



# Legal Drafting supported by AI: enhancing LEOS

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# Introduction

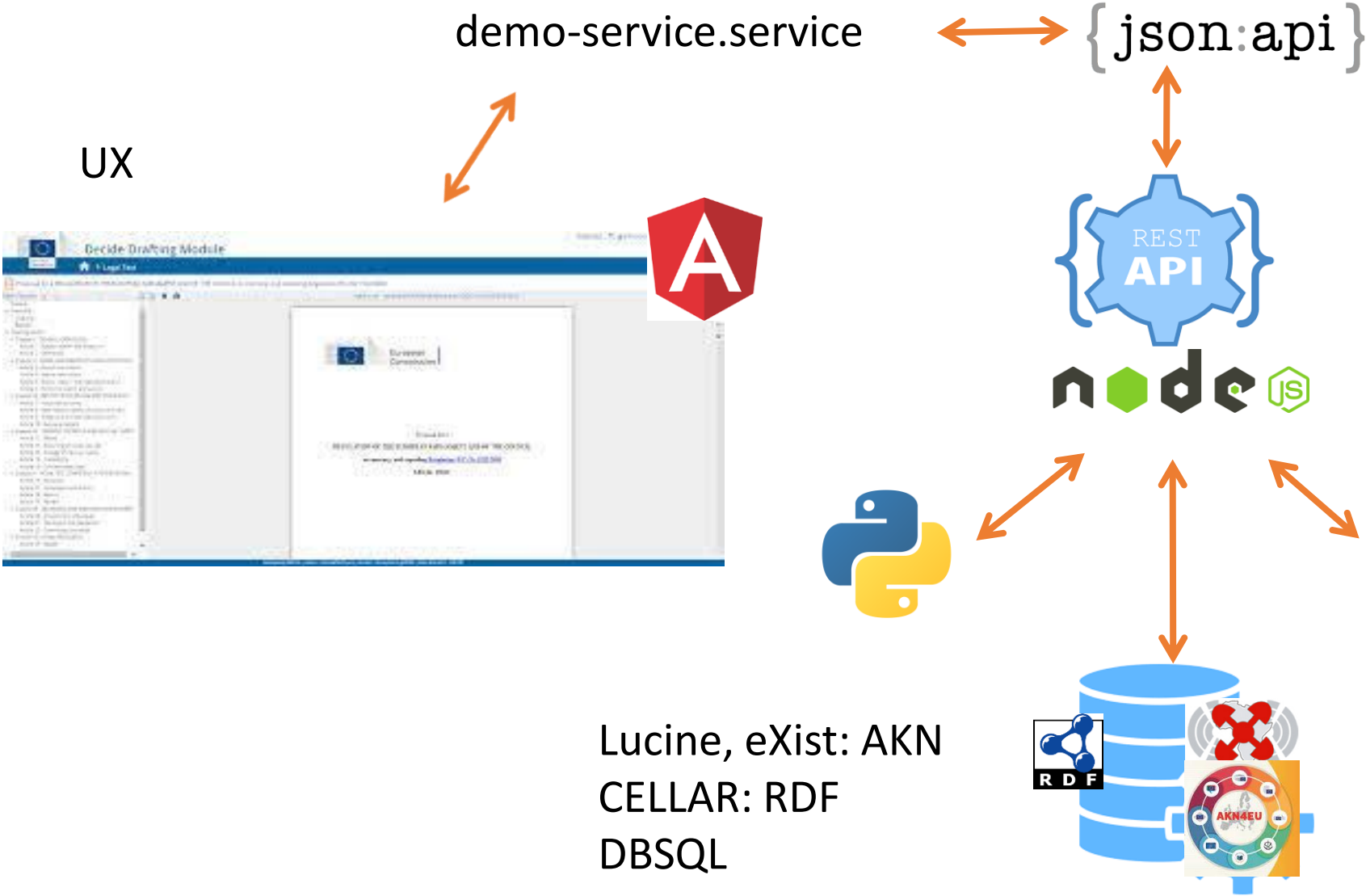


- This project aims to enrich [LEOS](#) web editor of the EU COMMISSION (DG INFORMATICS) with AI tools.
- LEOS is a legislative web editor for supporting legal drafting in [AKOMA NTOSO](#) [OASIS XML](#) standard.
- We have developed two modules that:
  1. suggest the pertinent [normative definitions](#) using similarity with the bill topic
  2. suggest the pertinent [normative reference](#) using the thematic similarity with the bill
  3. take into consideration the [temporal information](#) and the nested normative references
  4. use the metadata of [ELI](#) and [EUROVOC](#) to improve the similarity.

