

Ontology Requirements Specification Document	
1	Purpose
	The general goal of the OMICS Data Ontology (ODO) is to facilitate omics expression data query, annotation and comparison among different published research articles.
2	Scope
	<p>Regarding the large size of the OMICS field, some limitations are specified to delimit OMICS Data Ontology:</p> <ul style="list-style-type: none"> - 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
	<p>OMICs Data <u>query</u> obtaining published data sets that best fits the researchers requirements</p> <p>OMICs Data <u>comparison</u> between experimental assays carried out in similar conditions or organisms</p> <p>Omics Data <u>annotation</u> to enrich datasets with information about the molecules and samples involved in the study</p>
6	Ontology Requirements
	1. Non-Functional Requirements
	<ul style="list-style-type: none"> - 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 (<i>Table of Requirements</i>)
7	Pre-Glossary of Terms (optional)
	1. Terms from Competency Questions
	2. Terms from Answers
	3. Objects

<i>Table of Requirements</i>		
Identifier	Competency question / Natural language sentence	Answer
OMICS01	A research article/paper is identified by a unique paper DOI	
OMICS02	A research article has only one paper title, one abstract, one publication date and one or more author names	
OMICS03	A research paper has one PubmedID	
OMICS04	A research paper has an omics assay which can be transcriptomics or proteomics.	
OMICS05	An experimental assay must be “differential expression” or “baseline expression” studies, but not both at the same time	
OMICS06	A baseline expression study involves only one sample, whereas a differential expression involves more than one.	
OMICS07	An experimental assay results in at least one omics file	
OMICS08	An omics file has a unique identifier, a file name and a file format	
OMICS09	An omics assay uses a bioinformatic tool	
OMICS010	An omics assay has experimental metadata	
OMICS011	A transcriptomics assay has a transcriptomics technology, whereas a proteomics assay has a proteomics one	
OMICS012	A transcriptomics technology comprises a RT-qPCR, RNA microarray, qPCR, RiboSeq, nanopore sequencing or CAGE	
OMICS013	A proteomics technology comprises a western blot, a protein microarray, a SRM, a ICAT, SILAC, PLA or shotgun proteomics	
OMICS014	An omics assay has experimental conditions	
OMICS015	Experimental conditions study a cell type with a cell name Experimental conditions has a plant	

	structure with only one structure name	
OMICS016	A plant structure belongs to an organism with only one taxonID	
OMICS017	Experimental conditions have experimental variable for several plant stresses or genetic modifications	
OMICS018	A plant stress can be abiotic or biotic stress	
OMICS019	Genetic modification can be gene knock out or over expression, but not both at the same time	
OMICS020	An omics assay has an expression study which can be either baseline expression or differential expression	
OMICS021	Baseline expression studies have a baseline expression level, with a standard value and units	
OMICS022	Differential expression studies have a differential expression change, with a p-value and fold-change value	
OMICS023	Differential expression change can be an up-regulation, down-regulation or no-change.	
OMICS024	An expression study has an expression result which can be either from a baseline expression level or differential expression change	
OMICS025	A gene product is studied in an omics paper, and thus, a paper studies a gene product	
OMICS026	A gene product has as product a protein, untranslated RNA or a messenger RNA	
OMICS027	A messenger RNA is translated into protein, so protein is translated from messenger RNA	
OMICS028	A protein is an analyte of proteomics, whereas a messenger and untranslated RNA are analytes of transcriptomics.	
OMICS029	A gene product has an expression result which can be either from a baseline expression level or differential expression change	

OMICS030	A gene product encodes for a Gene, so a gene is encoded by a gene product	
OMICS031	A gene has a gene symbol, a gene sequence, a sequence length and an identifier.	
OMICS032	The gene symbol and gene name refer to equivalent concepts.	
OMICS033	A gene is targeted by a genetic modification, so a genetic modification targets a gene	
OMICS034	A gene product is represented by a moleculeID	
OMICS035	A moleculeID has a gene symbol or a protein symbol, but not both at the same time	
OMICS036	A gene product is located in a cellular component, so a cellular component is location of a gene product	
OMICS037	A gene product has a molecular function, so a molecular function is function of a gene product	
OMICS038	A gene product participates in a biological process, so a biological process has participant in a gene product	
OMICS039	One molecule ID can only have one gene ID or protein ID	
OMICS040	A gene can only have one gene sequence, so only one sequence length	
OMICS041	An omics paper can have several omics assay, and an omics assay might have several experimental conditions	
OMICS042	Experimental conditions might have several experimental variables.	
OMICS043	Transcriptomics or proteomics assays can have only one transcriptomics or proteomics technology, respectively.	