From monolithic XML for print/web to lean XML for data: realising linked data for dictionaries

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Oxford University Press (OUP)

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Introduction
Oxford University Press

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- **World-renowned dictionary publisher**
- **Licensing partner for lexical data**

Introduction
Shifts in Publishing

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- New trends & demands
- Emerging technologies & markets
- Importance of well-structured, semantically-rich data
- Speed!

Data Modelling
Our Current Dictionary Data Models

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- **Print-oriented**: designed to capture dictionary layout
- **Monolithic**: one enormous document
- **Permissive**: continually loosened to accommodate new texts

Can't give us the flexibility we need

Data Modelling
Requirements

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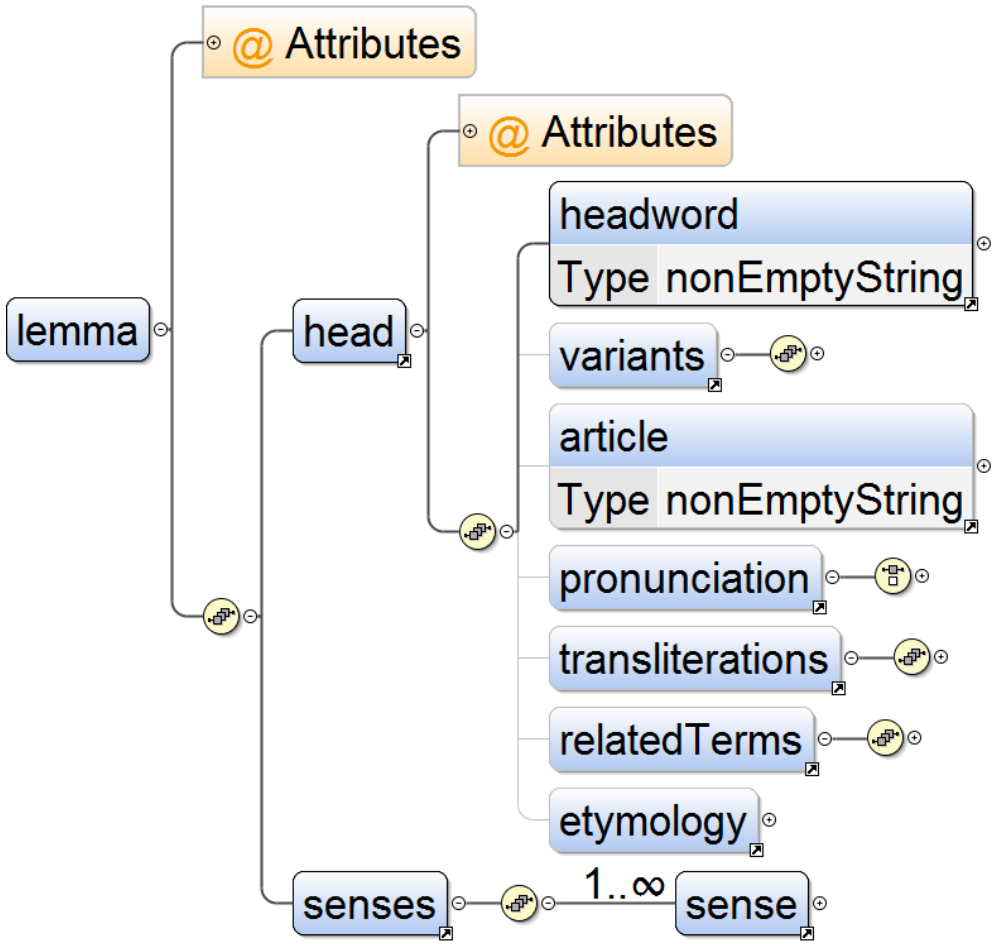
A new approach should:

- **Represent language concepts**, not layouts
- **Enable data reusability** for different products & services
- **Allow only one, clear way to model any given lexical item**

Data Modelling
The New Lexical Schema



Data Conversion
Moving Data into the Lexical Schema

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Conversion Framework Requirements

- **Scalability**: convert 40+ data-sets
- **Standardization**: harmonize variation inside the data-sets
- **Modularity**: enable customization, slotting in & out of QA, etc.

