



Linked Conservation Data

LCD Terminology Working Group

Vocabulary guidelines

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Repository maintainers

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Quick start

Non-technical quick start

To share your vocabulary on the LCD repository, follow these steps:

1. Ensure that you can share with an appropriate license as explained [here](#).
2. Ensure you have noted down the meaning of each of your terms and that there are no ambiguities (for example do not use the same term to mean two different things).
3. If you do not already have URIs for your terms, or if you are not sure what a URI is, contact the [repository maintainers](#) to help you produce them.
4. Use [this template](#) to enter your vocabulary data as explained here:

Diagram illustrating the structure of the vocabulary template spreadsheet with red annotations:

- concept URI prefix (replaces first part, acts as shorthand)**: Points to the `https://w3id.org/spg/` prefix in the `ConceptScheme URI` cell.
- first part of concept URIs to be replaced by prefix**: Points to the `https://w3id.org/spg/concept/` prefix in the `PREFIX` cell.
- vocabulary URI**: Points to the `spgc` prefix in the `PREFIX` cell.
- specify translations with @lang**: Points to the `@fr` language code in the `skos:prefLabel@fr` header.
- column for synonyms**: Points to the `skos:altLabel@en` header.
- terms / concepts**: Points to the `skos:prefLabel@en` column.
- concept URI column as: prefix:rest-of-URI**: Points to the `URI` column.
- column with URI of more general term (e.g. 'linseed oil' is a type of 'oil')**: Points to the `skos:broader` column.
- concept descriptions**: Points to the `skos:scopeNote@en` column.

	A	B	C	D	E	F	G
1	ConceptScheme URI	<code>https://w3id.org/spg/</code>					
2	PREFIX	<code>spgc</code>	<code>https://w3id.org/spg/concept/</code>				
3	<code>dc:title@en</code>	Smithsonian vocabulary for paintings conservation					
4	<code>dc:title@fr</code>	Vocabulaire Smithsonian pour la restauration des peintures					
5	<code>dc:description@en</code>						
6	<code>dc:description@fr</code>						
7	<code>dc:creator</code>	Smithsonian Institution					
8	<code>dc:rights</code>	<code>https://creativecommons.org/licenses/by/4.0/</code>					
9							
10	URI	<code>skos:prefLabel@en</code>	<code>skos:prefLabel@fr</code>	<code>skos:altLabel@en</code>	<code>skos:broader</code>	<code>skos:related</code>	<code>skos:scopeNote@en</code>
11	<code>spgc:20</code>	oil	huile		<code>spgc:20</code>		A general term from a water-insoluble viscous liquid.
12	<code>spgc:15</code>	linseed oil	l'huile de lin			<code>spgc:5</code>	The most popular drying oil used as paint medium. The med
13	<code>spgc:5</code>	drier	siccatif				Any catalytic material which when added to a drying oil acc
14							
15							
16							

5. Match your terms to the [Arts & Architecture Thesaurus](#) terms using [this template](#) as explained here:

	A	B	C	D
1	ConceptScheme URI	https://w3id.org/spg/		
2	PREFIX	spgc	https://w3id.org/spg/concept/	
3	PREFIX	aat	http://vocab.getty.edu/aat/	
4	dct:creator	Smithsonian Institution		
5	dct:rights	https://creativecommons.org/licenses/by/4.0/		
6				
7	URI	skos:prefLabel@en	skos:exactMatch	skos:closeMatch
8	spgc:20	oil	aat:300014254	Use closeMatch if the AAT term is not exactly the same as yours. We prefer exactMatch. Consider submitting new concepts to the AAT instead of using closeMatch.
9	spgc:15	linseed oil	aat:300014292	
10	spgc:5	drier	aat:300014732	
11				
12				
13				

your concept URI prefix

your vocabulary URI

first part of concept URIs to be replaced by prefix

your concept URI column as: prefix:rest-of-URI

AAT concept with exact match as: prefix:aat-id as shown on the AAT website

Research
 Research Home Tools Art & Architecture Thesaurus Full Record Display
 Art & Architecture Thesaurus® Online
 Full Record Display
 Click the icon to view the hierarchy.
 Semantic View (JSON, RDF, N3/Turtle, N-Triples)
 ID: 300014254
 Page Link: http://vocab.getty.edu/page/aat/300014254
 oil (organic material) (organic material, <materials by composition>, ... Materials (hierarchy name))

6. If you have never used Git before, email the resulting files to one of the [repository maintainers](#). Otherwise follow the instructions over [here](#).

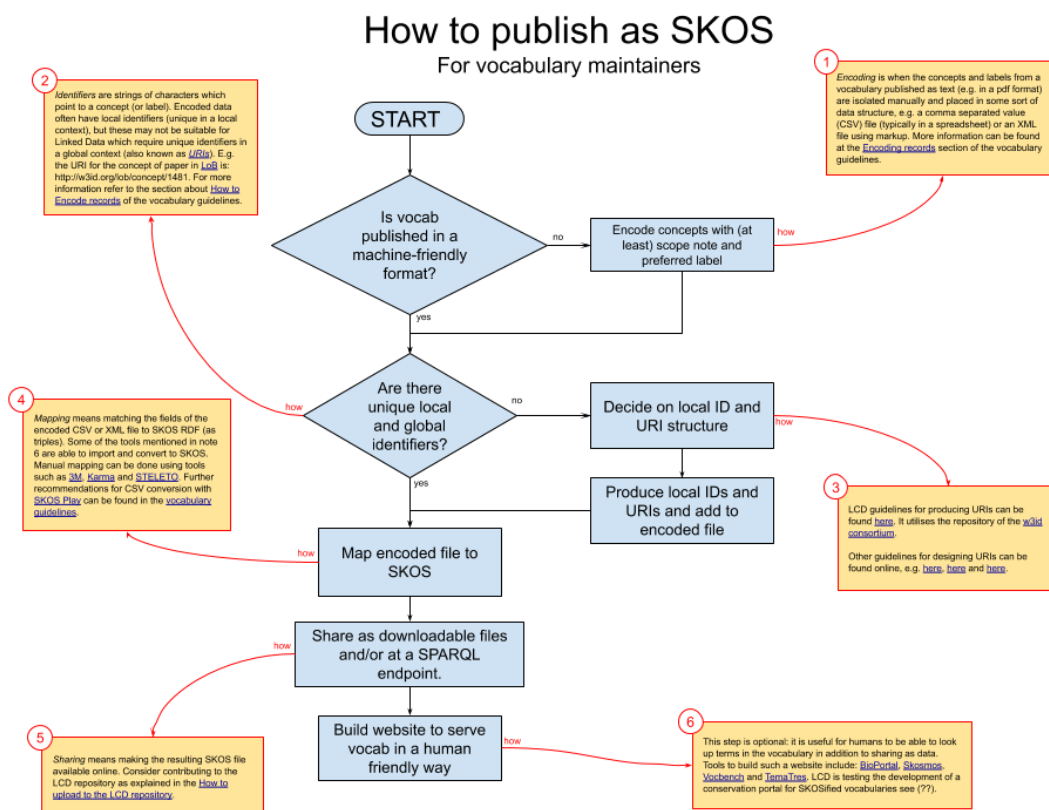
Technical quick start

The LCD vocabularies repository aims to collect individual conservation vocabularies in SKOS format to assist data integration. Please consult the sections about packaging SKOS data in TriG (for [publishing](#) and for [matching](#)) and about the file naming conventions when [contributing data to the repository](#). We advise forking the LCD vocabulary repository and pushing changes to it. The hub for matching conservation vocabularies is the [Arts & Architecture Thesaurus](#). LCD can submit new terms to the AAT on behalf of a vocabulary maintainer.

