

Introduction to linked data

# Using Linked Data Vocabularies



# Why reuse vocabularies

- Someone else has thought through the issues
  - many of these vocabularies have had a lot of effort put into their design
- Other people will understand the widely used ones
- There may be software designed to process them
- Enables reuse of data from different sources
  - helps with linking data – reduces information friction

# Example - Codelists

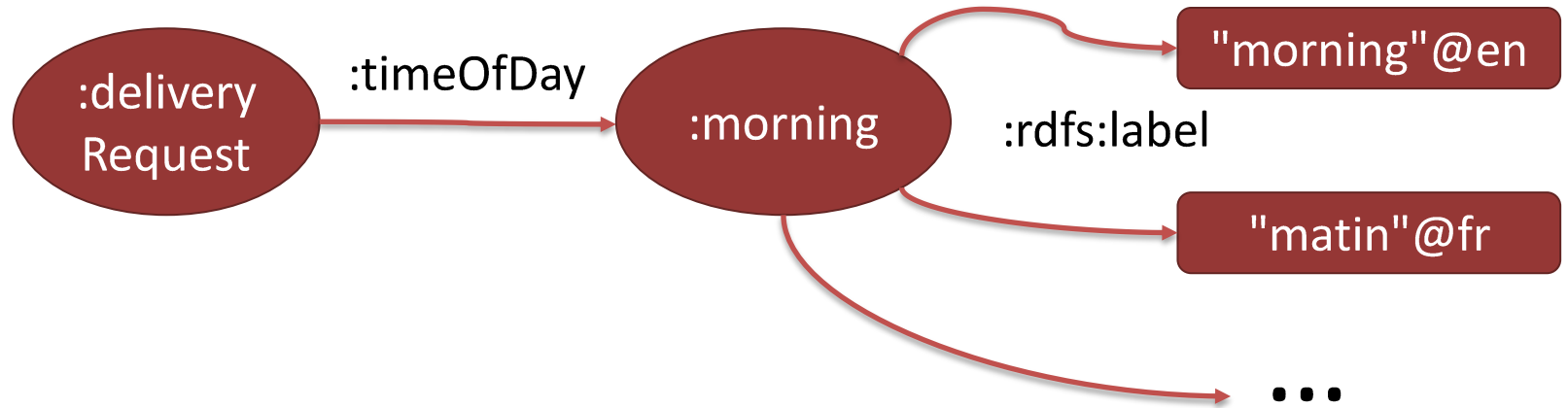
- We often encounter situations where we use a controlled vocabulary
  - bathing water quality: good, excellent, ...
  - status values are often from a controlled vocabulary
  - appointment request: morning or afternoon
  - film classification: U, PG, 12, 12A, 15, 18, NR
  - estate type: freehold, leasehold
- Commonly represented in data by a code, e.g. "am"

# We could do this



- this reflects what is typically done with non RDF representations
- it gives us no way to say anything about what we mean by 'AM'
- Will a French or a German or a Chinese person know what it means?

