Application of Language Technologies for Less-Resourced Languages, the case of Basque

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Outline

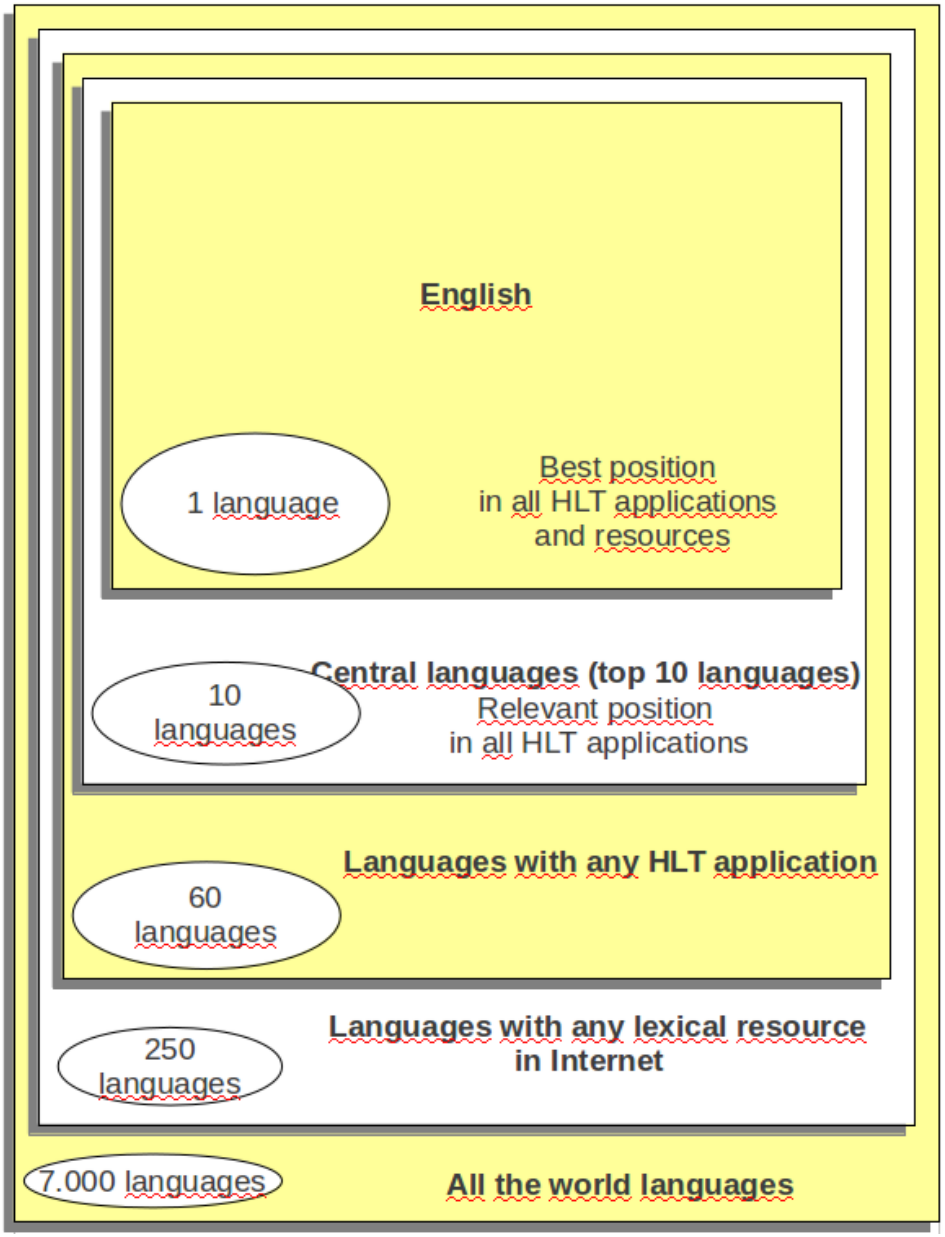
- **Which languages are "less resourced"? Six different levels**
- Strategy to develop Language Technologies for less-resourced languages

- Conclusions
- ELRA18 topics

How are languages facing HLT?

Which languages are "less resourced"?

- The answer is relative
- Six different levels



Which languages are "less resourced"? Six different levels

- 1. First level: English.
  (Good level of support in yesterday Joseph Mariani's presentation regarding to the number of LRs in LRE Map)
  - 37.9% of the users of Internet.
  - 45.00% of the web pages.
  - 62% of the HLT resources in LDC
  - 51% in ELRA.
  - Almost all the types of HLT applications.

Which languages are "less resourced"? Six different levels

- Second level: top 10 languages in the web
  - 82.2% of the Internet users (55.4% excluding English)
  - Active LR development continues
  - Most major categories of HLT are represented
  - Most of the HLT kind of resources described in LDC or ELRA are available for those languages
    - 45.79% for German, 41.27% for French, 40.76% for Spanish; 36.24% for Italian,
    - 31.31% for Portuguese
  - Streiter et al. (2006) use the term "central languages" to refer to this set of languages.
  - Relatively good level of support in Mariani's presentation

Which languages are "less resourced"? Six different levels

- Third level: around 70 languages.
  Moderate and fragmentary support in Joseph's pres.

  Languages with any HLT resource registered

  - 60 languages in ELRA,
  - 82 in LDC,
  - 73 in ACLWiki
  - 30 in NLSR.

