Centre for Next Generation Localisation

# A Semantic Model for End-to-End Multilingual Web Content Processing

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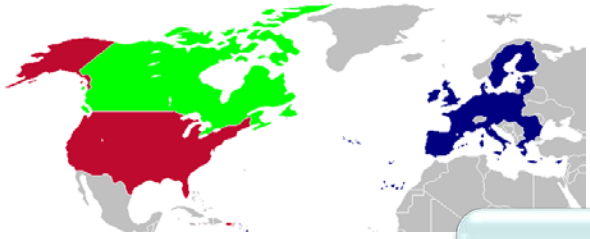
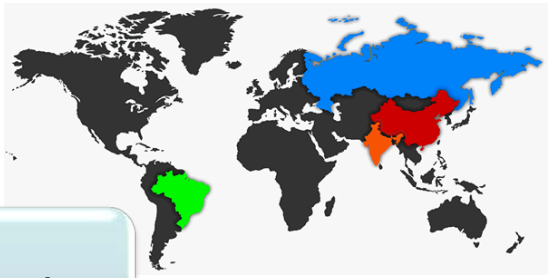
NDP National Development Plan 2007 - 2013
sfi science foundation ireland
DCU Dublin City University
UCD DUBLIN University College Dublin
University of Limerick
Trinity College Dublin

# Challenges for the Localisation Industry





Demand reflects shifts in global trade

Web & mobile, Apps & SaaS, perpetual beta, long tail

User Generated Content

Localisation Industry




# Centre for Next Generation Localisation

## DCU

- Machine Translation
- Translation Technology
- Multilingual Information Retrieval
- Semantic Model Evolution

## UCD

- Speech Synthesis
- Speech Recognition
- Semantic Model Generation

## UL

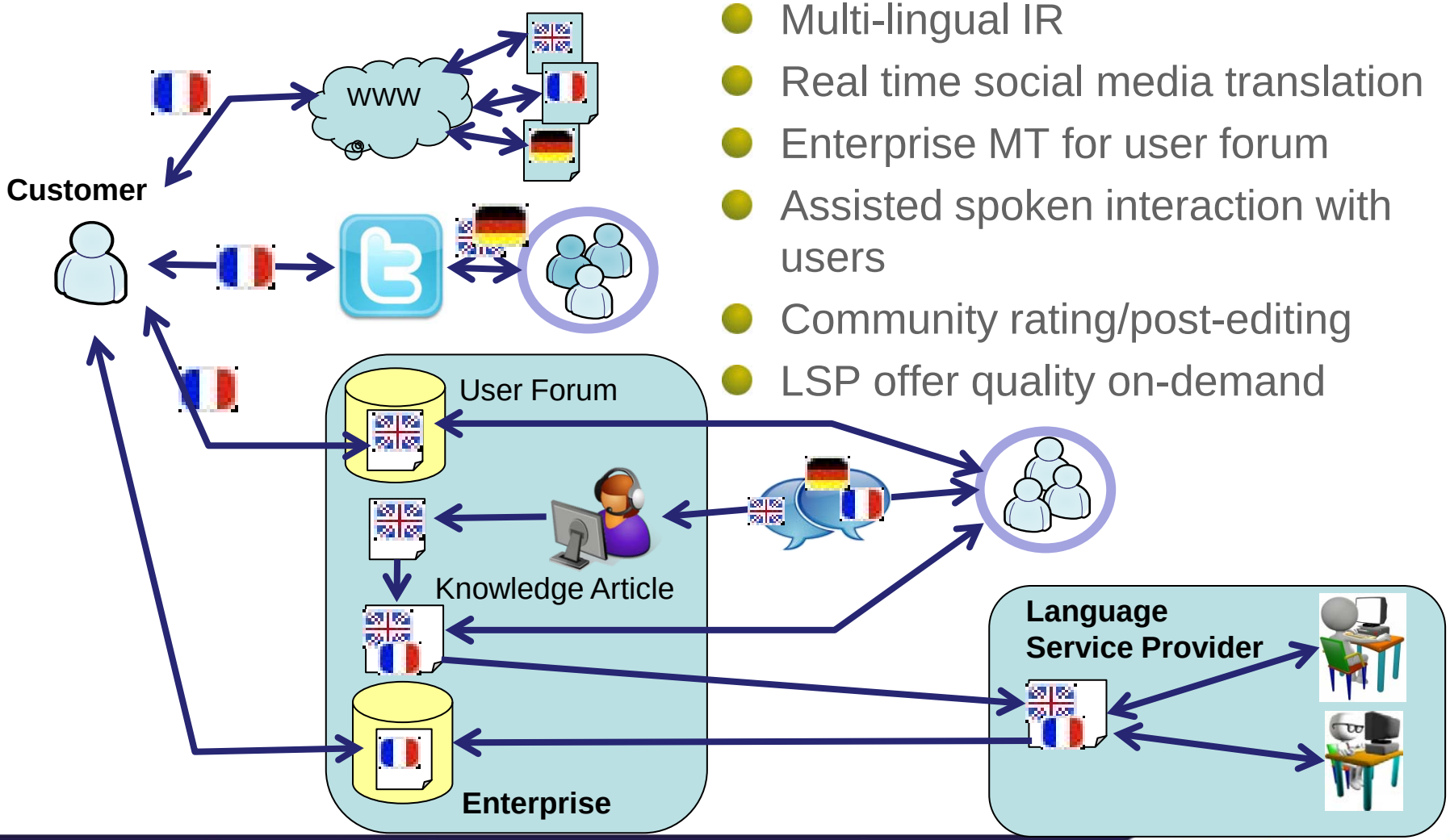
- Localisation Research Centre
- Localisation Standards
- Localisation Workflow

## TCD

- Personalisation
- Adaptive Hypermedia
- Text Analytics
- Interaction Design
- Service Integration & Management
- Semantic Interoperability

ALCHEMY SOFTWARE DEVELOPMENT
DNP Dai Nippon Printing Co.,Ltd.
IBM
Microsoft
SDL
SpeechStorm
symantec
traslán aistriúchán teicneolaíocht translation technology
VistaTEC
welocalize

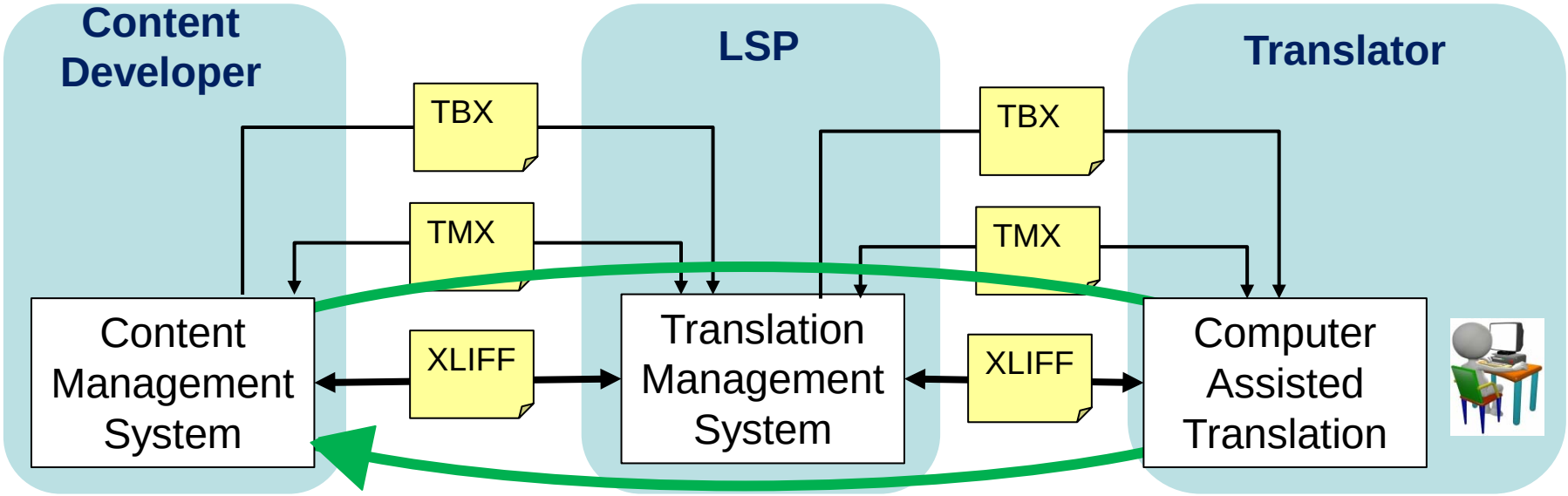
# Supporting the Global Customer




- Multi-lingual IR
- Real time social media translation
- Enterprise MT for user forum
- Assisted spoken interaction with users
- Community rating/post-editing
- LSP offer quality on-demand