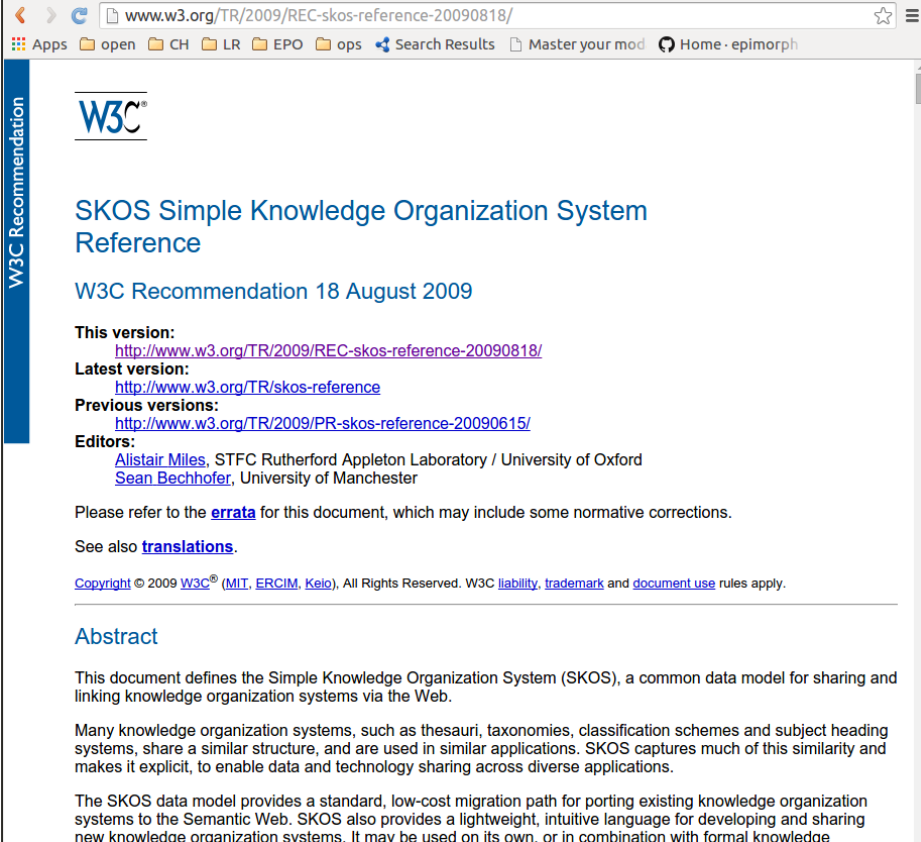
# Better to do this



- If we give the controlled vocabulary term a URI we can then say things about it.

# SKOS: A standard vocabulary

- Codelists
- Taxonomies
- W3C recommendation
- Widely used and respected



The screenshot shows a web browser window displaying the W3C Recommendation page for SKOS. The browser's address bar shows the URL [www.w3.org/TR/2009/REC-skos-reference-20090818/](http://www.w3.org/TR/2009/REC-skos-reference-20090818/). The page features the W3C logo at the top, followed by the title "SKOS Simple Knowledge Organization System Reference" and the date "W3C Recommendation 18 August 2009". Below this, it lists the current version, latest version, and previous versions with their respective URLs. The editors are listed as Alistair Miles and Sean Bechhofer. A note mentions errata, and a copyright notice is provided