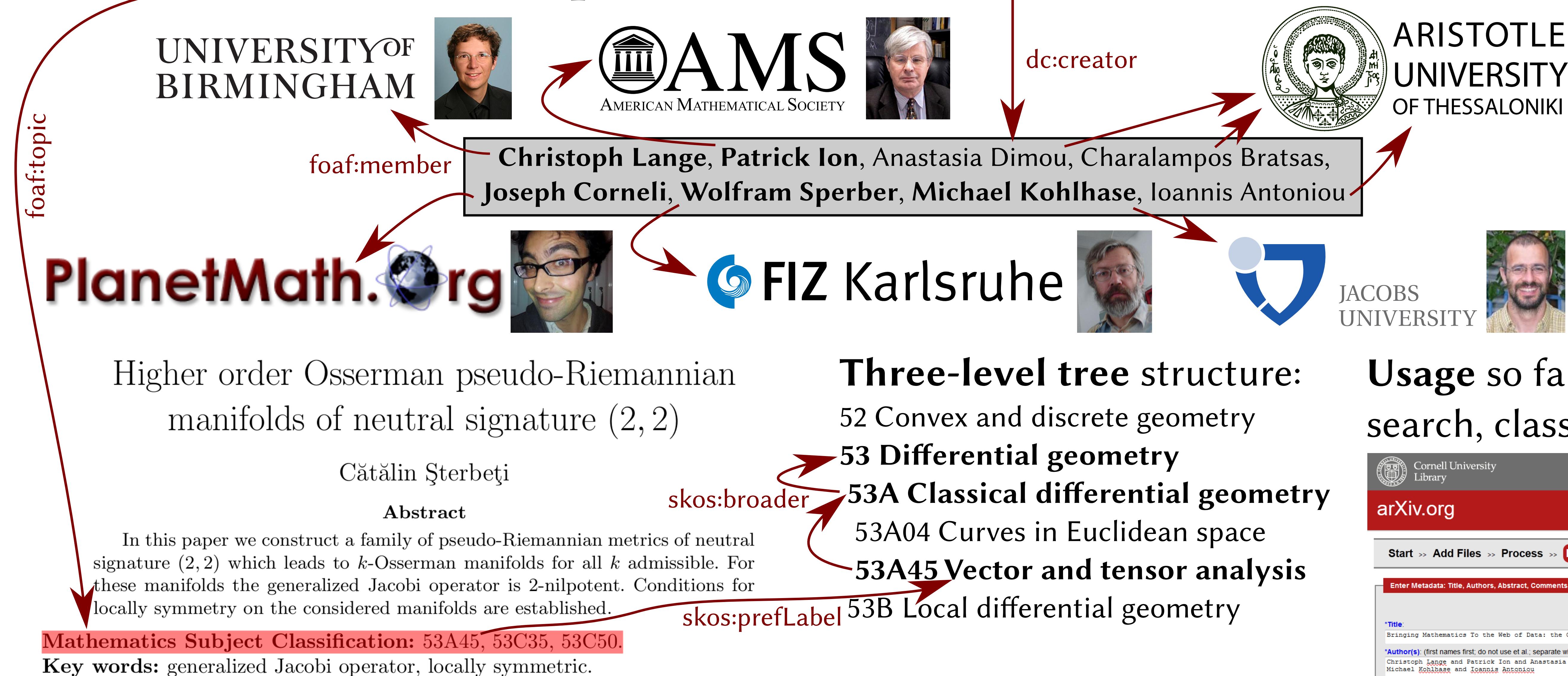


# Reimplementing the MSC (Mathematics Subject Classification) as a Linked Open Dataset



## Old implementation (plain TeX):

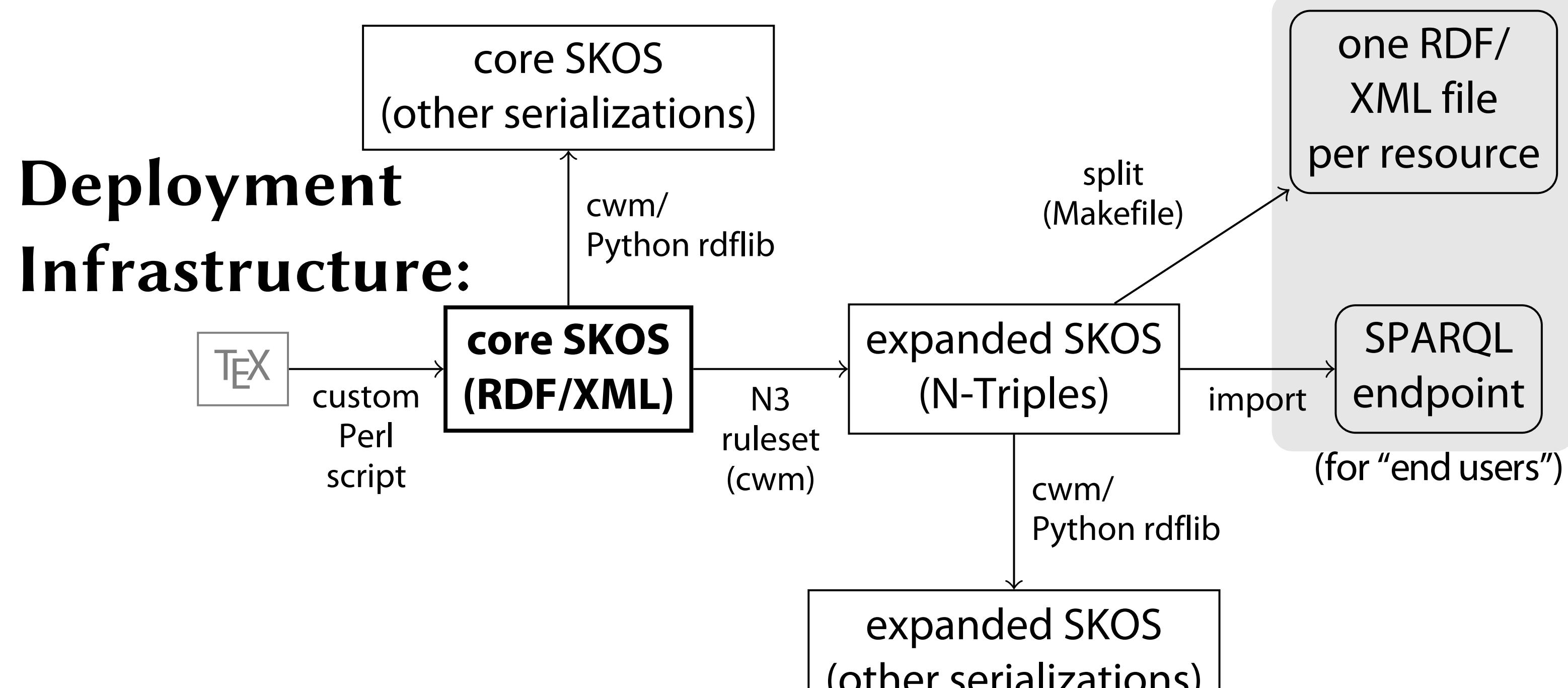
```
\MajorSub 53-++\SubText Differential geometry
\SeeFor{For differential topology, see \SbjNo 57Rxx.}
For foundational questions of differentiable manifolds, see \SbjNo 58Axx}
\SecndLvl 53Axx\SubText Classical differential geometry
\ThirdLvl 53A45\SubText Vector and tensor analysis
```

## Redesign Requirements:

1. facilitate **use and reuse**
2. facilitate **maintenance**
3. enable knowledge workers and service developers to **adapt and extend** the MSC
4. allow end users to **explore connections** to related subjects

**Further SKOS Features used:**

- <MathML> in labels
- links across MSC versions to reflect changes and aid migration
- links to other concept schemes
- collections (e.g. "historical topics")