# Conventional Localisation Interoperability

- Hand-off standards in XML
- Import & Export functions in monolithic tools

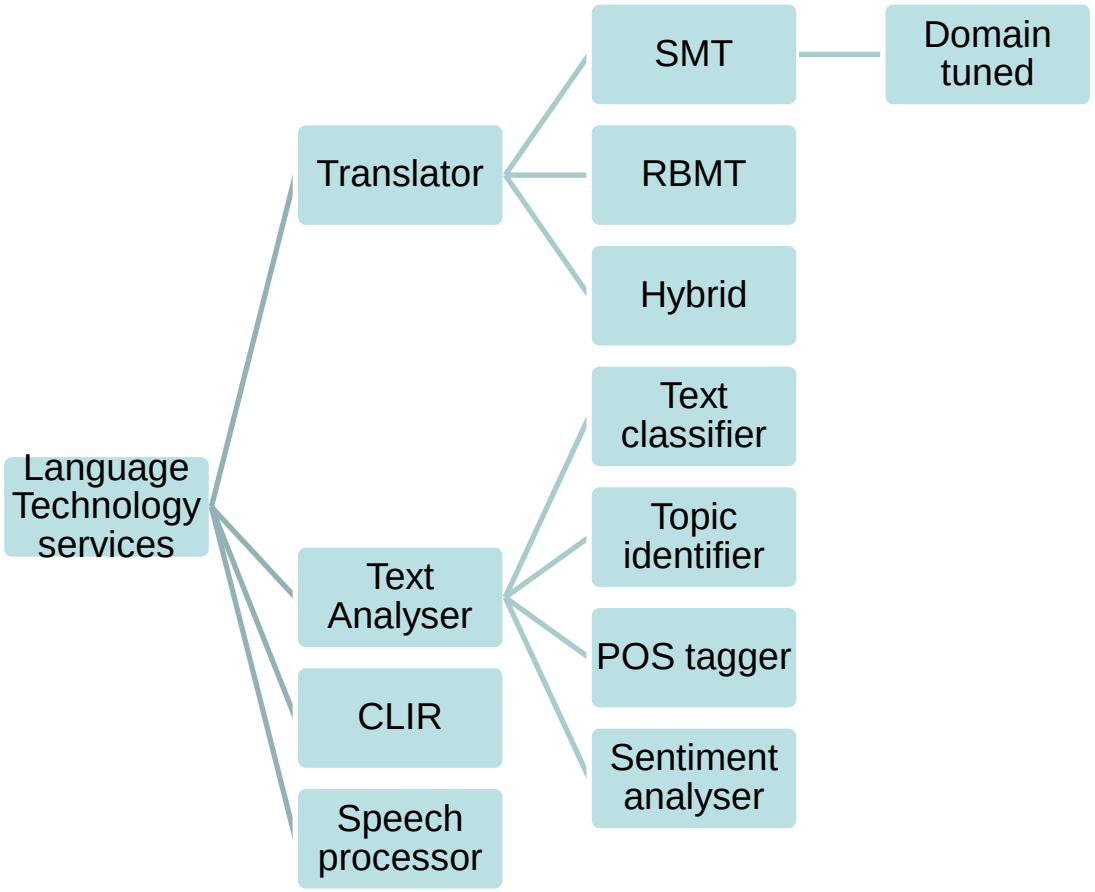


# Web Services – Potential Benefits for Localisation

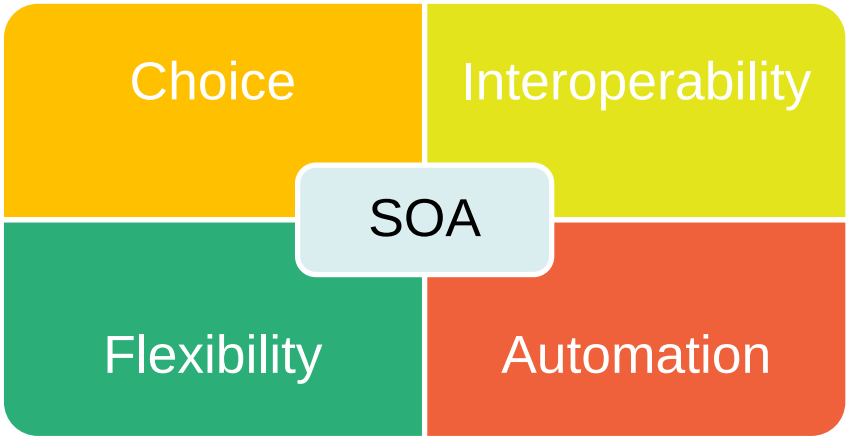
- Views sought from developers, LSP and tool vendors
- Scalability through automated interfaces
  - Coping with unpredictable workloads in an agile world
  - Building blocks for automated workflows
- 24x7 availability for a geographically distributed workforce
- 'Pay as you use' models
- More granular cost management
- Easy to “rip and replace” components
- Easy deployment and version consistency
- Guarantees from automated workflows
- Support for specialist companies delivering 'niche' services
  - Language Technology  and Language Resource Curation

# Web Services: Needed Now - Need to Innovate

1. Machine Translating
2. QA checking
3. Reporting
4. File Parsing
5. Leveraging
6. Segmentation
7. Pseudo translating
8. Updating
9. Generate localised file
10. Archiving
11. Artwork/Multimedia processing
12. Translating
13. Language reviewing
14. Testing



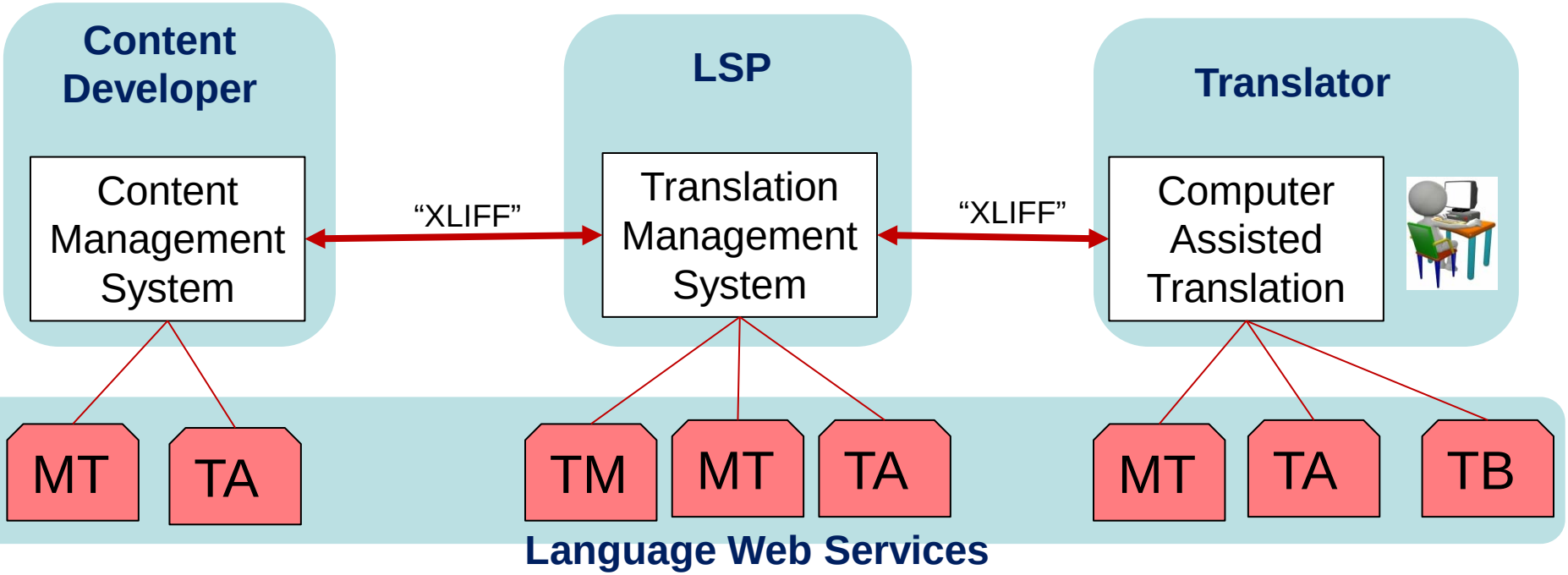
# Industry Survey – Barriers to Adoption



