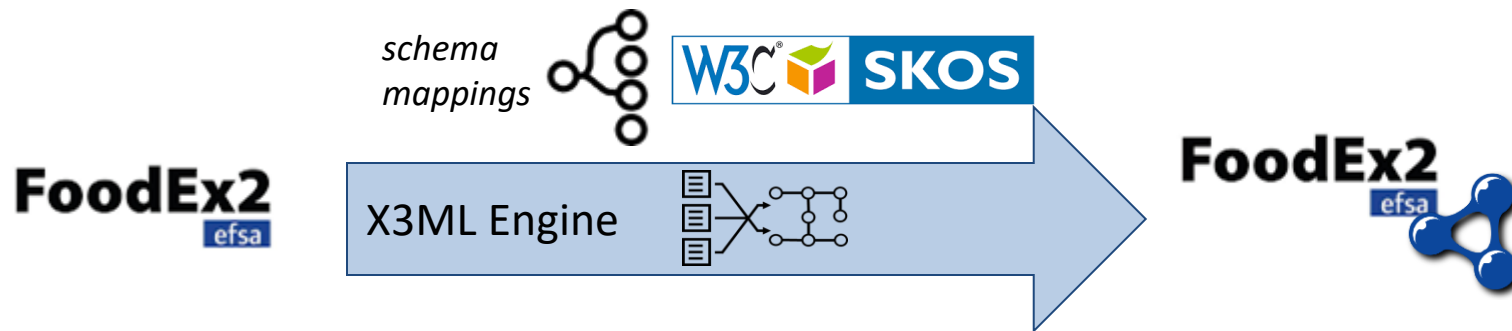
Defining the Schema Mappings

- Alignment between the FoodEx2 schema and SKOS
- Mappings were described using X3ML mapping definition language



SKOS-FoodEx2

Transforming FoodEx2 → SKOS-FoodEx2



- A transformation workflow supports the construction of SKOS-FoodEx2 as FoodEx2 evolves over time
 - FoodEx2 maintainers (EFSA) continue to support the existing maintenance procedures
 - Compliant with the addition/removal/update of terms in FoodEx2
 - Valid as long as the original schema (XML) of FoodEx2 does not change

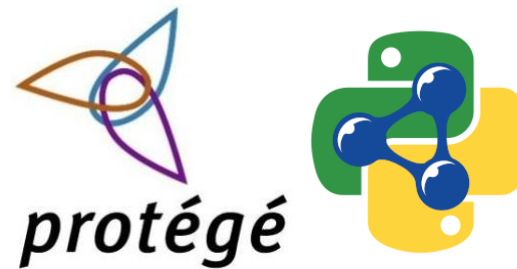
<https://github.com/isl/x3ml>

SKOS-FoodEx2 Access Services

- SKOS editors/tools
 - PoolParty, VocBench, Protégé
- Online SKOS browsers
 - Skosmos, W3C SKOS Play
- Programming libraries
 - RDFLib, RDF4J, Jena
- Visualization tools
 - GraphViz, RdfVisualizer, RDF Validation Service
- Query languages
 - SPARQL



Skosmos



SKOS Play !

Graphviz



W3C

rdf4j



RDF Visualizer



SKOS-FoodEx2

Access Services – cont'd

Catalogue MTX (FoodEx2 Matrix) Content language English

Alphabetical Hierarchy

- All Lists
- Facets
- Feed
- Food
 - Alcoholic beverages
 - Animal meat commodities (tissue RPCs)
 - Composite (recipe based) food classes (including some strictly related RPCs or RPC derivatives)
 - Composite dishes
 - Confectionery including chocolate
 - Eggs and egg products**
 - Egg powder
 - Hardened egg products
 - Liquid egg products
 - Processed eggs
 - Unprocessed eggs
 - Whole eggs
 - Fish meat and products thereof
 - Food for particular diets
 - Food products for young population
 - Fruit and primary derivatives thereof
 - Fruit/vegetables/plant drinks, spreads and related products
 - Garden vegetables and primary derivatives

All Lists > Food > Eggs and egg products

PREFERRED TERM **Eggs and egg products**

BROADER CONCEPT **Food**

NARROWER CONCEPTS

- Egg powder
- Hardened egg products
- Liquid egg products
- Processed eggs
- Unprocessed eggs
- Whole eggs