Data Conversion
Tools

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- **XProc**
- **XSpec**
- **Schematron & XML Schema**
- **Jenkins CI**
- **Agile methodology**

Data Conversion

Simplified XProc pipeline

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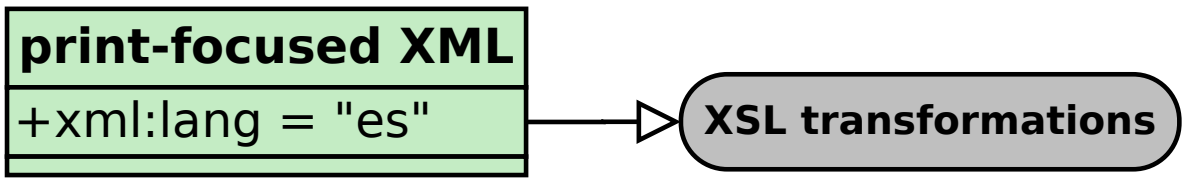
print-focused XML
+xml:lang = "es"

Data Conversion
Simplified XProc pipeline



Data Conversion

Simplified XProc pipeline

Data Conversion

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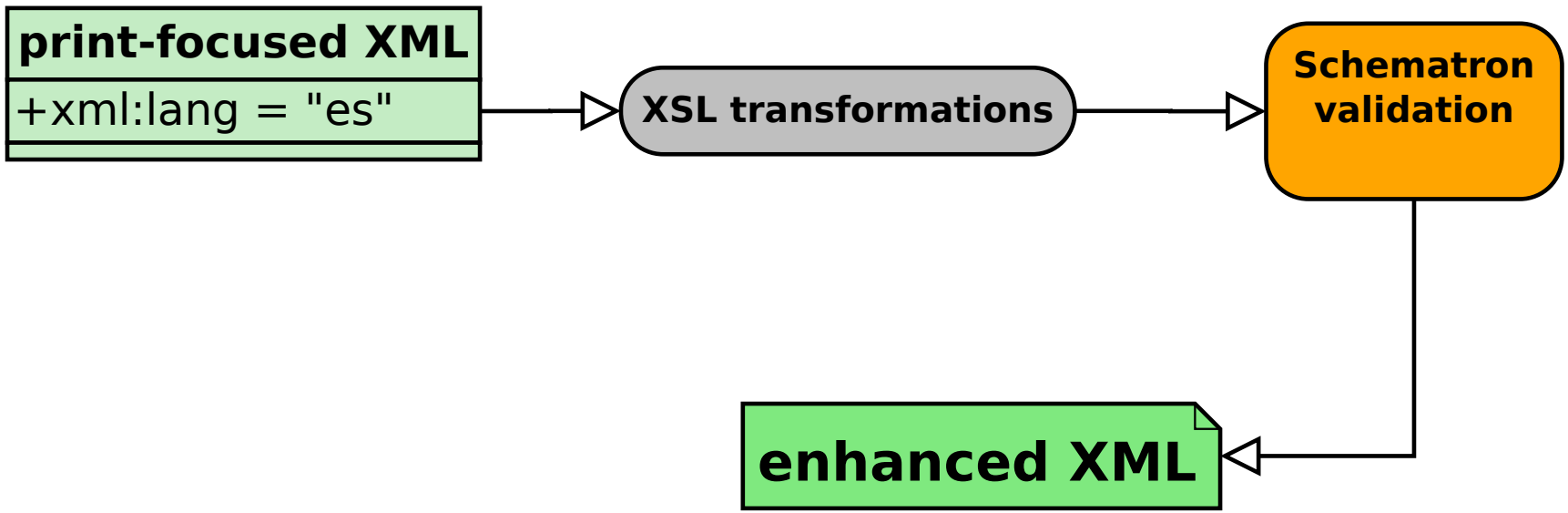