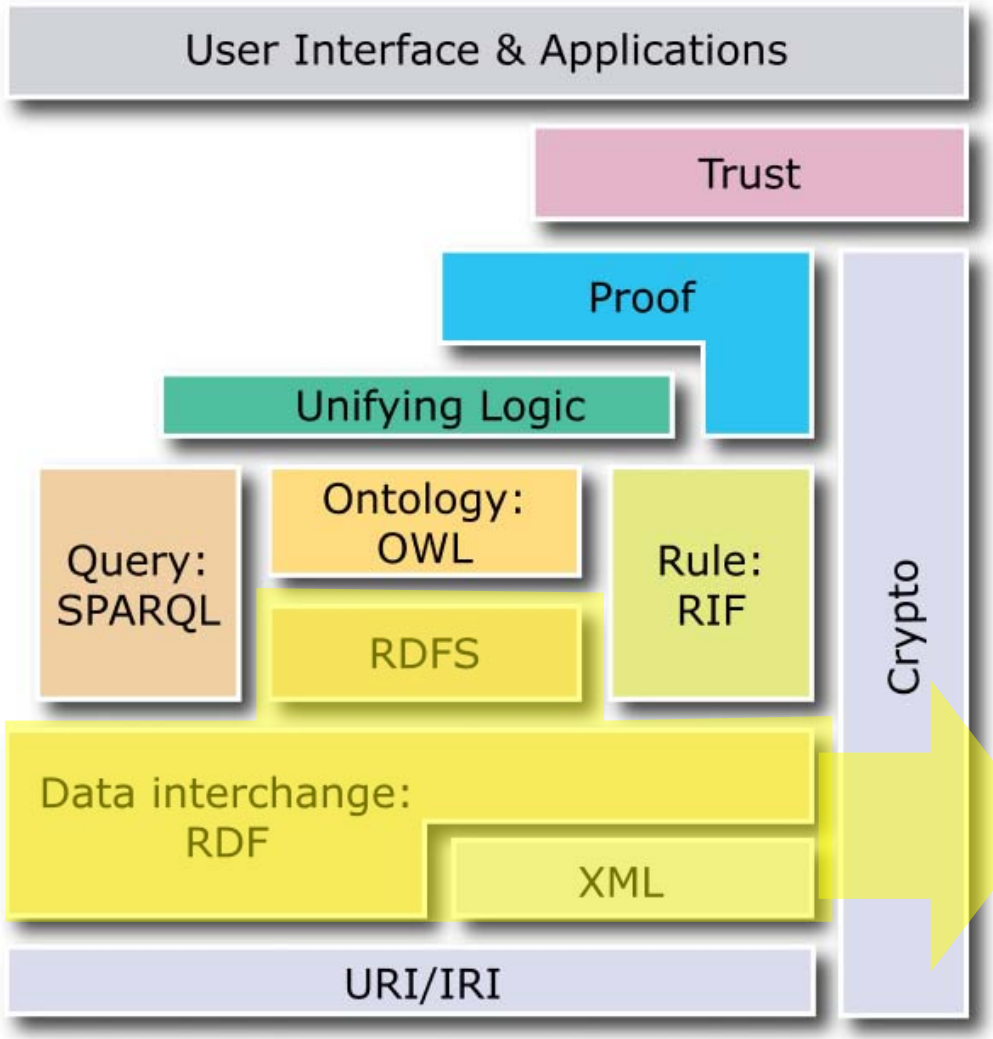

- Need for open standards
  - Reuse tools solutions
  - Building industry consensus
- Performance
- Reliability and robustness
- Security: need buy-in from IT departments at content developers and LSPs
- Maturity of workflow engines

# Web Service Interoperability

- Tools vendors and service providers already offering web services
- Repurposing handoff standard requires careful **profiling** and definition of **processing expectations**



# Semantic Web to the Rescue?




- Scalable in extension, good for incremental adoption
- Link XML content and RDF meta-data (RDFa)
- Leverage existing vocabularies, e.g. Dublin Core, Open Provenance Model, Creative Commons
- Maturing Tools & Stores
- RDF(S)
  - Subject-Property-Object
  - Name Spaces
  - URI
  - Classes and Subclasses
  - Range and Domain

# Relational Data

| ISBN | Title | Author | Publisher ID | Pages |
|---|---|---|---|---|
| 596002637 | Practical RDF | S. Powers | 7642 | 350 |
| 596000480 | Javascript | D. Flanagan | 3556 | 936 |
| ... | ... | ... | ... | ... |

- This example from http://research.talis.com/2005/rdf-intro/

# Row = Subject

| ISBN | Title | Author | Publisher ID | Pages |
|---|---|---|---|---|
| 596002637 | Practical RDF | S. Powers | 7642 | 350 |
| 596000480 | Javascript | D. Flanagan | 3556 | 936 |
| ... | ... | ... | ... | ... |

- This example from http://research.talis.com/2005/rdf-intro/

# Column = Property

| ISBN | Title | Author | Publisher ID | Pages |
|---|---|---|---|---|
| 596002637 | Practical RDF | S. Powers | 7642 | 350 |
| 596000480 | Javascript | D. Flanagan | 3556 | 936 |
| ... | ... | ... | ... | ... |

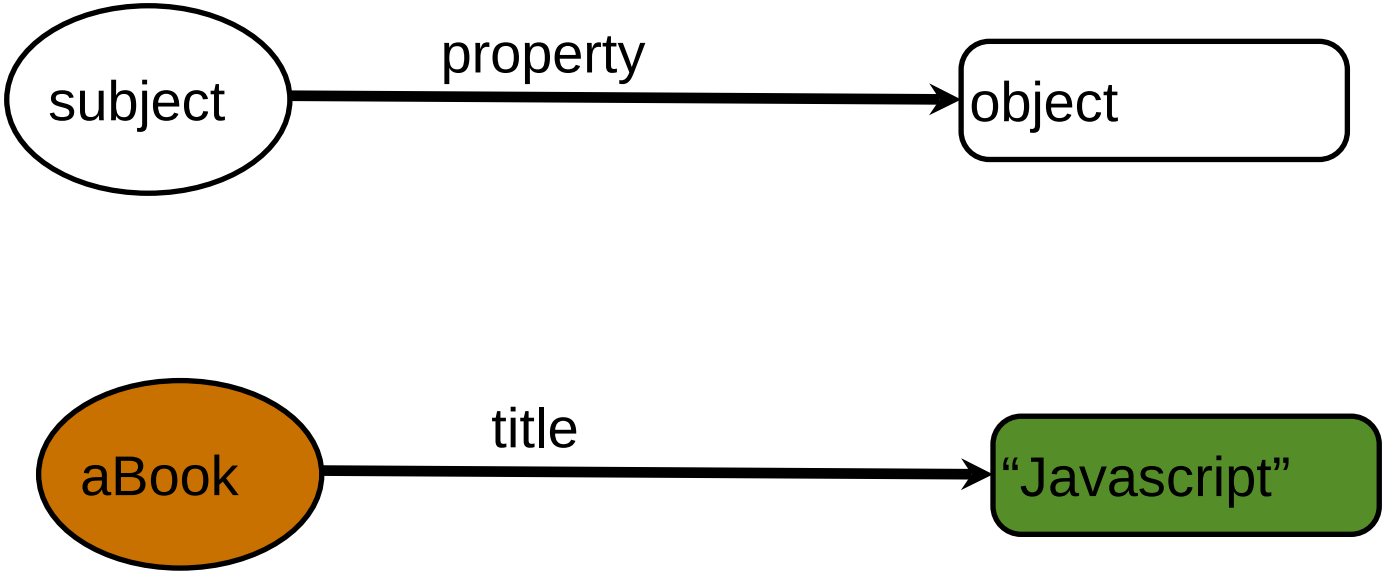
- This example from http://research.talis.com/2005/rdf-intro/

# Cell = Value

| ISBN | Title | Author | Publisher ID | Pages |
|---|---|---|---|---|
| 596002637 | Practical RDF | S. Powers | 7642 | 350 |
| 596000480 | Javascript | D. Flanagan | 3556 | 936 |
| ... | ... | ... | ... | ... |