RELATED CONCEPTS

- A031E#F02.A06BQ
- Eggs and egg-related (as part-nature)

SCOPE NOTE

The category covers all egg RPCs and derivatives. The part considered is by default the whole sold or prepared unit or a portion homogeneously representing the whole.
Ehttps://en.wikipedia.org/wiki/Egg_as_foodEhttps://www.google.co.uk/s?tbm=isch&q=Eggs and egg products

IDENTIFIER

- A031E
- A031E#F02.A06BQ [allFacets]

Using skosmos, a web-based browser for SKOS resources
<https://skosmos.org/>

Using RDFVisualizer, a generic visualizer of RDF resources
<https://demos.isl.ics.forth.gr/RDFV/>

RDF Visualizer

Model Overview

Enter subject

Choose a Template:

term A04JL [core#Concept]

source

- <https://en.wikipedia.org/wiki/Mulberries>
- [https://www.google.co.uk/search?tbm=isch&q=Mulberries \(black and white\) and similar-](https://www.google.co.uk/search?tbm=isch&q=Mulberries+(black+and+white)+and+similar-)

core#prefLabel

- Mulberries (black and white) and similar-@en

core#inScheme

- MTX@en,MTX (FoodEx2 Matrix) [core#ConceptScheme, VocabularyEncodingScheme]

core#related

- Source [core#Concept, core#Collection]
- term A04JL, Mulberries (black and white) and similar-@en [core#Concept]
- Part-nature [core#Collection, core#Concept]

expand list (6 entries)

type

- Raw Primary Commodities (RPC) [owl#Thing]
- Core Term [owl#Thing]

Identifier

- A04JL [termCode]
- A04JL#F01.A060LSF02.A0ELCSF27.A04JL [allFacets]

skos-these#subordinateArray

- MTX [skos-these#ThesaurusArray, core#Collection]

core#broader

- term A01EX, Other small fruits and berries@en [core#Concept]

hasVersion

- version 8.9 [core#Concept]

SKOS-FoodEx2

Access Services – cont'd

A0FDF	Tzatziki	Composite food simple	● Core Term
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Alternative Identifiers

A0FDF#F02.A0EPP\$F04.A02NE\$F33.A0C2F [allFacets]
A0FDF [termCode]

Implicit Facets

- F02 Part-nature - [A0EPP] Herbs/spices sauces (as part-nature)
- F04 Ingredient - [A02NE] Yoghurt
- F33 Legislative-classes - [A0C2F] FA-12.7 Salads and savoury based sandwich spreads

Description

The group includes any type of Tzatziki sauces, i.e. a Greek dressing-type sauce typically made with 10% fat yoghurt, cucumber, garlic and olive oil. However nowadays different variations of Tzatziki are present on the market.

Broader Terms

- A0C5X - All Lists
- - A0B6Z - Food
- - - A0BAG - Composite (recipe based) food classes (including some strictly related RPCs or RPC derivatives)
- - - - A042N - Seasoning, sauces and condiments
- - - - - A04QN - Condiments (including table-top formats)
- - - - - - A043V - Savoury sauces
- - - - - - - A0ERG - Herbs/spices sauces

URL References

<https://en.wikipedia.org/wiki/Tzatziki>
<https://www.google.co.uk/search?tbm=isch&q=Tzatziki>

Version	Status
8.9	APPROVED

<http://demos.isl.ics.forth.gr/foodex2search/>

Conclusion

- SKOS-FoodEx2 is a food resources knowledge base that leverages SKOS and Semantic Web technologies
- Key outcomes:
 - An automatic workflow to construct and support the evolution of FoodEx2
 - An improved FoodEx2 product (in terms of interoperability, semantic integration, shareability, etc.)
- In future:
 - Automatic links with external resources
 - Ontological version of FoodEx2
- This work was carried out in the context of the project Ontology Roadmapping and Case Study Implementation [SC01 implementing FWC OC/EFSA/DATA/2021/01 – Nov'22-Nov'23].



Conclusion – Meet the Authors



Yannis Marketakis



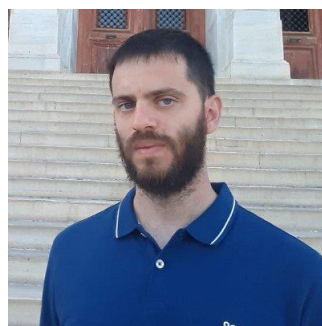
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