# Dataset

- 10 years of European legislation (2010-2021)
- 15.000 regulations and directives
- Formex 3.0 XML → AKN-XML
- Annotated with modifications, definitions, normative references.
- 899 documents with definitions

# Architecture



Each EUROVOC is associated with an average of the Word2Vec embeddings of the words composing it.





Save Import from OJ Exports Search

See user guidance   
  Enable track changes   
  Enable definition assistant  
 See track changes   
  Enable reference review

Display    Track-changes    ACMServices

Navigation Pane

- Preface
- Preamble
- Enacting Terms
  - Article 1 - Article heading... 1. Text...
  - Article 2 - Article heading... Commission sh...
- Signature

Versions

Proposal for a

**REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**

**on XYZ**

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the [Treaty on the Functioning of the European Union](#), and in particular Article [...] thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national Parliaments,

Having regard to the opinion of the European Economic and Social Committee<sup>1</sup>,

Having regard to the opinion of the Committee of the Regions<sup>2</sup>,

Acting in accordance with the ordinary legislative procedure,

ACM Services | Annotations & document notes

Search    Drafting Review    Annotations & document notes

regulation 406    26/05/2024

Definition suggestion    Enter an eurovoc

Reference suggestion    hydrogen

Request:

Term: regulation 406    Date: 2024-05-26

Eurovoc: hydrogen

**regulation 406/2010**  
This result fits "regulation 406".

Version: 2010-06-06T22:00:00.000Z  
Eurovoc: Technical standard, Pollution control, Motor vehicle.

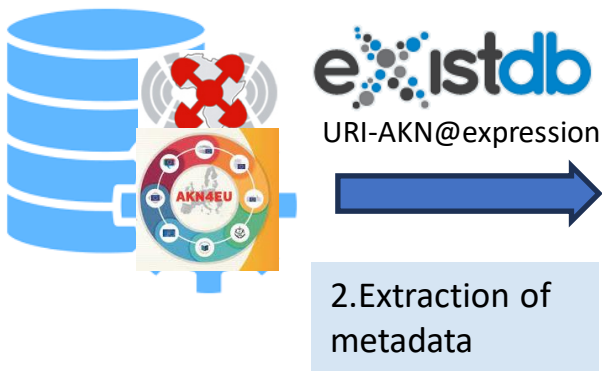
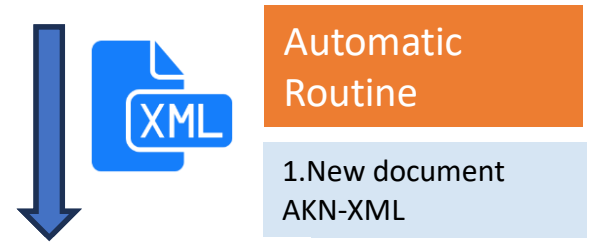
# References

- Suggesting normative references and checking their consistency
  - whether they are correct in syntax (e.g., Regulation (EEC) No 2195/91)
  - whether they are pertinent to topic (EUROVOC)
  - whether they are valid in time

