Toward an Ontology-based Language Service Infrastructure

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Outline

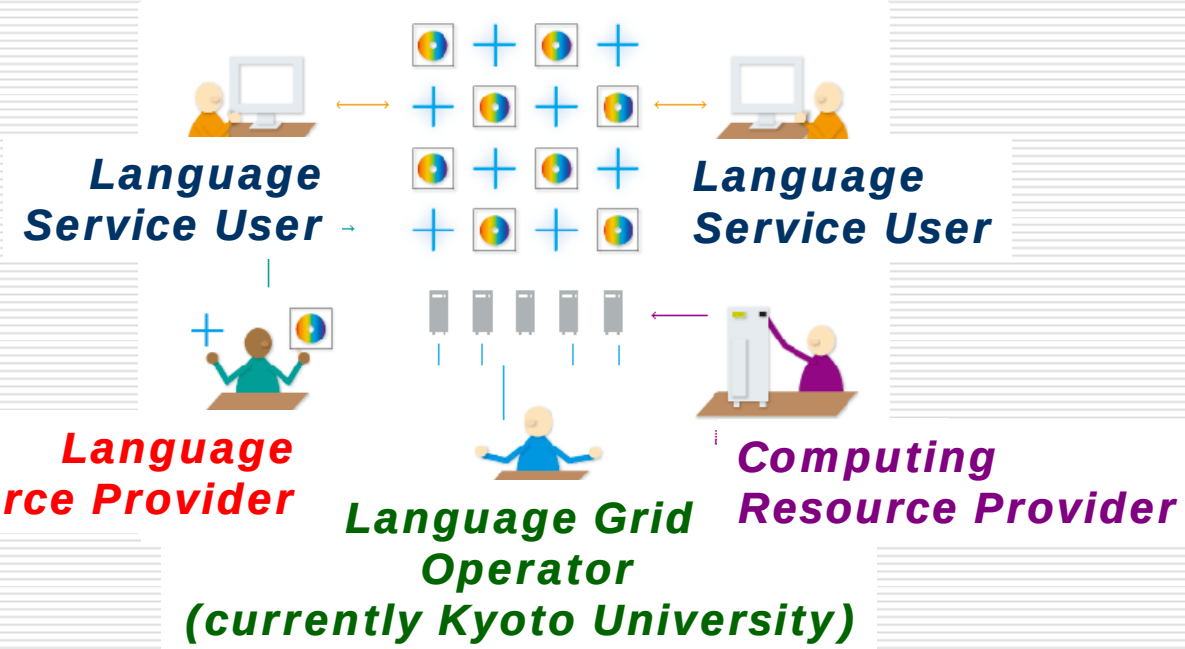
- Language Infrastructures
- The Language Grid project
- Language Service Ontology
- Summary and Discussions

Language Infrastructures

- Research Infrastructures
  - **CLARIN** is committed to establish an integrated and interoperable **research infrastructure** of language resources and its technology. It aims at lifting the current fragmentation, offering a stable, persistent, accessible and extendable infrastructure and therefore enabling **e-Humanities**
- Service Infrastructures
  - **Language Grid** provides a language infrastructure on which **language services that are useful in intercultural collaboration** can be composed, delivered, and utilized