Which languages are "less resourced"? Six different levels

- Fourth level: Around 300 languages
  Weak support in Mariani's presentation

  Languages with any lexical resource on-line registered

  - 307 languages in *yourdictionary.com*
  - It is almost the same set of languages that is present in Wikipedia (282 languages).

Which languages are "less resourced"? Six different levels

- Fifth level:
  Languages that have writing systems
  (Borin, 2009)
  - Here are included **other 2,014 languages**

- Sixth level:
  the big bag also including only-spoken languages in the world
  - Here are included at least **other 4,500 lang**.

Both 5th and 6th correspond to NA (Not Appl.) support in Mariani's presentation

How are languages facing HLT?

Which languages are "less resourced"?

- The answer is relative
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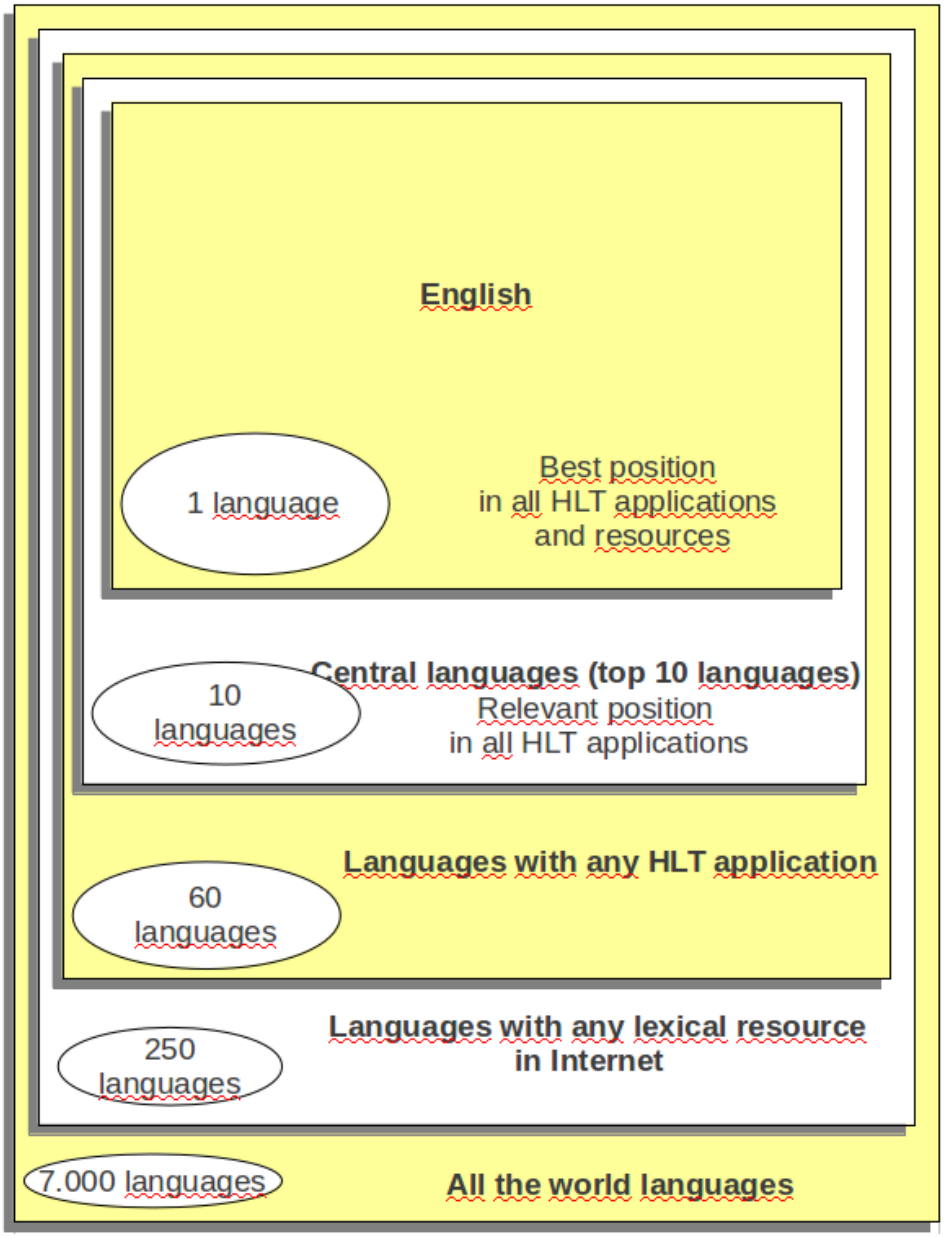

Which languages are "less resourced"? Six different levels

This 6 level typology gives **a relative definition of less-resourced languages**

- Comparing with English all the other languages could be considered less-resourced
- Or ...except the 10 top languages the rest can be considered less-resourced.
- The languages of the third level are lesser resourced than the languages of the second level, by definition
- 3rd or the 4th are the levels of languages usually called as less-resourced in the HLT domain.
- We may consider that languages in the 5th and the 6th levels are really endangered,

Outline

- Which languages are "less resourced"?
  Six different levels
- **Strategy to develop Language Technologies for less-resourced language**s
- Conclusions

Strategy to develop HLT in Basque
IXA Research Group

- IXA group: research group created in 1988.
- Our aim was to face the challenge of adapting Basque to HLT.
  - 1986: 5 university lecturers (computer science)
  - 2013: Interdisciplinary team
    - *31 computer scientists and 10 linguists*
- *Collaborating with 7 companies from Basque Country and 5 from abroad*
- *Involved in the birth of two new spin-off companies*
- *10 HLT products valuable to promote use of Basque.*

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We presented an open proposal for making progress in HLT (Aduriz et al., 1998).