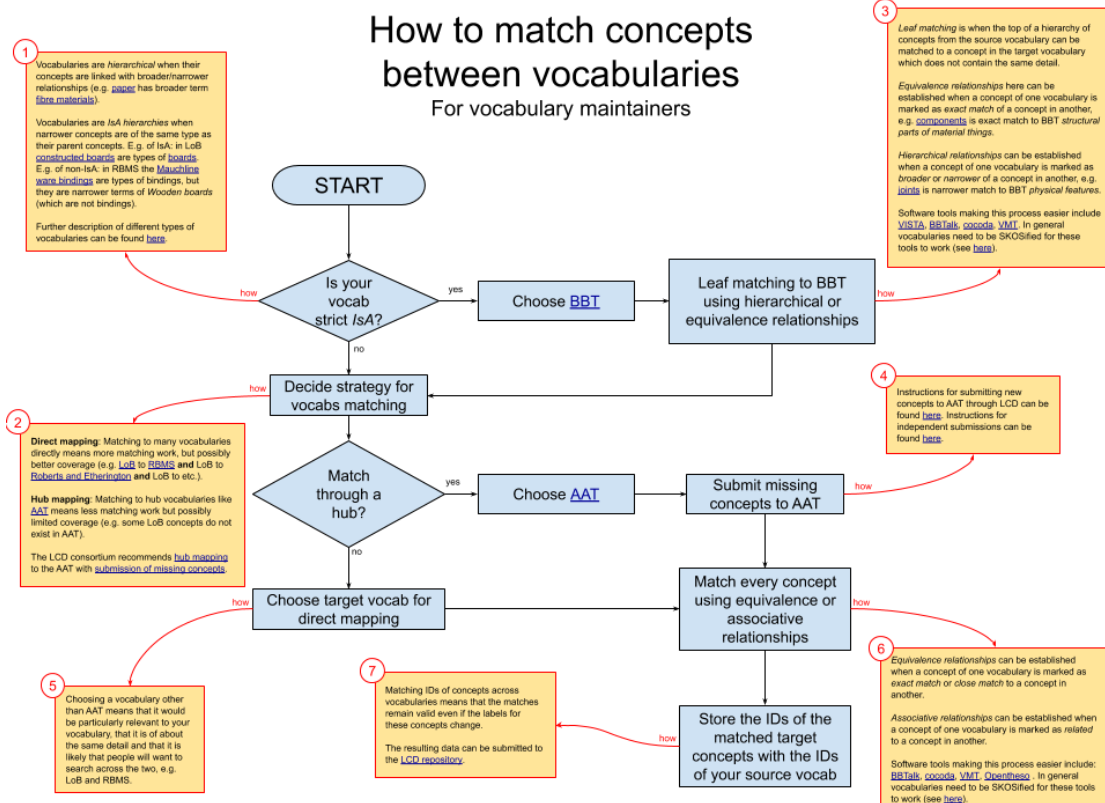
Flowcharts

This document is based on work done by the LCD consortium during 2019. Please consult these flowcharts for easy reference.

How to publish as SKOS



How to match concepts



Introduction

Scope and problem

This document provides guidance for contributing data about conservation vocabularies to the Linked Conservation Data (LCD) repository. Vocabularies contributed following these guidelines will enable cross-searching of conservation datasets. Records produced using terms and concepts from one vocabulary will be possible to be searched using terms and concepts from another. In practical terms this means that a conservator will be able to use familiar terminology to search records produced in a different domain or language.

Audience

This document is targeted to conservators who maintain and/or use consistent terminology in their practice. The guidelines proposed in this document do not depend on the scale of the vocabularies. They apply to short word-lists used in local databases and also to full hierarchical thesauri of thousands of terms.

Executing processes outlined in this document requires experience with manipulating data. If necessary, this document should be read jointly by the maintainer and a person with such experience.

License

Contributions to the repository should be provided without any constraints as explained in [Creative Commons Zero](#). Optionally, constraints outlined in the [Creative Commons Attribution 4.0 International License](#) are allowed. Specifying these constraints should be done following the instructions in section [Constraints of use](#) and it should include a sentence with the exact attribution text, if required.

Structure of this document

This document outlines the [types of vocabularies](#) considered in LCD. It then provides guidelines for using the LCD repository as a [host for conservation vocabularies](#) whose content is not offered online as structured or linked data. This typically includes vocabularies published as text documents either in print or PDF files. The document continues with guidelines on how to provide data about the [relationships of concepts](#) and terms from different vocabularies to the LCD repository. It concludes with presenting [example files](#) that are expected in the LCD repository.

Types of vocabularies

This section outlines the types of vocabularies considered in LCD. Different processes are required for each type in order to be shared effectively through the LCD repository. In sections [Hosting vocabularies in LCD](#) and [Aligning vocabularies for LCD](#), the described processes refer to one or more of these types. They are listed here in order of increasing complexity of structure. The structure of each type can be produced by building upon the previous one. More complexity of a vocabulary does not necessarily mean better quality, but in general it leads to easier use of vocabulary data.

Lists

This primarily includes plain lists of terms (word-lists), without definitions/descriptions, which are used as lookup lists or options in structured records, e.g. as database lookup fields or tick-boxes in survey forms. They do not always consist of terms, they could also include other sequences of symbols (for example, drawing patterns for marking condition on photographs of objects). These lists are often local in scope, i.e. they apply to institutions or conservation studios.

A word-list is an ordered list of terms (e.g. in alphabetical, chronological, etc. order) which does not indicate whether some of them are more general than others. For example, the term 'oil' is more general than the term 'linseed oil' since linseed oil is a specific type of oil. In a word-list there is no way of indicating this relationship between the two terms.

Glossaries

This includes word-lists with unambiguous descriptions for the use of a term. Sometimes these descriptions are called 'scope notes'. These word-lists may include 'used for' notes to document synonymous terms that are used elsewhere. To make this possible, a crucial distinction needs to be made between the **concept** that the scope note describes and the **term** used to refer to that concept. The same concept can be represented by multiple terms, for example the concept (from the [Getty AAT](#)) of "any greasy substance that is liquid at room temperature and insoluble in water", can be referred to by the terms: 'oil', 'huile' and 'έλαιο'. These terms are also called '**labels**' of the concept. Separating the concept from its terms/labels allows control of synonyms and equivalent terms.

Thesauri

This includes glossaries which also feature standardised relationships between concepts. There may be different types of relationships in a structured vocabulary. Those more relevant to conservation thesauri are:

- hierarchical relationships
 - broader/narrower: the relationship between a parent and child concept which indicates that the parent concept is more general (broader) and that the child concept is more specific (narrower). Concepts in a thesaurus are more general near the top of the hierarchy and become more specialized further down each branch. For example, in bookbinding a 'Byzantine endband' is a specific type of 'endband' (broader relationship).

- whole-part: the relationship between a parent and child concept which indicates that things described with the child concept are parts of things described with the parent concept. For example, again in bookbinding an 'endband core' is a component/part of an 'endband' (broader partitive relationship).
- associative relationships
 - related: the relationship between two concepts which indicates relevance. For example, the concept 'endband core' may be related to the concept 'leather' since leather is often a material used for endband cores. Note that 'leather' is not a specific type of 'endband' and it is also not a part of an endband - it only signifies the relevant concept of the material that can be used to produce the endband and other binding components.

Thesauri ideally keep the types of these relationships consistent, for example they do not mix broader with broader-partitive in the same hierarchy, or they do not use related and broader interchangeably.

Vocabularies expressed in SKOS

The [Simple Knowledge Organisation System](#) (SKOS) is recommended by the [W3C](#) for publishing vocabularies online and has been widely adopted. Such adoption means that there is a wealth of tools able to handle SKOS data. SKOS vocabularies feature [Uniform Resource Identifiers](#) (URIs) for each concept. A URI provides a unique reference to a concept in a uniquely identified domain (referred to as a [namespace](#)). For example, the concept 'endbands' as defined in the Language of Bindings thesaurus is uniquely identified as `concept/2370` in the namespace

<http://w3id.org/lob/> and therefore it can be identified globally here:

<http://w3id.org/lob/concept/2370>. In practical terms, this often means that every concept of the vocabulary can be mapped to a web-address unique to that concept. However, the existence of a webpage for a concept is not required as long as the URI is unique and reserved for the concept.

SKOS also formalises relationships between concepts and lexical labels including:

- `skos:prefLabel`, which links a concept with its preferred label
- `skos:altLabel`, which links a concept with additional non-preferred labels
- `skos:scopeNote`, which links a concept with its description text
- `skos:broader` and `skos:narrower`, which allow establishing structured hierarchies of concepts
- `skos:related`, which links a concept to a related concept

A full list of relationships formalised by SKOS can be found here:

<https://www.w3.org/TR/2009/REC-skos-reference-20090818/#vocab>.

Aim

As part of the LCD effort for conservation vocabularies our aim is to express word-lists, glossaries and thesauri as SKOS data to enable interoperability.

Hosting vocabularies in LCD

These guidelines are for vocabulary maintainers who do not have the resources to publish their vocabularies online as SKOS / Linked Data. The following sections outline the tasks required depending on the type of vocabulary processed.

Deciding on meaning

Applies to

This process applies to [word-lists](#).

Purpose

To clarify the context within which terms should be used, especially when this is ambiguous without a scope note.

How

This requires a survey of the records produced with the word-list to confirm how the terms are used in practice. For an ambiguous term, writing a (short) scope note is needed. For a term that has been used to mean different things in different records (polysemy), a copy of the term for each meaning is needed, followed by a qualifier to avoid confusion. For an example, see section [Terms with multiple concepts \(polysemes\)](#).

Output

A list of terms with unique labels and associated scope notes where necessary. This is broadly the case for the painting conservation vocabulary from the Smithsonian Conservation Institute available [here](#).

Encoding records

Applies to

This process is required for vocabularies held in formats which cannot be processed easily by software to separate labels, scope notes and relationships. Typically this includes vocabularies in print or typeset in PDF files. It may also include vocabularies in text which is partially or inconsistently tagged in wiki-type websites. It may also include vocabularies in text which rely on the textual narrative to communicate labels, scope notes and relationships. Another obstacle of formats which cannot be processed easily may be the fact that terms and concepts are dispersed across documents or resources and their grouping cannot be done automatically.

Purpose

1. To separate vocabulary information into labels, scope notes and relationships
2. To produce a consistent list of concepts with their associated labels, scope notes and related concepts

How

Methods depend on the format. A simple but time-consuming method is transcribing text into a spreadsheet or database form by hand.