Language Grid

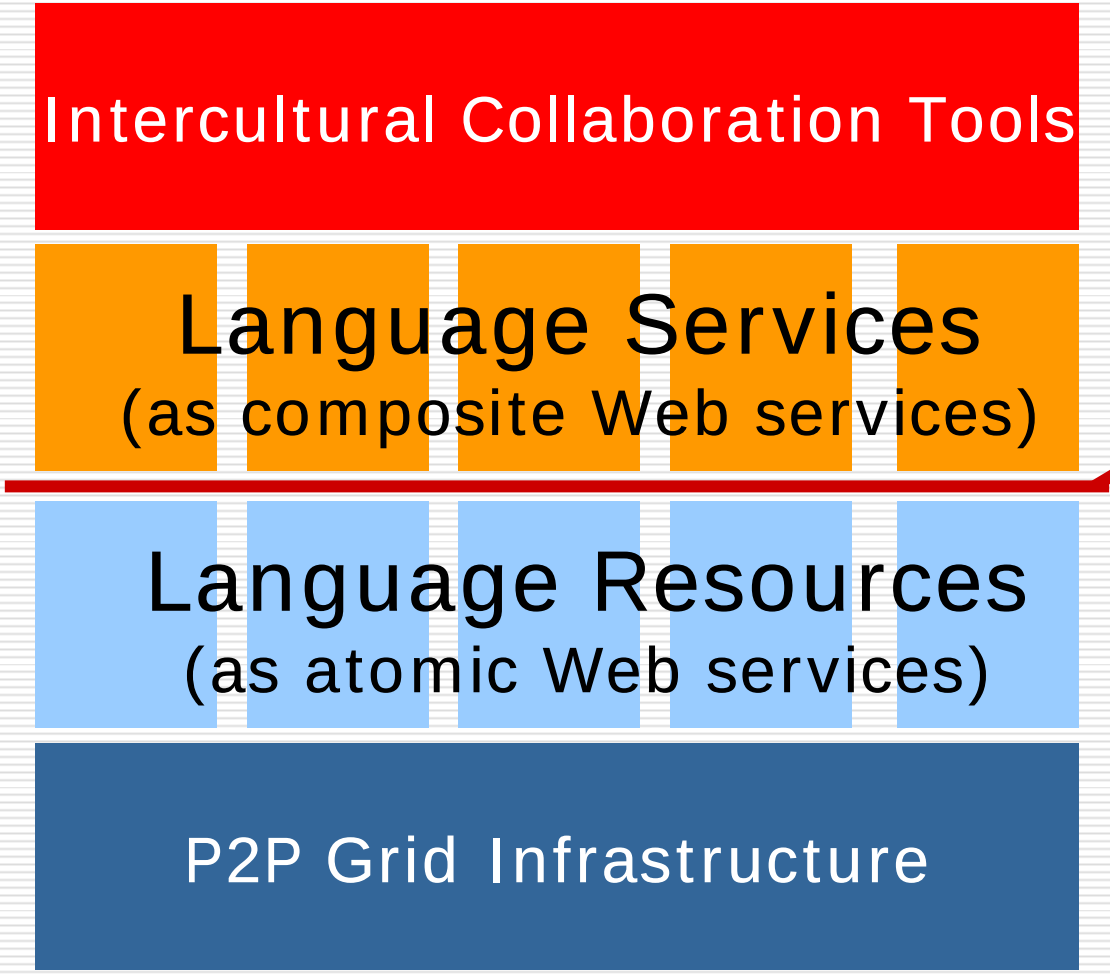
- *Connecting World's Language Services to Support Intercultural Collaboration*
- a project at NICT (National Institute of Information and Communications Technology)



Remark on LS and LR

- LS (Language Service): a Web service whose functionality is somehow related to language
- LR (Language Resource) in a broader sense can be classified into:
  - static data resource
    - corpus, lexicon, language model, etc.
    - *but, accessed via a processing resource (accessor)*
  - language processing resource
    - NLP tool/system
    - Language resource accessor

“Layer cake” of the Language Grid



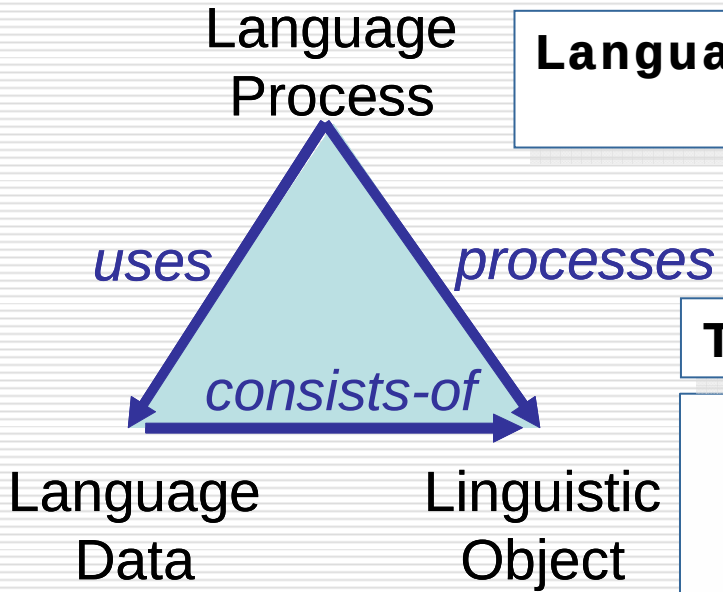
Set of standardized APIs are required.

Also, functional meta-descriptions for atomic services are necessary.