Anyway, the steps proposed did not correspond exactly with those observed in the history of the processing of English

- Resources available for the treatment of Basque allowed facing problems in a different way
- English LRs did not evolve as the result of a single coordinated plan.
- Instead many independent efforts produced these English LRs to address specific project needs.

Underlying strategy

- Need of standardization of resources to be useful:
  - in different researches
  - in different tools
  - in different applications

- Need of incremental design and development of language foundations, tools, and applications
  - in a parallel and coordinated way
  - in order to get the best benefit from them

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Strategy to develop HLT in Basque
IXA Research Group

- Our steps on standardization of resources brought us
  - to adopt TEI and XML standards as a basis for linguistic annotation at the different levels of processing
  - definition of a general methodology for corpus annotation (Artola et al., 2009).
- Taking as reference our experience in incremental design and development of resources/tools,
  - We propose four phases as a general strategy for language processing (Alegria et al., 2011)

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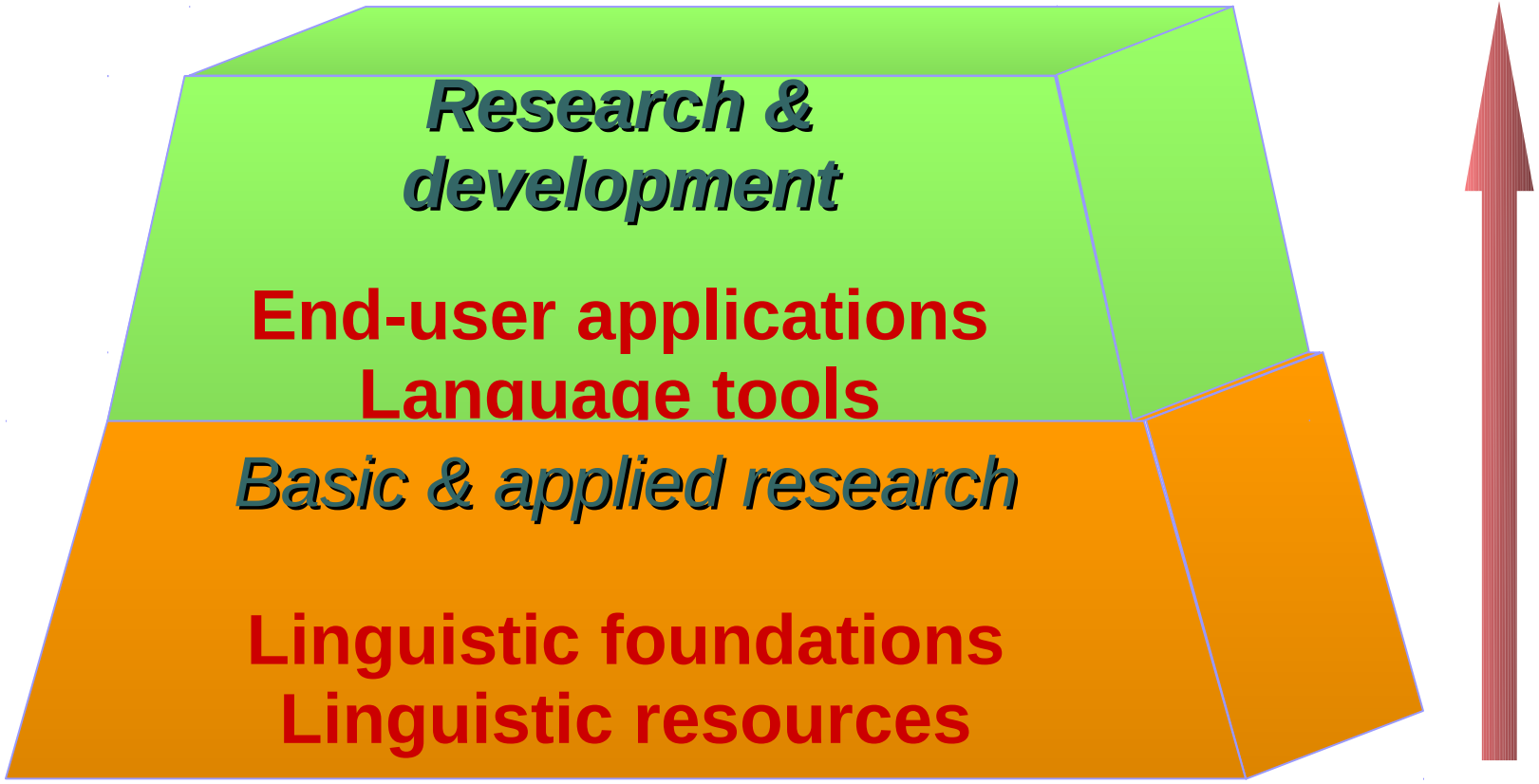
Strategic priorities: from basic research to application development



