LabProtocol specification 0.01

Bioschemas specification describing LabProtocol in the life-science

**Description:**

An experimental protocol is a sequence of tasks and operations executed to perform experimental research in biological and biomedical areas.

Experimental protocols are fundamental information structures that support the description of the processes by means of which results are generated in experimental research [1]. Experimental protocols describe how the data were produced, the steps undertaken and conditions under which these steps were carried out.

[1] Giraldo, O., Garcia, A., Corcho, O.: SMART Protocols: SeMAntic RepresenTation for Experimental Protocols, Riva del Garda, Trentino, Italy (2014). 4th Workshop on Linked Science 2014- Making Sense Out of Data (LISC2014)

**Supporting information:**

* [Use cases](https://docs.google.com/document/d/1EZ_U2u2aJH_ERsoecaJRAJkWVHYGU2SK8HYSjvhEaMM/)
* [Crosswalk](https://docs.google.com/spreadsheets/d/1h6gjJlRaOSHU-g6fFf87IsssQ6eVupQBnc14fC9YyyM)
* [Bioschemas mapping](https://docs.google.com/spreadsheets/d/1julB0P6kjXK_mL2dU8EDU9zMxIMah0_dYYeGt2Spllo)

# Properties

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| Based on schema.org [CreativeWork] | | | | | |
| **Property** | **Expected Type** | **Description** | **CN** | **MG** | **CV** |
| identifier | PropertyValue, Text, URL | The identifier property represents any kind of identifier for any kind of Thing, such as ISBNs, GTIN codes, UUIDs etc. Schema.org provides dedicated properties for representing many of these, either as textual strings or as URL (URI) links. See background notes for more details. | one | M | no |
| [citation](http://schema.org/citation) | CreativeWork or URL | A citation or reference to a creative work, such as a publication, web page, scholarly article, etc. | many | R | no |
| license | CreativeWork or URL | A license document that applies to this content, typically indicated by URL. | one | M | no |
| isBasedOn | CreativeWork or  URL | A resource that was used in the creation of this resource. This term can be repeated for multiple sources. For example, http://example.com/great-multiplication-intro.html. Supersedes isBasedOnUrl. | many | R | no |

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| Based on schema.org [Product/Service] | | | | | |
| **Property** | **Expected Type** | **Description** | **CN** | **MG** | **CV** |
| category | Text | A category for the item. Greater signs or slashes can be used to informally indicate a category hierarchy.  In LabProtocol some examples are: Biotechnology; cancer; cell biology; computational biology | many | R | no |

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| Based on schema.org [SoftwareApplication] | | | | | |
| **Property** | **Expected Type** | **Description** | **CN** | **MG** | **CV** |
| device | Text or URL | Device required to run the application. Used in cases where a specific make/model is required to run the application.  For LabProtocols it would be a laboratory equipment. | many | M | no |

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| Based on schema.org [Event] | | | | | |
| **Property** | **Expected Type** | **Description** | **CN** | **MG** | **CV** |
| duration | Duration | The time it takes to actually carry on the protocol, in ISO 8601 duration format. | one | R | no |

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| Based on schema.org [EntryPoint] | | | | | |
| **Property** | **Expected Type** | **Description** | **CN** | **MG** | **CV** |
| actionApplication | SoftwareApplication | An application that can complete the request.  Usage: Software used by the lab protocol. | many | R | no |

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| Based on schema.org [health-lifesci:MedicalStudy] | | | | | |
| **Property** | **Expected Type** | **Description** | **CN** | **MG** | **CV** |
| outcome | Text | outcome or expected result by a protocol execution. | many | R | no |

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| Based on schema.org [health-lifesci:MedicalDevice] | | | | | |
| **Property** | **Expected Type** | **Description** | **CN** | **MG** | **CV** |
| purpose | Text | A goal towards an action is taken. Can be concrete or abstract. | many | M | no |

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| Based on schema.org [BiologicalEntity] | | | | | |
| **Property** | **Expected Type** | **Description** | **CN** | **MG** | **CV** |
| sample | BiologicalEntity or URL | Samples used in the protocol | many | M | no |

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| New properties for [Thingl] | | | | | |
| **Property** | **Expected Type** | **Description** | **CN** | **MG** | **CV** |
| isMentionedIn | [Thing](http://schema.org/Thing) | [CretiveWork, Dataset, collection mentioning this entity](https://schema.org/mentions)  [Inverse of:mentions](https://schema.org/mentions) | many | R | no |

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| New properties for [LabProtocol] | | | | | |
| **Property** | **Expected Type** | **Description** | **CN** | **MG** | **CV** |
| advantage | Text | It should be made clear in which situations the Protocol has been successfully employed. | many | R | no |
| limitation | Text | It should be made clear in which situations the Protocol would be unreliable or otherwise unsuccessful. | many | R | no |
| applicability | Text | Applications of the protocol list the full diversity of the applications of the method and support if is possible to extend the range of applications of the protocol. e.g. northern blot assays, sequencing, etc. | many | R | no |
| reagent | BiologicalEntity (chemicals) or URL | Reagents participating in the list. ChEBI and PubChem entities can be used whenever available. Commercial names are also acceptable (URL if possible) | many | M | no |

**Legend:** *CN: Cardinality (one, many)*

*MG: Marginality (M: minimum; R: recommended; O: optional)*

*CV: Suggested controlled vocabularies (yes, no)*

# Examples

A full example of a lab protocol is available at:

<https://docs.google.com/document/d/1TUXC6r-hDGGGoGf4Q-GNDrd4m6SQUx37atsAi94ORIc/edit>

Schema.org [suggests](http://schema.org/docs/gs.html) implementing metadata using JSON-LD, RDFa or Microdata. JSON-LD is the recommended format by Google, but any of these formats can be used for embedding information about tools in a web page or other online resource.

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| Example 1 - [format: RDFa | JSON-LD | Microdata]. [Example description. Eg: Using minimum fields] |
| <div itemscope itemtype="http://schema.org/[type]">  <div itemprop="id">[id]</div>  <div itemprop="name">[name]</div>  <div itemprop="description">[description]</div>  ...  </div> |

# Controlled Vocabularies

This section contains a list of fields that require a controlled vocabulary or enumeration and suggests what is acceptable for each.

## [Reagent]

Although not mandatory, whenever possible ChEBI or PubChem should be used.