Web Services - current figure-

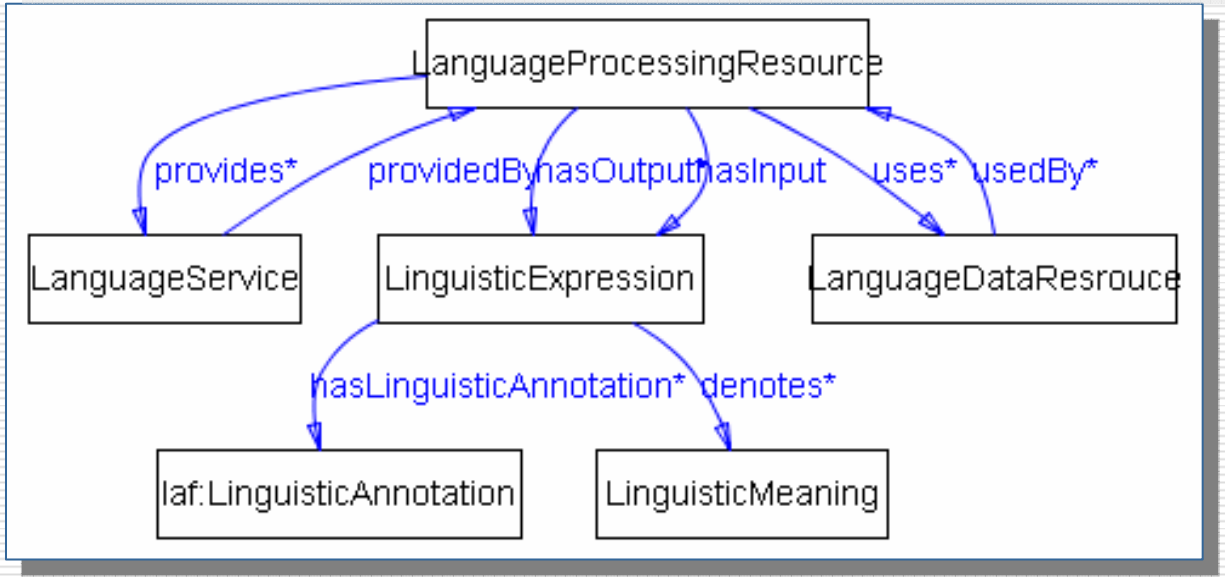
- Composite Web Services (Workflows)
  - Domain Specific Translation
  - Multi-hop Translation
  - Back Translation
- Atomic Web Services
  - Machine translators:(Japanese, Chinese) (Japanese, Korean) (Japanese, English) (English, German) (English, Spanish) (English, French) (English, Italian) (English, Portuguese)
  - Morphological analyzers/POS taggers: Japanese, Chinese, Korean, English, German, Spanish, French, Italian, Dutch, Russian, Bulgarian
  - Bilingual dictionaries:Life science terms (Japanese, English), Disaster management terms (Japanese, Chinese, Korean, English, French, Spanish), Academic terms (Japanese, English)

very top of the Language Service Ontology



Language Process (Service) Triangle

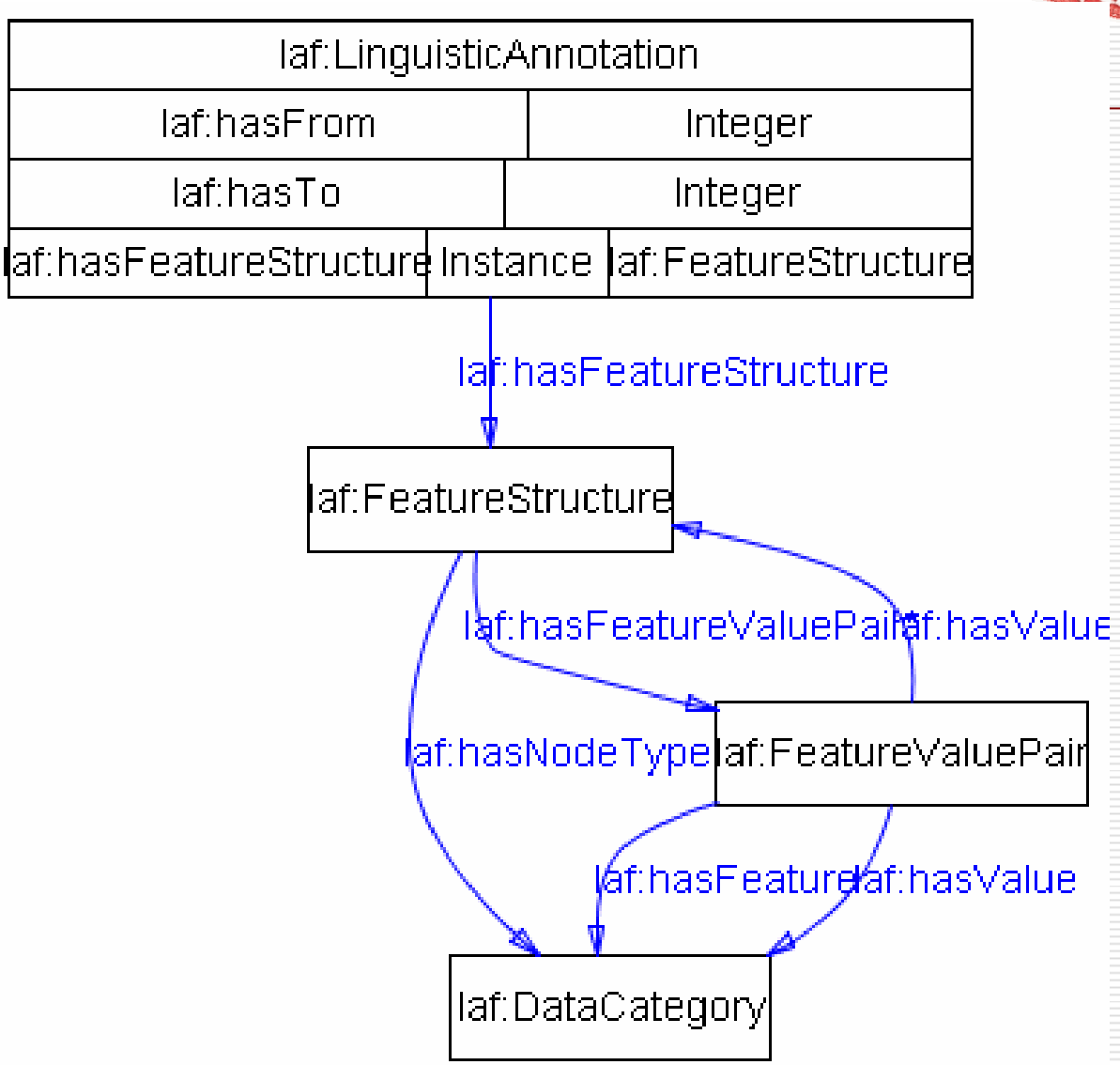
Top-level of the Language Service Ontology



