

8 Top Level Domains

Provenance Domain: Metadata describing the BCO

Usability Domain: Free text field for researcher to explain the analysis and relevant details.

Extension Domain: User-defined fields

Description Domain: Steps of the analysis, external resources needed for the steps, and the relationship of I/O objects

Execution Domain: Information about the environment in which the analysis was run

Parametric Domain: Records any parameters that were changed from default values

Input and Output Domain: A list of global input and output files

Error Domain: Used for describing errors. Can include the limits of detectability, false positives, false negatives, statistical confidence of outcomes, and description of errors

Required

Optional

Quick Checks

```
{
  "etag": "d516a923967ec1f8ee4bc666a2256bb91b3e035a91a1f5ef64b92e33ad23a104",
  "object_id": "https://beta.portal.aws.biochemistry.gwu.edu/bco/BCO_00016484",
  "spec_version": "https://w3id.org/ieee/ieee-2791-schema/",
  "provenance_domain": {
    "embargo": {},
    "name": "Regulatory BCO for hepatitis C virus resistance analysis",
    "version": "3.0",
```

Always a unique ID

Always this URL

Top level "Domain"

Check for open visibility

Check for modifications

Guidelines

- » "bco_id" may have user specific values (e.g. "FDA_00001" or "GWU_01A")
- » Use Extension Domains to ask for more project specific information
- » Use Verification Kit to quickly check validity of results
- » Steps that do not transform data (e.g. column sorting) can be described in the Usability Domain instead of as a full step in the Description Domain, at the Reviewer's discretion
- » Use IO Domain as a manifest for all data files

Resources:

Website: <https://biocomputeobject.org/>

Official Standard: <https://standards.ieee.org/content/ieee-standards/en/standard/2791-2020.html>

Open source repository: <https://opensource.ieee.org/2791-object/ieee-2791-schema>

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Examples for User-Defined Extension Domains

The extension domain is a user-defined field that can be used to include additional information not recorded anywhere else in the BCO.

Example 1: Expose All Parameters

A full parameter list can be used to show all the parameters that were changed, not just the default parameters that are in the base BCO. It can also be used for application-specific needs.

```
"parametric_domain": [  
  {  
    "is_default": true,  
    "param": "Minimum match length",  
    "value": 50,  
    "step": 1  
  },  
  {  
    "is_default": false,  
    "param": "Conflict resolution method",  
    "value": "Markovnikov rule",  
    "step": 1  
  }  
]
```

Example 2: Bibliography Domain

A bibliography domain can be created to keep track of all references, and to give them an identifier to refer to in the BCO.

```
{  
  "title": "On the Tendency of Varieties to Depart Indefinitely from the Original Type",  
  "book-authors": { "examples": ["Alfred Russel Wallace, Charles Darwin"] }  
},
```

Example 3: Supplementary Domain

A supplementary domain can be created to track any files that are not input/output files, but which may be relevant for understanding the BCO.

```
"supplementary_domain": [  
  {  
    "appendix_a":  
    https://docs.google.com/spreadsheets/d/1B3BrdD2ypRT0jk1wHyWU9xc1VCyExGBruWw-txazE9s/edit?usp=sharing,  
    "description": "Google drive template for a Gantt Chart"  
  }  
]
```

Resources:

Extension Domains are custom designed to specific needs, and will vary heavily by need and user experience with developing and working with schemas. The BioCompute team can help develop custom Extension Domains for specific needs.

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Ontology for Contributors

Ciccarese *et al.* <https://doi.org/10.1186/2041-1480-4-37>

"authoredBy"	Agent that originated or gave existence to the work that is expressed by the digital resource.
"contributedBy"	Agent that provided any sort of help in conceiving the work that is expressed by the digital artifact.
"createdAt"	The geo-location of the agents when creating the resource.
"createdBy"	Agent primarily responsible for encoding the digital artifact or resource representation. This creation is distinct from forming the content, which is indicated with <i>pav:contributedBy</i> or its subproperties.
"createdWith"	The software/tool used by the creator (<i>pav:createdBy</i>) when making the digital resource.
"curatedBy"	Agent specialist responsible for shaping the expression in an appropriate format. Often the primary agent responsible for ensuring the quality of the representation.

"derivedFrom"	Derived from a different resource.
"importedBy"	An agent responsible for importing data from a source given by <i>pav:importedFrom</i> .
"importedFrom"	Original source of imported information.
"providedBy"	Original provider of the encoded information (e.g. PubMed).
"retrievedBy"	Entity responsible for retrieving the data from an external source (usually a software entity).
"retrievedFrom"	The URI where a resource has been retrieved from.
"sourceAccessedBy"	agent who accessed the source.

Versioning

<https://semver.org/>

Versioning is based on “**Semantic Versioning**”
major.minor.patch

Major

Not allowed in BCO, value omitted

Minor

Use for addition of material, like a reviewer block

Patch

Use for editorial corrections

2.4.11

```
{
  "reviewer": {
    "name": "Josiah Carberry",
    "affiliation": "FDA",
    "email": "jcarberry@fda.hhs.gov",
    "contribution": [
      "curatedBy"
    ],
    "orcid": "https://orcid.org/0000-0002-1825-0097"
  },
  "status": "reviewed"
}
```