Growing your graph with OTTR

A method for graph enrichment

By Veronika Heimsbakk

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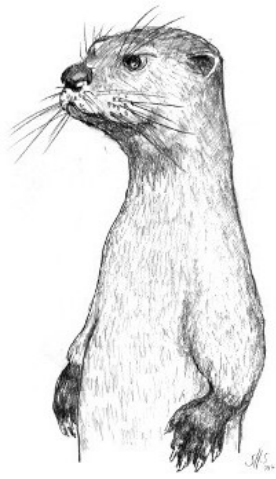
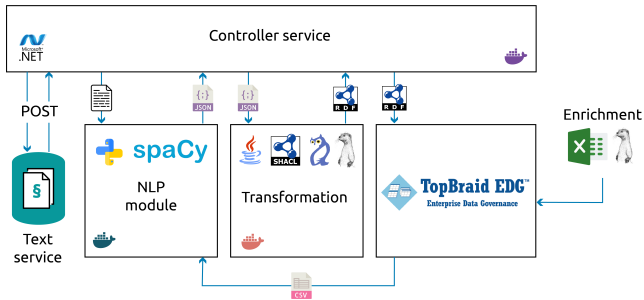
Reasonable Ontology Templates

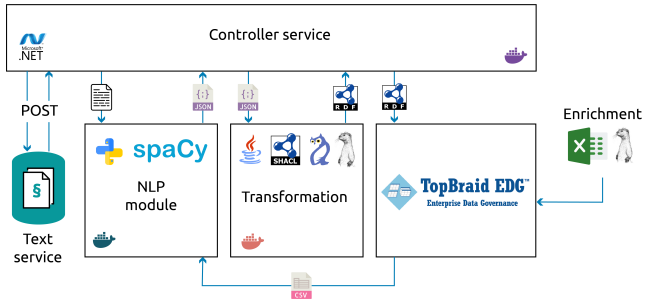


OTTR at the Norwegian Maritime Authority

The Norwegian Maritime Authority (NMA) use OTTR for *graph enrichment*.



OTTR at the Norwegian Maritime Authority



- Translating *code systems* into RDF.
- A tool for domain experts.
- Collaborative spreadsheets.

Code systems at the NMA

3851	**Meldingstype**		
3852	**Code**	**Norwegian**	**English**
3853	ALT	Altinn	Altinn
3854			
3855	**Meldingsvarslingstyper**		
3856	**Code**	**Norwegian**	**English**
3857	EMAIL	e-post	E-mail
3858	SMS	SMS	SMS
3859			
3860	**Meldingsvedleggstype**		
3861	**Code**	**Norwegian**	**English**
3862	ALR	Svar brev refusjonssøknad	Answer letter reimbursement application
3863	CRA	CRA meldingstype	CRA message type
3864	VARSEL	Varsling for utgående sertifikater	Notification for expiring certificates
3865			
3866	**MerverdiavgiftSats**		
3867	**Code**	**Norwegian**	**English**
3868	MVA	25	25
3869			
3870	**Miljøskadetype**		
3871	**Code**	**Norwegian**	**English**
3872	1	Bunkersolje	Bunker oil
3873	1.1	Tungolje	Heavy fuel oil
3874	1.2	Diesel	Diesel fuel oil

Specifications

mOTTR	Concepts and Abstract Model for Reasonable Ontology Templates
rOTTR	Adapting Reasonable Ontology Templates to RDF
wOTTR	Web Reasonable Ontology Templates
stOTTR	Terse Syntax for Reasonable Ontology Templates
tabOTTR	Tabular Reasonable Ontology Template Instances
bOTTR	Batch Instantiation of OTTR templates

Terse Syntax for Reasonable Ontology Templates

This specification defines the Terse Syntax for Reasonable Ontology Templates (stOTTR) for serialising OTTR templates and instances of OTTR templates, as defined by rOTTR.