More complex methods may require [scraping websites](#) and automatically identifying tagged text of interest. The process involves writing a script to load webpages holding vocabulary information, extracting it and storing it in a structured document. An example of doing this on the Smithsonian painting conservation glossary using a script can be found in section: [Encoding Python script](#). In other cases it may require transforming tagged text to a new structure, for example using [XSLT](#) to simplify an elaborate HTML page.

It is likely that the process of encoding is simplified when identifiers are used for concepts and possibly for labels. These identifiers would offer unambiguous references to concepts and labels at local level. Maintainers should consider the next section ([Producing URIs](#)) before establishing local identifiers during encoding.

Output

A computer file with structured data corresponding to the concepts, labels, scope notes and relationships of the vocabulary. For example, encoding/transforming the [webpage of the Smithsonian painting conservation glossary](#) could result in this table:

concept id	term	scope note	broader concept	related concept
20	oil	A general term from a water-insoluble viscous liquid.		
5	drier	Any catalytic material which when added to a drying oil accelerates drying or hardening of the film.		
15	linseed oil	The most popular drying oil used as paint medium. The medium hardens over several weeks as components of the oil polymerize to form an insoluble matrix. Driers can be added to accelerate this process.	20	5

Or an XML file with XML elements:

```
<concept>
  <id>20</id>
  <term>oil</term>
  <scopeNote>A general term from a water-insoluble viscous
liquid.</scopeNote>
</concept>
<concept>
  <id>5</id>
  <term>drier</term>
  <scopeNote>Any catalytic material which when added to a drying oil
accelerates drying or hardening of the film.</scopeNote>
```

```

</concept>
<concept>
  <id>15</id>
  <term>linseed oil</term>
  <scopeNote>The most popular drying oil used as paint medium. The
medium hardens over several weeks as components of the oil polymerize
to form an insoluble matrix. Driers can be added to accelerate this
process.</scopeNote>
  <broader>20</broader>
  <related>5</related>
</concept>

```

Producing URIs

Applies to

This process is required for all vocabularies which do not already provide URIs (see [Vocabularies expressed in SKOS](#)) for each of their concepts.

Ideally URIs should be created and maintained long-term as described in this section by the vocabulary maintainer. If the technicalities of creating the URIs make the process too resource intensive, then contact with the [LCD repository maintainers](#) is necessary for help with registering a vocabulary name with w3id.org (see [Managing w3id.org URIs](#)).

Purpose

To provide unique identifiers and unambiguous reference points for concepts at a global scope.

How

LCD requires that a vocabulary concept has a single URI. Concepts that are updated in later versions of vocabularies should maintain the URIs from earlier versions. Updates to scope notes should not change the meaning of the concept. If this appears to be the case, maintainers should consider narrower concepts in addition to existing ones. Using a different URI for a concept means that we are referring to a different concept. URIs used to refer to the vocabulary as a dataset may change when the vocabulary is updated.

If the host organisation for the vocabulary has an existing practice for producing and maintaining URIs, then it is advisable to follow that practice. If there is no such practice then URIs should be produced as follows.

URIs for vocabularies

The following applied only to vocabularies by bodies which cannot produce and maintain their own URIs long term. The URIs for vocabularies should look like this:

`https://w3id.org/vocabulary_name`

and for their individual versions:

`https://w3id.org/vocabulary_name/version`

Where:

vocabulary_name is the full name or abbreviation of the vocabulary. For example, the vocabulary-name of the Language of Bindings thesaurus is 'lob'. Choosing the vocabulary-name will require reviewing the [w3id repository](#) for availability of the proposed name.

version is the identifier or name or number of the corresponding version of the vocabulary. If maintainers wish to make the vocabulary available at a specific location as a complete dataset then producing a URI for the latest version is also advised:

`https://w3id.org/vocabulary_name/latest`

The redirection rule of this URI will need to be updated whenever a new version of the vocabulary is published.

URIs for concepts

The URIs for concepts should look like this:

`https://w3id.org/vocabulary_name/concept/concept_id`

Where:

vocabulary_name as before.

concept_id is the local identifier of the concept as produced during encoding (see [Encoding records](#)).

Managing w3id.org URIs

The w3id.org project offers redirection for URIs of a vocabulary. The idea is that the w3id server accepts requests to a URI, it follows redirection rules set by the vocabulary maintainer and sends the request to another server if available. This means that if the vocabulary concepts are held for example in LCD servers and at some point the maintainer decides to run their own server for the vocabulary, then the URIs are not affected, since the redirection rule on w3id.org can be modified to send requests to the new server. The information provided over here: <https://w3id.org/> explains how to provide the redirection rules to the w3id.org GitHub repository. If individual web-pages/requests for the concepts of the vocabulary cannot be served, it is advised that the name of the vocabulary is submitted to w3id.org with a simple redirection to a holding page so that the address `w3id.org/vocabulary_name` is reserved.

Output

The output of this process is the same as the [output](#) described in section [Encoding records](#) but it also includes the URI of each concept instead of its local identifier. For example, if we consider the vocabulary name for the Smithsonian painting conservation glossary as 'spg':

concept URI	term	scope note	broader concept	related concept
https://w3id.org/spg/concept/20	oil	A general ... liquid.		
https://w3id.org/spg/concept/5	drier	Any ... the film.		
https://w3id.org/spg/concept/15	linseed oil	The most ... process.	https://w3id.org/spg/concept/20	https://w3id.org/spg/concept/5

Or an XML file with tags:


```

<concept>
  <conceptUri>https://w3id.org/spg/concept/20</conceptUri>
  <term>oil</term>
  <scopeNote>A general term from a water-insoluble viscous
liquid.</scopeNote>
</concept>
<concept>
  <conceptUri>https://w3id.org/spg/concept/5</conceptUri>
  <term>drier</term>
  <scopeNote>Any catalytic material which when added to a drying oil
accelerates drying or hardening of the film.</scopeNote>
</concept>
<concept>
  <conceptUri>https://w3id.org/spg/concept/15</conceptUri>
  <term>oil</term>
  <scopeNote>The most popular drying oil used as paint medium. The
medium hardens over several weeks as components of the oil polymerize
to form an insoluble matrix. Driers can be added to accelerate this
process.</scopeNote>
  <broader>https://w3id.org/spg/concept/20</broader>
  <related>https://w3id.org/spg/concept/5</related>
</concept>

```

Exporting to SKOS

Applies to

This process applies to all vocabularies submitted to the LCD repository.

Ideally the output from the previous section should be exported to SKOS as described in this section. If the technicalities of exporting to SKOS make the process too resource intensive, then LCD accepts submissions of tabular data from the last section's [output](#) for upload to the LCD repository (see [How to upload to the LCD repository](#)).

Purpose

To convert vocabulary data into a consistent SKOS syntax.

How

This process involves taking the [output](#) as described in section [Producing URIs](#) and encoding it into a format widely recognised by relevant software. This is the [turtle](#) syntax for encoding SKOS data using the principles of the [Resource Description Framework](#). Software like [SKOS Play](#) can assist with transforming CSV files into SKOS turtle. Depending on availability and familiarity of tools, maintainers may choose to use alternative tools such as [3M](#) (for XML), [Karma](#) and [STELETO](#). This resource may also be useful: <https://www.w3.org/wiki/ConverterToRdf>. A simple case scenario for exporting CSV vocabulary data to SKOS turtle for the example with the Smithsonian painting conservation glossary is provided [here](#).

Output

To continue with the Smithsonian painting conservation glossary example, the output of this process is a SKOS RDF file in turtle syntax:

```
@prefix dct: <http://purl.org/dc/terms/> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix skos: <http://www.w3.org/2004/02/skos/core#> .
@prefix spgc: <https://w3id.org/spg/concept/> .

<https://w3id.org/spg/> a skos:ConceptScheme;
  dc:creator "Smithsonian Institution"@en;
  dct:rights <https://creativecommons.org/licenses/by/4.0/>;
  dct:title "Smithsonian vocabulary for paintings conservation"@en,
  "Vocabulaire Smithsonian pour la restauration des peintures"@fr;
  skos:hasTopConcept spgc:20, spgc:5 .

spgc:20 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/>;
  skos:narrower spgc:15;
  skos:prefLabel "huile"@fr, "oil"@en;
  skos:topConceptOf <https://w3id.org/spg/> .

spgc:15 a skos:Concept;
  skos:broader spgc:20;
  skos:inScheme <https://w3id.org/spg/>;
  skos:prefLabel "l'huile de lin"@fr, "linseed oil"@en;
  skos:related spgc:5 .

spgc:5 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/>;
  skos:prefLabel "drier"@en, "siccatif"@fr;
  skos:topConceptOf <https://w3id.org/spg/> .
```

The vocabulary file can be uploaded to the LCD repository (see [How to upload to the LCD repository](#)) in the folder: `./vocabs/vocabulary_name` with the name `vocabulary_name-version.ttl`. In the Smithsonian paintings glossary this would be `./vocabs/spg/spg-1.0.ttl`.