Data Conversion

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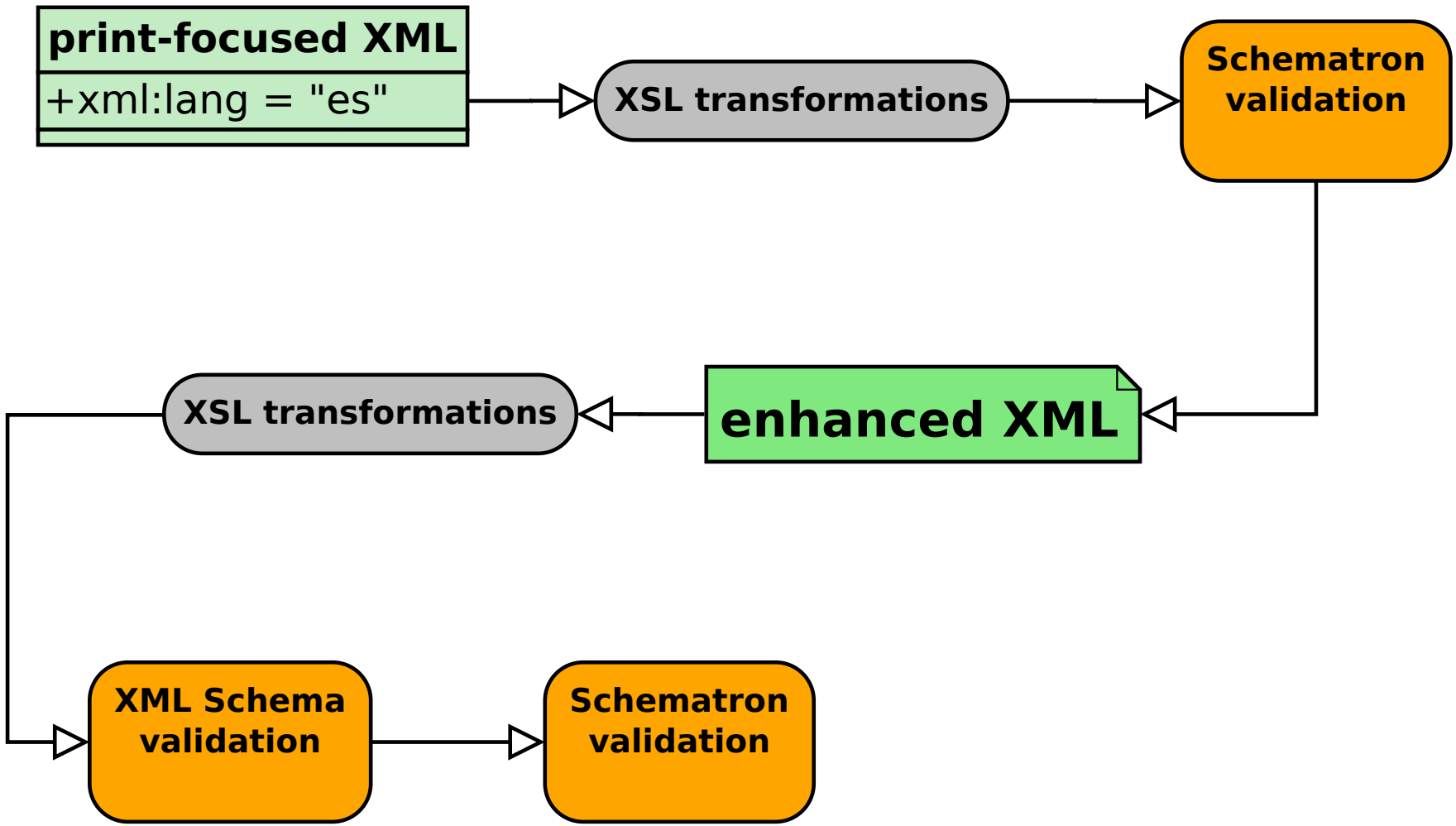
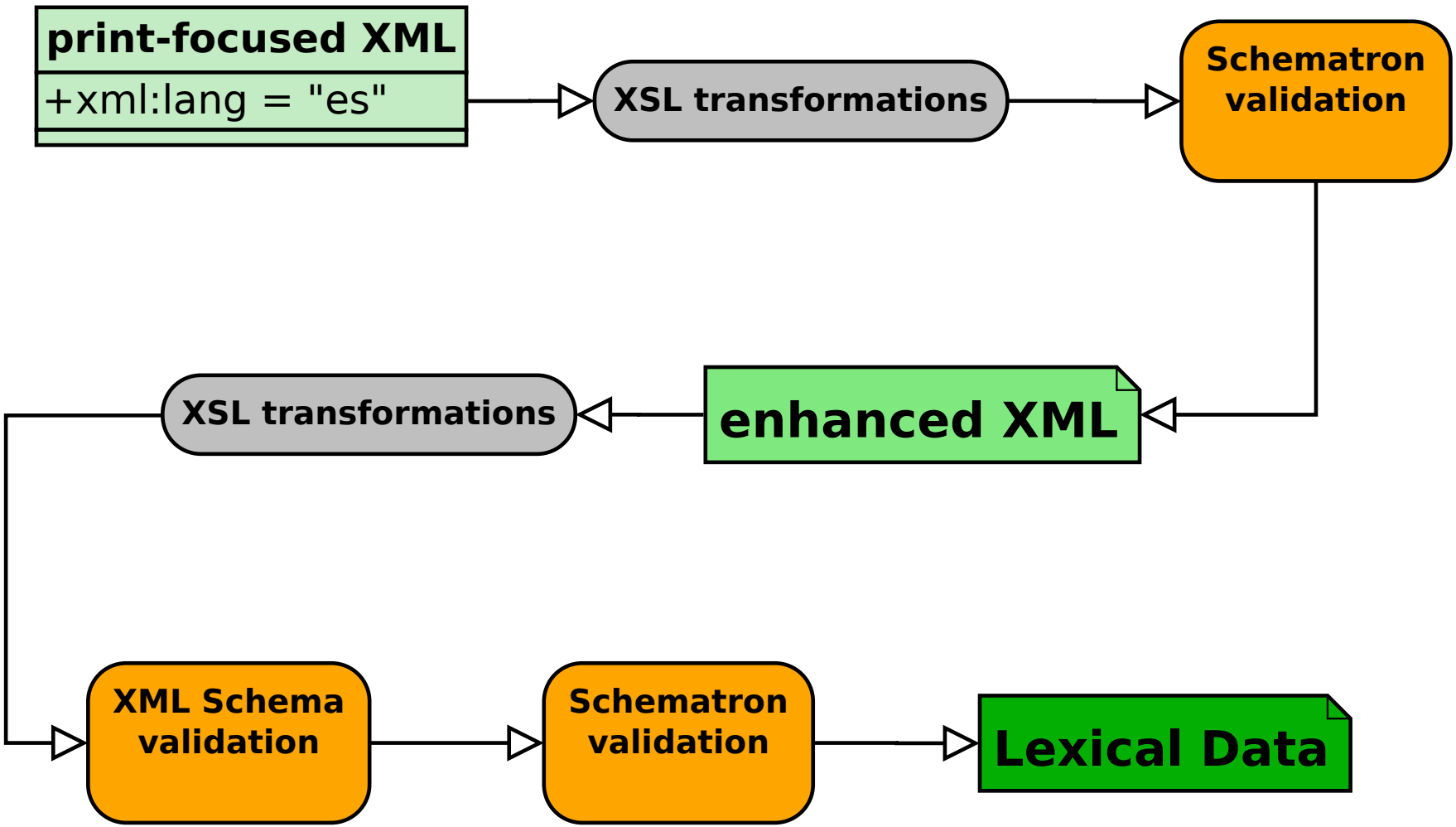