- This example from http://research.talis.com/2005/rdf-intro/

# Graph View

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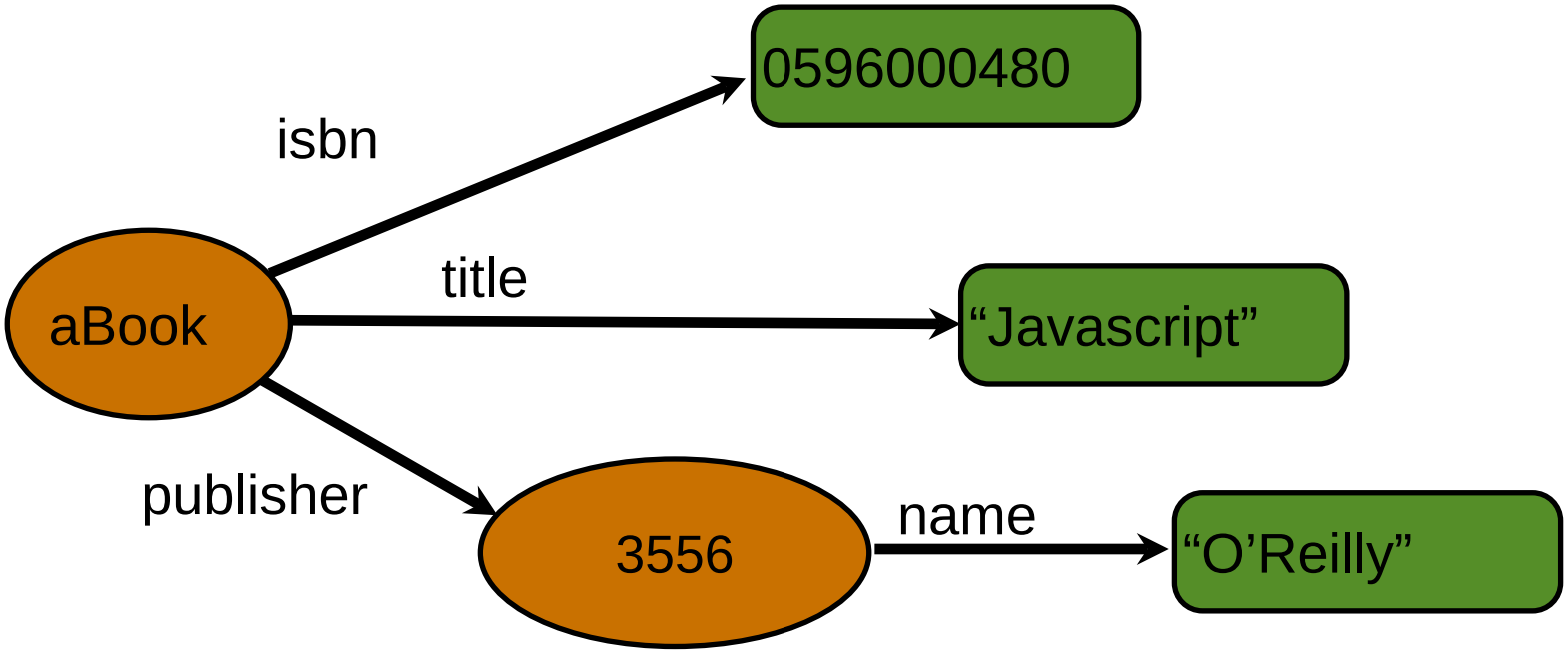
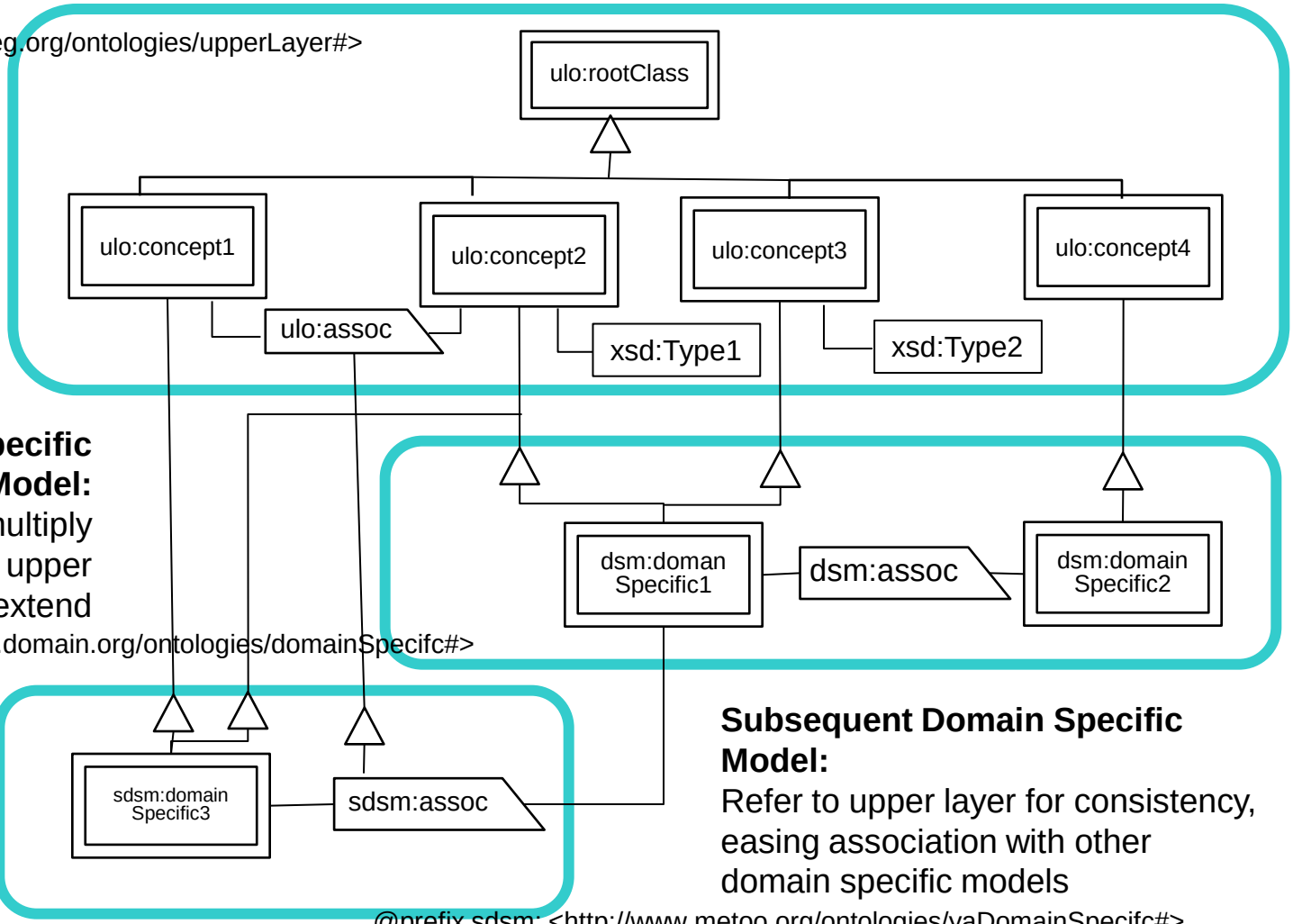



- This example from http://research.talis.com/2005/rdf-intro/

# Classes, Properties, Specialisation and Name Spaces yield Scalable Extensibility

@prefix ulo: <http://www.eg.org/ontologies/upperLayer#>

**Upper Layer Ontology:** Reusable concepts and associations




**Domain Specific Model:** Concepts multiply inherit from upper layer and extend

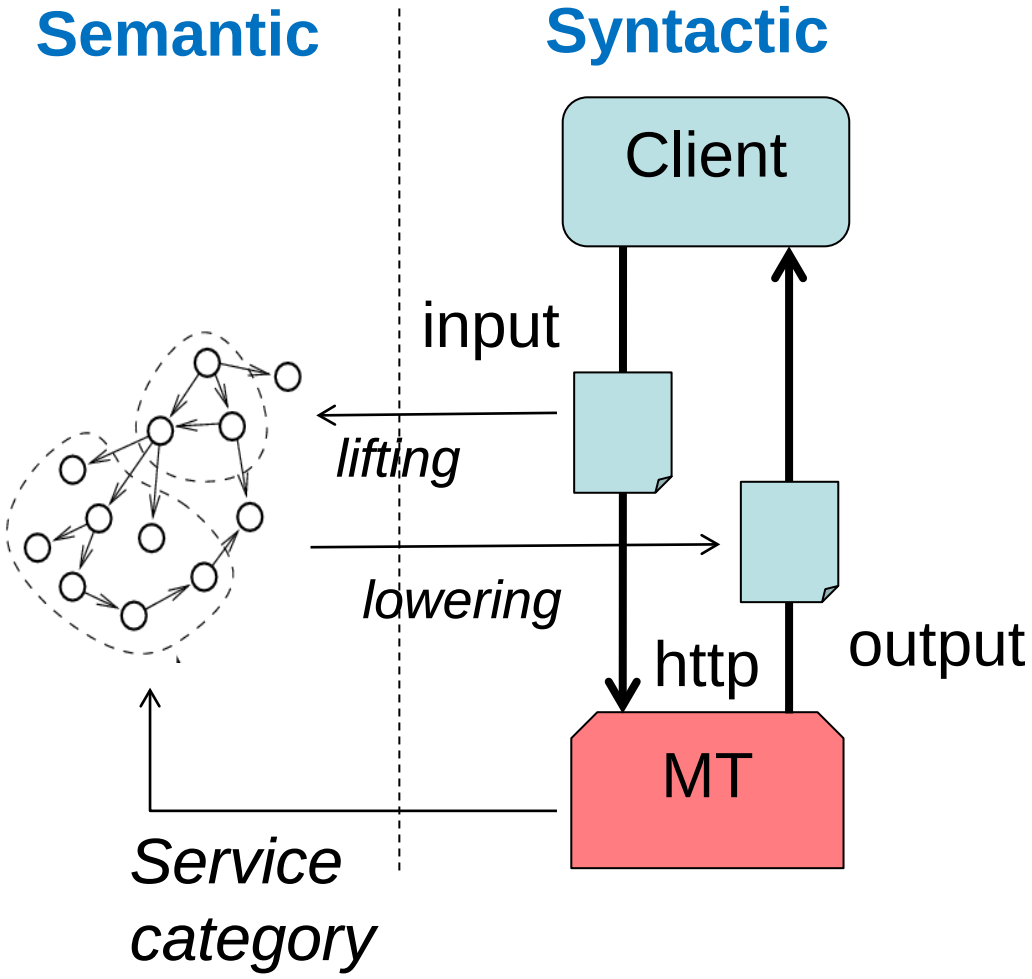
@prefix dsm: <http://www.domain.org/ontologies/domainSpecifc#>

**Subsequent Domain Specific Model:**
Refer to upper layer for consistency, easing association with other domain specific models

