Metadata Made Easy - Develop and Use Domain Specific Metadata Schemes by following the dmdScheme Approach

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Abstract

1. Metadata plays an essential role in the long term preservation, reuse, and interoperability of data. Nevertheless, creating useful metadata can be sufficiently difficult and weakly-enough incentivised that many datasets may be accompanied by little or no metadata. One key challenge is, therefore, how to make metadata creation easier and more valuable. We present a solution that involves creating domain specific metadata schemes that are as complex as necessary and as simple as possible. These goals are achieved by co-development between a metadata expert and the researchers (i.e. the data creators). The final product is a bespoke metadata scheme into which researchers can enter information (and validate it) via the simplest of interfaces: a web browser application and a spreadsheet. 2.We provide the R package ['dmdScheme'](https://CRAN.R-project.org/package=dmdScheme) [@Krug2019] for creating a template domain specific scheme. We describe how to create a domain specific scheme from this template, including the iterative co-development process, and the simple methods for using the scheme, and simple methods for quality assessment, improvement, and validation. 3.The process of developing a metadata scheme following the outlined approach was successful, resulting in a metadata scheme which is used for the data generated in our research group. The validation quickly identifies forgotten metadata, as well as inconsistent metadata, therefore improving the quality of the metadata. Multiple output formats are available, including XML. 4. Making the provision of metadata easier while also ensuring high quality must be a priority for data curation initiatives. We show how both objectives are achieved by very close collaboration between metadata experts and researchers to create domain specific schemes. A near-future priority is to provide methods to interface domain specific schemes with general metadata schemes, such as the Ecological Metadata Language, to increase interoperability.

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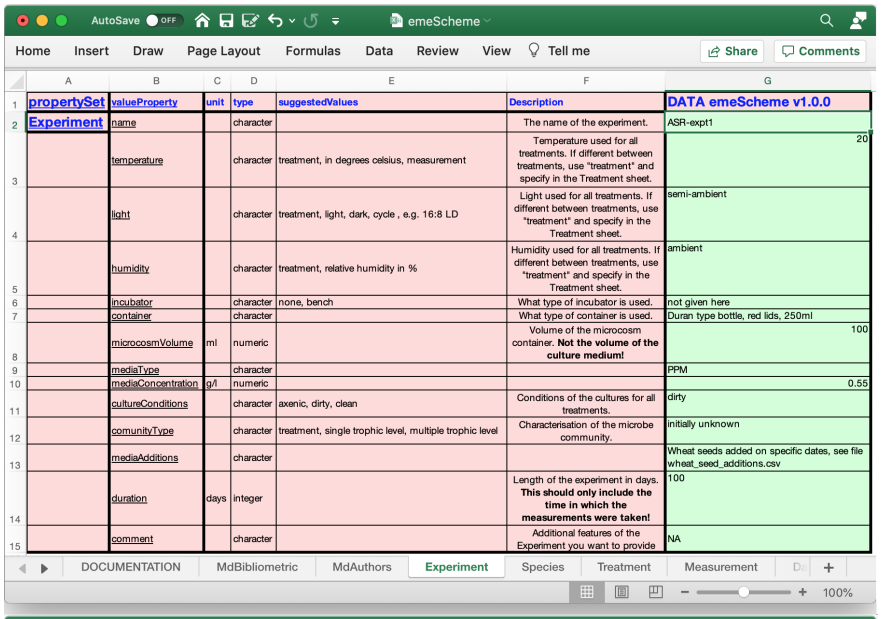