Packaging the dataset

Applies to

This process applies to all vocabularies submitted to the LCD repository.

Ideally the output from the previous section should be packaged with version information as explained in this section. If the technicalities of packaging make the process too resource intensive, then this step can be ignored provided that clear versioning information is indicated in the filenames of the uploaded datasets and the license is clearly stated in a separate LICENSE file (see [How to upload to the LCD repository](#)).

Purpose

To format vocabulary data as versioned datasets. This is useful because versioned vocabularies allow keeping track of updates to concepts.

How

This process involves taking the [output](#) as described in section [Exporting to SKOS](#) and assigning the version of the produced dataset. Versioning and provenance metadata should be included in the same dataset file as vocabulary data. We propose the following:

- that the vocabulary version URI (see [URIs for vocabularies](#)) is used as a dataset identifier
- that the version (or other provenance) information is related to the dataset identifier using relationships provided by the [Dublin Core](#) (DC), [RDF Schema](#) (RDFS) and [Web Ontology Language](#) (OWL) schemas

A simple way to do that is to use the [TriG](#) syntax with minimal changes to the [output](#) shown in the [Exporting to SKOS](#) section.

Note that the automatic transformation of CSV to TriG using SKOSPlay does **not** produce a valid output.

Output

The TriG encoding of the provenance information for the Smithsonian glossary should like this:

```
@prefix dct: <http://purl.org/dc/terms/> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix skos: <http://www.w3.org/2004/02/skos/core#> .
@prefix spgc: <https://w3id.org/spg/concept/> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix void: <http://rdfs.org/ns/void#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<https://w3id.org/spg/1.0> {
  <https://w3id.org/spg/1.0> a <http://rdfs.org/ns/void#Dataset> ;
  owl:versionInfo "1.0" ;
  dct:issued "2020-01-01T12:00:00Z"^^xsd:dateTime ;
  dct:rights <https://creativecommons.org/licenses/by/4.0/> ;
  dc:creator "Smithsonian Institution" ;
```

```
dct:created "2015-01-01T12:00:00Z"^^xsd:dateTime .
```

```
<https://w3id.org/spg/> a skos:ConceptScheme;
  dct:creator "Smithsonian Institution"@en;
  dct:rights <https://creativecommons.org/licenses/by/4.0/>;
  dct:title "Smithsonian vocabulary for paintings conservation"@en,
  "Vocabulaire Smithsonian pour la restauration des peintures"@fr;
  skos:hasTopConcept spgc:20, spgc:5 .

spgc:20 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/>;
  skos:narrower spgc:15;
  skos:prefLabel "huile"@fr, "oil"@en;
  skos:topConceptOf <https://w3id.org/spg/> .

spgc:15 a skos:Concept;
  skos:broader spgc:20;
  skos:inScheme <https://w3id.org/spg/>;
  skos:prefLabel "l'huile de lin"@fr, "linseed oil"@en;
  skos:related spgc:5 .

spgc:5 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/>;
  skos:prefLabel "drier"@en, "siccatif"@fr;
  skos:topConceptOf <https://w3id.org/spg/> .
}
```

The vocabulary file including version information needs to be uploaded to the LCD repository (see [How to upload to the LCD repository](#)) in the folder: `./vocabs/vocabulary_name` with the name `vocabulary_name-version.trig`. In the Smithsonian paintings glossary this would be `./vocabs/spg/spg-1.0.trig`.

Aligning vocabularies for LCD

These guidelines are for vocabulary maintainers and researchers who wish to align conservation terminology across different vocabularies to facilitate joint searching of conservation records from different databases. The guidance in this section should be considered independently from that of section: [Hosting vocabularies in LCD](#).

A common scenario of alignment is the target-driven alignment where concepts are matched between two vocabularies where one is considered the **source** and the second the **target**. The first step is identifying the two vocabularies.

Choosing target vocabulary

Choosing the Backbone thesaurus

Vocabularies in conservation often cover terminology about the technology and condition of objects and more rarely terminology about treatment. From a knowledge organisation point of view it is good practice to separate the concepts in broad categories so that records produced with these concepts can be automatically classified. These broad categories can be considered as top concepts in hierarchies of structured vocabularies. It is important for interoperability to ensure that conservation vocabularies become part of a wider universe of terminologies in humanities and cultural heritage. LCD has chosen the [Backbone thesaurus](#) (BBT) as an overarching thesaurus that can accommodate vocabularies from many disciplines. The BBT is a generic skeleton thesaurus providing the necessary broad categories for conservation. By matching top concepts of vocabularies with the BBT categories we ensure interoperability with vocabularies in other fields. The BBT is a mature thesaurus which should provide broad categories for every possible top concept.

Choosing the Getty Arts & Architecture Thesaurus

LCD has chosen the [Getty Art & Architecture Thesaurus](#) (AAT) as a hub for alignment of conservation terminology and we encourage vocabulary maintainers to attempt to match terms with that. By matching concepts of vocabularies to AAT concepts we ensure that the hub is a common reference point for terminology in conservation. This is also the most efficient way of matching concepts across different vocabularies.

Missing terms in AAT

While AAT is considered as a hub thesaurus for LCD, its coverage may not be adequate in some specific areas of conservation. This means that in some cases new concepts will need to be submitted for inclusion in the AAT. The LCD consortium can submit terms to the AAT on behalf of vocabulary maintainers. Vocabulary maintainers can upload a csv file with the concept id, preferred label, scope note and proposed AAT broader term alongside a bibliographical reference of the concept being used with that label. A template file can be used for this which can be found [here](#). The csv file can be uploaded to the LCD repository (see [How to upload to the LCD repository](#)) in the folder: `./aat/vocabulary_name` with the name `vocabulary_name-version-aat-submit.csv`. In the Smithsonian paintings glossary this would be `./aat/spg/spg-1.0-aat-submit.csv`. Independent submissions of new terms to

the AAT can also be done over [here](#) (requires an account). More information about this process can be found [here](#). Please note that contributing concepts to the AAT requires agreeing to the AAT license agreement in addition to the recommended [LCD licenses](#).

Choosing individual vocabularies

Matching between two vocabularies directly is discouraged. In exceptional cases, when a project requires direct comparison of terminologies then this can be done. Where possible, effort for terminology matching should be directed to matching with the AAT.

SKOS matching properties

Matching two concepts involves producing a statement linking the two in a particular way. For example, a concept from one vocabulary may be broader to a concept from another, or a concept from one vocabulary (spgc:20 [oil]) may be very similar or exactly the same as the concept from another (aat:300014254 [oil (organic material)]). SKOS formalises these links into a set of properties. In the last example this would be:

```
spgc:20 skos:exactMatch aat:300014254
```

The SKOS properties that vocabulary maintainers are encouraged to use for matching are described next.

Hierarchical properties

These include the properties `skos:broadMatch` and `skos:narrowMatch` which serve the same purpose as `skos:broader` and `skos:narrower` discussed in the section [SKOS vocabularies](#), only that they apply to concepts across different vocabularies.

Equivalence properties

These include the properties `skos:closeMatch` and `skos:exactMatch`. Official SKOS documentation provides the following description for these properties: “A `skos:closeMatch` link indicates that two concepts are sufficiently similar that they can be used interchangeably in **some** information retrieval applications. A `skos:exactMatch` link indicates a high degree of confidence that two concepts can be used interchangeably across a wide range of information retrieval applications.” For example, when ranking results from queries, two concepts from different vocabularies linked with `skos:exactMatch` may be ranked higher than those linked with `skos:closeMatch`. The choice of equivalence property depends on the confidence level of the conservator reading the two scope notes for the concepts.

Associative properties

These include the `skos:relatedMatch` which can be used by a conservator who sees value in redirecting colleagues from the current concept to another which they think will be of interest. Note that `skos:related` is used between concepts in the same vocabulary whereas `skos:relatedMatch` between concepts of two different vocabularies.

Matching

Applies to

This task applies to vocabulary maintainers and conservators working with documentation records from multiple vocabularies.

Purpose

To identify the concepts from different vocabularies which are the same or similar.

How

The process can be undertaken manually on general purpose software such as spreadsheet editors. It can be more efficient when using specialised vocabulary matching software. This software typically accesses the two vocabularies that are being matched and asks user input on the appropriate SKOS property for the match. The LCD consortium proposes three tools for vocabulary matching:

- [VisTA](#) allows matching individual concepts as well as hierarchies of concepts between two SKOS vocabularies. Based on versioning metadata in the vocabulary datasets, the tool allows verification of existing matches following vocabulary updates (including possible relocations of concepts in hierarchies). VisTA can handle SKOS data.
- [VMT](#) allows matching individual concepts with concepts of the AAT thesaurus. VMT runs on a web browser window and can handle tabular data (CSV) as explained [here](#).
- [OpenRefine](#) is a general purpose tool for managing tabular data (CSV) which includes support for automatic matching of concepts based on labels. Matching with the AAT thesaurus can be done by following instructions over [here](#). These require an instance of OpenRefine installed locally.