at the bottom. The abstract section begins with a definition of SKOS as a common data model for sharing and linking knowledge organization systems via the Web.

W3C Recommendation

W3C<sup>®</sup>

## SKOS Simple Knowledge Organization System Reference

W3C Recommendation 18 August 2009

**This version:**  
<http://www.w3.org/TR/2009/REC-skos-reference-20090818/>

**Latest version:**  
<http://www.w3.org/TR/skos-reference>

**Previous versions:**  
<http://www.w3.org/TR/2009/PR-skos-reference-20090615/>

**Editors:**  
[Alistair Miles](#), STFC Rutherford Appleton Laboratory / University of Oxford  
[Sean Bechhofer](#), University of Manchester

Please refer to the [errata](#) for this document, which may include some normative corrections.

See also [translations](#).

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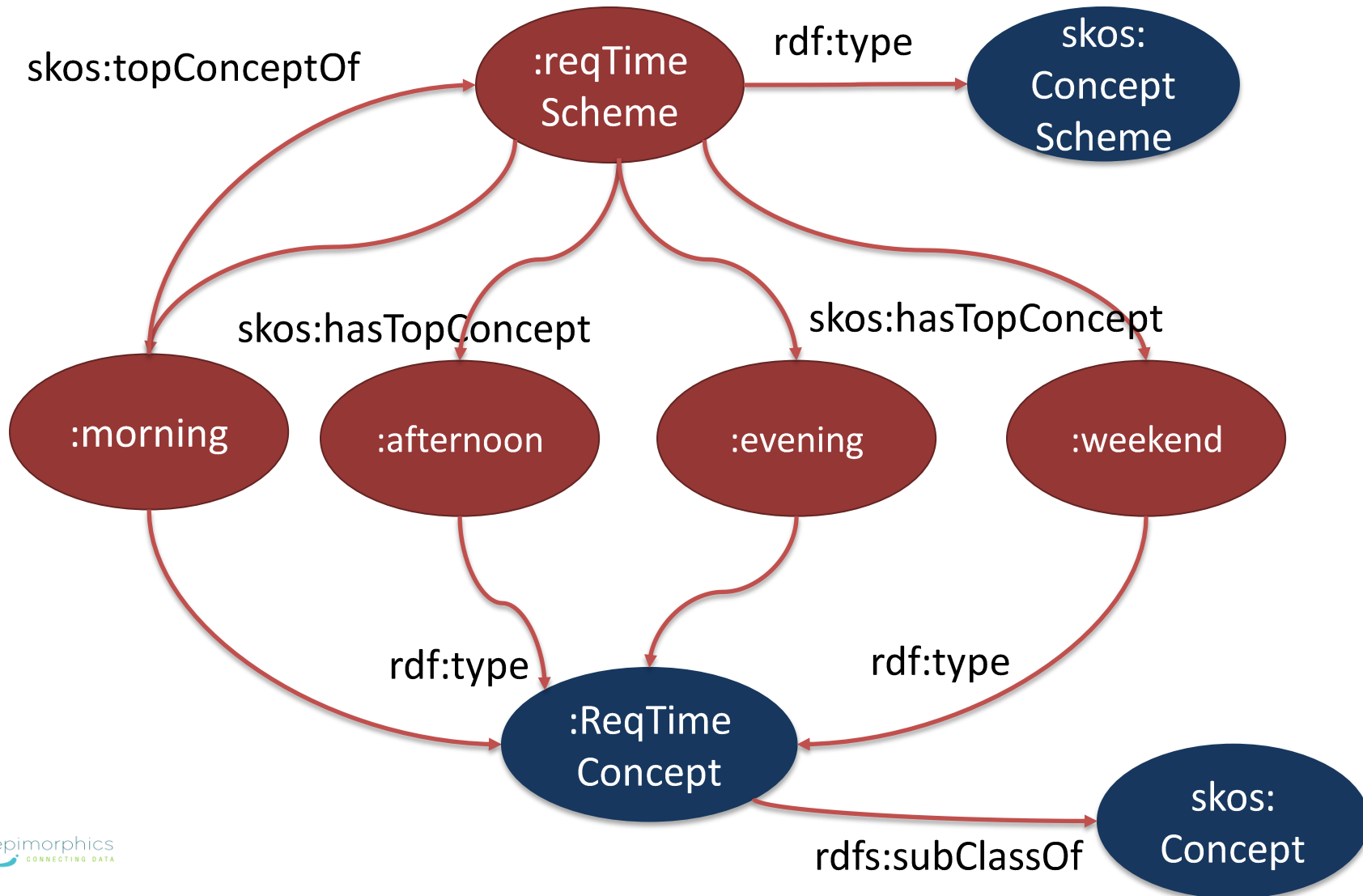
### Abstract

