Reliable Context

RELIABLE CONTEXT / RESEARCH & PRACTICAL GUIDANCE

SKOS Concept vs OWL Class: A Modeling Decision Test

> Reliable Context is a kernel of truth: a system of record for organizations that fuse private and public information and must defend every value they act on. One canonical record per real thing, a cited source and an observation date behind every value, unknowns declared rather than left blank, and any past state of the record reproducible.

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Executive Summary

A **SKOS concept** identifies an entry in a knowledge organization system. An **OWL class** specifies a set of individuals and supports logical claims about membership. A notion should become a class when its intended use requires defensible instance-level entailments, rather than because it has a label or occupies a hierarchy. Baker and colleagues explain this boundary in terms of SKOS concepts lacking precise extensional semantics by default. A document about printers and a physical printer therefore require different modeling decisions, even when their interfaces display the same word. (arxiv.org) (www.dublincore.org)

The standards have different documentary roles. The **SKOS Reference** is a World Wide Web Consortium (W3C) Recommendation dated **18 August 2009**. (www.w3.org) The **OWL 2 Primer**, second edition, is a W3C Recommendation dated **11 December 2012**. (www.w3.org) These dates identify the specifications used here, not recent changes to their semantics. The proposed decision procedure asks about intended users, lexical management, hierarchy meaning, inference obligations and validation obligations. Choose SKOS for indexing, navigation and vocabulary administration; choose OWL for explicit membership criteria and consequences; choose a connected pair when both behaviors are independently required. Existing publication systems support this coexistence: ShowVoc handles both ontologies and thesauri, while VocBench separates its semantic-model choice from lexicalization. (op.europa.eu) (vocbench.uniroma2.it)

The dangerous shortcut is converting every broader link into subclassing. A thesaurus hierarchy can combine generic, instance and part-whole relationships, whereas subclassing requires universal inheritance of membership. The worked printer-repair counterexample shows how a service event can consequently be classified as equipment. (www.isko.org) Class-individual punning is available in OWL 2 DL (Description Logic), but its two interpretations remain separate; shared spelling or a shared identifier is insufficient evidence for a semantic bridge. (www.w3.org) Validation is also a separate obligation: VocBench explicitly distinguishes shape checks from reasoning, and RDF4J documents checks when transactions commit. (vocbench.uniroma2.it) (rdf4j.org)

The empirical evidence supports explicit quality checks, not a universal performance ranking. Suominen and Mader's historical study examined **24 SKOS vocabularies** (ucrisportal.univie.ac.at) and defined **26 computable quality issues** (ucrisportal.univie.ac.at); its sample does not establish today's prevalence of

vocabulary defects. The practical deliverable is a modeling contract with expected and forbidden outputs, a declared inference configuration and separately specified validation rules. **Reliable Context** provides an adjacent first-party perspective through its stated requirement for canonical records and cited, dated evidence behind values. That record guarantee does not determine whether a vocabulary entry denotes a concept, a class or a connected pair.

Introduction and Background

The information task comes before the vocabulary format. A search interface may need consistent terms, synonyms and navigable categories. A classifier may need to infer that a particular device satisfies a class definition. A submission workflow may need to reject a record without a required value. UNESCO describes its thesaurus in terms of organizing and finding information, while HermiT describes consistency checking and class subsumption. These are distinct observable behaviors. (vocabularies.unesco.org) (www.hermit-reasoner.com)

The **Simple Knowledge Organization System (SKOS)** and **Web Ontology Language (OWL)** both support graph-based knowledge representation, but their modeling commitments differ. The normative SKOS Reference states its status precisely as “W3C Recommendation 18 August 2009.” (www.w3.org) The explanatory SKOS Primer states “W3C Working Group Note 18 August 2009.” (www.w3.org) The OWL 2 Primer states “W3C Recommendation 11 December 2012.” (www.w3.org)