## In Use: PlanetMath's "browse by subject":

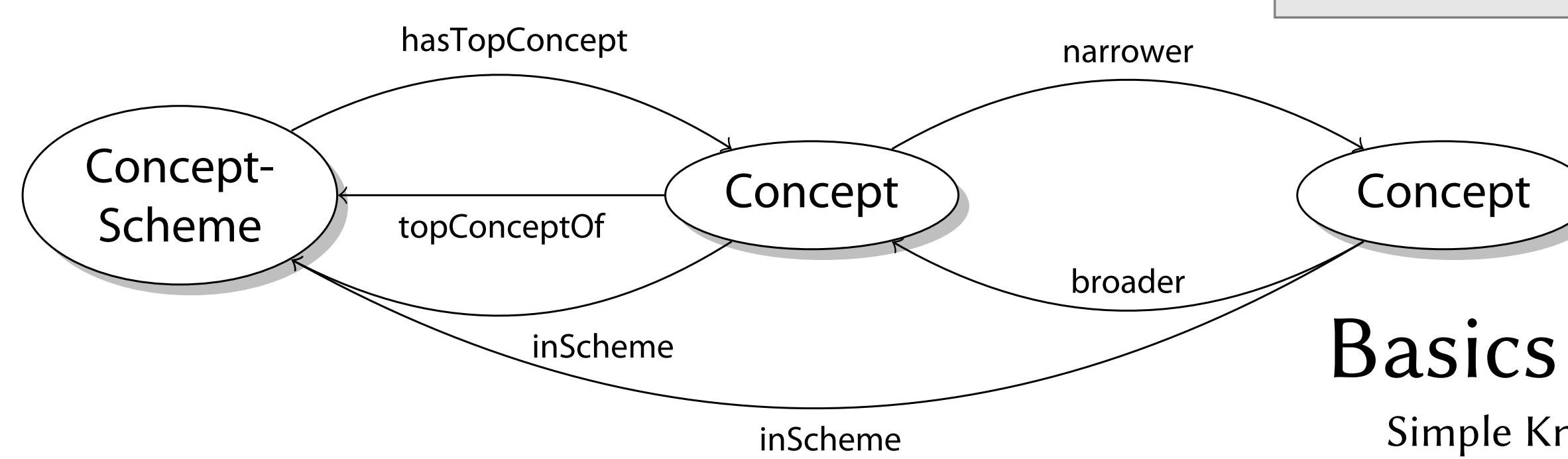
```

PREFIX msc: <http://msc2010.org/resources/MSC/2010/>
PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
PREFIX dct: <http://purl.org/dc/terms/>
SELECT DISTINCT ?subclass ?notation ?label COUNT(?article) WHERE {
    msc:53Axx skos:narrower ?subclass . # get subclasses; then, for each subclass:
    ?subclass skos:notation ?notation ; # get the MSC class number
    skos:prefLabel ?label . # get the preferred label
    OPTIONAL { ?article dct:subject ?subclass } # get classified articles (if any)
    FILTER langMatches(lang(?label), "en") # only English labels
}
GROUP BY ?subclass ?notation ?label # grouping just needed for COUNT() to work
    
```

**Three-level tree structure:**  
 52 Convex and discrete geometry  
**53 Differential geometry**  
 53A Classical differential geometry  
 53A04 Curves in Euclidean space  
 53A45 Vector and tensor analysis  
 53B Local differential geometry

**Usage so far (browsing, search, classification, ...):**

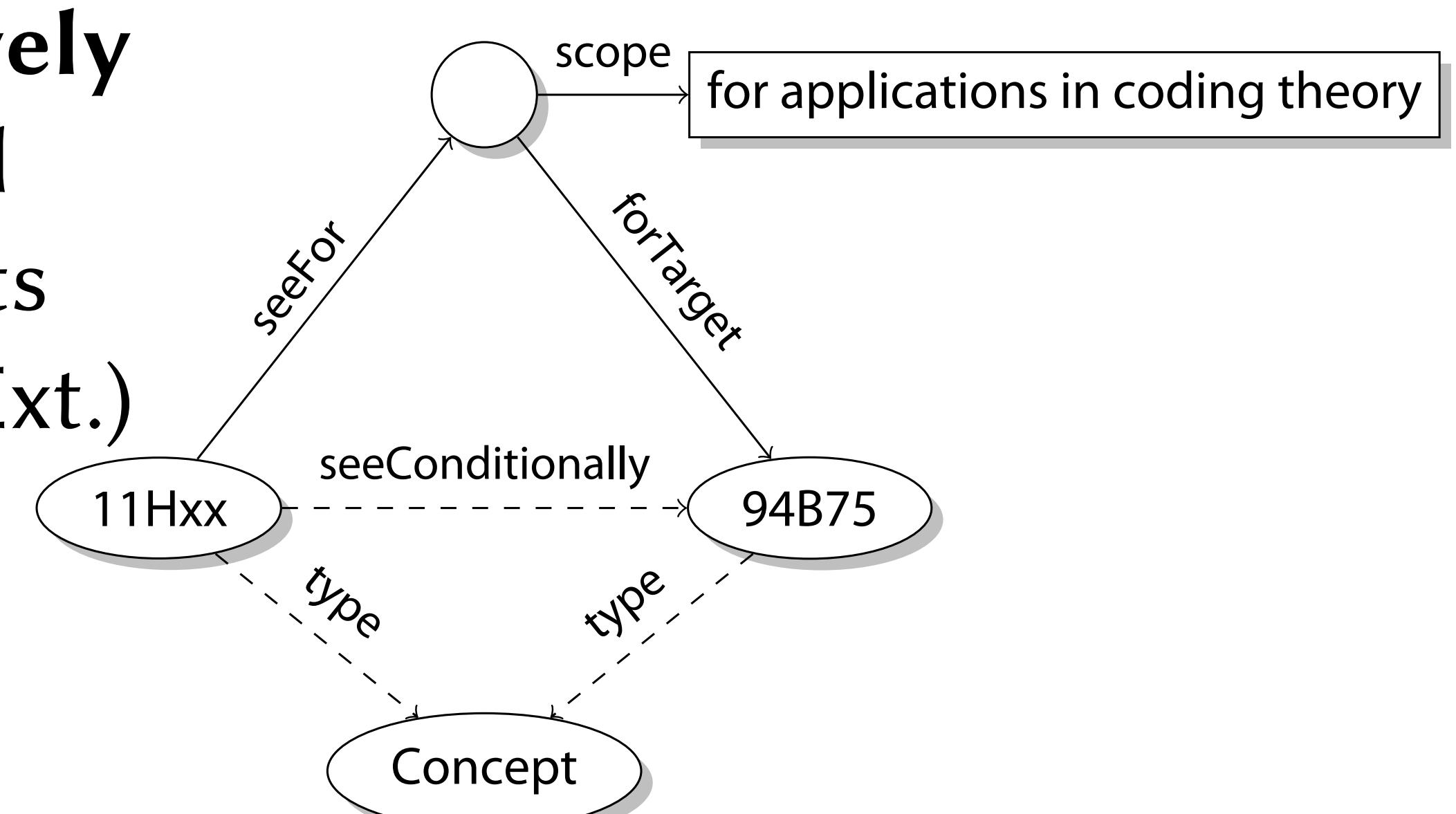
Cornell University Library  
arXiv.org  
Logged in as ch.lange | Help | My Account | Logout  
Start > Add Files > Process > Metadata > Preview  
Enter Metadata: Title, Authors, Abstract, Comments, etc.  
Save and Continue  
  