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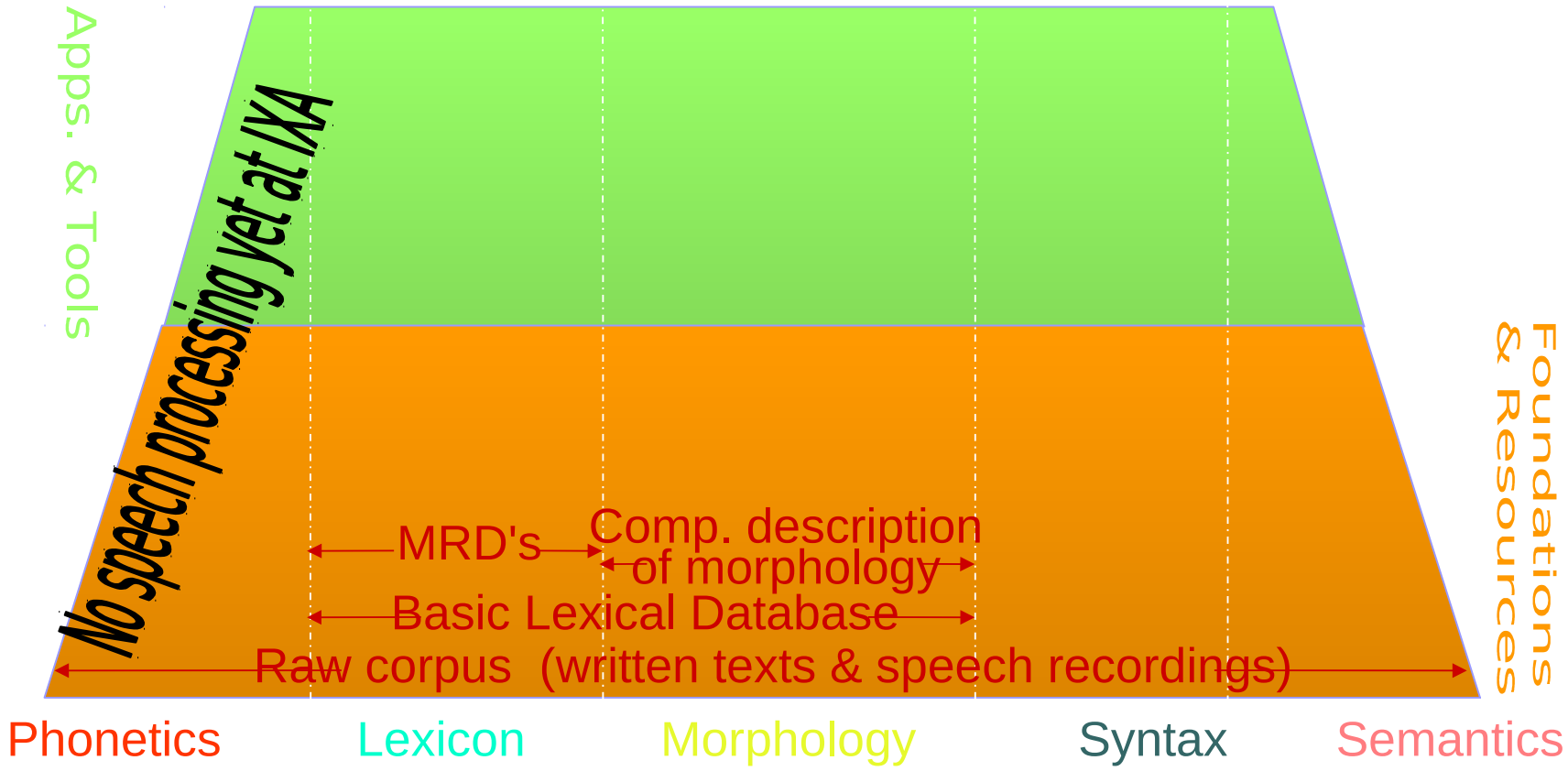
Phase I: laying foundations