A **concept** is the identified unit being managed in a vocabulary; a **label** is wording used to name it. Getty defines a term as a word or phrase referring to a concept and accommodates synonyms for the same concept. (www.getty.edu) A **class** denotes a set of individuals. An **individual** is an object in the interpretation to which membership and property assertions can apply. **Subsumption** means that every member of the narrower class belongs to the broader class. **Inference** derives statements warranted by the selected semantics and available assertions. (www.w3.org) (jena.apache.org)

This report uses a hypothetical office-equipment vocabulary throughout. Its central distinction is between a manual's subject and a device's membership. Dublin Core defines subject as a resource's topic and type as its nature or genre; neither distinction should disappear in an import pipeline. (www.dublincore.org) For context engineers, the starting artifact should therefore be a behavioral specification: what a user may retrieve, what the system must infer, and what a validator must reject.

Key Changes

Here, “changes” means changes in modeling commitment when moving from vocabulary management to formal classification. It does not imply a newly released revision of either standard.

From an entry to an extension

The boundary is **extensional commitment**: which individuals count as members, and what follows from that membership. Baker and colleagues distinguish this commitment from the looser meanings managed in a thesaurus. (arxiv.org) “Laser printers” can be a useful indexing entry without a complete definition of every

qualifying machine. An OWL class requires the author to accept the consequences of the axioms actually asserted, including consequences for existing instance data.

This distinction is operationally visible. Getty describes multilingual thesauri for cataloging and research; the Library of Congress provides resolvable identifiers for controlled vocabulary lists and their values. (www.getty.edu) (www.loc.gov) Research Vocabularies Australia displays concepts, schemes and collections, while Schema.org separately provides DefinedTerm and DefinedTermSet structures. Those publishing capabilities are evidence of vocabulary behavior, not evidence that every entry has an OWL class interpretation. (documentation.ardc.edu.au) (schema.org)

From a navigation edge to universal membership

A broader edge helps organize concept meanings. It does not automatically become a universal statement about all instances. Arthur Smith (2022) distinguishes generic, instance and part-whole thesaurus hierarchies; SKOS does not identify their type through an undifferentiated broader link. (www.isko.org) SKOS broader is not declared transitive: chaining broader statements does not itself entail another broader statement, although the transitive superproperty supports hierarchical reachability. (www.w3.org)

A hierarchy display can conceal this difference. TopQuadrant documents displaying a concept hierarchy from broader statements, and Getty permits multiple parents with a preferred display parent. Neither interface convention proves that every displayed edge expresses class subsumption. (docs.topquadrant.com) (www.getty.edu) The reviewer must inspect what the edge means before approving its conversion.

From one representation to deliberately connected representations

The SKOS Reference deliberately leaves applications freedom to connect concepts and classes through chosen patterns; it supplies no automatic equivalence between them. (www.w3.org) A connected pair can consequently preserve an indexing entry while adding a formal class for devices. The bridge must state its purpose, direction and operational consequences. ShowVoc's support for different vocabulary models illustrates coexistence, while VocBench makes semantic modeling and lexicalization separate project choices. (op.europa.eu) (vocbench.uniroma2.it)

Table 1 compares the obligations using the same laser-printer example. Its recommendations are the report's decision framework, grounded in the documented behaviors cited in the cells.

Decision dimension	SKOS concept	OWL class	Connected pair
Required behavior	Index and browse “Laser printers.” (skosmos.org)	Classify actual devices and explain subsumption. (www.hermit-reasoner.com)	Serve indexing and classification through explicit links. (vocbench.uniroma2.it)
Expected inference	Concept-level hierarchy consequences; no device membership from a heading. (arxiv.org)	A laser-printer instance is also a printer. (www.w3.org)	Only the consequences licensed by the chosen bridge. (www.w3.org)