Data Conversion

Simplified XProc pipeline



Data Conversion
Build Workflow

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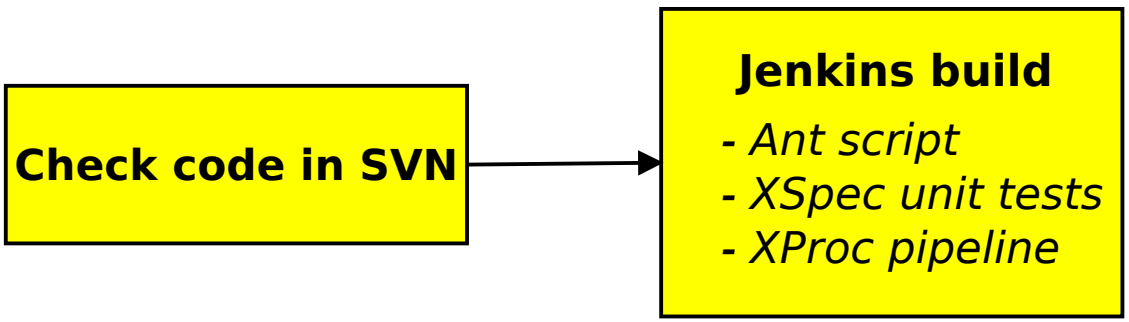

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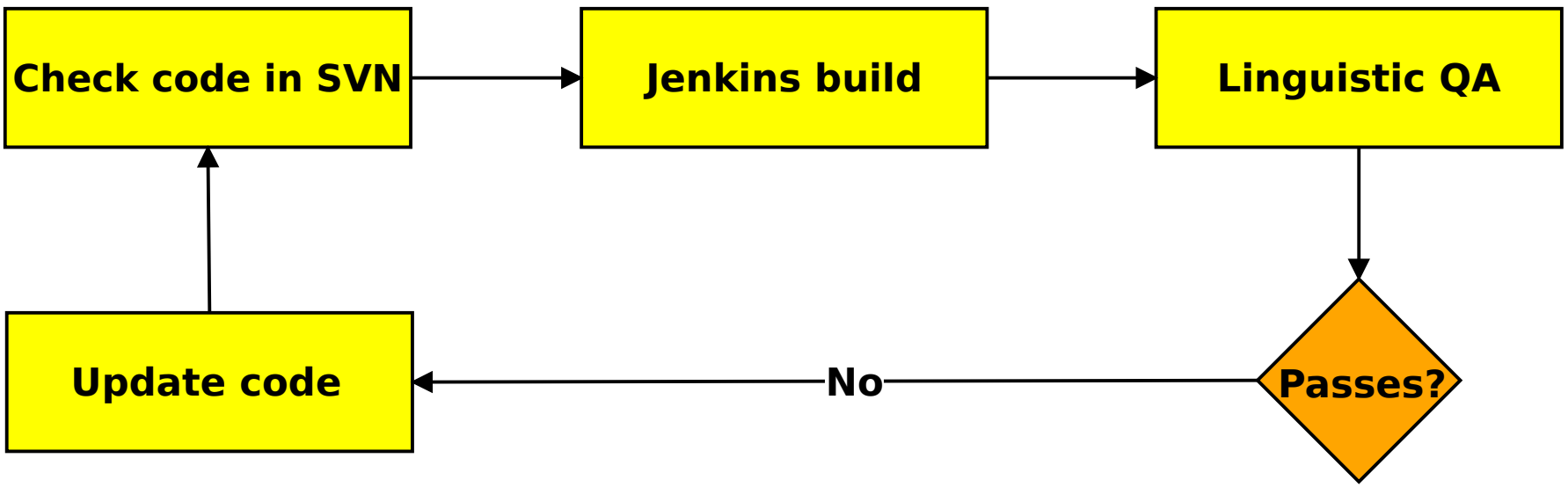