Output

The output of this process is a separate file with the matching statements between the two vocabularies. VISTA produces matching records in SKOS TriG files which are ready to be uploaded to the LCD repository. VMT produces CSV files which can be converted to SKOS RDF turtle files as explained in sections: [Exporting to SKOS](#) and [Packaging SKOS](#). If other tools are used for matching then the resulting file should follow the same format.

A URI has to be created to identify the produced alignment result and may look like this:

`https://w3id.org/vocab/align/local_vocabulary_name-to-remote_vocabulary_name/version`

Ideally the output from matching should be submitted as a SKOS TriG syntax file as explained next. If the technicalities of producing such file make the process too resource intensive, then tabular data in the form of a CSV file can be submitted (see [Uploading to LCD](#)).

For the above example the TriG syntax may look like this:

```
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
```

```

@prefix dct: <http://purl.org/dc/terms/> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix skos: <http://www.w3.org/2004/02/skos/core#> .
@prefix spg: <https://w3id.org/spg/> .
@prefix spgc: <https://w3id.org/spg/concept/> .
@prefix aat: <http://vocab.getty.edu/aat/> .

<https://w3id.org/spg/align/spg-to-aat/1> {

  <https://w3id.org/spg/align/spg-to-aat/1>
    dct:identifier "trig-example-1" ;
    dc:creator "Ceri";
    dct:created "2020-05-05T12:00:00.000+01:00"^^xsd:dateTime ;
    dct:description "Example mappings (1) in TriG format"@en ;
    .

    spgc:20 skos:exactMatch aat:300014254 .
    spgc:15 skos:exactMatch aat:300014292 .
    spgc:5 skos:closeMatch aat:300014732 .

}

```

The resulting file needs to be uploaded to the LCD repository (see [How to upload to the LCD repository](#)) in the folder: `./align/local_vocabulary_name--remote_vocabulary_name` with the name

`local_vocabulary_name-version--remote_vocabulary_name-version.trig`
or

`local_vocabulary_name-version--remote_vocabulary_name-version.ttl`
or

`local_vocabulary_name-version--remote_vocabulary_name-version.csv`

In the Smithsonian glossary example the file naming would be:

`./align/spg--aat/spg-1.0--aat-0320.trig`

or

`./align/spg--aat/spg-1.0--aat-0320.ttl`

or

`./align/spg--aat/spg-1.0--aat-0320.csv`

How to upload to the LCD repository

Accepted formats

LCD should ideally hold SKOS files using the TriG syntax. If producing such files is technically too demanding, then tabular data in CSV format can be used instead. LCD repository maintainers will undertake the task of converting CSV files to SKOS TriG files.

CSV templates

A good starting point for producing vocabularies in CSV is [this template](#).

A good starting point for suggesting concepts to be submitted to the AAT is [this template](#).

A good starting point for producing matches across vocabularies in CSV is [this template](#).

SKOS Validation

If SKOS is submitted then before uploading any files to the LCD repository files need to be validated with a suitable SKOS validator, for example: <http://labs.sparna.fr/skos-testing-tool/> or directly with <https://github.com/cmader/qSKOS/>. The uploaded data should pass the following tests:

- anr: [ambiguous notation reference](#)
- chr: [Cyclic Hierarchical Relations](#)
- dlv: [Disjoint Labels Violation](#)
- husv: [HTTP URI Scheme Violation](#)
- ipl: [Inconsistent Preferred Labels](#)
- ml: [Missing Labels](#)
- oilt: [Omitted or Invalid Language Tags](#)
- ol: [Overlapping Labels](#)
- uc: [Undocumented Concepts](#)

LCD repository

If the technicalities of uploading data to the LCD repository makes the process too resource intensive, then files can be emailed to one of the [LCD repository maintainers](#) .

Uploading files with encoded vocabularies or alignment data to the LCD repository requires the following procedure:

1. Forking the [LCD repository on Github](#). More information on forking GitHub repositories can be found [here](#). This will create a copy of the LCD repository.
2. Adding contact information and brief context in a README file as explained [here](#).
3. Creating the required folders for the vocabulary and alignment files and uploading them to the forked repository.
4. Submitting a pull request for changes from the forked repository to the LCD repository as explained [here](#).

The proposed changes (i.e. the newly uploaded files) are reviewed by the LCD repository maintainers and they are either approved or rejected with comments.

Possible filenames

The following types of files with their associated naming conventions and formats can be submitted to the LCD repository:

Vocabulary files:

```
./vocabs/vocabulary_name/vocabulary_name-version.trig  
./vocabs/vocabulary_name/vocabulary_name-version.ttl  
./vocabs/vocabulary_name/vocabulary_name-version.csv
```

Terms to submit to the AAT:

```
./aat/vocabulary_name/vocabulary_name-version-aat-submit.csv
```

Matching files:

```
./align/local_vocabulary_name--remote_vocabulary_name/local_vocabulary_name-version--remote_vocabulary_name-version.trig  
./align/local_vocabulary_name--remote_vocabulary_name/local_vocabulary_name-version--remote_vocabulary_name-version.ttl  
./align/local_vocabulary_name--remote_vocabulary_name/local_vocabulary_name-version--remote_vocabulary_name-version.csv
```

Constraints of use

Vocabularies should be available for use as explained in [License](#). The way that a vocabulary is shared depends on the format used. For turtle and CSV files a separate file should be uploaded over here:

```
./vocabs/vocabulary_name/LICENSE
```

or

```
./align/local_vocabulary_name--remote_vocabulary_name/LICENSE
```

For TriG files, the license information should be included using the [dct:rights](#) property while a separate file with this information can also be uploaded.

Example process

For the purposes of this document we have selected an example vocabulary for painting conservation from the Smithsonian Conservation Institute available [here](#).

Hosting

Encoding Python script

The following Python script performs web scraping - extracting terms and descriptions from the list on the Smithsonian painting conservation glossary webpage:

```
import requests
from lxml import html

# replace tabs with spaces, normalize and trim whitespace
def clean(s):
    return " ".join(str(s).replace("\t", " ").strip().split())

# get the HTML page content from web URL
PAGE_URL = "https://www.si.edu/mci/english/learn_more/taking_care/painting_glossary.html"
LOCAL_FILE = "smithsonian.csv"
page = requests.get(PAGE_URL, timeout=5.000)
uri_base = "https://w3id.org/spg/concept/"

# success?
if page.status_code == 200:
    # parse out the specific list items we are interested in
    tree = html.fromstring(page.content)
    items = tree.xpath('//div[@id="site_sections"]/ul/li/p')

    with open(LOCAL_FILE, "w", encoding="utf-8") as output:
        line = f"\"concept id\", \"concept\", \"description\"\\n\" # header
        output.write(line)
        i = 0
        for item in items:
            i = i + 1
            # parse and clean terms and descriptions
            concept = clean(item.xpath('./strong/text()')[0])
            desc = clean(item.xpath('./text()')[0][2:]) # removed first 2 chars (colon
and space)
            desc = desc.replace("'", '"') # escape quotation marks in the description
            line = f"\"{uri_base}{i}\", \"{concept}\", \"{desc}\"\\n\" # item formatted as
comma delimited term and description
            output.write(line)
        else:
            print(f"Could not get data, status code {page.status_code} returned")
```

The script extracts the list of terms and descriptions and writes the results to a local csv file as shown next.

CSV file from webpage data

concept id	concept	description
https://w3id.org/spg/concept/1	abrasion	A paint lo... friction.
https://w3id.org/spg/concept/2	acrylic	A family o...lic acids.
https://w3id.org/spg/concept/3	alkyd	A syntheti...atty acid.
https://w3id.org/spg/concept/4	alla prima	An Italian... painting.
https://w3id.org/spg/concept/5	binder	The nonvol... together.
https://w3id.org/spg/concept/6	blanching	A term app...materials.
https://w3id.org/spg/concept/7	blending	Blending i...rceptible.
https://w3id.org/spg/concept/8	blocking-in	Usually re...he ground.
https://w3id.org/spg/concept/9	bloom	A bluish f...ome films.
https://w3id.org/spg/concept/10	body	Common ter...nsistency.
https://w3id.org/spg/concept/11	chalking	The presen... elements.
https://w3id.org/spg/concept/12	chiaroscuro	The use of... painting.
https://w3id.org/spg/concept/13	color	A generic ... of color.
https://w3id.org/spg/concept/14	craquelure	A pattern ...aint film.
https://w3id.org/spg/concept/15	crawling	The tenden...e surface.
https://w3id.org/spg/concept/16	crazing	Fine lines...r cooling.
https://w3id.org/spg/concept/17	crocking	Removal of...r rubbing.
https://w3id.org/spg/concept/18	drier	Any cataly... the film.
https://w3id.org/spg/concept/19	drying oils	Oils which...lmond oil.
https://w3id.org/spg/concept/20	efflorescence	A phenomen...substrate.
https://w3id.org/spg/concept/21	egg tempera painting	Egg (eithe...h century.
https://w3id.org/spg/concept/22	emulsion	A suspensi... a liquid.
https://w3id.org/spg/concept/23	enamel paints	Historical... lacquers.
https://w3id.org/spg/concept/24	extender	A pigment ...the gloss.