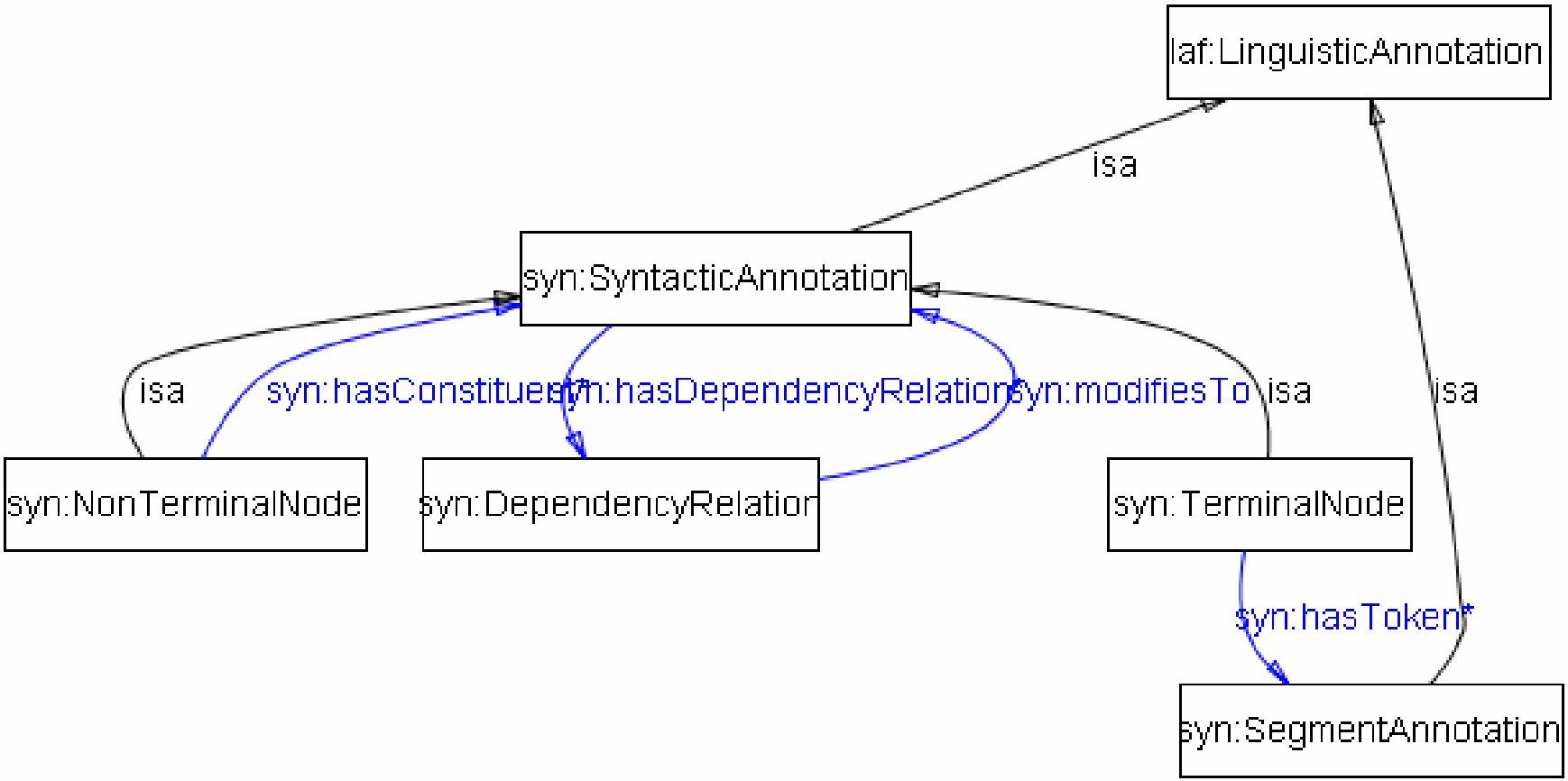
Considerations in Developing the Sub-ontologies

