

ISO 20691:2022-11 (E)

Biotechnology - Requirements for data formatting and description in the life sciences

Contents	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Recommendations and requirements for the description of entities and concepts in life science data	8
4.1 General	8
4.2 Recommended ubiquitous identifier scheme for biological and conceptual entities	8
4.2.1 URI provisions	8
4.2.2 IRI provisions	9
4.2.3 Relationship between URI and IRI	10
4.3 Formatting data and contextual descriptive data (metadata) for biological entities and concepts	10
4.3.1 General	10
4.3.2 Version control	10
4.3.3 Arbitrary Limits	10
4.3.4 Character sets	10
4.3.5 Machine readability	10
4.3.6 Knowledge representation	11
5 Technical and organizational recommendations and requirements for data formats	11
5.1 General	11
5.2 Organizational responsibilities	11
5.3 Documentation	12
5.4 Versioning and change log	12
5.5 Compatibility	12
5.6 Extensibility	12
5.7 Compression	12
5.8 Structural and control elements	12
5.9 Requirements for data types within formats	13
5.9.1 General	13
5.9.2 Encoding of numerical quantity values	13
5.9.3 Encoding of character strings	13
5.9.4 Encoding of sequence data	13
5.9.5 Time data	13
5.9.6 Boolean data	13
5.9.7 Biological Imaging data	14
5.10 Consistency and compatibility	14
5.11 Data integrity	14
5.12 Format validation	14
5.13 Data provenance	14
6 Semantic recommendations and requirements for data formats	15
6.1 General	15
6.2 Minimum consensus information for annotation of biological data	15
6.2.1 General	15

6.2.2	Species	16
6.2.3	Sex	16
6.2.4	Age	16
6.2.5	Organ	16
6.2.6	Tissue	16
6.2.7	Cell type	16
6.2.8	Identifiable objects	16
ISO 20691:2022(E) 6.2.9	Identifiable processes	17
6.2.10	Manipulated entities	17
6.2.11	Analytical, experimental and computational technology	17
6.2.12	Biological or analytical question	17
6.2.13	Technology-specific data	17
6.3	Syntax and reification	19
7	Requirements for terminologies and ontologies suitable for annotation of biological data	19
7.1	General	19
7.2	Requirements for biological ontologies	19
7.2.1	Maintainer	19
7.2.2	Maintenance of the ontology	19
7.2.3	Ontology syntax	20
7.2.4	Linking to other ontologies and term reuse	20
7.2.5	Licensing and attribution	20
7.2.6	Stable URIs and versioning information	20
7.2.7	Community involvement	20
7.2.8	Language	20
8	Requirements for domain specific data standards	20
8.1	General	20
8.2	Specific requirements for domain specific data standards	20
8.2.1	Maintainer	20
8.2.2	Maintenance of the data standard	21
8.2.3	Data standard syntax	21
8.2.4	Linking to other data standards	21
8.2.5	Licensing and attribution	21
8.2.6	Stable URIs and versioning information	21
8.2.7	Community involvement	21
8.2.8	Language	21
9	Requirements for data repositories for biological data	22
9.1	General	22
9.2	Requirements for data repositories of biological data	22
9.2.1	Maintainer	22
9.2.2	Maintenance of the repository	22
9.2.3	Repository structure	22
9.2.4	Linking to other repositories	22
9.2.5	Licensing and attribution	22
9.2.6	Stable URIs and versioning information	22
9.2.7	Data visibility	23
9.2.8	Community involvement	23
9.2.9	Language	23
Annex A (informative)	Examples of common formats for life science data	24
Annex B (informative)	Minimum reporting standards for data, models and metadata	37
Bibliography		47