https://w3id.org/spg/concept/25	fly specks	The bodily...ff at all.
https://w3id.org/spg/concept/26	fugitive pigment	A phrase u... sunlight.
https://w3id.org/spg/concept/27	gesso	Traditiona... to paint.
https://w3id.org/spg/concept/28	glair	Egg white.... material.
https://w3id.org/spg/concept/29	glaze	1) To cove... solvents.
https://w3id.org/spg/concept/30	gloss	The shine,...a coating.
https://w3id.org/spg/concept/31	grime	Surface di...e varnish.
https://w3id.org/spg/concept/32	ground	A layer of... or paint.
https://w3id.org/spg/concept/33	haze	The dullne...gredients.
https://w3id.org/spg/concept/34	impasto	The textur... surfaces.
https://w3id.org/spg/concept/35	inpainting	Paint appl...aint loss.
https://w3id.org/spg/concept/36	lacquer	A term whi...stituents.
https://w3id.org/spg/concept/37	lake	A colored ...a pigment.
https://w3id.org/spg/concept/38	latex	a generic ...er system.
https://w3id.org/spg/concept/39	leaching	When solve...e brittle.
https://w3id.org/spg/concept/40	lean paint	Lean oil c...urpentine.
https://w3id.org/spg/concept/41	light fastness	(1) abilit... of light.
https://w3id.org/spg/concept/42	lightness	(Brightnes...ure white.
https://w3id.org/spg/concept/43	linseed oil	The most p...s process.
https://w3id.org/spg/concept/44	loaded	A painting...ith paint.
https://w3id.org/spg/concept/45	luster	The gloss ... a finish.
https://w3id.org/spg/concept/46	medium	The compon...dispersed.
https://w3id.org/spg/concept/47	mildew	Organic su... "mildew."
https://w3id.org/spg/concept/48	mineral spirits	A petroleu... to 400°F.
https://w3id.org/spg/concept/49	mottling	A film def...rfections.
https://w3id.org/spg/concept/50	natural varnish	Tree resin...(shellac).
https://w3id.org/spg/concept/51	oil	A general ...ous liquid

https://w3id.org/spg/concept/52	oleoresinous	Indicating...d a resin.
https://w3id.org/spg/concept/53	opacity	Hiding pow...iteration.
https://w3id.org/spg/concept/54	opaque	Impervious...anslucent.
https://w3id.org/spg/concept/55	orange peel	A pebbled ...kes place.
https://w3id.org/spg/concept/56	over paint	This paint...technique.
https://w3id.org/spg/concept/57	paint layer	The paint ... painting.
https://w3id.org/spg/concept/58	pentimento	Derived fr...naked eye.
https://w3id.org/spg/concept/59	pigment	A finely d... is added.
https://w3id.org/spg/concept/60	polar solvents	Solvents s...constants.
https://w3id.org/spg/concept/61	polymer	A large mo...erization.
https://w3id.org/spg/concept/62	priming	The applic...and color.
https://w3id.org/spg/concept/63	resin	An organic...c origins.
https://w3id.org/spg/concept/64	retouching	The work d... painting.
https://w3id.org/spg/concept/65	sagging	The tenden... surfaces.
https://w3id.org/spg/concept/66	saturation	Purity or ... grayness.
https://w3id.org/spg/concept/67	scumble	Very thin ...nderlayer.
https://w3id.org/spg/concept/68	shade	The differ...milar hue.
https://w3id.org/spg/concept/69	sheen	A specular...5 degrees.
https://w3id.org/spg/concept/70	sinking	The absorp...d surface.
https://w3id.org/spg/concept/71	size	An adhesiv...f gelatin.
https://w3id.org/spg/concept/72	stretcher	A rigid wo...e corners.
https://w3id.org/spg/concept/73	strainer	A stretche... expanded.
https://w3id.org/spg/concept/74	synthetic resin	Complex, s...molecules.
https://w3id.org/spg/concept/75	synthetic varnishes	Polyvinyl ... acrylate.
https://w3id.org/spg/concept/76	tacking edges	The outsid...stretcher.
https://w3id.org/spg/concept/77	tempra	Usually re...glue size.
https://w3id.org/spg/concept/78	thermoplastic	The term a...en heated.

https://w3id.org/spg/concept/79	thermosetting	The term a...esoftened.
https://w3id.org/spg/concept/80	toughness	The abilit... cracking.
https://w3id.org/spg/concept/81	turpentine (spirits)	The tradit...leaf pine.
https://w3id.org/spg/concept/82	ultraviolet	The light ...iolet end.
https://w3id.org/spg/concept/83	varnish	An applied...on for it.
https://w3id.org/spg/concept/84	water sensitive binder	Glue, gum ...paintings.
https://w3id.org/spg/concept/85	white spirit	Turpentine...t thinner.

The above list includes terms which refer to more than one concepts, such as <https://w3id.org/spg/concept/29> glaze and <https://w3id.org/spg/concept/41> light fastness. In the next step we manually split these terms into separate concepts.

Terms with multiple concepts (polysemes)

https://w3id.org/spg/concept/86	glaze (glass-like surface production)	To impart a glass-like surface. Aged glaze is very sensitive to solvents.
https://w3id.org/spg/concept/87	light fastness (dimension)	The relative degree of change or lack of change in color of materials exposed to the same amount and character of light.
https://w3id.org/spg/concept/29	glaze (coloring)	To cover paler under painting with a layer consisting of transparent pigments and excess medium. Traditionally used to add color to forms modeled in monochrome opaque paint.
https://w3id.org/spg/concept/41	light fastness (color quality)	ability to withstand color changes on exposure to light.

In the next step we reformat this list using the template provided by the SKOS Play website.

XLSX file for SKOS Play conversion

File re-formatted and saved as .xlsx

ConceptScheme URI	https://w3id.org/spg/1.0/	
PREFIX	spgc	https://w3id.org/spg/concept/
dct:title@en	Smithsonian vocabulary for paintings conservation	
dct:description@en		
URI	skos:prefLabel@en	skos:scopeNote@en
spgc:1	abrasion	A paint lo... friction.
spgc:2	acrylic	A family o...lic acids.
spgc:3	alkyd	A syntheti...atty acid.
spgc:4	alla prima	An Italian... painting.
spgc:5	binder	The nonvol... together.
spgc:6	blanching	A term app...materials.
spgc:7	blending	Blending i...rceptible.
spgc:8	blocking-in	Usually re...he ground.
spgc:9	bloom	A bluish f...ome films.
spgc:10	body	Common ter...nsistency.
spgc:11	chalking	The presen... elements.
spgc:12	chiaroscuro	The use of... painting.
spgc:13	color	A generic ... of color.
spgc:14	craquelure	A pattern ...aint film.
spgc:15	crawling	The tenden...e surface.
spgc:16	crazing	Fine lines...r cooling.
spgc:17	crocking	Removal of...r rubbing.
spgc:18	drier	Any cataly... the film.

spgc:19	drying oils	Oils which...mond oil.
spgc:20	efflorescence	A phenomen...substrate.
spgc:21	egg tempera painting	Egg (eithe...h century.
spgc:22	emulsion	A suspensi... a liquid.
spgc:23	enamel paints	Historical... lacquers.
spgc:24	extender	A pigment ...the gloss.
spgc:25	fly specks	The bodily...ff at all.
spgc:26	fugitive pigment	A phrase u... sunlight.
spgc:27	gesso	Traditiona... to paint.
spgc:28	glair	Egg white.... material.
spgc:29	glaze (coloring)	To cover p...que paint.
spgc:30	gloss	The shine,...a coating.
spgc:31	grime	Surface di...e varnish.
spgc:32	ground	A layer of... or paint.
spgc:33	haze	The dullne...gredients.
spgc:34	impasto	The textur... surfaces.
spgc:35	inpainting	Paint appl...aint loss.
spgc:36	lacquer	A term whi...stituents.
spgc:37	lake	A colored ...a pigment.
spgc:38	latex	a generic ...er system.
spgc:39	leaching	When solve...e brittle.
spgc:40	lean paint	Lean oil c...urpentine.
spgc:41	light fastness (color quality)	ability to... to light.
spgc:42	lightness	(Brightnes...ure white.
spgc:43	linseed oil	The most p...s process.
spgc:44	loaded	A painting...ith paint.

spgc:45	luster	The gloss ... a finish.
spgc:46	medium	The compon...dispersed.
spgc:47	mildew	Organic su... "mildew."
spgc:48	mineral spirits	A petroleu... to 400°F.
spgc:49	mottling	A film def...rfections.
spgc:50	natural varnish	Tree resin...(shellac).
spgc:51	oil	A general ...ous liquid
spgc:52	oleoresinous	Indicating...d a resin.
spgc:53	opacity	Hiding pow...iteration.
spgc:54	opaque	Impervious...anslucent.
spgc:55	orange peel	A pebbled ...kes place.
spgc:56	over paint	This paint...technique.
spgc:57	paint layer	The paint ... painting.
spgc:58	pentimento	Derived fr...naked eye.
spgc:59	pigment	A finely d... is added.
spgc:60	polar solvents	Solvents s...constants.
spgc:61	polymer	A large mo...erization.
spgc:62	priming	The applic...and color.
spgc:63	resin	An organic...c origins.
spgc:64	retouching	The work d... painting.
spgc:65	sagging	The tenden... surfaces.
spgc:66	saturation	Purity or ... grayness.
spgc:67	scumble	Very thin ...nderlayer.
spgc:68	shade	The differ...milar hue.
spgc:69	sheen	A specular...5 degrees.
spgc:70	sinking	The absorp...d surface.
spgc:71	size	An adhesiv...f gelatin.