@prefix sdsm: <http://www.metoo.org/ontologies/yaDomainSpecifc#>

# Semantics for Web Service Interoperability

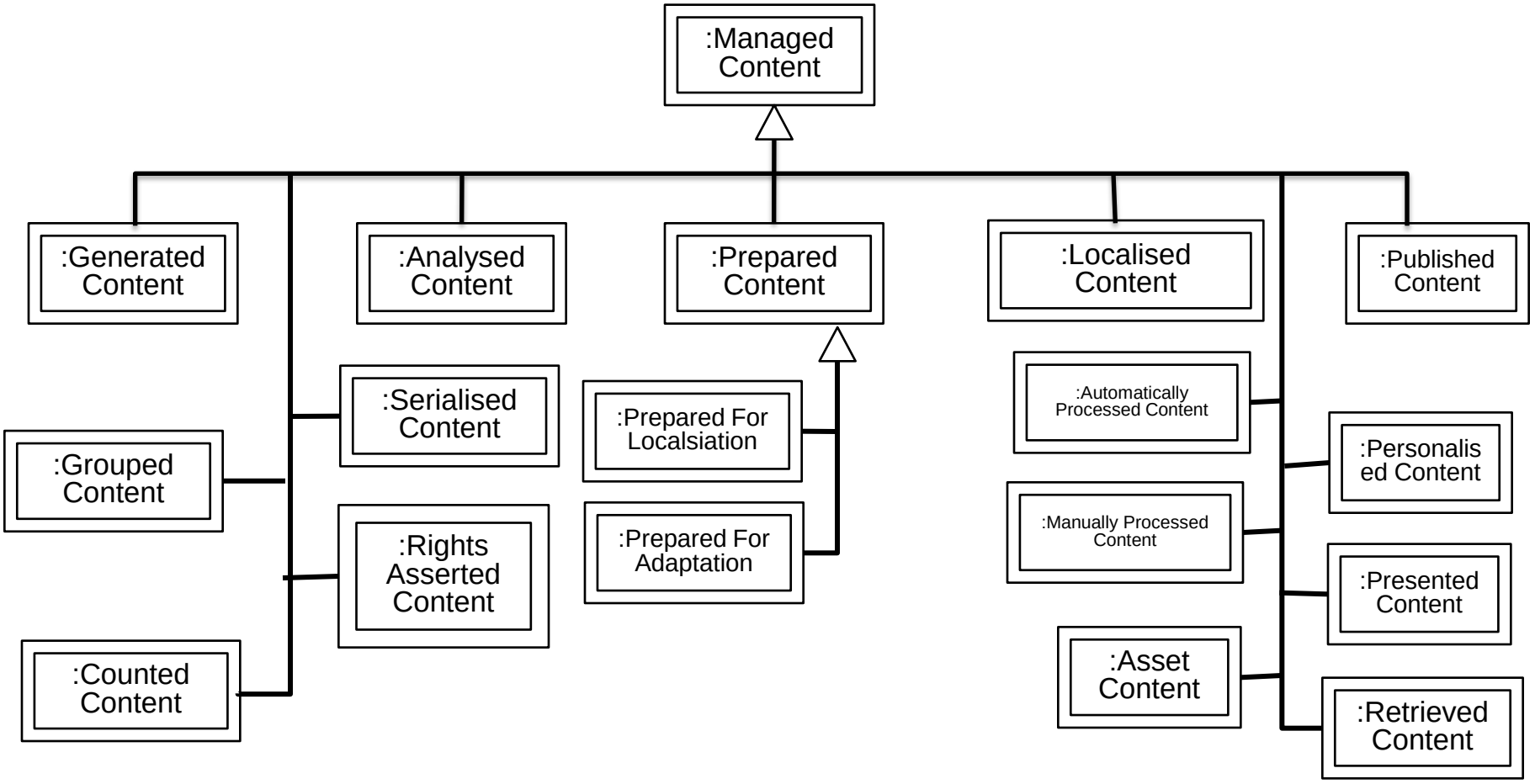
- Web service input and output passed as structured data: XML, JSON
- Semantic Annotations
  - Operation/interface to service category
  - Input/Output to semantic structures
- W3C Semantic Annotation for WSDL (SAWSDL)
- WSMOLite for RESTful



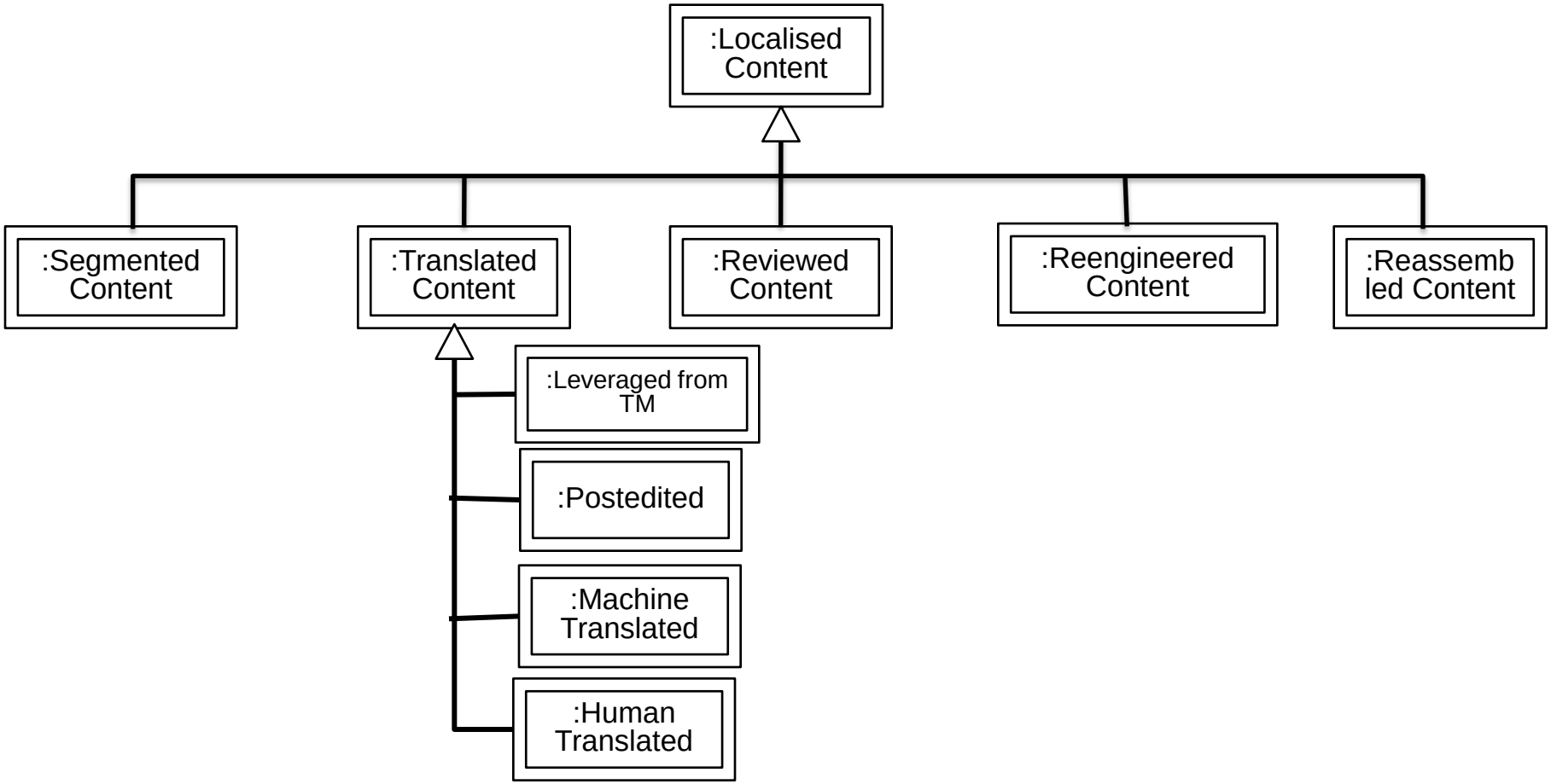
# Propose RDFS Semantic Models

- Content
  - The **core processed content taxonomy** that we use to record the content transformations of various types (including training) delivered by services
- Service Model
  - Taxonomy service category classifications of different services , dovetails with the  content model