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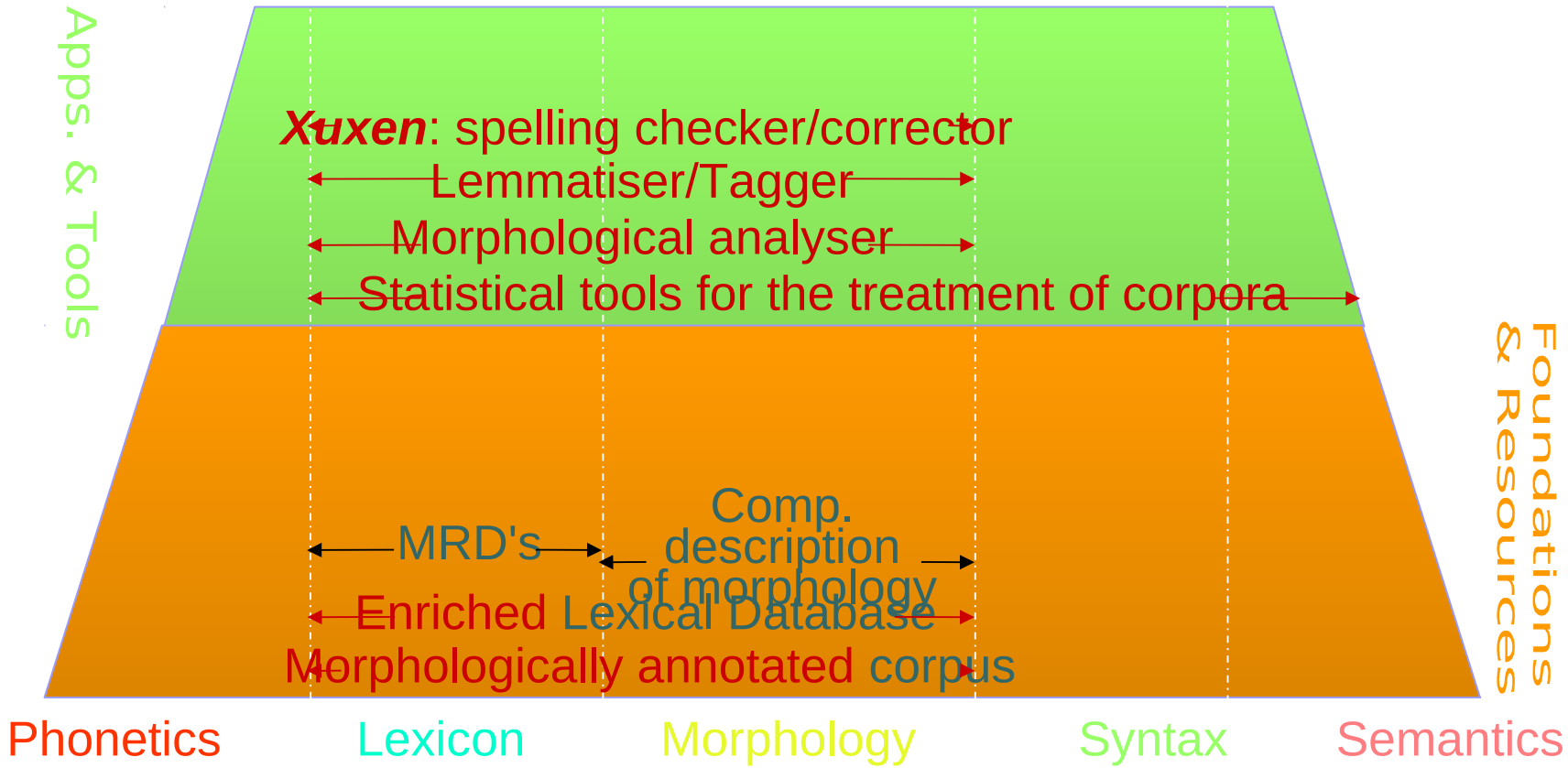
Phase II:
first basic tools and applications



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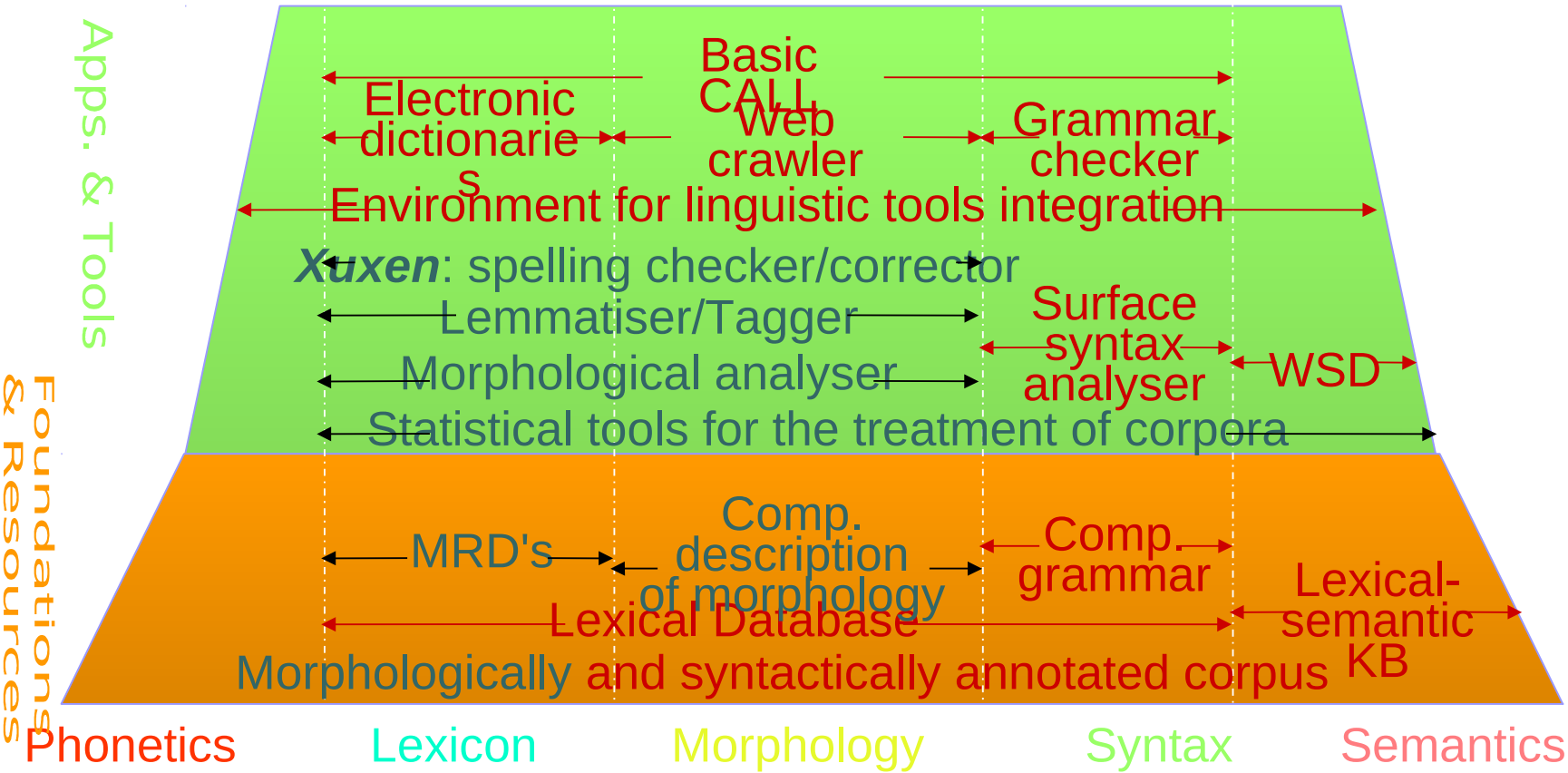
Phase III: more advanced tools and applications