Decision dimension	SKOS concept	OWL class	Connected pair
Labeling	Manage preferred terms, synonyms and languages. (www.getty.edu)	Label a formal category for its users. (www.w3.org)	Specify which representation owns lexical changes. (vocbench.uniroma2.it)
Validation	Test editorial completeness and vocabulary quality. (ucrisportal.univie.ac.at)	Test logical consistency separately from record requirements. (vocbench.uniroma2.it)	Validate links, instance data and vocabulary records separately. (rdf4j.org)
Failure mode	Treat a useful navigation relation as a formal definition. (www.isko.org)	Confuse a topic with the nature of its document. (www.dublincore.org)	Assume shared identifiers supply an unasserted bridge. (arxiv.org)
Evidence required	Editorial scope and retrieval use cases. (vocabularies.unesco.org)	Instance criteria and accepted entailments. (protege.stanford.edu)	Separate model and lexicalization specifications. (vocbench.uniroma2.it)

The connected option carries additional governance obligations; it is warranted when both columns describe required behavior. It should not be selected merely because a publication platform accepts both models. A platform's supported formats do not substitute for the team's membership criteria, retrieval contract or bridge specification. (op.europa.eu) (vocbench.uniroma2.it)

The five-question modeling decision

Who uses the notion, and for which operation?

Begin with the action, not the noun. Indexers and search users may need stable entries for document subjects. Vocabulary editors may need to revise scope and wording. Instance-data consumers may need reproducible classification. Skosmos explicitly targets indexing, information retrieval and vocabulary development, while Finto publishes vocabularies, ontologies and classifications through browsing interfaces and application programming interfaces (APIs). (skosmos.org) (finto.fi)

Record the distinction in the candidate's design note:

- **User:** Identify the actor consuming this notion.
- **Operation:** State whether the actor indexes, browses, classifies or submits data.
- **Boundary example:** Include an object that users might confuse with a member.

For “Laser printers,” a manual can be relevant without being a laser printer. If that boundary is absent from the requirements, postpone the class conversion until it is resolved. Dublin Core's subject/type distinction supplies a useful vocabulary for the discussion. (www.dublincore.org)

Are labels and notation the main managed assets?

If the work primarily concerns wording, language variants, abbreviations or codes, a concept representation is a strong initial choice. Getty distinguishes variant names from concept identity; ARDC's browser searches labels, descriptions and notation. (www.getty.edu) (documentation.ardc.edu.au) Schema.org also distinguishes a term's human-readable name from its identifying code within a set. (schema.org)

The design note should specify:

- **Lexical authority:** Name the owner of preferred wording and accepted synonyms.
- **Language policy:** State which language-tagged labels are required for publication.
- **Identifier policy:** Keep identity separate from the current display wording.

Multilingual delivery is a real vocabulary requirement, as ShowVoc's documentation demonstrates. (op.europa.eu) It does not establish an instance-classification requirement. The question is whether changing a label changes what objects qualify as members. If the proposed model cannot answer that question, it has not yet established a class definition.

What does each hierarchy edge mean?

Evaluate each candidate edge individually. A generic relationship may support subclassing, but a part-whole relationship, an instance relationship and a convenient browsing arrangement require different treatment. Smith's account makes these distinctions explicit, and Getty's preferred-parent convention shows why display order needs its own interpretation. (www.isko.org) (www.getty.edu)

Before accepting the edge:

- **Universal test:** Ask whether every possible child instance must be a parent instance.
- **Counterexample:** Try an ordinary member for which that statement would be false.
- **Edge specification:** Record the meaning rather than inferring it from indentation.

An editor's preferred tree placement is insufficient. The universal test is particularly valuable when the source vocabulary mixes organizational and subject-based categories. Formalization requires semantic disambiguation, which Baker and colleagues describe as a process that usually cannot be automated. (arxiv.org)

Which inference must the system produce?

Write a concrete expected conclusion: “Given this device's asserted type, infer its broader equipment type.” Then write a forbidden conclusion: “Do not classify a manual as equipment merely because its subject is equipment.” The assertion layer and inferred layer should be inspectable independently. Jena documents access to both the combined inference model and the unchanged asserted model. (jena.apache.org)

The inference contract should state:

- **Premises:** List the instance facts and axioms needed for the conclusion.
- **Consequence:** Identify the exact triple or classification to derive.
- **Configuration:** Name the reasoner and supported semantics to be checked.