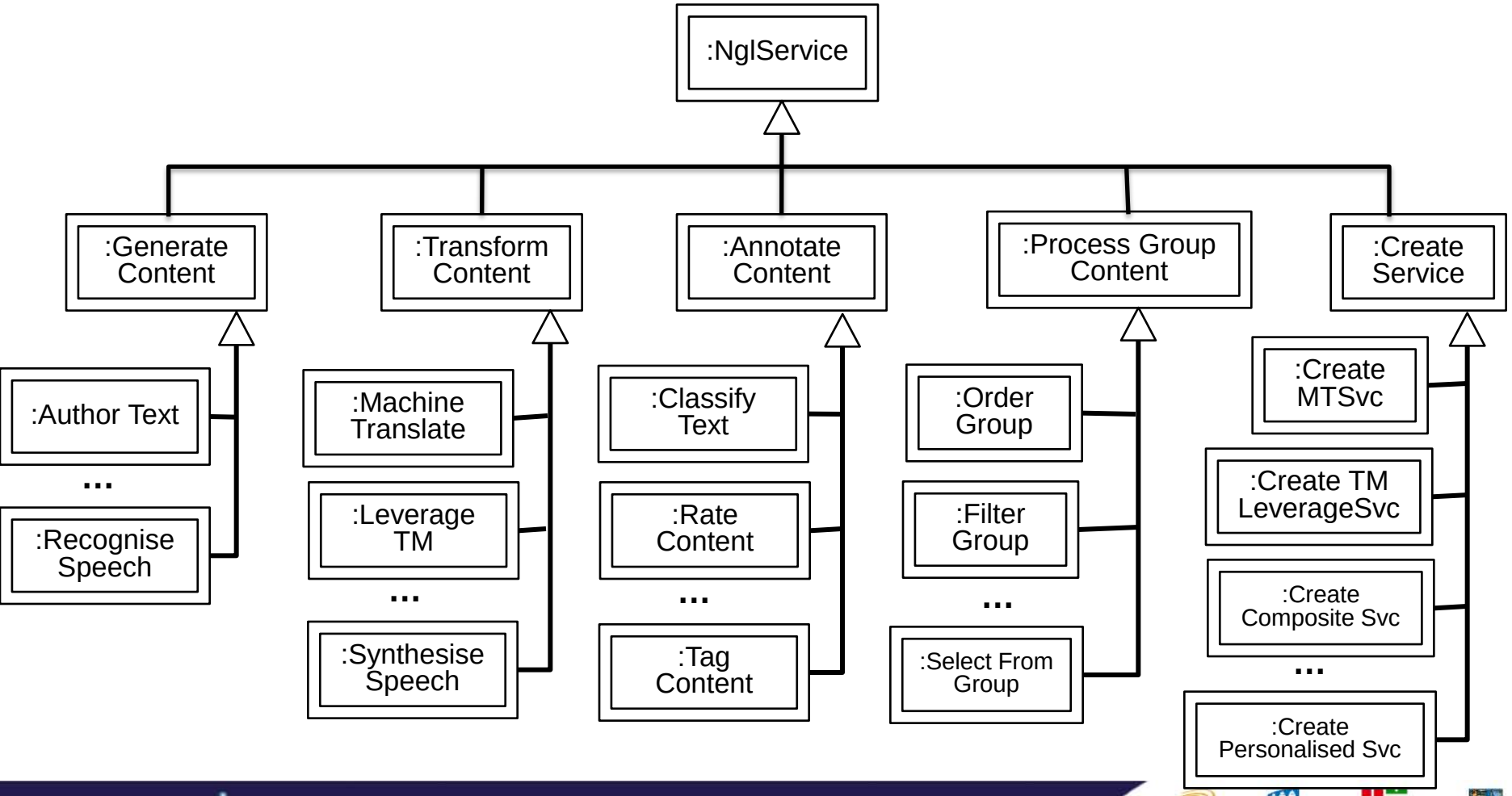
# NGL Content: Seed Taxonomy



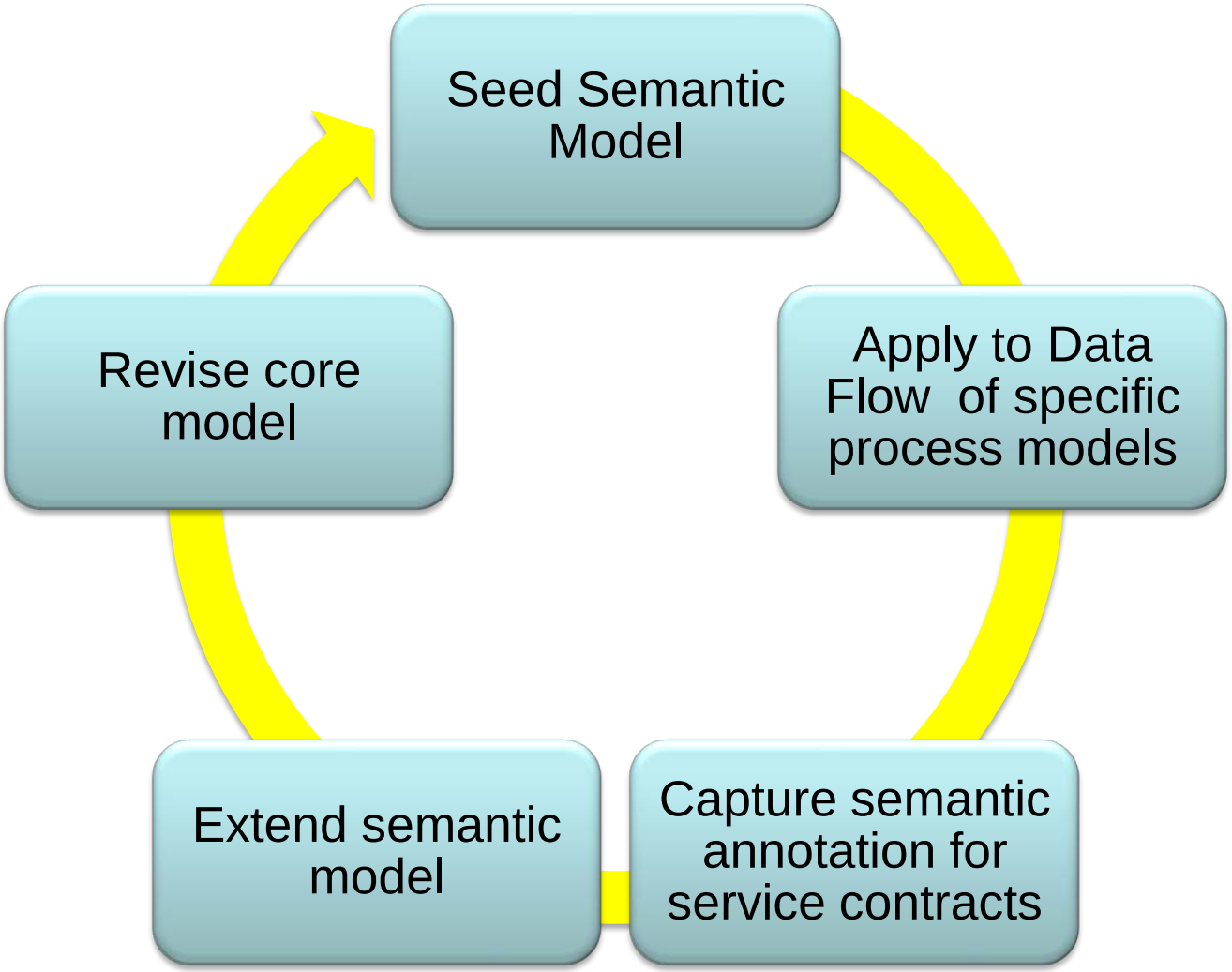
# NGL Content: Seed taxonomy for localised content