Title: Bringing Mathematics To the Web of Data: the Case of the Mathematics Subject Classification  
Author(s): (First names first, do not use et al. separate with commas or and; see linked help)  
Christoph Lange and Patrick Ion and Anastasia Dimou and Charalampous Bratsas and Wolfram Sperber and Michael Kohlhase and Ioannis Antoniou  
Abstract: The Mathematics Subject Classification (MSC), maintained by the American Mathematical Society's Mathematical Reviews, is a hierarchical classification scheme for classifying publications in mathematics. While it is widely used, its traditional, idiosyncratic conceptualization and representation did not encourage wide reuse on the Web, and it made the scheme difficult to adapt to new requirements. We present the design of the new [Open Data](#) version of the MSC using SKOS, and our focus is concentrated on turning it into the new MSC authority. This document presents the design, the main features and details of our design considerations and how we realized them in the implementation, presents use cases, and future applications.  
Comments (e.g.: 10 pages, 5 figures, conference or other essential info):  
ECCS 2012, Lecture Notes in Computer Science No. 7265, Springer 2012.  
Report number: (local report number; otherwise leave blank)  
Journal reference: (full biblio info: only if already "published"; otherwise leave blank)  
DOI: (If known, otherwise leave blank)  
ACM class: (optional; delimit by comma)  
MSC class: (ams.org)  
68T35  
MSC-class:  
• For submissions to the math archive, this field is used to indicate the mathematical classification code according to the Mathematics Subject Classification. Here is an example  
MSC-class: 1440 (Primary) 1426 (Secondary)  
Save and Continue



**Basics of SKOS Core**  
Simple Knowledge Organization System

<<http://msc2010.org/resources/MSC/2010/53A45>>  
msc2010:53A45 a skos:Concept ;  
skos:inScheme msc2010: ;  
skos:broader msc2010:53Axx ;  
skos:prefLabel "Vector and tensor analysis"@en,  
"向量与张量分析"@zh ;  
skos:notation "53A45"^^mscsmpl:MSCNotation .

**Partitively Related Concepts (SKOS Ext.)**



## Next Steps:

1. **Community building:** official announcement by MR/Zentralblatt, and to Linked Data community
2. **Improving retrieval:** adding precise definitions of the MSC classes; adding index terms to classes; introducing a faceted structure (beyond collections)
3. **Weaving the Web of Data:** connect to DBpedia, OpenMath CDs, ACM Computing Classif., EuDML, ...

We enable **fine-grained classification** of mathematical resources smaller than articles (e.g. blog posts, tweets). Effect: **democratization of scientific publishing, towards networked science**