A product's use of the word “OWL” does not establish complete support for every intended inference. Jena documents subset implementations, while Protégé connects to description logic reasoners and supports explanation. Those capabilities need to be matched to the chosen axioms. (jena.apache.org) (protege.stanford.edu)

Which validation must the system enforce?

Specify whether the obligation concerns semantic consistency, required fields, permitted values, language coverage or editorial workflow. VocBench describes shape validation as complementary to reasoning. RDF4J validates transactional changes and also revalidates data after shapes change. (vocbench.uniroma2.it) (rdf4j.org)

The validation contract should state:

- **Target:** Identify the graph and resources being checked.
- **Constraint:** Express the condition that must hold for publication or commit.
- **Outcome:** Specify the rejection or review behavior when the check fails.

A class model is justified by its membership and inference obligations, not simply by an interest in stricter checks. A vocabulary can need extensive validation while remaining a vocabulary. Suominen and Mader's computable SKOS quality checks demonstrate this distinction independently of an OWL conversion. (ucrisportal.univie.ac.at)

Implementation Considerations and Process Changes

Minimal representations (Hypothetical Example)

The following fixtures are hypothetical designs. **Resource Description Framework (RDF)** supplies their graph representation; the Turtle blocks declare their own prefixes. The SKOS concept is an individual in OWL terminology, even though the vocabulary term skos:Concept is itself a class. (www.w3.org)

For the indexing outcome:

```
@prefix v: <https://example.org/vocabulary/> .
@prefix ex: <https://example.org/data/> .
@prefix skos: <http://www.w3.org/2004/02/skos/core#> .
@prefix dcterms: <http://purl.org/dc/terms/> .

v:equipment a skos:ConceptScheme .
v:printers a skos:Concept ;
    skos:prefLabel "Printers"@en ;
    skos:inScheme v:equipment .
v:laserPrinters a skos:Concept ;
    skos:prefLabel "Laser printers"@en ;
    skos:broader v:printers ;
    skos:inScheme v:equipment .
ex:manual dcterms:subject v:laserPrinters .
```

The manual is linked to a subject. This design makes no class assertion that the manual is a printer. The distinction follows the documented meaning of subject, rather than the visual similarity of a subject label and a class label. (www.dublincore.org)

For the classification outcome:

```
@prefix o: <https://example.org/ontology/> .
@prefix ex: <https://example.org/data/> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .

o:Printer a owl:Class .
o:LaserPrinter a owl:Class ;
    rdfs:subClassOf o:Printer .
ex:unit42 a o:LaserPrinter .
```

The required conclusion is that unit42 is a Printer. HermiT documents class-subsumption reasoning, and Jena describes how a configured reasoner exposes derived statements. The team must still verify that its deployed configuration implements this particular contract. (www.hermit-reasoner.com) (jena.apache.org)

For the connected outcome, add the following to the separately maintained concept and class graphs:

```
@prefix o: <https://example.org/ontology/> .
@prefix v: <https://example.org/vocabulary/> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .

o:indexingConcept a owl:AnnotationProperty .
o:LaserPrinter o:indexingConcept v:laserPrinters .
```

This is an application-defined annotation, not a standardized SKOS-to-OWL equivalence. Under OWL 2 Direct Semantics, annotations have no semantic effect; this link therefore does not classify the manual or turn every concept relationship into a class axiom. (www.w3.org) Its useful behavior must be specified in the application contract, such as showing the indexing entry beside a class description.

Boundary counterexample (Hypothetical Example)

Suppose an editor places the subject heading “Printer repair” under “Printers” for browsing. A migration mechanically turns that edge into subclassing and also assigns a service event to the resulting Repair class:

```
@prefix ex: <https://example.org/unsafe-conversion/> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .

ex:PrinterRepair rdfs:subClassOf ex:Printer .
ex:serviceEvent a ex:PrinterRepair .
```

RDF Schema (RDFS) subclass semantics entail that serviceEvent is a Printer. (www.w3.org) The unwanted result arises from the conversion decision, not from a reasoner inventing a fact. The original topic relation could have remained useful for retrieval without making that instance-level commitment. Smith's hierarchy distinctions explain why conversion must inspect each edge's meaning. (www.isko.org)

Table 2 is a regression specification for these hypothetical fixtures. Its entries are expected outcomes under the stated semantics, not reported results from a full OWL implementation.

