Ontologies for Food Systems Sustainability:

A Meta-Framework *- Abstract*

Giorgio A. Ubbiali[1,2], Matthew C. Lange[2] and Andrea Borghini[1]

[1] *University of Milan, 7 Festa del Perdono Street, Milan, 20122, Italy*

[2] *International Center for Food Ontology Operability Data and Semantics, 1 Shields Avenue, Davis, 95616, California, USA*

Abstract

Food systems are among the main drivers of several global sustainability concerns, such as biodiversity loss, land degradation, climate change, increasing inequalities, and health-related issues. Therefore, aiming to address these concerns, stakeholders from different fields of study dedicate particular attention to the sustainability of these systems.

However, there exist large and intense debates on food systems sustainability. These debates originate because, across fields of study, stakeholders endorse disparate meanings, approaches, and metrics on food systems sustainability. They essentially hold different perspectives on what food systems sustainability means and how it must be addressed.

Establishing a shared language among stakeholders is the essential first step to effectively dealing with food systems sustainability. Sharing the same language will contribute to clarifying the meanings stakeholders underpin on food systems sustainability. At the same time, a common language will also assist in integrating practices and metrics on food systems sustainability.

Ontologies support achieving the goal of establishing a shared language for food systems sustainability. In fact, ontologies guarantee to consistently represent knowledge, providing robust and standardized vocabularies that stakeholders may employ to organize, reuse, and interoperate data across different data sources.

Ontologies must comprehensively deal with the variety of perspectives on food systems sustainability to establish a shared language effective for food systems sustainability. Nevertheless, ontologies are designed and implemented, whether deliberately or unconsciously, relying on particular frameworks that simply reflect the authors' personal perspectives of the phenomenon under inquiry. Thus, designing ontologies in this manner appears insufficient when it comes to food systems sustainability.

To promote the design of ontologies that comprehensively and effectively deal with food systems sustainability, it becomes imperative to develop a meta-framework – a foundational framework - that consents to account for and possibly conjugate different perspectives on food systems sustainability.

In this talk, first, we will provide insights into what distinguishes a meta-framework from a framework. Then, we will illustrate the Food Systems Sustainability Meta-Framework (FSSMF) we are developing. We will describe the design process we are following and briefly present the foundational elements (tenets) of food systems sustainability that FSSMF outlines. In sum, FSSMF outlines two types of tenets, "Pillars" and "Stocks of Essential Relations" of food systems sustainability. Pillars count for three and stocks for two.

Pillars:

- Food systems stakeholders' perspectives.
- Food systems complexity.
- Food systems transformations.

Stocks of Essential Relations:

- Domain neutral relations.
- Domain proper relations.

We will also present in brief the FSSMF guidelines and the FSSMF Atlas - a series of nodes and edges-based representational maps that graphically illustrate the main terminology pertaining to pillars and stocks - that we are developing. FSSMF guidelines and FSSMF Atlas aim to support stakeholders in consistently and coherently using FSSMF for designing food systems sustainability ontologies. Finally, we will point out the next steps we envision to proceed with FSSMF. Developing FSSMF, we aim to strengthen the support ontologies offer to establish a shared language for food systems sustainability.

Authors' Contacts

- Giorgio A. Ubbiali: giorgio.ubbiali@unimi.it; 0000-0001-7872-1770.

- Matthew C. Lange: matthew@ic-foods.org; 0000-0002-6148-7962.

- Andrea Borghini: andrea.borghini@unimi.it; 0000-0002-2239-1482.