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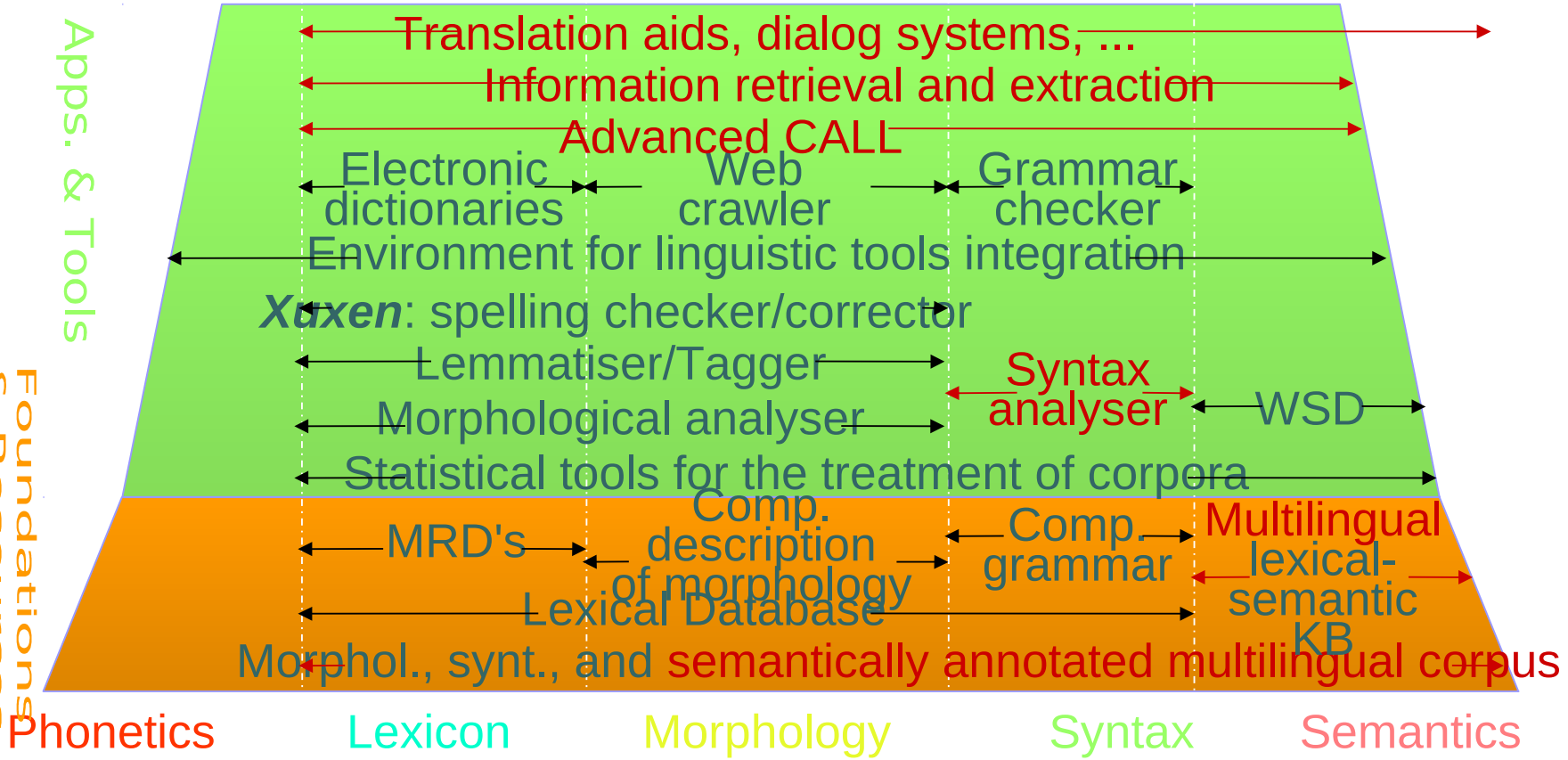
Created LRs and tools (1988-2010)

PRODUCTS	1988-1993	1993-1996	1996-1999	1999-2002	2002-2005	2006-2009	2009...
Applications			**Multimeteo MT application**			**Anhitz** (QA, MT, IE-IR, Avatar) **Matxin** MT system	**Ihardetsi** (QA) **BASYQUE** (Lexic application) **EUSMT** (SMT)
Semantics					**BasqueWordnet**	**MCR** Wordnet WSD-Ixa	**(Eu)SemCor UKB**, WSD algorithm
Syntax				**Zatiak-Ixati** Chunker	**Erreus** corpus of errors	**Ancora, EPEC** corpus	**Maltixa** (MALT parser) **EDGK** dependency parser
Lexic		**EDBL** Lexical data base	**EDBL** 2.0	Elhuyar-Word	**UZEI_MSWord** Synonym. Dict.	EDBL 3.0	**Lexkit** Dicc. Escolar Cubano
Morphology	**Xuxen** Spelling Checker	Xuxen1.0 Morph. analyzer	Xuxen 2.0 Eustagger	Xuxen3.0 Elhuyar-Word	Xuxen 3.0 Eihera NER	ZT corpus Eulia tagging tool	**BertsolariXa LibiXaml**

Phase IV: multilinguality and general applications



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Aplications (2012)
Translation, content management and learning
(Leturia et al., 2013) TC3 Journal

- Automatic dubbing of documentaries into Basque using subtitles in Spanish.