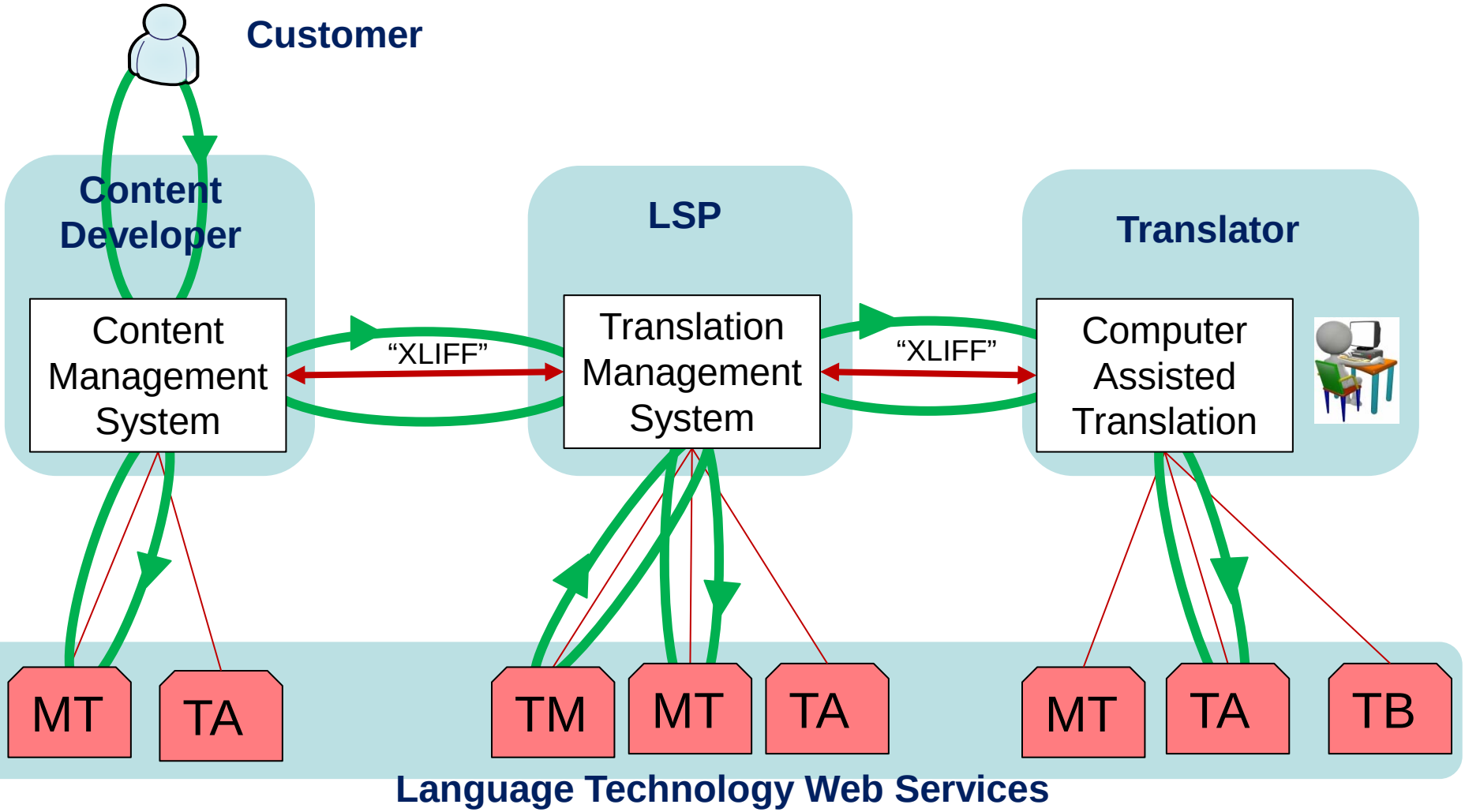
# NGL Service Model: Seed Taxonomy



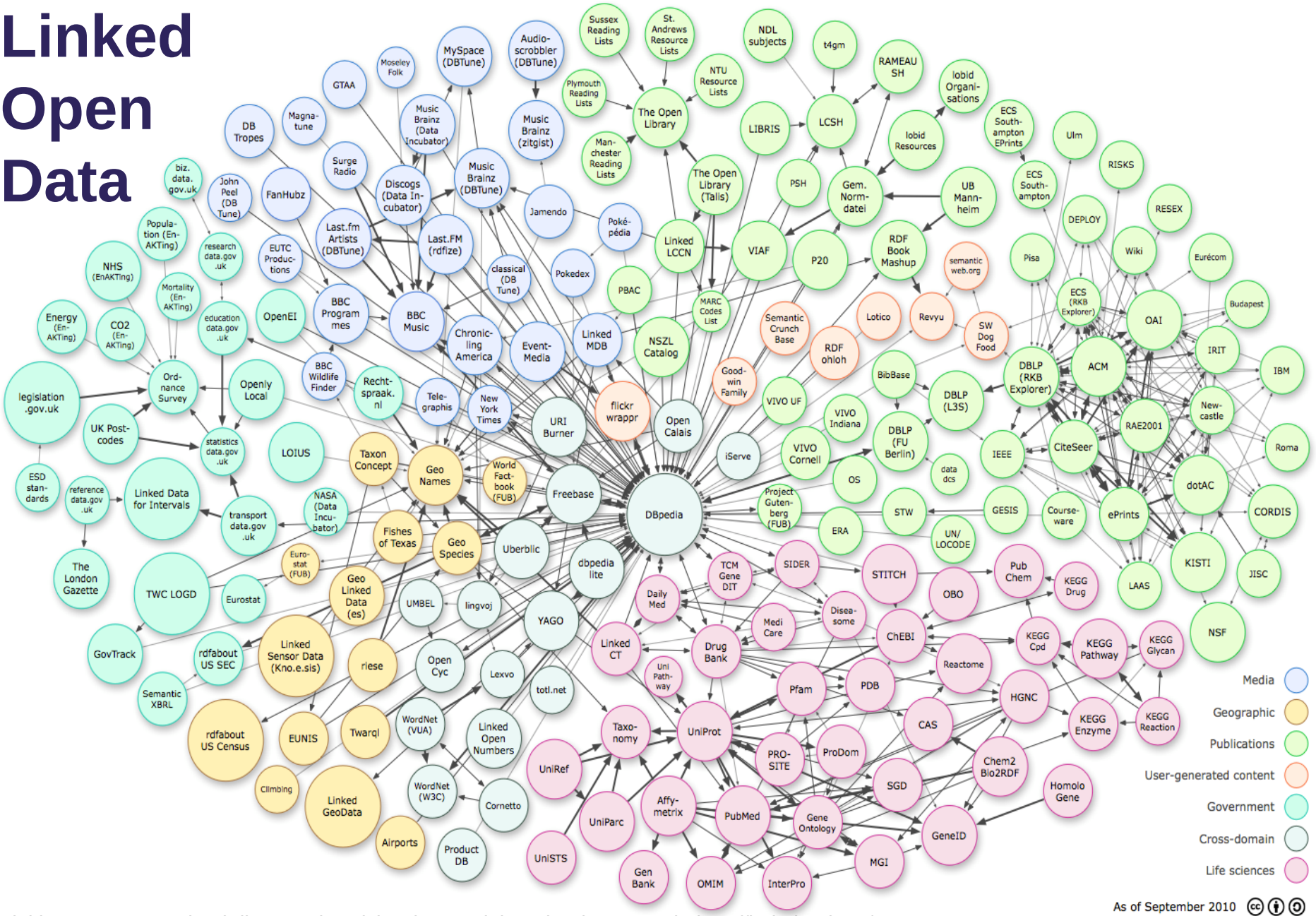
# Model Refinement



# Fine-grained Roundtrips



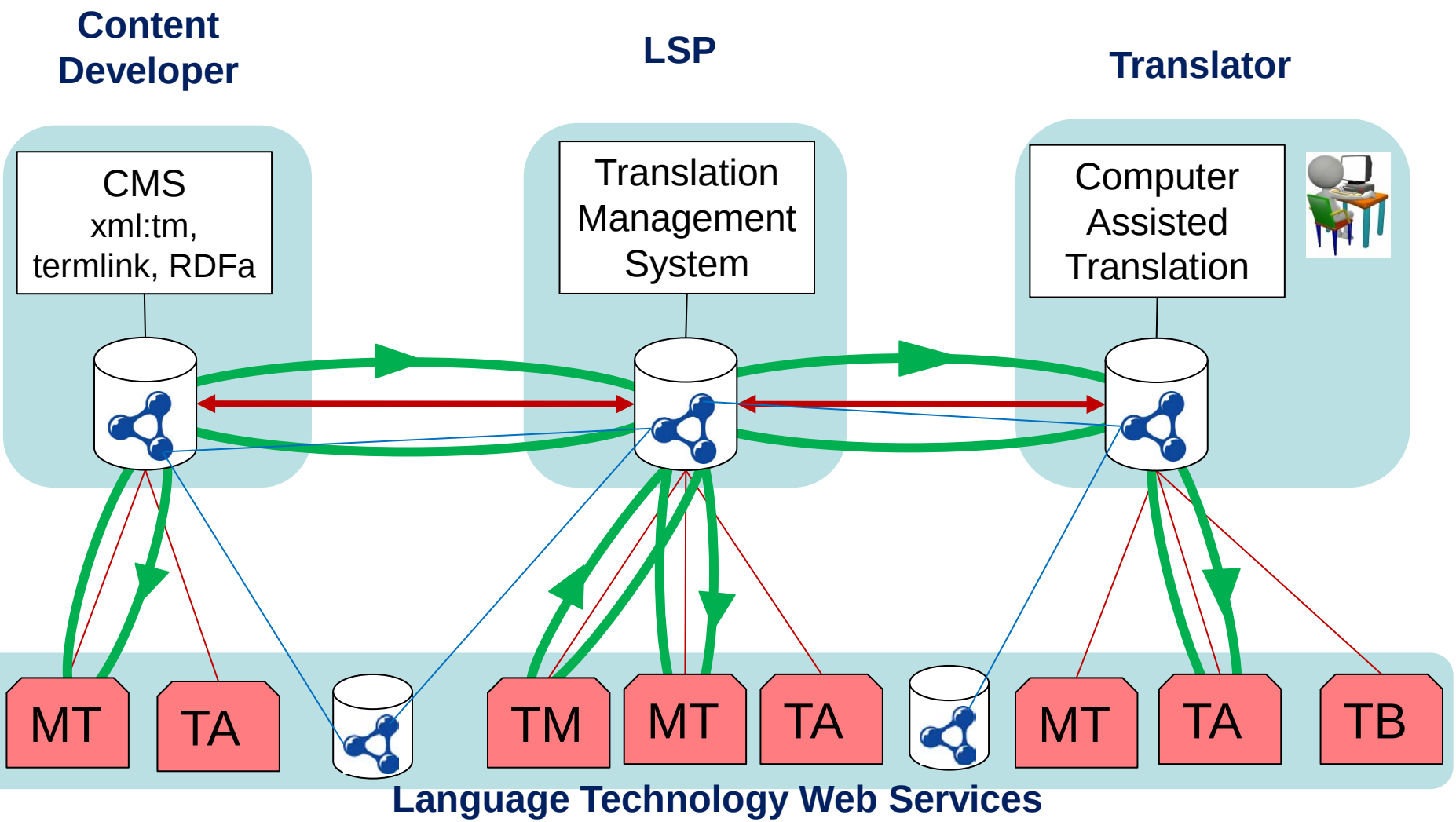
# Linked Open Data




Linking Open Data cloud diagram, by Richard Cyganiak and Anja Jentzsch. http://lod-cloud.net/