- They shouldn't be incompatible with the relevant standards
- **LAF** (Linguistic Annotation Framework) together with related standards**:** should be incorporated for defining the types of input/output data of processing resources
- **LMF** (Lexical Markup Framework)**:** should be introduced for developing a taxonomy of lexicons, as well as linguistic information encoded in lexicon entries

“Ontologization” of LAF



SyntacticAnnotation as a subclass of **LinguisticAnnotation**



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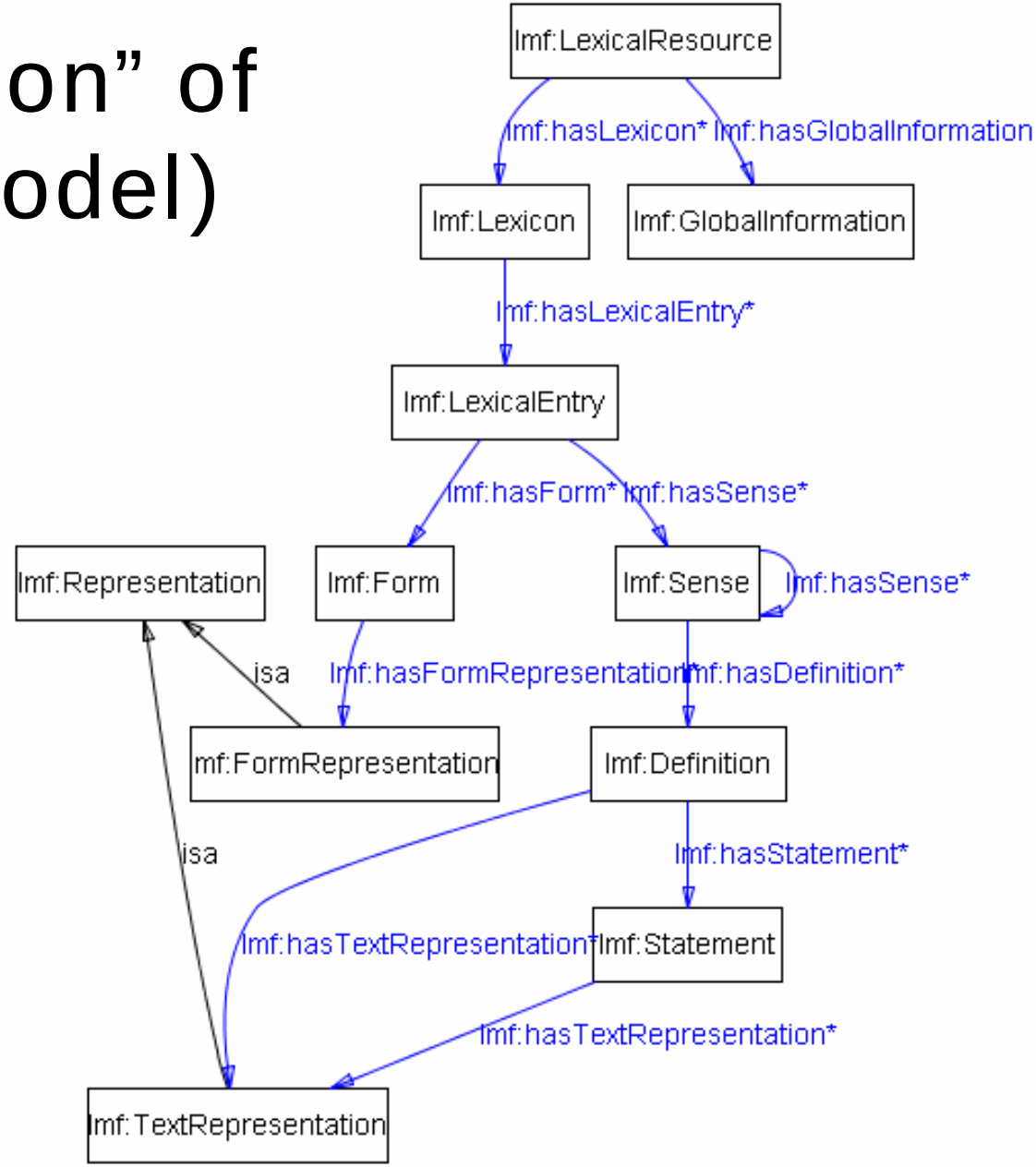
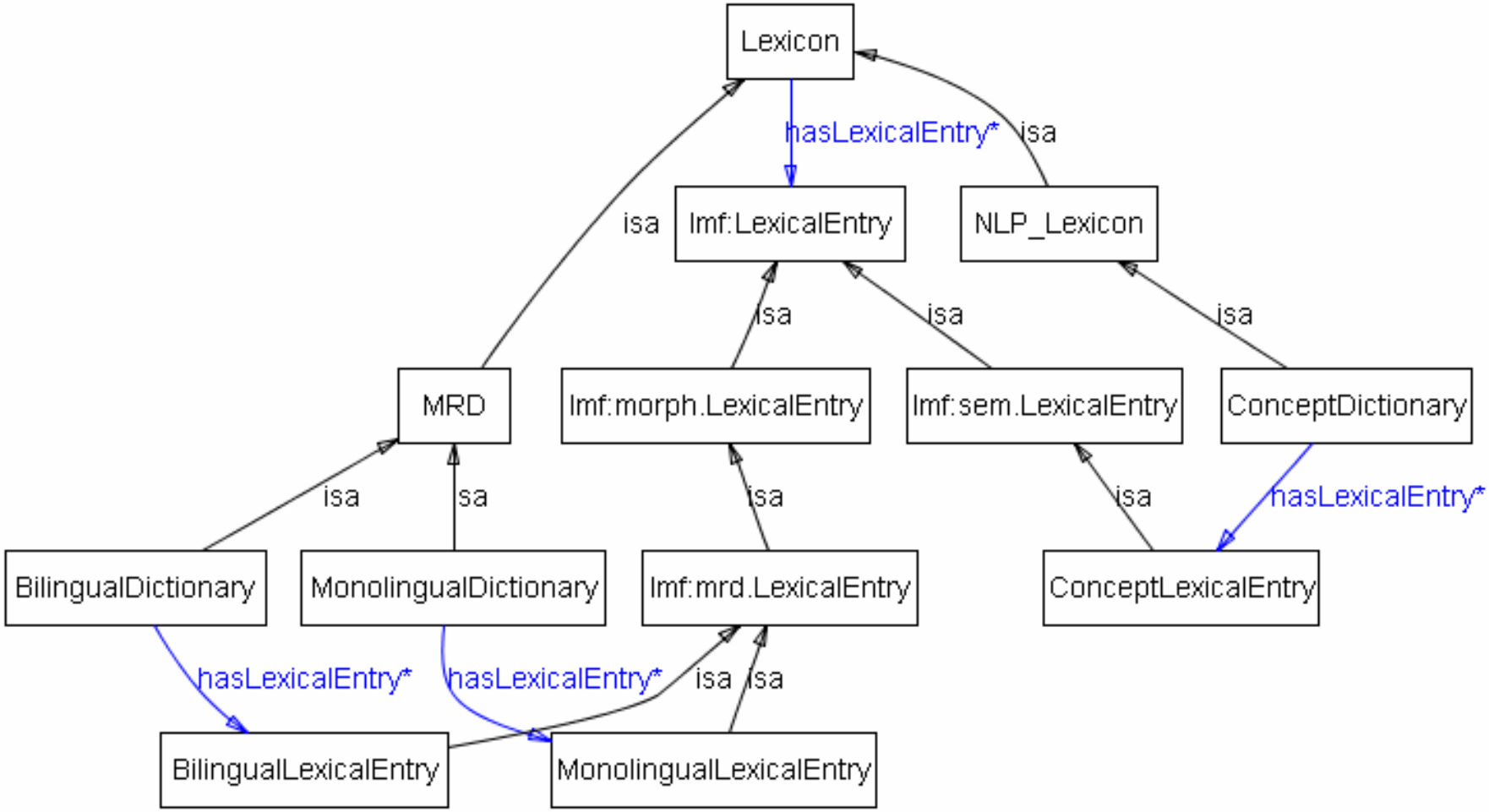
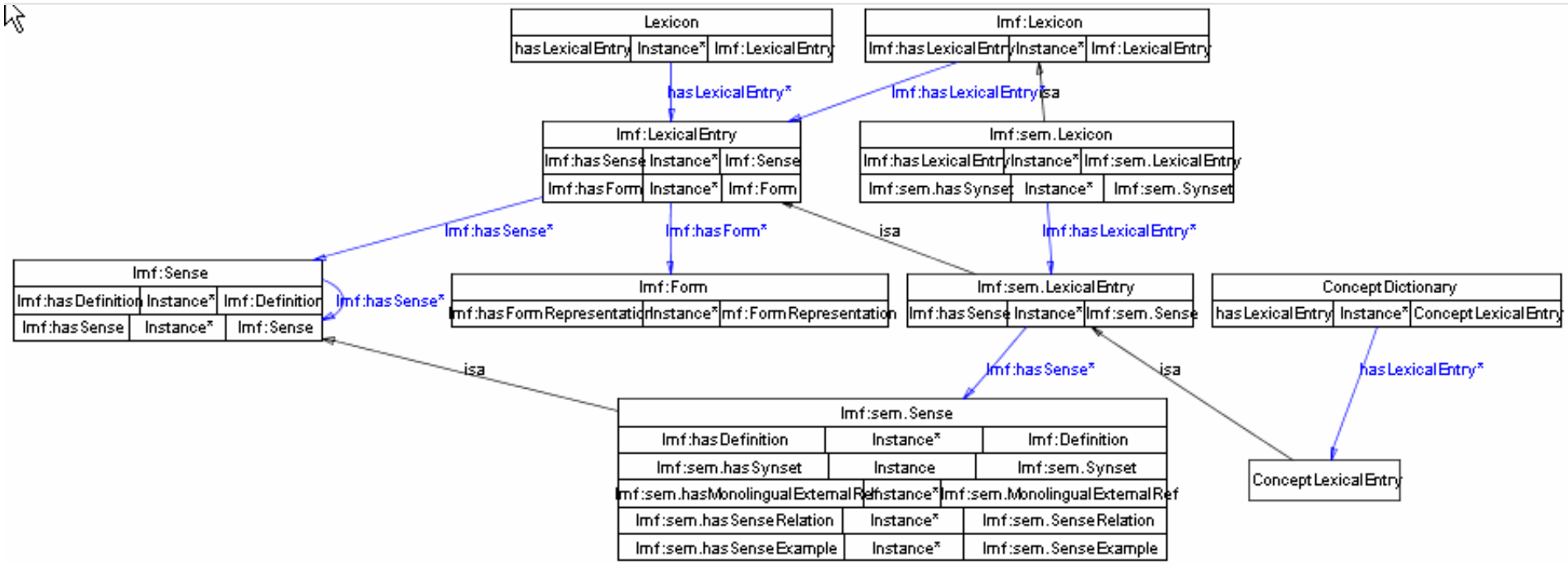
“Ontologization” of LMF (core model)