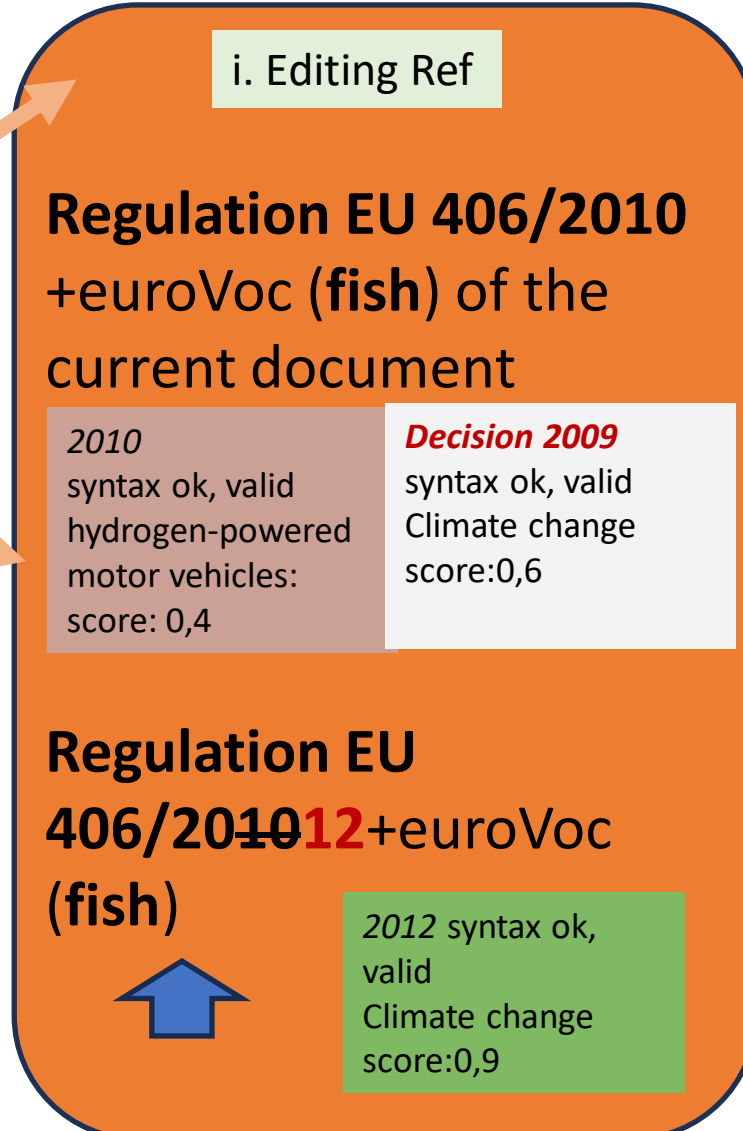
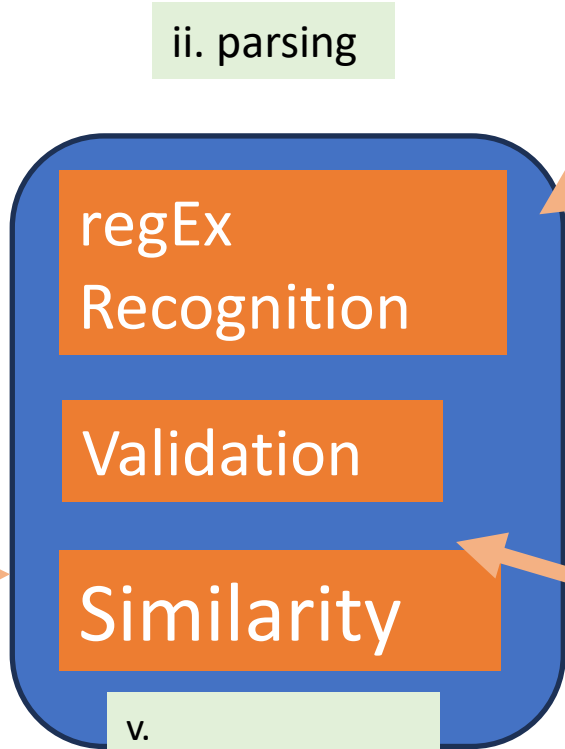
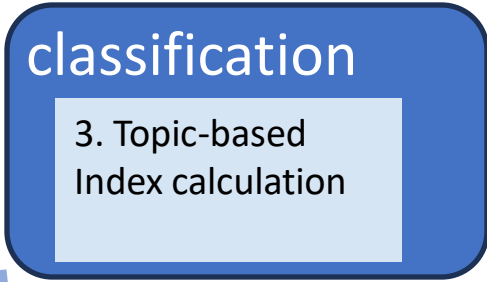
# Scenario reference

run-time Server Side

LEOS + Suggestion Module



iii. Section validation (articles, paragraphs)



<a href="#">URI-AKN@expression</a> (key)- CELEX, AKNShort, FRBRWORK
DocIndex
ValidityDate
DocDate
DocYear
DocNumber
DocType

iv. Request of metadata

Regulation (EU) No 406/2010 of 26 April 2010

EuroVoc: hydrogen-powered motor vehicles

v. Index calculation and Comparison

The screenshot displays a legal document viewer interface. On the left, a navigation pane lists sections like 'Preface', 'Preamble', and 'Enacting Terms'. The main content area shows a proposal for a regulation titled 'REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on XYZ'. The text includes 'THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION', 'Having regard to the Treaty on the Functioning of the European Union', and 'Acting in accordance with the ordinary legislative procedure'. A blue arrow points from the text 'Having regard to the opinion of the European Economic and Social Committee<sup>1</sup>' to the right-hand side. On the right, a panel titled 'ACM Services | Annotations & document notes' contains metadata for the term 'immigration liaison officer', including its definition, long title, FRBRExpressionuri, Partition, References (with a link to '32019R1240-art\_2'), Version date, Eurovoc, and Score. At the bottom of this panel are buttons for 'Copy', 'Download', and 'Akoma Ntoso'.