Fixture	Expected output	Forbidden output or required review
SKOS indexing	Preserve the subject link; infer `v:printers skos:narrower v:laserPrinters` and `v:laserPrinters skos:broaderTransitive v:printers`. (www.w3.org) (www.dublincore.org) (docs.topquadrant.com)	Do not derive manual membership in the Printer class. (arxiv.org)
OWL subclassing	Derive unit42 membership in Printer. (www.w3.org)	Do not substitute document relevance for device membership. (www.dublincore.org)
Connected annotation	Retain the explicit class-to-concept annotation. (www.w3.org)	Do not infer membership from the annotation alone. (arxiv.org)
Mechanical repair conversion	Derive serviceEvent membership in Printer under the supplied subclass axiom. (www.w3.org)	Reject that consequence against the intended domain meaning. (www.isko.org)
Shape revision	Recheck affected existing records under the chosen validation engine. (rdf4j.org)	Do not assume changing constraints leaves acceptance unchanged. (vocbench.uniroma2.it)

The forbidden column is essential because a system can return all expected positive examples while also returning unacceptable classifications. Preserve the input graph and distinguish it from inferred statements when inspecting the fixture. Jena exposes that distinction explicitly. (jena.apache.org)

When stronger axioms are justified (Hypothetical Example)

Consider a classification service that must distinguish printers eligible for a particular maintenance workflow. The team can justify formal class axioms if membership has an agreed interpretation, operational decisions depend on inferred membership, and boundary instances have been reviewed. Protégé's inference explanations and HermiT's consistency and subsumption capabilities are relevant tools for that review. (protege.stanford.edu) (www.hermit-reasoner.com)

For a concrete justified definition, supplement the classification fixture with a maintenance-record class and an object property. Define the workflow category by an intersection and an existential restriction: it includes printers linked to some maintenance record. These are reviewed criteria, not claims about the record's adequacy. (www.w3.org)

```
@prefix o: <https://example.org/ontology/> .
@prefix ex: <https://example.org/data/> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .

o:MaintenanceRecord a owl:Class .
o:hasMaintenanceRecord a owl:ObjectProperty .
o:PrinterWithMaintenanceRecord a owl:Class ;
    owl:equivalentClass [ a owl:Class ;
        owl:intersectionOf (
            o:Printer
            [ a owl:Restriction ;
```

```
            owl:onProperty o:hasMaintenanceRecord ;
            owl:someValuesFrom o:MaintenanceRecord ]
        ) ] .
ex:unit42 o:hasMaintenanceRecord ex:recordA .
ex:recordA a o:MaintenanceRecord .
```

Together with unit42's inferred Printer membership, these premises entail membership in PrinterWithMaintenanceRecord. This definition is justified when the application explicitly needs that classification. The equivalence supplies both directions; a necessary-condition subclass axiom alone would not support classification from the conditions.

An OWL existence requirement is not automatically a requirement that a particular field be present in the submitted graph. Under open-world reasoning, missing information need not be false. (www.w3.org) A publication policy requiring an explicit maintenance-status value should therefore have its own validation rule. TopQuadrant's documentation illustrates maximum-count checks, while VocBench separates shape validation from reasoning. (docs.topquadrant.com) (vocbench.uniroma2.it)

SKOS also has genuine integrity constraints: preferred-label uniqueness per language, disjoint lexical-label properties, and the incompatibility of related with hierarchical reachability. (www.w3.org) These constraints should not be confused with every editorial preference. Requiring a preferred label, prohibiting all cycles or mandating a particular language set needs an explicit organizational policy and check. Historical quality-assessment work includes structural checks and repair heuristics beyond mere serialization. (seco.cs.aalto.fi)

Migration and mapping boundaries

Conversion changes the contract

A move from concepts to classes changes what statements mean for instance data. Baker and colleagues explain that hierarchy formalization needs disambiguation among subsumption, instantiation, part-whole and other relations. (arxiv.org) Treat the exercise as a reviewed semantic transformation, with evidence attached to each changed commitment, rather than a namespace substitution.