Data Conversion
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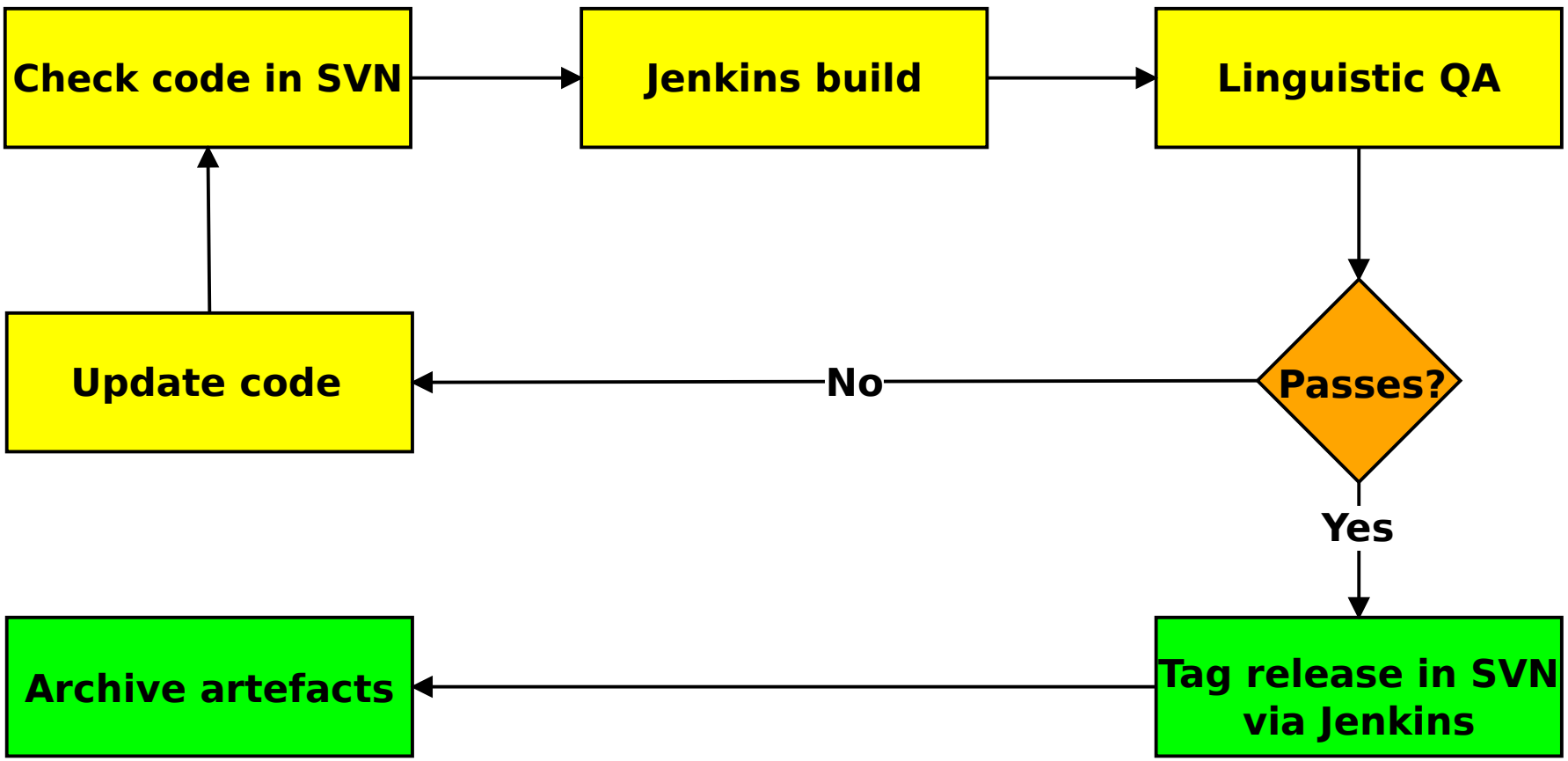