spgc:72	stretcher	A rigid wo...e corners.
spgc:73	strainer	A stretche... expanded.
spgc:74	synthetic resin	Complex, s...molecules.
spgc:75	synthetic varnishes	Polyvinyl ... acrylate.
spgc:76	tacking edges	The outsid...stretcher.
spgc:77	tempra	Usually re...glue size.
spgc:78	thermoplastic	The term a...en heated.
spgc:79	thermosetting	The term a...esoftened.
spgc:80	toughness	The abilit... cracking.
spgc:81	turpentine (spirits)	The tradit...leaf pine.
spgc:82	ultraviolet	The light ...iolet end.
spgc:83	varnish	An applied...on for it.
spgc:84	water sensitive binder	Glue, gum ...paintings.
spgc:85	white spirit	Turpentine...t thinner.
spgc:86	glaze (glass-like surface production)	To impart ... solvents.
spgc:87	light fastness (dimension)	The relati... of light.

The next step involves the online conversion of the .xlsx file to SKOS RDF Turtle on SKOS Play.

SKOS turtle file

```
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix dcat: <http://www.w3.org/ns/dcat#> .
@prefix dct: <http://purl.org/dc/terms/> .
@prefix euvoc: <http://publications.europa.eu/ontology/euvoc#> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix org: <http://www.w3.org/ns/org#> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix qb: <http://purl.org/linked-data/cube#> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix schema: <http://schema.org/> .
@prefix skos: <http://www.w3.org/2004/02/skos/core#> .
@prefix skosxl: <http://www.w3.org/2008/05/skos-xl#> .
@prefix spgc: <https://w3id.org/spg/concept/> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
```

```

<https://w3id.org/spg/1.0/> a skos:ConceptScheme;
  dct:title "Smithsonian vocabulary for paintings conservation"@en;
  skos:hasTopConcept spgc:1, spgc:10, spgc:11, spgc:12, spgc:13, spgc:14, spgc:15, spgc:16,
    spgc:17, spgc:18, spgc:19, spgc:2, spgc:20, spgc:21, spgc:22, spgc:23, spgc:24, spgc:25,
    spgc:26, spgc:27, spgc:28, spgc:29, spgc:3, spgc:30, spgc:31, spgc:32, spgc:33, spgc:34,
    spgc:35, spgc:36, spgc:37, spgc:38, spgc:39, spgc:4, spgc:40, spgc:41, spgc:42, spgc:43,
    spgc:44, spgc:45, spgc:46, spgc:47, spgc:48, spgc:49, spgc:5, spgc:50, spgc:51, spgc:52,
    spgc:53, spgc:54, spgc:55, spgc:56, spgc:57, spgc:58, spgc:59, spgc:6, spgc:60, spgc:61,
    spgc:62, spgc:63, spgc:64, spgc:65, spgc:66, spgc:67, spgc:68, spgc:69, spgc:7, spgc:70,
    spgc:71, spgc:72, spgc:73, spgc:74, spgc:75, spgc:76, spgc:77, spgc:78, spgc:79, spgc:8,
    spgc:80, spgc:81, spgc:82, spgc:83, spgc:84, spgc:85, spgc:86, spgc:87, spgc:9 .

spgc:1 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "abrasion"@en;
  skos:scopeNote "A paint loss caused by excess friction during improper varnish removal or a
varnish loss caused by friction."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:2 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "acrylic"@en;
  skos:scopeNote "A family of synthetic resins made by polymerizing esters of acrylic acids."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:3 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "alkyd"@en;
  skos:scopeNote "A synthetic resin which is the condensation product of a polybasic acid such as
phthalic, a polyhydric alcohol such as glycerin and an oil fatty acid."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:4 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "alla prima"@en;
  skos:scopeNote "An Italian phrase meaning painted solely wet in wet and usually, but not
necessarily, at a single sitting. It is used most commonly with reference to oil painting."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:5 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "binder"@en;
  skos:scopeNote "The nonvolatile portion of a coating vehicle which is the film-forming
ingredient used to bind the pigment particles together."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:6 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "blanching"@en;
  skos:scopeNote "A term applied to lacquer when they become partially opaque, cloudy or
transparent upon application or drying. Fast-evaporating solvents may cool the film enough to
cause water condensation, precipitating solid materials."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:7 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "blending"@en;
  skos:scopeNote "Blending is most commonly used with reference to academic painting to mean the
blending together of separate touches of color for half tones until the graduations of tone and
the marks of the brush are imperceptible."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:8 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;

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    skos:prefLabel "blocking-in"@en;
    skos:scopeNote "Usually refers to the broad application of masses of light, shade, and color,
in the early stages of a painting. It helped to obliterated rapidly the glaring bright of the
ground."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:9 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "bloom"@en;
    skos:scopeNote "A bluish fluorescent coat which forms on the surface of some films."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:10 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "body"@en;
    skos:scopeNote "Common term for the degree of viscosity of a paint or varnish, as \"a lot of
body\" or \"not much body.\" A practical term used to give a qualitative picture of
consistency."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:11 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "chalking"@en;
    skos:scopeNote "The presence of a loose powder on the surface of a paint after exposure to the
elements."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:12 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "chiaroscuro"@en;
    skos:scopeNote "The use of graduation of light and dark to describe forms in drawing and
painting."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:13 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "color"@en;
    skos:scopeNote "A generic term referring exclusively to all colors of the spectrum, including
white and black. Color is described by three properties: hue, lightness and saturation. (1) Hue
(color, character, dominant wavelength): blue, green, red, etc. (2) Lightness (brightness,
reflectance, value): position on the gray scale between pure black and pure white (3) Saturation
(purity, grayness, cleanliness, muddiness, chroma): purity or intensity of color."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:14 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "craquelure"@en;
    skos:scopeNote "A pattern of cracks that develops on the surface of a painting as a result of
the natural drying and aging of the paint film."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:15 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "crawling"@en;
    skos:scopeNote "The tendency of a liquid to draw up and bead on the surface."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:16 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "crazing"@en;
    skos:scopeNote "Fine lines or minute surface cracks occurring on painted surfaces due to
unequal contraction in drying or cooling."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

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spgc:17 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "crocking"@en;
  skos:scopeNote "Removal of color on abrasion or rubbing."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:18 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "drier"@en;
  skos:scopeNote "Any catalytic material which when added to a drying oil accelerates drying or
hardening of the film."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:19 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "drying oils"@en;
  skos:scopeNote "Oils which have the property of forming a solid, elastic surface when exposed
to air in thin layers. The drying oils most commonly used in oil painting were linseed oil,
walnut oil and poppy oil. Examples of non-drying oil unsuitable for painting are olive oil and
almond oil."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:20 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "efflorescence"@en;
  skos:scopeNote "A phenomena whereby a whitish crust of fine crystals forms on a painted
surface. These are usually sodium salts which diffuse through the paint film from the
substrate."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:21 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "egg tempera painting"@en;
  skos:scopeNote "Egg (either whole, yolk or white) can be used as a pigment binder. Tempera
painting was very popular until the late fifteenth century."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:22 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "emulsion"@en;
  skos:scopeNote "A suspension of fine particles or globules of a liquid within a liquid."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:23 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "enamel paints"@en;
  skos:scopeNote "Historically, enamel has described decorative and protective glassy coatings on
metal as well as glassy, decorative coatings on glass. Enamel has also implied certain organic
coating such as paints or lacquers."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:24 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "extender"@en;
  skos:scopeNote "A pigment which contributes very little hiding to the system, but does
reinforce the film and alter the gloss."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:25 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "fly specks"@en;
  skos:scopeNote "The bodily waste discharged by flies. Fresh specks can be cleaned off with
moistened cotton swabs; however, aged specks can not be cleaned off at all."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

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spgc:26 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "fugitive pigment"@en;
  skos:scopeNote "A phrase used to describe a pigment's impermanence and tendency to fade or
change color under the influence of natural effects such as sunlight."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:27 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "gesso"@en;
  skos:scopeNote "Traditionally a lean layer of size and chalk to form a ground on which to
paint."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:28 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "glair"@en;
  skos:scopeNote "Egg white. It is used in egg tempera painting and as a coating material."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:29 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "glaze (coloring)"@en;
  skos:scopeNote "To cover paler under painting with a layer consisting of transparent pigments
and excess medium. Traditionally used to add color to forms modeled in monochrome opaque
paint."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:30 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "gloss"@en;
  skos:scopeNote "The shine, sheen or luster of the surface of a coating."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:31 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "grime"@en;
  skos:scopeNote "Surface dirt: a combination of air-borne soot, nicotine, and cooking grease.
Dirt can be in the varnish, on top of the paint layer, or on top of the varnish."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:32 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "ground"@en;
  skos:scopeNote "A layer of opaque paint applied to a support to provide a suitable color and
texture on which to draw or paint."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:33 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "haze"@en;
  skos:scopeNote "The dullness of a surface removable by polishing. It usually results from
faulty solvent balance or incompatibility of ingredients."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:34 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "impasto"@en;
  skos:scopeNote "The texture created in a paint surface by the movement of the brush. Impasto
usually implies thick, heavy brushwork, but the term also refers to the crisp, delicate textures
found in smoother paint surfaces."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

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spgc:35 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "inpainting"@en;
  skos:scopeNote "Paint applied over losses only. This is a technique commonly used by
conservators to unify a painting that has suffered paint loss."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:36 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "lacquer"@en;
  skos:scopeNote "A term which usually indicates that the material dries by evaporation and forms
a film from the nonvolatile constituents."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:37 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "lake"@en;
  skos:scopeNote "A colored natural or synthetic dye absorbed onto a semi-transparent base and