- Personal tutor in language learning
  - through a speech-driven avatar
  - automatically created grammar and comprehension exercises
  - writing aids (dictionaries, writing numbers, spelling...)
  - automatic evaluation of pronunciation

Boosting cooperation among the agents related to Language Industries

LANGUNE
THE BASQUE ASSOCIATION OF LANGUAGE INDUSTRIES

- **Langune** association created in 2010:
  The Association of Language Industries of the Basque language
  1. What does Langune work for?
  2. Current reality of the LI in the Basque Country

  See wider presentation: www.langune.com

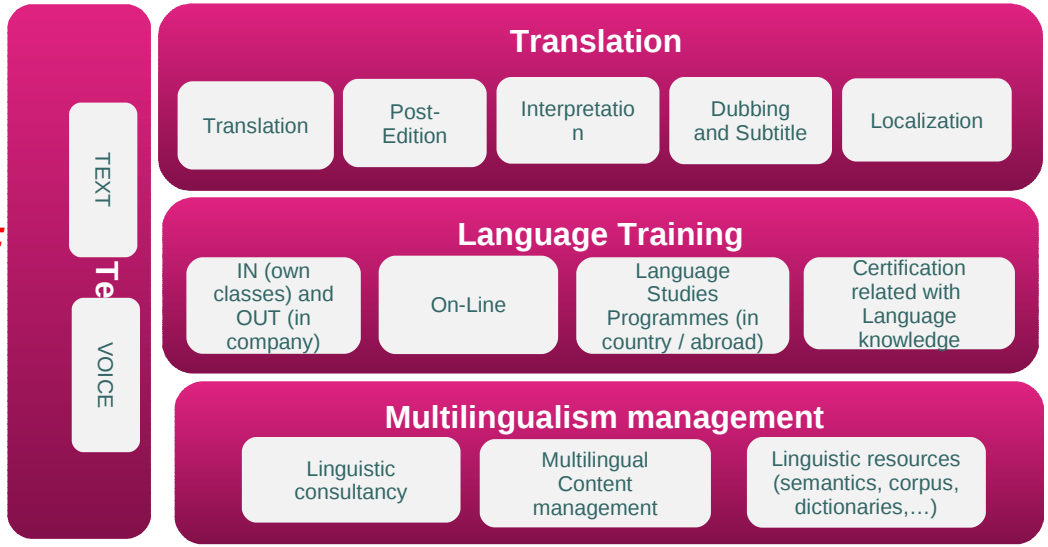
1. What does Langune work for?

- The Association of Language Industries of the Basque language – Langune, was officially set up in 2010, in order to **promote the development and competitiveness** of these industries, creating opportunities for collaboration and innovation in products / services, technologies and markets increasing the visibility and value added of this sector.

- In 2012, the Department of Industry, Innovation, Trade and Tourism of the Basque Government conceded Langune the title of **CLUSTER** of Language Industry.

- The comprehensive nature of the industry comes from having the entire value chain in a very reduced environment; from entities specialising in Translation to Language Training, Multilingualism management and Language Technology.