Results & Discussion
Source data

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A sense of 'malaúva' from a monolingual Spanish dictionary

```
<ACEPCIO ACEP="2">
  <AREA-GEO>Esp</AREA-GEO>
  <NIVELL>coloquial</NIVELL>
  <SIGNIFICAT>Persona que tiene mal carácter o mala
      intención.</SIGNIFICAT>
  <SINONIM>malaleche.</SINONIM>
</ACEPCIO>
```

Results & Discussion
OUP XML

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Print-focused DTD

```
<se2 num="2">
  <lg>
    <ge>Esp</ge>
    <reg>coloquial</reg>
  </lg>
  <msDict type="core">
    <df>Persona que
        tiene mal
        carácter o mala
        intención.</df>
    <syn>malaleche</syn>
  </msDict>
</se2>
```

Results & Discussion
OUP XML

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    <syn>malaleche</syn>
  </msDict>
</se2>
```

New Lexical XSD

```
<sense register="informal"
    region="ES">
  <definitions>
    <definition>
      <text>Persona que tiene
          mal carácter o mala
          intención</text>
    </definition>
  </definitions>
  <synonyms>
    <synonym>malaleche</
        synonym>
  </synonyms>
</sense>
```

Results & Discussion
OUP XML

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Print-focused DTD

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       synonym>
  </synonyms>
</sense>
```

Next steps
Scale It Up

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- Consolidate data in an **XML database**
- Build an **RDF layer** on top of the XML database
- Leverage **Semantic Web** to enhance our data