Sketch of the LMF-based Lexicon Ontology



Configuration of **ConceptLexiconEntry**



Summary

- Language Grid as a service-oriented language infrastructure
- Language Service Ontology as a shared ground for describing atomic Web services (wrapped language resources)
  - "Ontologization" of relevant ISO standards
    - the ontology has been developed in cooperation with DFKI Language Technology (Germany) and ILC-CNR (Italy)
  - *... the current set of Web APIs and the ontology is not directly linked*

Discussions

- How to adjust/control abstraction level of the linguistic annotations?
  - handle idiosyncrasies; is *theory-neutral* a sufficient solution?
  - avoid unnecessary details, depending on the purpose of a language service
- Necessity of an ontology for linguistic attributes/values
  - relevant standards: Data Category (Registry)
    - DC should be more structured and the DCRs should be distributed over the Web
  - also required for ULA?

Thank you!

- Come visit us at:
  http://langrid.nict.go.jp/
- References:
  - Yoshihiko Hayashi, Thierry Declerck, Paul Buitelaar, Monica Monachini. Ontologies for a Global Language Infrastructure. *ICGL2008*, to appear.
  - Yoshihiko Hayashi. Conceptual Framework of an Upper Ontology for Describing Linguistic Services. *IWIC2007, LNCS 4568*, pp.31-45.

IC Collaboration Tools

Langrid Chat

A multilingual communication tool for chat.

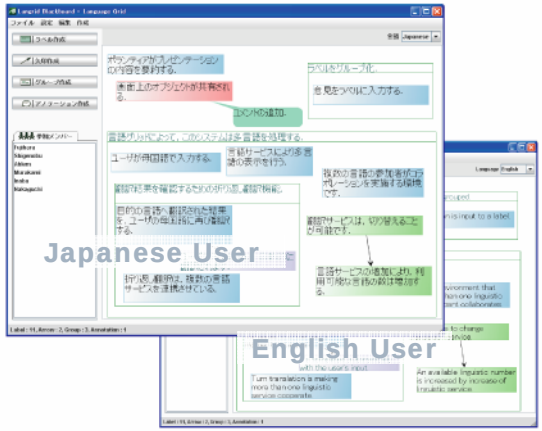
- Users can read and write in their first language, so they can communicate easier.