A practical migration record should include:

- **Source identity:** Preserve the original concept identifier and its meaning at migration time.
- **Chosen target:** State whether the result is a class, an individual or a retained concept.
- **Edge decision:** Document the interpretation assigned to each transformed relationship.
- **Behavioral difference:** Record newly expected and newly forbidden entailments.
- **Version reference:** Identify the exact vocabulary and ontology releases reviewed.

Stable identity and version references are operational requirements, not cosmetic details. Getty recommends resource URIs and documents recurring vocabulary downloads. ARDC supports multiple vocabulary versions with version-specific endpoints and an alias for the current version. (www.getty.edu) (documentation.ardc.edu.au)

Mapping does not settle classification

An inter-vocabulary mapping and an OWL class axiom answer different questions. The mapping may support navigation between indexing systems, while a class axiom constrains the interpretation of individuals. Standardized exchange also does not resolve incompatibility between different knowledge organization systems, as Smith emphasizes. (www.isko.org) SKOS exactMatch expresses confidence in concept interchangeability across retrieval applications, rather than OWL resource identity or equality of class extensions. Acceptance of a concept mapping should consequently remain separate from acceptance of a class conversion. (www.w3.org)

Do not use a shared preferred label as evidence that two records identify the same concept. Labels can change, and Getty explicitly permits variant names referring to one concept. (www.isko.org) (www.getty.edu) Equally, an accepted lexical relationship does not supply the universal instance-level statement required by subclassing. The reviewer needs the membership evidence separately.

Preserve clients and editorial workflows

Migration can affect consumers even when the interface looks similar. ARDC documents SKOS-specific concept endpoints; Finto's API retrieves concepts through words or URIs. (documentation.ardc.edu.au) (api.finto.fi) A converted dataset therefore needs client-contract checks as well as semantic checks. A URI that still resolves is insufficient if its expected concept behavior has disappeared.

VocBench documents refactoring between SKOS and SKOS eXtension for Labels (SKOS-XL) lexicalizations and recommends semantic versioning for project versions. These are documented management operations, not guarantees that any semantic conversion is lossless. (vocbench.uniroma2.it) Finto's change-suggestion workflow illustrates the continuing editorial work around existing concepts. (finto.fi)

Preserve the following operational evidence:

- **Resolution behavior:** Test identifiers used by existing consumers.
- **Lexical behavior:** Check labels, language tags and notation after transformation.
- **Endpoint behavior:** Test concept retrieval and instance-classification routes separately.
- **Constraint behavior:** Revalidate records when shapes or acceptance rules change.
- **Release evidence:** Retain the reviewed input, output and decision record.

RDF4J's documented revalidation after shape changes shows why acceptance needs a release-specific record. PoolParty also documents property retrieval through explicit property URIs, reinforcing the need to preserve consumer expectations at the property level. (rdf4j.org) (help.poolparty.biz)

Data Analysis and Evidence

The quantitative evidence here concerns vocabulary quality, not comparative execution speed. Osma Suominen and Christian Mader's **2014** paper, *Assessing and Improving the Quality of SKOS Vocabularies*, provides the clearest retrieved empirical basis for distinguishing serialization, formal integrity and broader quality assessment. (ucrisportal.univie.ac.at) The authors define **26** computable quality issues (ucrisportal.univie.ac.at) and examine **24** vocabularies. (ucrisportal.univie.ac.at)

Table 3 separates the published observations from what the modeling decision can reasonably infer.