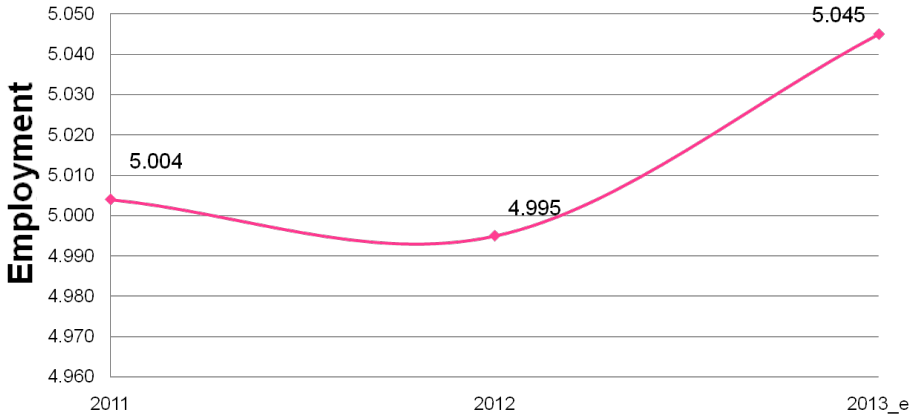
CORE BUSINESS OF LANGUNE

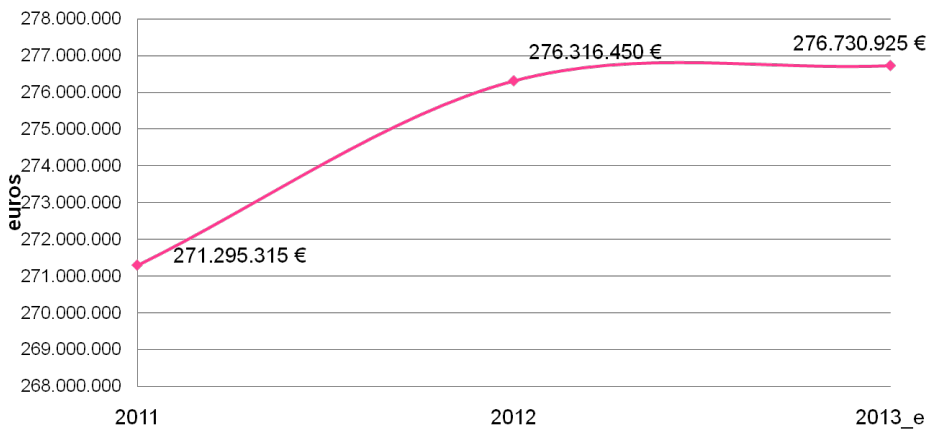


2. Current reality of the LI in the Basque Country

- The Basque language industry comprises **585 companies** with:
  - Turnover of around **276M€**.
  - Employment related to this sector **over 5,000 people**.
  - These figures represent **0,42% of Gross Domestic Product** (GDP).
  - Tendency in 2013 around a **1% growth**.

Growing tendency





Conclusions

- From our experience we defend that research and development for less resourced languages should to be faced to build a BLARK following this points:
  - 1) high standardization
  - 2) open-source
  - 3) reusing language foundations, tools, and applications
  - 4) incremental design and development of them.
- We have defined six different sets of languages attending to their penetration on HLT technologies.
- We think that our strategy to develop language technologies could be **useful for several hundred languages:**
  those that have developed a **written standard**
  and perhaps also some **initial lexical resources**
  but that are **still very far from central languages.**

Conclusions

- We know that any HLT project related with a less privileged language should follow those guidelines, but from our experience we know that in most cases they do not.
- We think that if Basque is now in an good position in HLT is because during the last twenty years those guidelines have been applied even though when it was easier to define "toy" resources and tools useful to get good short term academic results, but not always reusable in future developments.
- Similar experiences with other languages:
  Czech is another exception to the correlation between language size and LR scarcity; the excessive rich body of LRs for Czech is due to the coordinated efforts of a few ambitious and productive researchers.

Conclusions

- We promoted the creation of Langune (The Association of Language Industries of the Basque language)
  - 578 companies,
  - 276M€,
  - 5,000 people,
  - 0,42% GDP

ELRA18 topics

- ISLRN?
  Fine. Better identification of our products.
  Better recognition of citations.
- Impact Factor?
  Fine. It will help us to present the real value of our products.
  - In general / per language
  - Number of downloads
  - Number of citations

ELRA18 topics

- Crowd-sourcing evaluation?
  - Arranging communities to help in enriching resources for less-resourced languages...

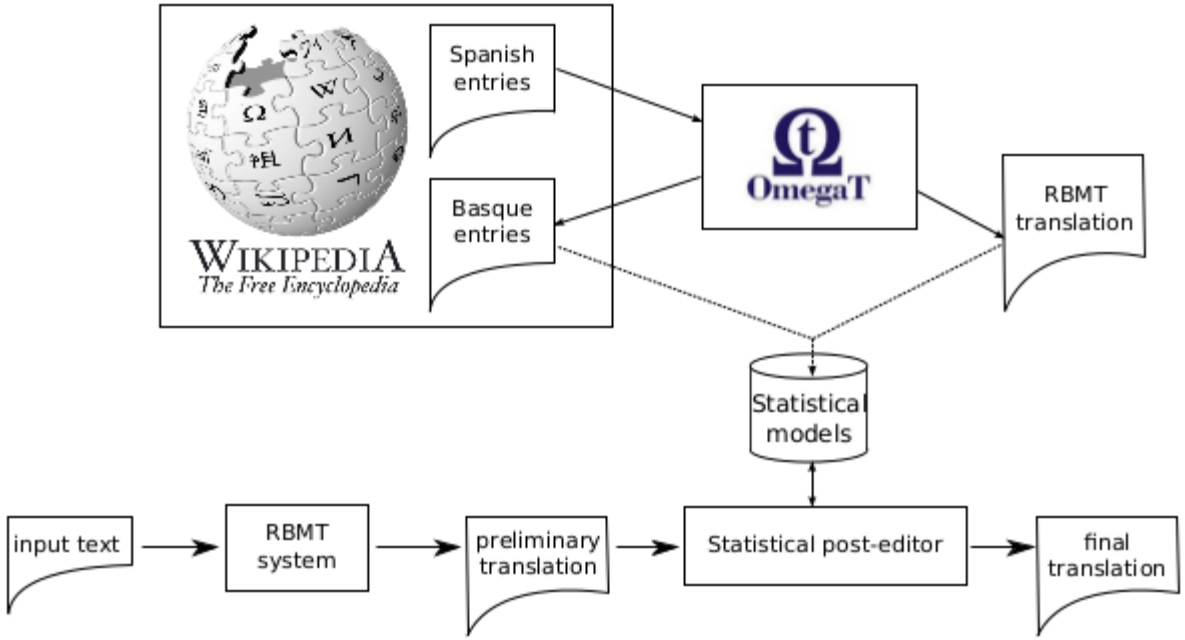
    is not an easy task...

    without a substantial critical mass of collaborators this kind of processes is inviable.

Crowd-sourcing LR creation

(Alegria eta al, 2013).
'The People's Web Meets NLP: Collaboratively Constructed LRs', Springer

Reciprocal Enrichment Between Basque Wikipedia and Machine Translation



- Creation of 100 new wikipedia entries
- 10% improvement in the MT output
- But ... huge work to engage volunteers.