used as a pigment."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:38 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "latex"@en;
  skos:scopeNote "a generic term describing stable dispersions of resin particles in a water
system."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:39 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "leaching"@en;
  skos:scopeNote "When solvents are applied to a paint film, solvent soluble compounds are
removed and the film becomes more brittle."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:40 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "lean paint"@en;
  skos:scopeNote "Lean oil color is paint in which the oil or fat content has been reduced,
usually by indirect means such as diluting the paint with turpentine."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:41 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "light fastness (color quality)"@en;
  skos:scopeNote "ability to withstand color changes on exposure to light."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:42 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "lightness"@en;
  skos:scopeNote "(Brightness, reflectance, value) Position on the grey scale between pure black
and pure white."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:43 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "linseed oil"@en;
  skos:scopeNote "The most popular drying oil used as paint medium. The medium hardens over
several weeks as components of the oil polymerize to form an insoluble matrix. Driers can be
added to accelerate this process."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:44 a skos:Concept;

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    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "loaded"@en;
    skos:scopeNote "A painting is said to be loaded when it is painted thickly, often with a heavy
impasto. A loaded brush is one charged to its full capacity with paint."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:45 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "luster"@en;
    skos:scopeNote "The gloss of a finish."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:46 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "medium"@en;
    skos:scopeNote "The component of paint in which the pigment is dispersed."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:47 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "mildew"@en;
    skos:scopeNote "Organic surfaces exposed to high temperature-humidity atmospheres are attacked
by fungus growth. This dark discoloration, usually a mold type of fungus but more commonly called
\"mildew.\""@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:48 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "mineral spirits"@en;
    skos:scopeNote "A petroleum fraction with boiling range between 300 to 400°F."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:49 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "mottling"@en;
    skos:scopeNote "A film defect associated with spraying. Appears as circular imperfections."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:50 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "natural varnish"@en;
    skos:scopeNote "Tree resins (mastic and dammar), fossil resins (copal and amber), and insect
resin secretions (shellac)."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:51 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "oil"@en;
    skos:scopeNote "A general term from a water-insoluble viscous liquid"@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:52 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "oleoresinous"@en;
    skos:scopeNote "Indicating a material which has been made by the combination of an oil and a
resin."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:53 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "opacity"@en;
    skos:scopeNote "Hiding power or the degree of obliteration."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

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spgc:54 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "opaque"@en;
  skos:scopeNote "Impervious to light or not translucent."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:55 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "orange peel"@en;
  skos:scopeNote "A pebbled film surface similar to the skin of an orange in appearance. It is caused by too rapid drying before leveling takes place."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:56 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "over paint"@en;
  skos:scopeNote "This paint was not applied by the artist but applied at a later date. It not only covers the original paint, but its presence often indicates an excessive alteration of the image. Over painting is not an acceptable conservation technique."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:57 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "paint layer"@en;
  skos:scopeNote "The paint layer is the actual layer or layers of color more-or-less opaque applied by the artist in the execution of the painting."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:58 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "pentimento"@en;
  skos:scopeNote "Derived from the Italian meaning \"repentance.\" Pentimenti are the changes in composition which a painter makes while producing a painting. These alterations are often visible in the infra-red, to x-rays and sometimes to the naked eye."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:59 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "pigment"@en;
  skos:scopeNote "A finely divided, insoluble substance which imparts color to the material to which it is added."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:60 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "polar solvents"@en;
  skos:scopeNote "Solvents such as alcohols, ketones, etc., which contain oxygen, etc. These have high dielectric constants."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:61 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "polymer"@en;
  skos:scopeNote "A large molecule formed when many molecules are linked together by polymerization."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:62 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "priming"@en;
  skos:scopeNote "The application of sizes and/or grounds to a support to prepare the painting's surface, modify its absorbency, texture and color."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

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spgc:63 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "resin"@en;
  skos:scopeNote "An organic polymer in the form of a crystalline or amorphous solid, or viscous
liquid, of wither natural or synthetic origins."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:64 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "retouching"@en;
  skos:scopeNote "The work done by a restorer to replace areas of loss or damage in a
painting."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:65 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "sagging"@en;
  skos:scopeNote "The tendency of a wet paint film to flow downward and become thicker on
vertical surfaces."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:66 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "saturation"@en;
  skos:scopeNote "Purity or intensity of color. Degree of freedom from grayness."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:67 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "scumble"@en;
  skos:scopeNote "Very thin layer of opaque or semi-opaque paint that partially hides the
underlayer."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:68 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "shade"@en;
  skos:scopeNote "The difference in appearance between colors of similar hue."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:69 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "sheen"@en;
  skos:scopeNote "A specular reflectance taken at a low angle, usually 85 degrees."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:70 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "sinking"@en;
  skos:scopeNote "The absorption of paint medium by a lean underlayer to produce a matte or dead
surface."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:71 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "size"@en;
  skos:scopeNote "An adhesive diluted in water. Usually means and animal glue consisting of
collagen and gelatin, rabbit skin glue, parchment glue, and edible jelly are all forms of
gelatin."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:72 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "stretcher"@en;

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    skos:scopeNote "A rigid wooden frame over which a canvas is usually stretched. The stretcher
can be expanded by tapping keys (wedges) inserted at the corners."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:73 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "strainer"@en;
    skos:scopeNote "A stretcher from with fixed corners. It cannot be expanded."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:74 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "synthetic resin"@en;
    skos:scopeNote "Complex, substantially amorphous organic semi-solid or solid materials built up
by chemical reaction of simple molecules."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:75 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "synthetic varnishes"@en;
    skos:scopeNote "Polyvinyl acrylate."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:76 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "tacking edges"@en;
    skos:scopeNote "The outside edges of a stretched canvas through which tacks are inserted
attaching it onto the stretcher."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:77 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "tempra"@en;
    skos:scopeNote "Usually refers to egg (either whole, yolk, or white) used as the medium but can
also refer to glue size."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:78 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "thermoplastic"@en;
    skos:scopeNote "The term applied to resins which soften and flow when heated."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:79 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "thermosetting"@en;
    skos:scopeNote "The term applied to resins which become hard after heating and cannot be
resoftened."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:80 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "toughness"@en;
    skos:scopeNote "The ability of a material to take bending, impact, etc., without cracking."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:81 a skos:Concept;
    skos:inScheme <https://w3id.org/spg/1.0/>;
    skos:prefLabel "turpentine (spirits)"@en;
    skos:scopeNote "The traditional solvent or thinner for a drying oil (such as linseed oil)
distilled from the resin that is exuded by certain trees, e.g., the European larch, white fir,
and American longleaf pine."@en;
    skos:topConceptOf <https://w3id.org/spg/1.0/> .

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spgc:82 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "ultraviolet"@en;
  skos:scopeNote "The light rays which are outside of the visible spectrum at its violet
end."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:83 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "varnish"@en;
  skos:scopeNote "An applied surface film, usually of a transparent, cloudless resin. It imparts
an even gloss to the surface, wetting the paint, and providing protection for it."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:84 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "water sensitive binder"@en;
  skos:scopeNote "Glue, gum arabic, starch, cellulose esters. These materials were used by
artists in the past and present in the construction of oil paintings."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:85 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "white spirit"@en;
  skos:scopeNote "Turpentine substitute consisting of naphtha thinners (solvent distilled from
petroleum). They are colorless hydrocarbons, boiling range 100 to 160°C, used as a paint
thinner."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:86 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "glaze (glass-like surface production)"@en;
  skos:scopeNote "To impart a glass-like surface. Aged glaze is very sensitive to solvents."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

spgc:87 a skos:Concept;
  skos:inScheme <https://w3id.org/spg/1.0/>;
  skos:prefLabel "light fastness (dimension)"@en;
  skos:scopeNote "The relative degree of change or lack of change in color of materials exposed
to the same amount and character of light."@en;
  skos:topConceptOf <https://w3id.org/spg/1.0/> .

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SKOS TriG with dataset packing

Aligning