Evidence item	Reported quantity or result	Interpretation boundary
Quality-assessment method	26 computable quality issues. (ucrisportal.univie.ac.at)	A research method's checks, not the number of normative SKOS integrity conditions.
Examined vocabulary set	24 SKOS vocabularies. (ucrisportal.univie.ac.at)	The authors call the set representative; the retrieved abstract does not establish probability sampling.
Historical sample outcome	All examined vocabularies contained structural errors or other quality problems. (ucrisportal.univie.ac.at)	A result for that sample and method, not a current population prevalence estimate.
Publication context	Journal on Data Semantics, 2014. (ucrisportal.univie.ac.at)	Historical evidence; no longitudinal claim about today's deployments.
Repair methodology	Some issues, including cycles, are addressed through repair heuristics. (seco.cs.aalto.fi)	Automatic repair still requires review against the intended vocabulary meaning.

The study supports a limited but consequential conclusion: publishing a SKOS graph does not remove the need for quality assessment. It does not demonstrate that OWL conversion improves vocabulary quality, that a particular product performs better, or that the historical sample's results generalize to all present-day vocabularies. The sample, method and scope must remain attached to any reuse of its findings. (ucrisportal.univie.ac.at)

Baker, Bechhofer, Isaac, Miles, Schreiber and Summers' design account appeared in the *Journal of Web Semantics* in **May 2013**. (arxiv.org) It supplies an explanatory basis for minimal ontological commitment and for the limits of mechanical formalization. (arxiv.org) This is conceptual design evidence, rather than a benchmark comparing storage engines or reasoners.

The retrieved institutional documentation supplies a different evidence class: observable intended uses. UNESCO describes consistent organization and discovery of documents; the Library of Congress publishes controlled vocabulary identifiers and ontologies; ARDC documents browsing and versioned APIs. (vocabularies.unesco.org) (www.loc.gov) (documentation.ardc.edu.au) These examples establish implemented publication patterns. They do not measure the benefits of adopting the proposed decision matrix.

For an organization's own evaluation, report the candidate set, the edge interpretations reviewed, the required entailments and the rejected counterexamples. Measure lexical retrieval and instance classification separately. Record the exact input release, inference configuration and validation graph. No head-to-head latency result, adoption percentage or current defect-prevalence estimate was established in this research; none is required to decide whether a proposed class axiom is justified.

Implications and Future Directions

Treat formal commitment as a reviewable decision

The modeling decision belongs in the same review process as the application behavior it authorizes. NISO's controlled-vocabulary guidance covers construction, testing, maintenance and management; ISO's thesaurus standard addresses development and maintenance for information retrieval. (www.niso.org) (www.iso.org)

These scopes justify sustained editorial management rather than a one-time conversion.

Require expert review when any of the following applies:

- **Mixed hierarchy:** An edge's generic, instance or part-whole interpretation is unresolved.
- **Automated formalization:** A proposed conversion assigns class axioms without reviewed membership criteria.
- **Combined identity:** A shared identifier is expected to connect concept and class meanings.
- **Profile uncertainty:** Imported axioms may exceed the reasoner's supported language.
- **Constraint ambiguity:** A missing value is being treated simultaneously as unknown and invalid.
- **Consumer dependence:** Existing endpoints rely on concept-specific behavior.

The reasons are concrete. OWL profiles trade expressiveness for reasoning efficiency, while the full SKOS RDF schema is an OWL Full ontology. Punning alone does not establish that an imported ontology conforms to OWL 2 DL. (www.w3.org) SHACL, the **Shapes Constraint Language**, also leaves entailment support optional, so the validation graph and entailment regime require specification. (www.w3.org)

Separate evidence guarantees from modeling semantics

Reliable Context's stated guarantee that past record states can be reproduced illustrates a related requirement: reviewers need to know which evidence and decisions supported an earlier state. That guarantee is adjacent to the SKOS-versus-OWL decision. It does not supply a class definition or a reasoner configuration. A modeling record should preserve its assumptions and source versions so that its consequences can be reviewed later.