AutoSave OFF emeScheme

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	A	B	C	D	E	F	G
1	propertySet	valueProperty	unit	type	suggestedValues	Description	DATA emeScheme v1.0.0
2	Experiment	name		character		The name of the experiment.	ASR-expt1
3		temperature		character	treatment, in degrees celsius, measurement	Temperature used for all treatments. If different between treatments, use "treatment" and specify in the Treatment sheet.	20
4		light		character	treatment, light, dark, cycle , e.g. 16:8 LD	Light used for all treatments. If different between treatments, use "treatment" and specify in the Treatment sheet.	semi-ambient
5		humidity		character	treatment, relative humidity in %	Humidity used for all treatments. If different between treatments, use "treatment" and specify in the Treatment sheet.	ambient
6		incubator		character	none, bench	What type of incubator is used.	not given here
7		container		character		What type of container is used.	Duran type bottle, red lids, 250ml
8		microcosmVolume	ml	numeric		Volume of the microcosm container. **Not the volume of the culture medium!**	100
9		mediaType		character			PPM
10		mediaConcentration	g/l	numeric			0.55
11		cultureConditions		character	axenic, dirty, clean	Conditions of the cultures for all treatments.	dirty
12		comunityType		character	treatment, single trophic level, multiple trophic level	Characterisation of the microbe community.	initially unknown
13		mediaAdditions		character			Wheat seeds added on specific dates, see file wheat_seed_additions.csv
14		duration	days	integer		Length of the experiment in days. **This should only include the time in which the measurements were taken!**	100
15		comment		character		Additional features of the Experiment you want to provide	NA

DOCUMENTATION MdBibliometric MdAuthors Experiment Species Treatment Measurement Da +

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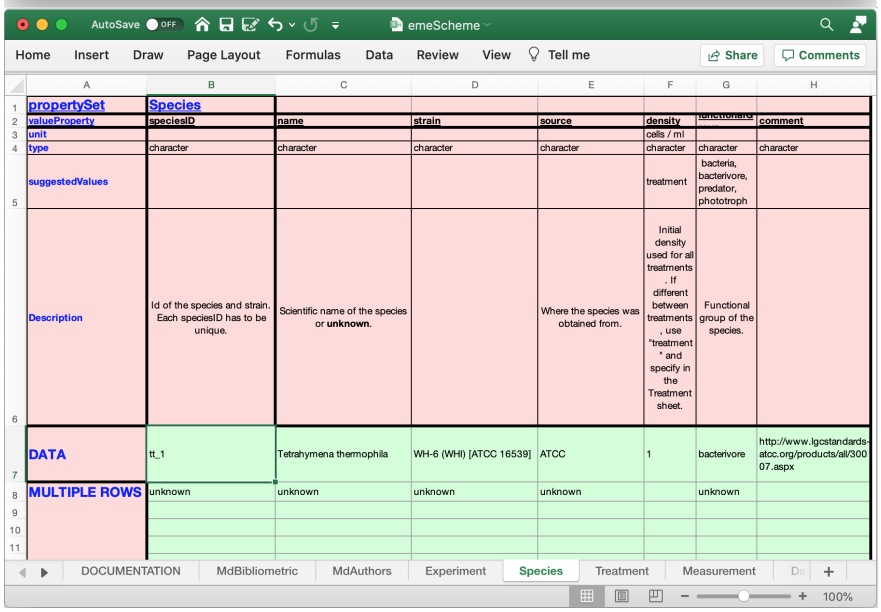

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	A	B	C	D	E	F	G	H
1	propertySet	Species						
2	valueProperty	speciesID	name	strain	source	density	functional	comment
3	unit					cells / ml		
4	type	character	character	character	character	character	character	character
5	suggestedValues					treatment	bacteria, bacterivore, predator, phototroph	
6	Description	Id of the species and strain. Each speciesID has to be unique.	Scientific name of the species or **unknown**.		Where the species was obtained from.	Initial density used for all treatments . If different between treatments , use "treatment " and specify in the Treatment sheet.	Functional group of the species.	
7	DATA	tt_1	Tetrahymena thermophila	WH-6 (WHI) [ATCC 16539]	ATCC	1	bacterivore	http://www.lgcstandards-atcc.org/products/all/30007.aspx
8	MULTIPLE ROWS	unknown	unknown	unknown	unknown		unknown	
9								
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