This document defines the Simple Knowledge Organization System (SKOS), a common data model for sharing and linking knowledge organization systems via the Web.

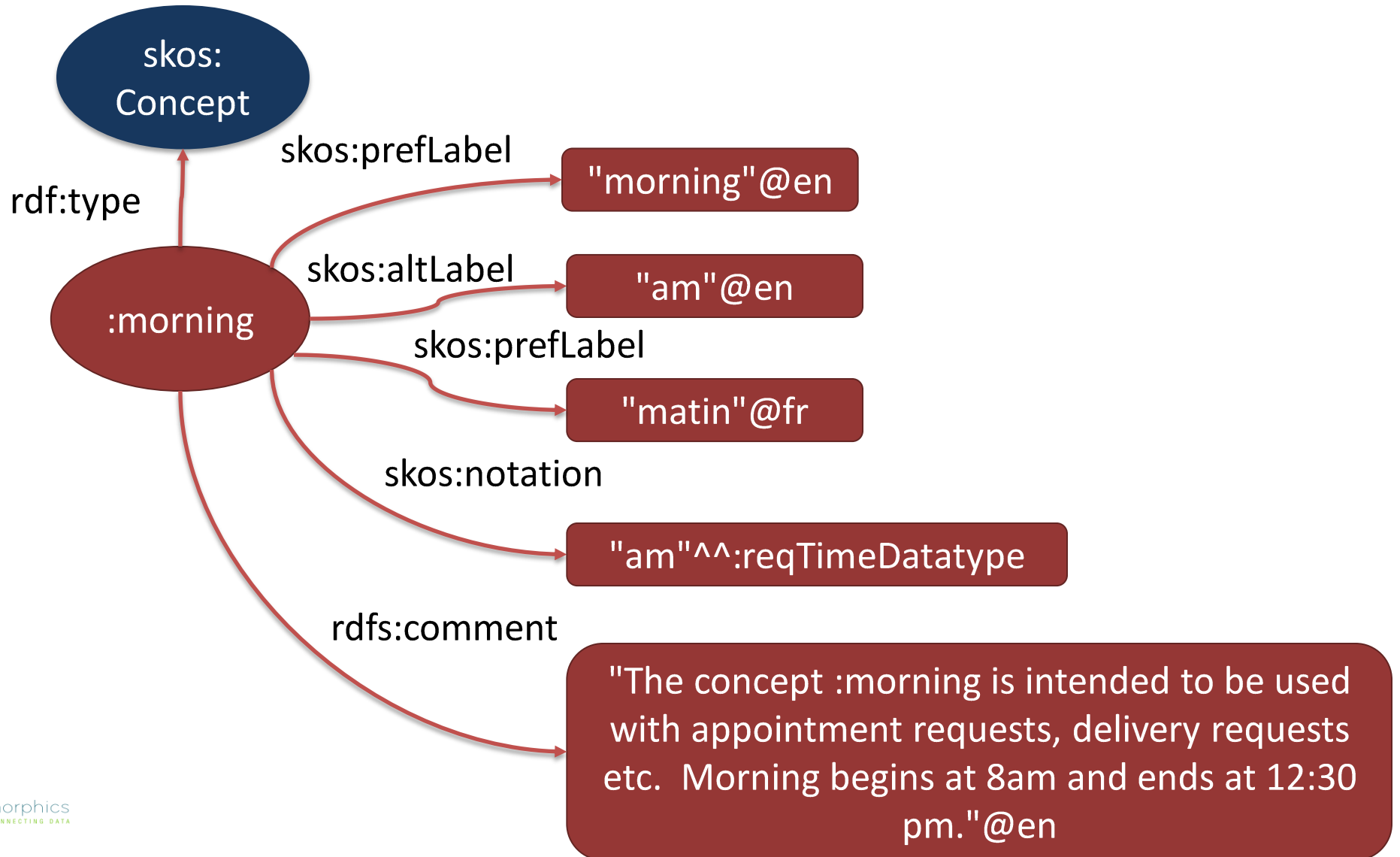
Many knowledge organization systems, such as thesauri, taxonomies, classification schemes and subject heading systems, share a similar structure, and are used in similar applications. SKOS captures much of this similarity and makes it explicit, to enable data and technology sharing across diverse applications.