There are practical tools for maintaining both lexical and ontological structures. VocBench separates model and lexicalization settings. PoolParty's documentation for its **2024 R1** release describes custom schemes as views over ontology classes, relations and attributes. (vocbench.uniroma2.it) (help.poolparty.biz) Those are documented capabilities of the cited interfaces and release, not comparative performance evidence.

Future evaluations should ask whether reviewers can recover why a concept remained a concept, why a class was introduced and why a bridge was accepted. A matrix's adoption or citation by practitioners is a hypothesis to test. Its immediate value is that the proposed behavior can be challenged with concrete boundary cases before a migration authorizes new classifications.

Frequently Asked Questions (FAQs)

When should a SKOS concept become an OWL class?

When there is an agreed membership interpretation and a required instance-level inference that the class axioms implement. A hierarchy position or label alone is insufficient. Formalization must distinguish the relationships expressed by the source vocabulary. (arxiv.org)

Can a SKOS concept also be an OWL class?

Yes, OWL 2 DL supports class-individual punning, with independent interpretations. That does not automatically connect concept relations to class membership or guarantee that all imported SKOS axioms fit the chosen profile. Separate identifiers plus an explicit bridge are often easier to review. (www.w3.org)

Is a SKOS taxonomy an OWL ontology?

The words “taxonomy” and “ontology” do not settle the graph's commitments. A SKOS hierarchy can serve browsing and indexing; an OWL class hierarchy carries instance-membership consequences. ShowVoc publishes both kinds of controlled vocabulary, demonstrating that sharing a platform does not erase their distinction. (op.europa.eu)

Does broader mean subclass, and is mapping a conversion?

Broader need not identify a generic hierarchy relationship. A mapping supports a specified relationship between vocabulary entries; converting an entry to a class additionally commits to consequences for individuals. Review both decisions explicitly rather than importing an assumption from the displayed hierarchy. (www.isko.org)

Conclusion

A concept becomes a class through an accepted modeling commitment, not through a change of label, a richer interface or a convenient conversion script. The decision test begins with required behavior. If the task is controlled indexing, multilingual naming or navigation, the concept representation should remain the starting point. If the task requires defensible instance classification, the team should state membership criteria and the consequences it accepts. If both tasks are required, a connected pair should retain separate contracts. These recommendations follow the distinctions established throughout the report. (skosmos.org) (vocbench.uniroma2.it)

The printer examples expose the practical boundary. A manual can concern a device without becoming that device. A repair event can sit under an equipment topic without qualifying as equipment. A formal subclass axiom changes those consequences for any asserted members. The reviewer should therefore approve the expected outputs and the forbidden outputs together, preserving the asserted graph separately from inferred statements. (www.dublincore.org) (jena.apache.org)

The useful handoff is a release-specific modeling record: candidate meaning, intended users, lexical authority, hierarchy interpretation, inference obligation, validation obligation, boundary examples and accepted bridge semantics. Migration should preserve identifiers, consumer behavior and evidence for changed commitments. Vocabulary quality and logical classification remain separate evaluation dimensions. (www.getty.edu) (documentation.ardc.edu.au) The result is a controlled vocabulary or ontology whose behavior can be defended from explicit assumptions, rather than a hierarchy whose visual structure silently decides what every represented object must be.

Source links

Links cited in this article, in order of first appearance. Full addresses are provided for readers using extracted text.

1. https://arxiv.org/html/1302.1224
2. https://www.dublincore.org/specifications/dublin-core/dcmi-terms
3. https://www.w3.org/TR/skos-reference
4. https://www.w3.org/TR/owl-primer
5. https://op.europa.eu/en/web/eu-vocabularies/showvoc
6. https://vocbench.uniroma2.it/doc/user/projects.jsf
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8. https://www.w3.org/TR/owl2-new-features
9. https://vocbench.uniroma2.it/doc/user/global_data_management.jsf
10. https://rdf4j.org/documentation/programming/shacl
11. https://ucrisportal.univie.ac.at/en/publications/assessing-and-improving-the-quality-of-skos-vocabularies
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