Next Steps
Prototype RDF/XML

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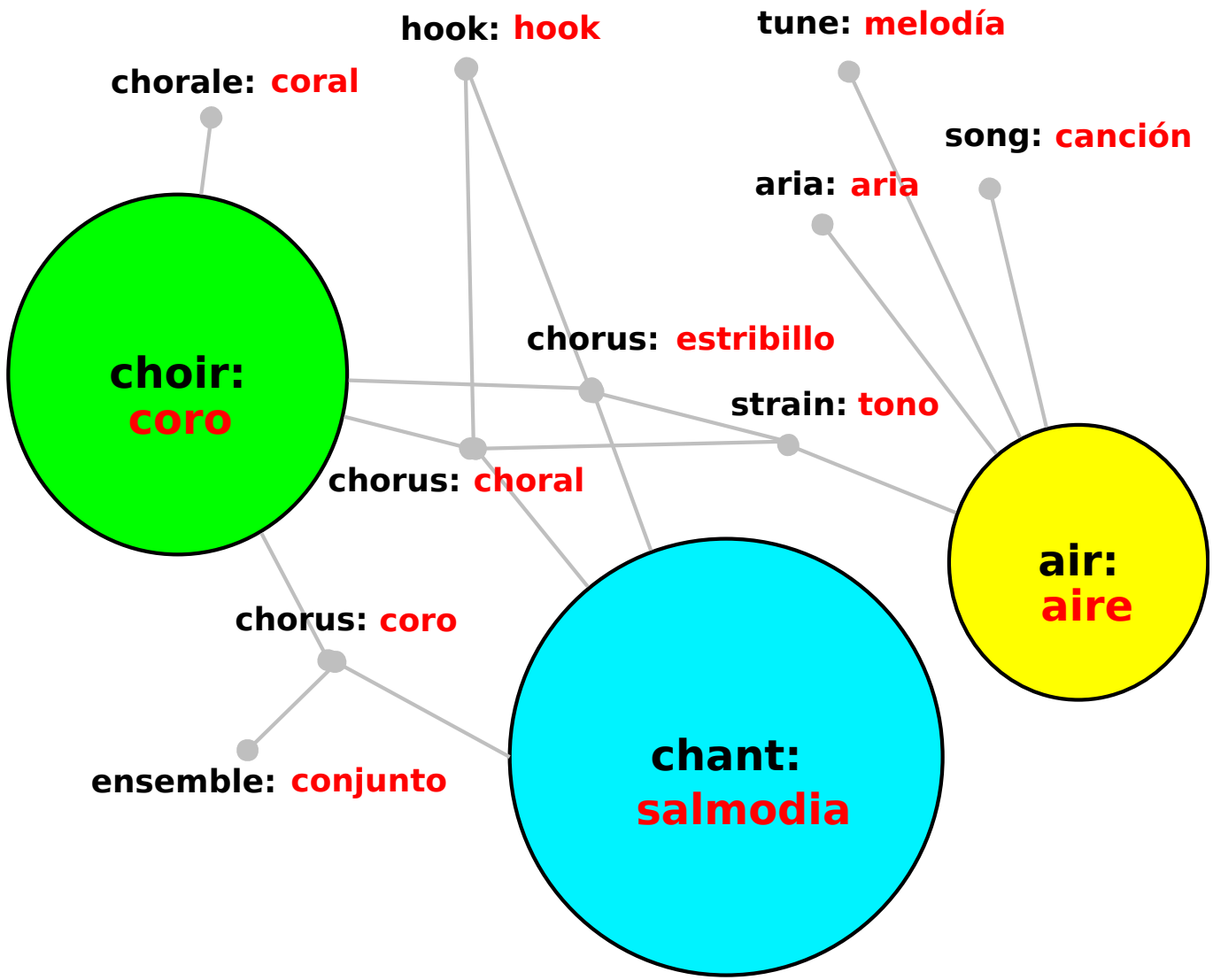
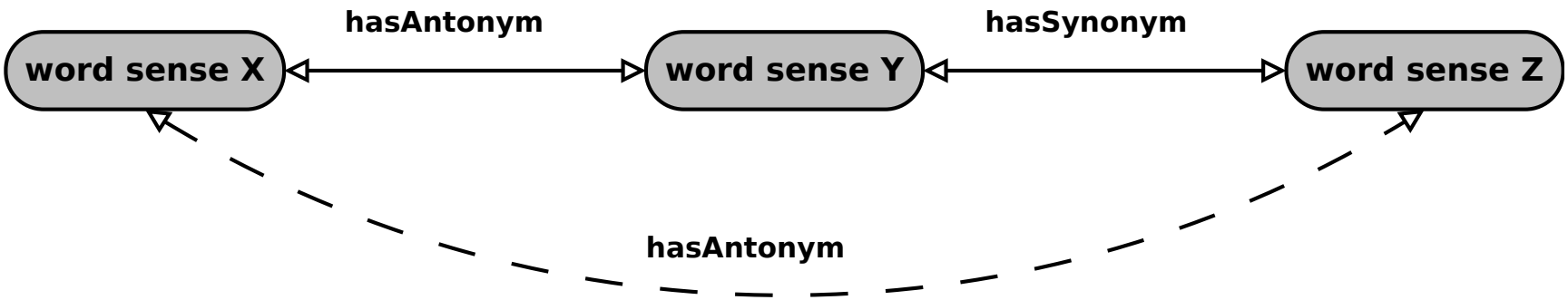
```
<Sense rdf:about="sense:es_noun_malauva_se_2">
  <isDescribedBy
    rdf:resource="
        definition:es_noun_malauva_se_2_def_1"/>
  <hasRegister rdf:resource="register:informal"
     />
  <hasRegion rdf:resource="region:ES"/>
  <hasSynonym rdf:resource="lemma:a5e644"/>
</Sense>
<StandardDefinition
  rdf:about="definition:es_noun_malauva_se_2_def_1">
  <rdfs:label xml:lang="es">Persona que tiene mal
   carácter o mala intención</rdfs:label>
</StandardDefinition>
```

RDF Data extraction

Musical terms in English & Spanish



Inference mechanism



Summary

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- **Overall project requirements**
  - Moving from products to platforms and services
  - Supporting current business needs while innovating
  - Adapting in nimble ways to fast changing market requirements
  - Focusing on time and cost efficiency
- **Data model**
  - Content driven
  - Machine interpretable
  - Modular
  - Evolvable/adaptable
- **Conversion process**
  - Highly automated
  - Modular
  - Scalable

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Thank you for your attention!
Any questions?

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