The SKOS data model provides a standard, low-cost migration path for porting existing knowledge organization systems to the Semantic Web. SKOS also provides a lightweight, intuitive language for developing and sharing new knowledge organization systems. It may be used on its own, or in combination with formal knowledge

# SKOS Concept Scheme



# For each Concept

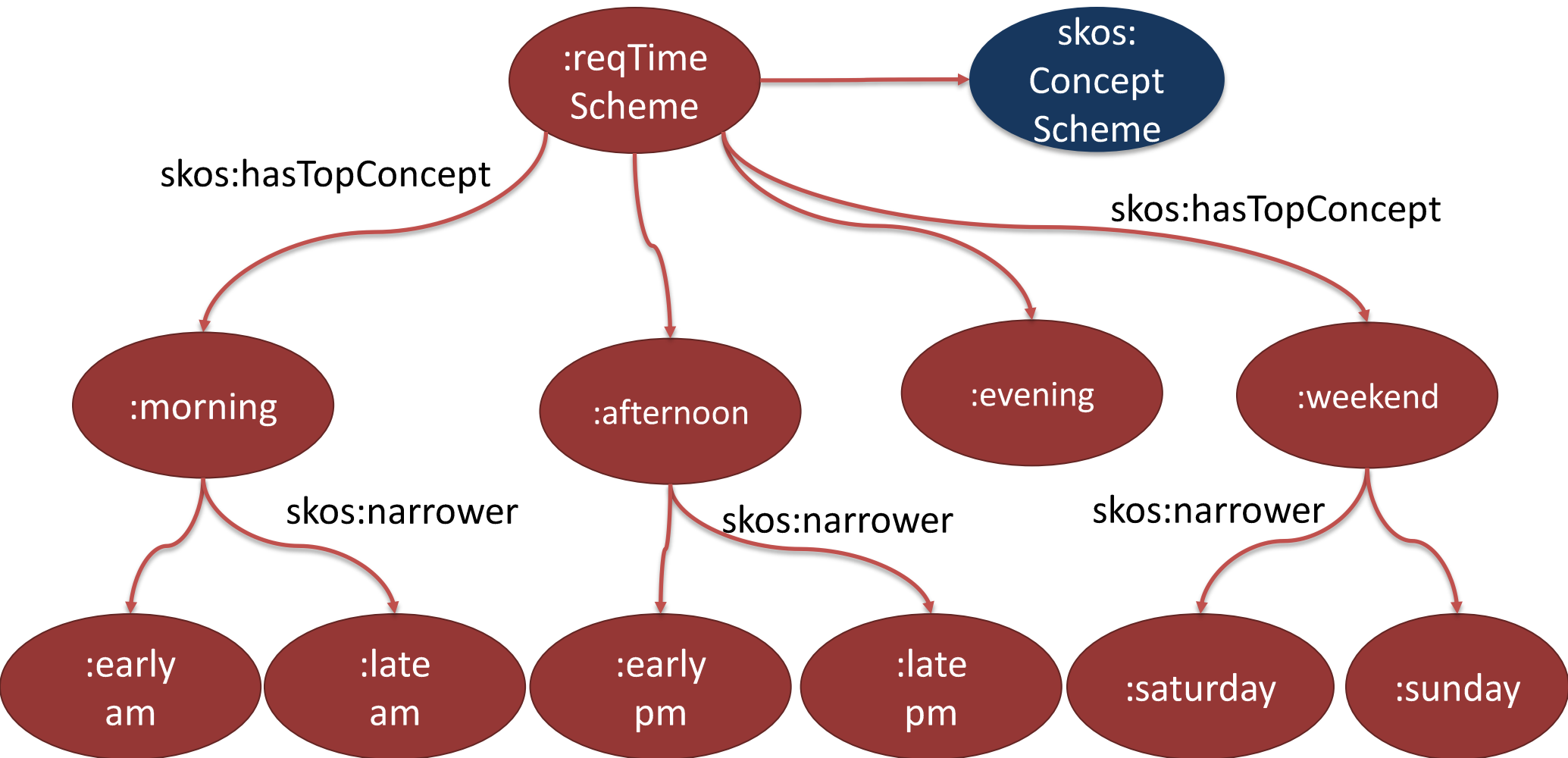




# Exercise

- Pick a code list for something you are familiar with
- Sketch out a concept scheme for it

# Concept Schemes can be hierarchical



# A list of SKOS properties

- label properties
  - skos:prefLabel, skos:altLabel, skos:hiddenLabel
- skos:notation
- documentation properties (skos:note)
  - skos:changeNote, skos:definition, skos:editorialNote, skos:example, skos:historyNote, skos:scopeNote
- semantic relations (skos:semanticRelation)
  - skos:narrower, skos:broader, skos:related, skos:narrowerTransitive, skos:broaderTransitive
- mapping properties (skos:mappingRelation)
  - skos:closeMatch, skos:exactMatch, skos:broadMatch, skos:narrowMatch, skos:relatedMatch

# Example: the CPC classification scheme

The screenshot shows the 'CPC classification scheme' page. The breadcrumb trail is: > all > basic > class > definition > description > none > property > skos. The 'View' panel lists: label, comment, has top concept > label, has top concept > title, type, and see also. The main content area shows a list of concepts from A to H, with 'H' (ELECTRICITY) selected.

Linked Data API

## CPC classification scheme

[Show Search Form](#)

<http://data.epo.org/ld/def/cpc/cpcClassificationScheme>

comment: The concept scheme at the root of the CPC classification hierarchy.

has top concept

<b>A</b>
title: HUMAN NECESSITIES
<b>B</b>
title: PERFORMING OPERATIONS; TRANSPORTING
<b>C</b>
title: CHEMISTRY; METALLURGY
<b>D</b>
title: TEXTILES; PAPER
<b>E</b>
title: FIXED CONSTRUCTIONS
<b>F</b>
title: MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING ENGINES OR PUMPS
<b>G</b>
title: PHYSICS
<b>H</b>
title: ELECTRICITY

The screenshot shows the 'H03' page. The breadcrumb trail is: > all > basic > class > definition > description > none > property > skos. The 'View' panel lists: label, notation, modified, broader > label, broader > title, narrower > label, narrower > title, title, and type. The main content area shows details for H03, including its notation, modified date, and a list of narrower terms from H03B to H03G.

Linked Data API

## H03

[Show Search Form](#)

<http://data.epo.org/ld/def/cpc/H03>

notation: H03

modified: 01/01/2013

broader

<b>H</b>
title: ELECTRICITY

narrower

<b>H03B</b>
title: GENERATION OF OSCILLATIONS, DIRECTLY OR BY FREQUENCY-CHANGING, BY CIRCUITS EMPLOYING ACTIVE ELEMENTS WHICH OPERATE IN A NON-SWITCHING MANNER; GENERATION OF NOISE BY SUCH CIRCUITS
<b>H03C</b>
title: MODULATION
<b>H03D</b>
title: DEMODULATION OR TRANSFERENCE OF MODULATION FROM ONE CARRIER TO ANOTHER
<b>H03F</b>
title: AMPLIFIERS
<b>H03G</b>
title: CONTROL OF AMPLIFICATION

# My point is ...

- an illustration of a common use case
  - controlled vocabularies
- an example of a high quality vocabulary
- skos is a relatively simple vocabulary
  - broad range of application
- it is the product of a lot of careful design work
- and decades of experience from the taxonomy community

# Questions/Observations



[www.epimorphics.com](http://www.epimorphics.com)



# Bubble and Arc components