Case: NPO Pangaea

Pangaea tries to create bond among kids around the world via online universal playground. Langrid Chat is used by volunteers to plan activities in order to connect different countries.

Langrid Blackboard

A multilingual blackboard for information sharing among people in different countries.



- Information on the cards can be shared in different languages.

Case: All For One Collaboration Project

This tool has been used at seminars in universities or research institutes, to help exchange students and foreign researchers who need language support.

Langrid Input

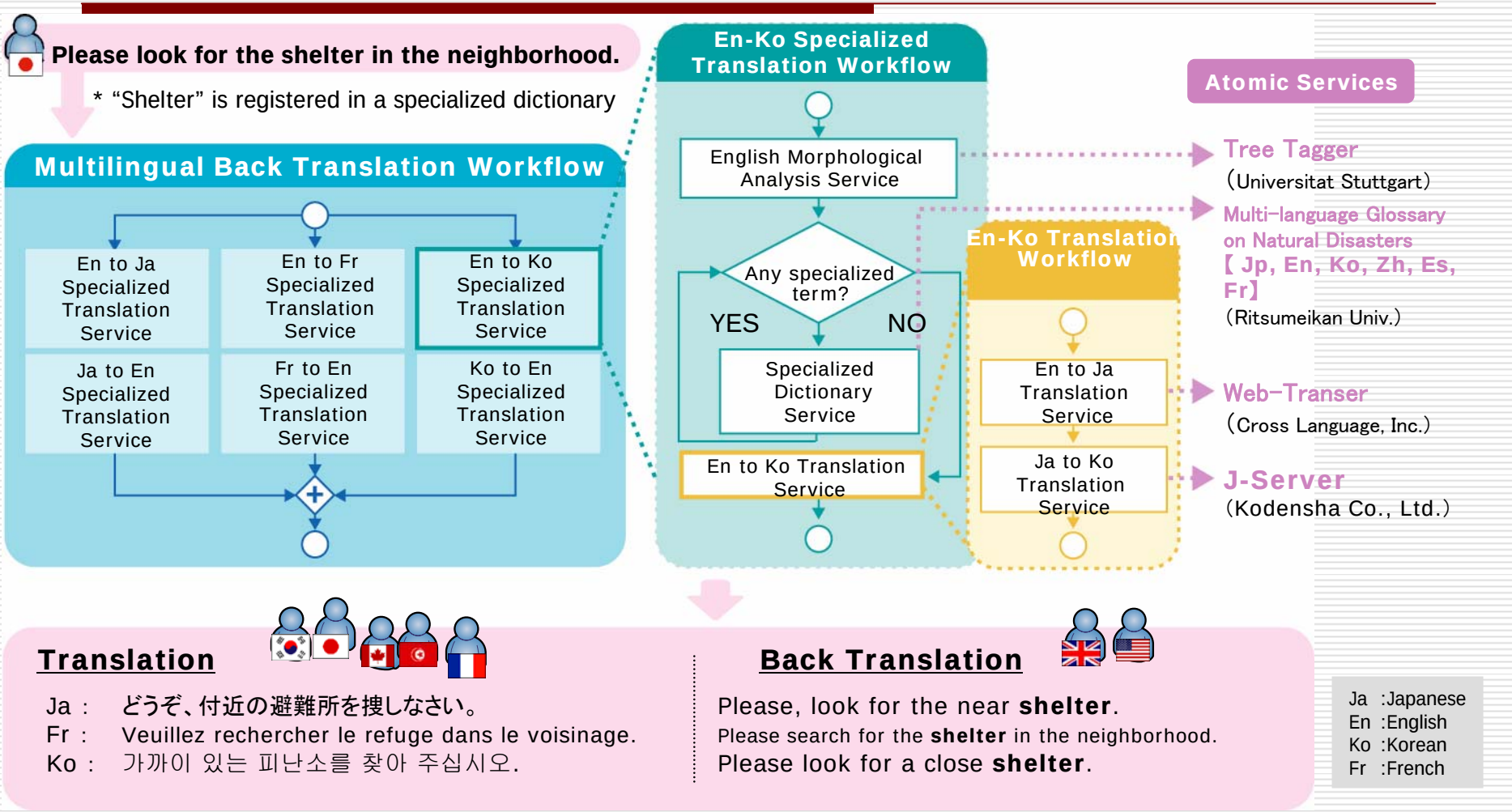
A multilingual text input tool for existing tools like BBS.

- User can edit specialized dictionary for specialized translation.

Case: NGO JEARN

Children around the world used Langrid Input to create English messages for the official BBS of the “Natural Disaster Youth Summit.”

Composite Service Workflow: *multilingual specialized translation*



Core and Service Nodes in P2P Grid Architecture