ata

# Interoperability through Linked Data

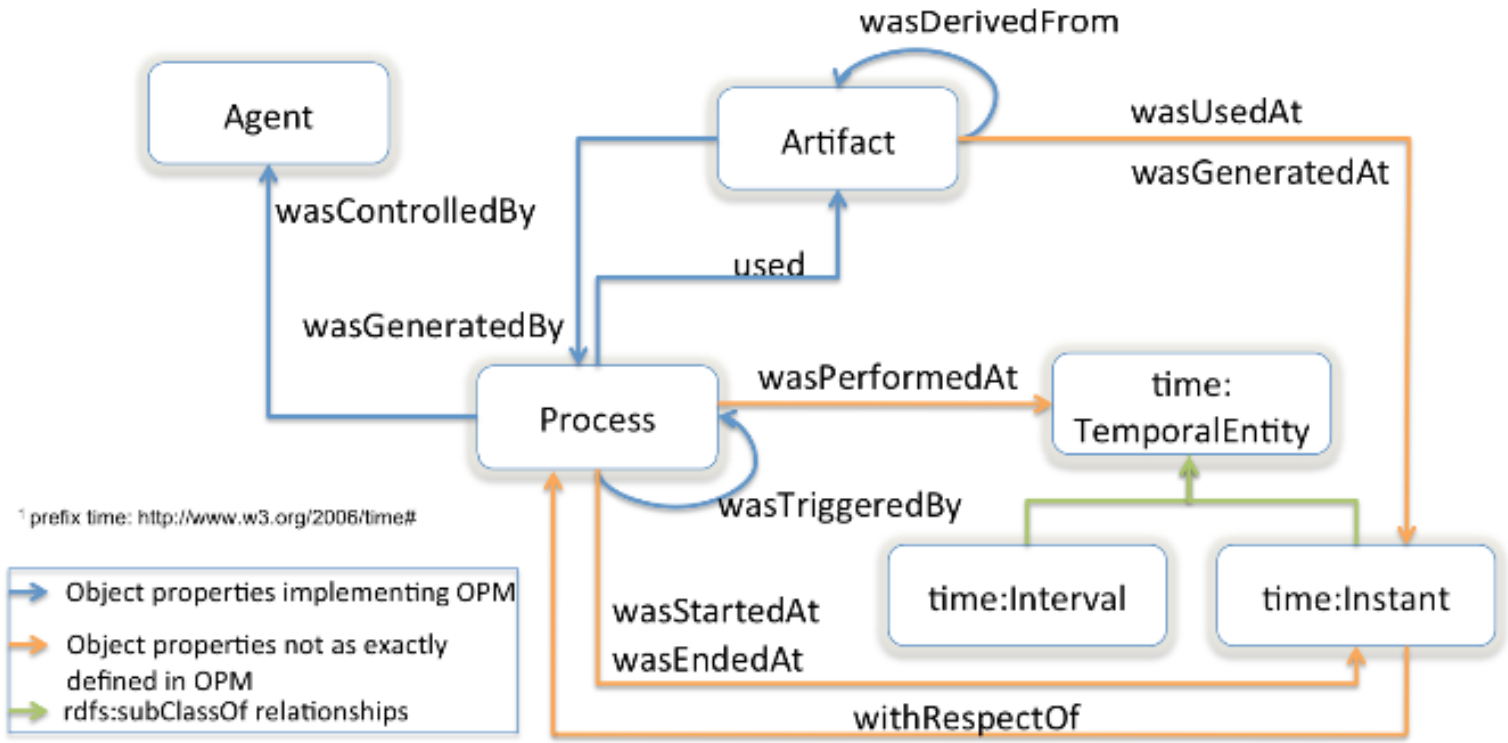


# Content State Transformation

- Content semantics aim to express the state transformation that operate on content and its meta-data as the result of content processing by different services
- A provenance-oriented model based on the **Open Provenance Vocabulary** is used to capture both process transformation and details of the agents and content of those operations
- This allows processes to be defined in terms specific transforms  (additions, changes) on content

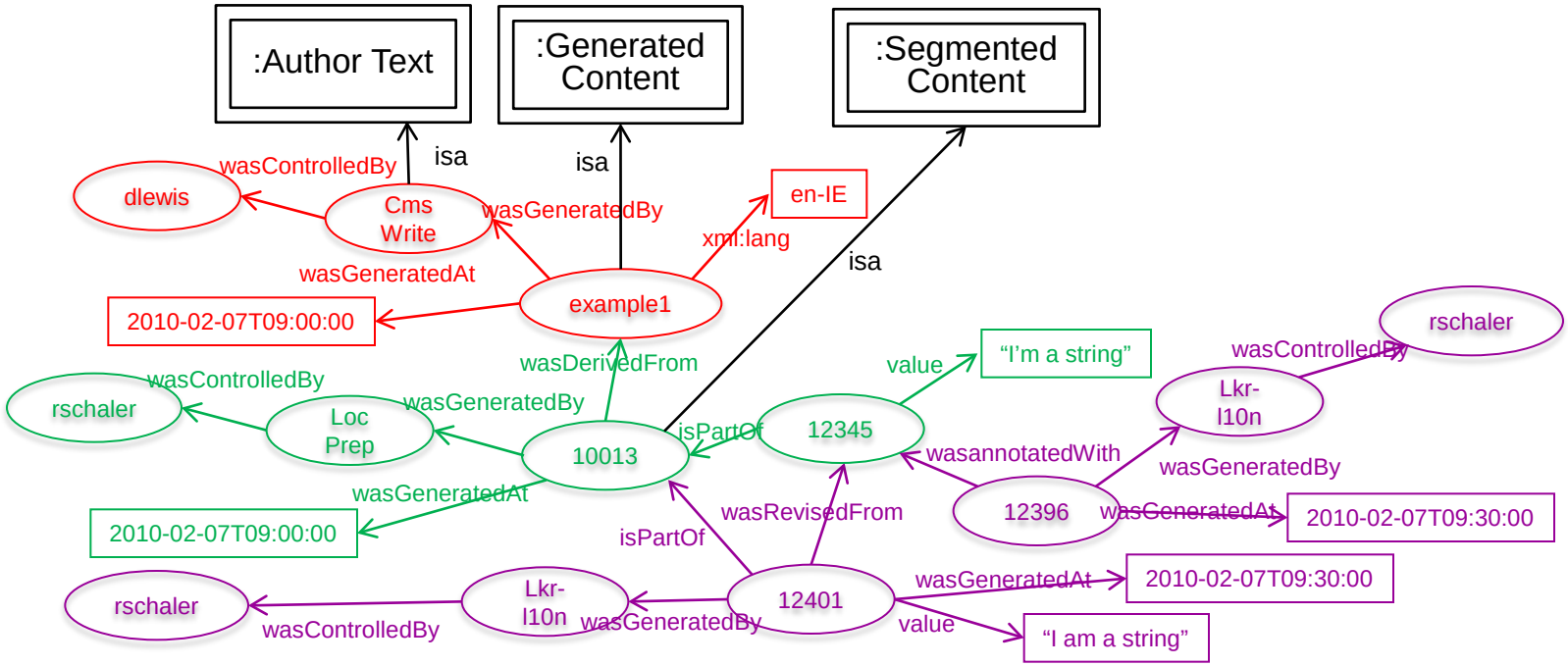
# Linked Localisation Data

- Open Provenance Vocabulary
  - Lightweight version of Open Provenance Model
  - http://openprovenance.org/



# Author, segment and source QA

**1: Register source Document (typically from CMS)** → **2: Register doc for localisation and segment** → **3: annotate each segment with source QA and then revise specific source segments as appropriate**



# Next Steps

- Applying and Revising semantic model to different use cases
  - CNGL Web+LT+Loc demonstrators
  - Annotating available APIs
- Semantic sandpit
- Content mark-up for links - RDFa
- Avoid standardising semantics
  - Linked Data vocabularies established through adoption
- Stress testing semantic technology
- Access control to federated triple stores
- Service pre-conditions and effects with rules

# Conclusions

**Extensible** semantic models offers interoperability without stifling innovation

**Semantic Annotation** offers improved service-oriented interoperabilty

**Provenance-based** linked data for fine-grained process roundtrips

**Quality-driven** language resource management

**Visit:**

www.cngl.ie

**Watch:**

http://www.youtube.com/user/nextgenlocalisation

**Contact:**

Dave.Lewis@cs.tcd.ie