stOTTR Terms

A term is, syntactically, either a variable, a constant or a list of terms.

```
?chocolateCake
?CAKE

<http://example.com/carrotcake>
ex:bananabread
:bløtkake

[]
_:blankcake
```

stOTTR Terms

A term is, syntactically, either a variable, a constant or a list of terms.

```
"coffee"
"tea"^^xsd:normalisedString
42
true
3.14

("coffee", ex:bananabread, 42)
(("coffee", 42), ex:bananabread, (3.14) )
```

stOTTR Types

A type, i.e., the type of a term, is either a basic type, a list type or a LUB-type (least upper bound).

```
xsd:double
owl:Class
rdfs:Resource
ottt:Bot

List<xsd:string>
List<NEList<xsd:int>>

LUB<xsd:string>
LUB<owl:Class>
```

LUB-types cannot be nested.

stOTTR Template signatures

```
ex:Template1 [ ?a , ?b ] .

ex:Template2 [ ! owl:Class ?a , ? xsd:double ?b = 3.14 ] .

ex:Template3 [ !??a ] .

ex:Template4 [ ]
@@ex:Template1(ex:Template4, "arg"),
@@ex:Template1(ex:Template4, "another arg")
.
```

stOTTR Template

```
o-sdir:Drawing[
    ! ?drawing,
    ?subject,
    ?projectCode,
    ! ?labelNo,
    ?description,
    ? ?labelEn
] :: {
    o-rdf:Type(?drawing, sdir:Document),
    o-rdf:Type(?drawing, owl:Class),
    ottr:Triple(?drawing, sdir:subject, ?subject),
    o-rdf:Type(?subject, owl:Class),
    ottr:Triple(?drawing, sdir:projectCode, ?projectCode),
    o-rdf:Type(?projectCode, sdir:ProjectCode),
    o-rdfs:Label(?drawing, ?labelNo),
    o-rdfs:Label(?drawing, ?labelEn),
    ottr:Triple(?drawing, rdfs:comment, ?description)
} .
```

tabOTTR

tabOTTR is designed to be simple to use and simple to parse. The development is driven by use cases. There are therefore constructs or types of values that may not be possible to represent in tabOTTR.

tabOTTR Prefix

#OTTR	prefix
ex	http://example.org/
unit	http://qudt.org/vocab/unit/
#OTTR	end

The following are implicitly declared for all files:

```
rdf     http://www.w3.org/1999/02/22-rdf-syntax-ns\#
rdfs    http://www.w3.org/2000/01/rdf-schema\#
owl     http://www.w3.org/2002/07/owl\#
xsd     http://www.w3.org/2001/XMLSchema\#
dc      http://purl.org/dc/elements/1.1/
ottr    http://ns.ottr.xyz/templates\#
```

stOTTR Example

	A	B	C	E	F	G	H
1	#OTTR	prefix					
2	ottr	http://ns.ottr.xyz/0.4/					
3	sdir	https://www.sdir.no/SDIR_Simulator#					
4	o-sdir	https://www.sdir.no/SDIR_Simulator/ottr#					
5	scope	https://www.sdir.no/SDIR_Simulator/shapes/scope#					
6	sh	http://www.w3.org/ns/shacl#					
7	#OTTR	end					
8							
9	#OTTR	template	o-sdir:Drawing				
10		1	2	3	4	5	6
11	iri	iri	iri	text	text	text	
12	**Dokumenteres i følgende dokument**	**Fagområde**		Norsk label	beskrivelse av tegningen	Engelsk label	
13	sdir:AccommodationFireExtinguishingSystem	sdir:FireExtinction	sdir:ProjectCodeB11	Slokkesystem innredning@@no	For behandling av fast installerte slokkesystem i innredning skal følgende dokumentasjon innsendes: • Typegodkjenningssertifikat • Dokumentasjon krevd av typegodkjenningssertifikatet • Kapasitetsberegninger		
14	sdir:FireControlPlan	sdir:FireExtinction	sdir:ProjectCodeB11	Brannkontrollplan@@no	All dokumentasjon skal være merket med versjon eller dato, i tillegg til vanlig nummerering. Planen skal være i tilstrekkelig stor målestokk til å gi et klart bilde av installasjonene, og symbolene skal være i henhold til IMO resolution A.952(23). Mangler noe av dette vil dokumentasjonen bli returnert	Fixed fire – extinguishing system accommodati	
15	sdir:FireMainDrawing	sdir:FireExtinction	sdir:ProjectCodeB11	Brannledning@@no	• Oversiktsarrangement med inntegnet plassering av brannpumper, brannledning, isolasjonsventil og hydranter • Symbolliste som forklarer rør og ventilinndelinger, samt pumpekapasitet@@no	Accommodations for crew (MLC)@@en	

