Miguel La iglesia Mirones, Lucía Muñoz Gil
Semantic Technologies, MSc in Computational Biology
January 2024

Ontology Requirements Specification Document	
1	**Purpose**
	The general goal of the OMICSO is to facilitate omics expression data query, annotation and comparison among different published research articles.
2	**Scope**
	Regarding the large size of the OMICS field, some limitations are specified to delimit OMICSO: - Type of omics fields: transcriptomics and proteomics, the ones mostly related to omics data expression. - Sample analysis: only samples coming from plants. - Biological molecule of analysis: RNA or proteins. - Type of assay: baseline expression or differential expression assays. - Published articles: only omics data coming from approved and published scientific articles and available at PubMed.
3	**Implementation Language (optional)**
	Ontology Web Language (OWL)
4	**Intended End-Users (optional)**
	Scientific researchers in the field of omics data analysis and interpretation
5	**Intended Uses**
	OMICs Data query obtaining published data sets that best fits the researchers requirements OMICs Data comparison between experimental assays carried out in similar conditions or organisms Omics Data annotation to enrich datasets with information about the molecules and samples involved in the study
6	**Ontology Requirements**
	1. **Non-Functional Requirements**
	- Annotated in English - Open license - Online availability - The terms used for biomolecules, organisms… must follow these common standards in the scientific community.

	2. **Functional Requirements: Lists or tables of requirements written as Competency Questions and sentences**
	** Functional Requirements are specified at the end of the documents (*Table of Requirements*)
7	**Pre-Glossary of Terms (optional)**
	1. **Terms from Competency Questions**
	2. **Terms from Answers**
	3. **Objects**

Miguel La iglesia Mirones, Lucía Muñoz Gil
Semantic Technologies, MSc in Computational Biology
January 2024

Table of Requirements		
Identifier	**Competency question / Natural language sentence**	**Answer**
OMICSO1	A research article/paper is identified by a unique paper DOI	
OMICSO2	A research article has only one paper title, one abstract, one publication date and one or more author names	
OMICSO3	A research paper has one PubmedID	
OMICSO4	A research paper has an omics assay which can be transcriptomics or proteomics.	
OMICSO5	An experimental assay must be “differential expression” or “baseline expression” studies, but not both at the same time	
OMICSO6	A baseline expression study involves only one sample, whereas a differential expression involves more than one.	
OMICSO7	An experimental assay results in at least one omics file	
OMICSO8	An omics file has a unique identifier, a file name and a file format	
OMICSO9	An omics assay uses a bioinformatic tool	
OMICSO10	An omics assay has experimental metadata	
OMICSO11	A transcriptomics assay has a transcriptomics technology, whereas a proteomics assay has a proteomics one	
OMICSO12	A transcriptomics technology comprises a RT-qPCR, RNA microarray, qPCR, RiboSeq, nanopore sequencing or CAGE	
OMICSO13	A proteomics technology comprises a western blot, a protein microarray, a SRM, a ICAT, SILAC, PLA or shotgun proteomics	
OMICSO14	An omics assay has experimental conditions	
OMICSO15	Experimental conditions study a cell type with a cell name Experimental conditions has a plant	

	structure with only one structure name	
OMICSO16	A plant structure belongs to an organism with only one taxonID	
OMICSO17	Experimental conditions have experimental variable for several plant stresses or genetic modifications	
OMICSO18	A plant stress can be abiotic or biotic stress	
OMICSO19	Genetic modification can be gene knock out or over expression, but not both at the same time	
OMICSO20	An omics assay has an expression study which can be either baseline expression or differential expression	
OMICSO21	Baseline expression studies have a baseline expression level, with a standard value and units	
OMICSO22	Differential expression studies have a differential expression change, with a p-value and fold-change value	
OMICSO23	Differential expression change can be an up-regulation, down-regulation or no-change.	
OMICSO24	An expression study has an expression result which can be either from a baseline expression level or differential expression change	
OMICSO25	A gene product is studied in an omics paper, and thus, a paper studies a gene product	
OMICSO26	A gene product has as product a protein, untranslated RNA or a messenger RNA	
OMICSO27	A messenger RNA is translated into protein, so protein is translated from messenger RNA	
OMICSO28	A protein is an analyte of proteomics, whereas a messenger and untranslated RNA are analytes of transcriptomics.	
OMICSO29	A gene product has an expression result which can be either from a baseline expression level or differential expression change	

OMICSO30	A gene product encodes for a Gene, so a gene is encoded by a gene product	
OMICSO31	A gene has a gene symbol, a gene sequence, a sequence length and an identifier.	
OMICSO32	The gene symbol and gene name refer to equivalent concepts.	
OMICSO33	A gene is targeted by a genetic modification, so a genetic modification targets a gene	
OMICSO34	A gene product is represented by a moleculeID	
OMICSO35	A moleculeID has a gene symbol or a protein symbol, but not both at the same time	
OMICSO36	A gene product is located in a cellular component, so a cellular component is location of a gene product	
OMICSO37	A gene product has a molecular function, so a molecular function is function of a gene product	
OMICSO38	A gene product participates in a biological process, so a biological process has participant in a gene product	
OMICSO39	One molecule ID can only have one gene ID or protein ID	
OMICSO40	A gene can only have one gene sequence, so only one sequence length	
OMICSO41	An omics paper can have several omics assay, and an omics assay might have several experimental conditions	
OMICSO42	Experimental conditions might have several experimental variables.	
OMICSO43	Transcriptomics or proteomics assays can have only one transcriptomics or proteomics technology, respectively.	