# Definitions

- Suggesting definitions
  - through **similarity** in topic
  - through consistency in context (e.g., EUROVOC)
  - inclusion of the normative reference (link) text
  - temporal point-in-time mechanism

# Scenario definition

run-time  
serverSide

## EDITOR

1. New document AKN-XML



```
<FRBRExpression>  
<FRBRthis value="/akn/eu/act/regulation/ep/2009/406/deu@/!main"/>  
<FRBRuri value="/akn/eu/act/regulation/ep/2009/406/deu@/!main"/>  
<FRBRdate date="2009-05-18" name="Act Date"/>  
<FRBRauthor href="#EP"/>  
<FRBRlanguage language="deu"/>  
</FRBRExpression>
```

eXist  
Mark-up the definition



2. Extraction of definition

classification

3. Calculation of index of topic  
Regulation (EU)  
2017/2394

6. definiendum

Search – IR  
Lucene

Filter4  
Similarity, Validity

5. Editing DEF

Directive (EU) 2019/1

“applicant authority”  
+euroVoc  
single market

Def1 - URI  
Def2 - URI  
Def3 - URI

4. Storing in SQLDB



7. Request of metadata

URI-AKN@expression,  
index, validity, date,  
year, number, type

8. Similarity calculation

Directive 2010/24/EU  
EuroVoc:  
tax system  
administrative cooperation  
redemption  
financial interests of  
members claim  
EAGGF Guarantee Section

Regulation (EU)  
2017/2394  
administrative cooperation  
consumer protection  
single market  
EU Member State  
infringement of EU law  
consumer policy



# Anatomy of definition

Directive 2010/24/EU

## Article 3

### Definitions

For the purposes of this Directive:

- (a) ‘applicant authority’ means a central liaison office, a liaison office or a liaison department of a Member State which makes a request for assistance concerning a claim referred to in Article 2;
- (b) ‘requested authority’ means a central liaison office, a liaison office or a liaison department of a Member State to which a request for assistance is made;
- (c) ‘person’ means:
  - (i) a natural person;
  - (ii) a legal person;
  - (iii) where the legislation in force so provides, an association of persons recognised as having the capacity to perform legal acts but lacking the legal status of a legal person; or
  - (iv) any other legal arrangement of whatever nature and form, which has legal personality or not, owning or managing assets which, including income derived therefrom, are subject to any of the taxes covered by this Directive;
- (d) ‘by electronic means’ means using electronic equipment for the processing, including digital compression, and storage of data, and employing wires, radio transmission, optical technologies or other electromagnetic means;
- (e) ‘CCN network’ means the common platform based on the common communication network (CCN) developed by the Union for all transmissions by electronic means between competent authorities in the area of customs and taxation.

**definiens**

**definiendum**

**definiens**

**definiendum**

# AKN annotation - text

Directive 2010/24/EU

```
<article eld="prt_1__art_3" fmx:GUID="003">
```

```
<num>Article 3</num>
```

```
<heading>Definitions</heading>
```

```
<list eld="prt_1__art_3__list_1">
```

```
<intro eld="prt_1__art_3__list_1__intro">
```

```
<p>For the purposes of this Directive:</p>
```

```
</intro>
```

```
<point eld="prt_1__art_3__list_1__point_a" defines="#def_a">
```

```
<num>(a)</num>
```

```
<content eld="prt_1__art_3__list_1__point_a__content">
```

```
<p>"<def eld="def_a">applicant authority</def>"
```

definiendum

```
<defBody eld="defBody_a"> means a central liaison office, a liaison office or a liaison department of a Member State which makes a request for assistance concerning a claim referred to in Article 2;</defBody></p>
```

definiens

```
</content>
```

```
</point>
```

<https://eur-lex.europa.eu/legal-content/IT/ALL/?uri=celex%3A32010L0024>

# Meta in AKN

Directive 2010/24/EU

```
<definitions source="#unibo">
```

```
<definition refersTo="#applicantAuthority">
```

definiendum

```
<definitionHead href="#def_a" refersTo="#applicantAuthority"/>
```

```
<definitionBody href="#defBody_a"/>
```

```
<definitionBody href="#prt_1__art_3__list_1__point_a"/>
```

*definiens*

```
</definition>
```

```
<definition refersTo="#requestedAuthority">
```

definiendum

```
<definitionHead href="#def_b" refersTo="#requestedAuthority"/>
```

```
<definitionBody href="#defBody_b"/>
```

```
<definitionBody href="#prt_1__art_3__list_1__point_b"/>
```

*definiens*

```
</definition>
```

# Normative references and temporal issues

## Problems:

Some definitions include a few words and normative reference  
Normative definition could be modified over time

## Solutions:

1. We retrieve the normative reference text and we inject it into the model
2. We consider all the versioning of the legislation point-in-time respect the date view of the end-user (e.g., future view)

# Conclusions

Our hybrid AI modules produce some benefits in the legal drafting activities:

1. Reduce manual/error-prone work typing the normative references, also avoiding repetitions in legislative citations
2. Maximising reuse of similar legal concepts (e.g., definition)
3. Increasing transparency and searchability of the existing legal knowledge included in the corpora.

We have used hybrid AI combining AKN-XML, RDF, Word2Vec, Lucine-indexing, DBSQL, Xquery