tabOTTR Data types

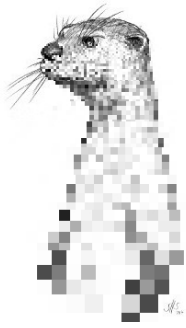
`iri`	IRI
`blank`	RDF blank node
`text`	unttyped RDF literal
IRI, e.g. XSD	typed RDF literal
`auto`	individually determined by value
`X+`	an RDF list where the type of items are determined by `X`

Each value is individually typed according to following rules.

`iri`	string is aboslute URL or a QName.
`blank`	string starts with `_:`, fresh node `*`.
typed literal	`xsd:boolean`, `xsd:integer`, `xsd:decimal`
untyped literal	default
none value	`ottr:none`

Lutra

Lutra is an open source (LGPL) reference implementation of OTTR.



Latest stable `.jar` downloadable from `https://gitlab.com/ottr/lutra/lutra/-/releases`

Running the Lutra CLI

```
java -jar lutra.jar -l ottrlib.ttl -L stottr -I tabottr -f data.xlsx -o outputfile.ttl
```

`ottrlib.ttl`	Location of stOTTR templates.
`data.xlsx`	Instance data stored in Excel with tabOTTR flavouring.
`outputfile.ttl`	Serialized RDF.

Running the Lutra CLI

```
java -jar lutra.jar -l ottrlib.ttl -L stottr -I tabottr -f data.xlsx -o outputfile.ttl
```

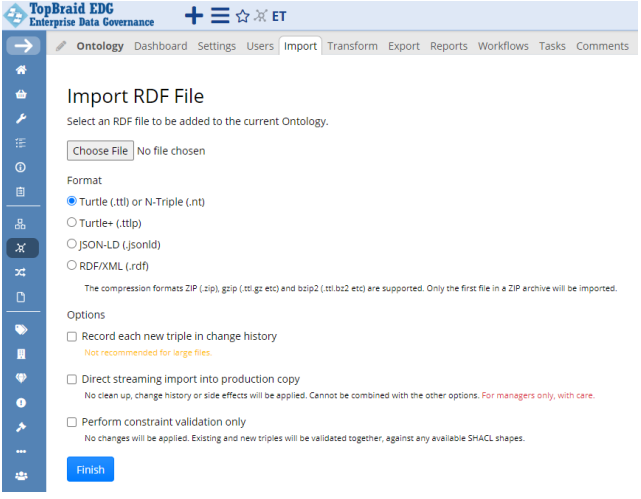
`-l, -library`	Location of OTTR library.
`-L, -libraryFormat`	Input format of library, `wottr` or `stottr`.
`-I, -inputFormat`	Input format of instances, `wottr`, `stottr`, `tabottr` or `bottr`. Default: `wottr`.
`-f, -fetchMissing`	Fetch missing template dependencies. Assume that definitions are accessible via IRI. Default: false.
`-o, -output`	Path for writing output.

OTTR output

```
sdir:FireControlPlan  a   owl:Class , sdir:Document ;
        rdfs:comment      "All dokumentasjon skal være ..."@no ;
        rdfs:label        "Brannkontrollplan"@no ,
                          "Fixed fire - extinguishing system accommodation"@en ;
        sdir:projectCode  sdir:ProjectCodeB11 ;
        sdir:subject      sdir:FireExtinction .
```

- `sdir:ProjectCodeB11` and `sdir:FireExtinction` already exists in our knowledge graph.
- SPARQL query stored in library to check for resources without description.

Melt the data!



Pros & Cons

+ Easy to serialize chunks of data.
+ Recognizable tools for domain experts.
+ tabOTTR syntax for domain experts.

– Difficult to automate.
– Support of few file formats.
– Documentation somewhat hard to read.

https://github.com/veleda/ottr-masterclass

https://ottr.xyz/

♡

#KGC2022

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youtube.com/playlist?list=PLAiy7NYe9U2Gjg-600CTV1HGypiF95d_D