The CESAR Project:
Enabling LRT for 70M+ Speakers

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Outline

- CESAR project in general
  - geo-linguistic spread
  - partners in the consortium
  - general aims
- brief overview of situation in three countries
  - Croatia
  - Serbia
  - Slovakia
- conclusions

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CESAR project
Geo-linguistic position

- CESAR stands for **CEntral and Southeast EuropeAn Resources**
- CESAR operates as a part of META-NET NoE
- one of three supporting ICT-PSP projects defined with their geo-linguistic spread
  - Central and Southeast Europe
  - three inner seas: Baltic, Adriatic, Black Sea
- CESAR covers languages:
  - Polish EU, 38M (40-48M)
  - Slovak EU, 5.4M (7M)
  - Hungarian EU, 10M (16M)
  - Croatian EU in 2013, 4.4M (5.5M)
  - Serbian candidate soon, 7.3M (9M)
  - Bulgarian EU, 7.5M (9M)
- all languages Slavic, except Hungarian
CESAR Consortium

- **Bulgaria**
  - Bulgarian Academy, Institute for Bulgarian Language L. Andreychev

- **Croatia**
  - University of Zagreb, Faculty of Humanities and Social Sciences

- **Hungary**
  - Hungarian Academy, Research Institute for Linguistics
  - Budapest University of Technology and Economics

- **Poland**
  - Polish Academy of Sciences, Institute of Computer Science
  - University of Łódź

- **Serbia**
  - University of Belgrade, Faculty of Mathematics
  - Institute Mihajlo Pupin

- **Slovakia**
  - Slovak Academy of Sciences, Ž. Štúr Institute of Linguistics
General aims

- Language resources & tools (LRT) in CESAR countries were developed
  - mostly in a sporadic manner
  - according to specific project needs
  - with little or no regard to
    - long-term sustainability
    - IPR status
    - interoperability
    - reusability in different contexts (e.g. in multilingual applications)

- CESAR project aims to address this issues by
  - enhancing and upgrading
  - standardising
  - cross-linking
  - a wide variety of language resources and tools

- making these LRT available through META-SHARE platform
General aims 2

- resources will include interoperable mono and multilingual
  - speech databases
  - corpora
  - dictionaries and wordnets
  - relevant LT processing tools
    - tokenisers
    - lemmatisers
    - taggers
    - chunkers and parsers

- effort will be made to ensure sustainability through
  - mobilising the national LT communities
  - raising awareness of the role of language resources amongst
    - R&D policy makers
    - media
    - general public

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Croatia
Croatia: Research in LT

University of Zagreb, Faculty of Humanities & Social Sciences

- long tradition: the first Croatian computational corpus, Bujas Osman, 1967

- today
  - Croatian-English Parallel Corpus, since 2000
  - Croatian Dependency Treebank, since 2007, http://hobs.ffzg.hr
  - CroTag, hybrid MSD-tagger (MulText East compliant), since 2006
  - Croatian NERC system, since 2005
  - Croatian module for NooJ, 2009

- projects
  - EU: TELRI I & II, CLARIN, ACCURAT, LetsMT!, XLIKE
Croatia: Research in LT 2

- **Institute of Croatian Language and Linguistics**
  - terminological databases, http://struna.ihjj.hr
  - digital dictionaries of Croatian dialects (incl. geo-mapping)

- **University of Zagreb, Faculty of Electrical Engineering and Computing**
  - Knowledge Technologies Laboratory, http://ktlab.fer.hr
    - information retrieval, information extraction
    - knowledge technologies, visualisation
    - tools: CorAl (corpus aligner), TermeX (terminology extraction)
  - projects
    - national: Knowledge discovery in textual data, http://rmjt.ffzg.hr/p5.html
    - AIDE – Automatic Indexing of Documents with Eurovoc, http://hidra.srce.hr:8080/eCadis/eCadis.jsp
Croatia: Research and beyond

- **University of Rijeka**
  - speech processing unit
  - Croatian spoken corpus
- **association and portal**
  - Croatian Language Technologies Society, since 2004, http://www.hdjt.hr
  - portal Language Technologies for Croatian, since 2000, http://jthj.ffzg.hr
- **curricula**
  - University of Zagreb, Faculty of Humanities and Social Sciences
    - Department of Linguistics
      - M.A. study of Linguistics, direction Computational Linguistics
      - educating experts in computational and corpus linguistics
    - Department of Information Sciences
      - a range of courses in NLP
  - University of Zadar
    - Department of Linguistics
      - M.A. study of Linguistics, direction Computational Linguistics
Croatia: LT in industry

- Matica hrvatska & SysPrint: spelling checker, 1997 (MS-Office)
- Novi Liber: online monoling. dictionary, since 2006, http://hjp.srce.hr
  - automatic classification of newswires
  - automatic keyword and NE extraction and populating metadata
  - using lemmatisation in search engine
- translation and localisation SMEs using M(A)T
  - Integra, http://www.integra.hr
  - Ciklopea, http://www.ciklopea.com
  - Prevoditelj, http://www.prevoditelj.com...
- **historical meeting for LT:** Dubrovnik, 1989
  - *Language Industries: Needs and Perspectives*
  - for the first time experts from CEE met with colleagues from WE
  - J. Sinclair, A. Zampolli, M. Gross / P. Sgall, E. Hajičova, F. Kiefer, J. Biên...
Serbia
**Serbia: Research Institutions**

- **University of Belgrade**
  - Faculty of Mathematics – language models & tools
  - Faculty of Philology – language resources
  - Faculty of Philosophy – cognitive modelling
  - Faculty of Electrical Engineering – speech

- **Institute Mihajlo Pupin**
  - Software tools

- **University of Novi Sad**
  - Faculty of Philosophy – lexicography
  - Faculty of Technical Sciences – speech

- **Serbian Academy of Sciences and Art**
  - Institute for Serbian Language – lexicography
  - Institute for Balkan Studies – multimedia content

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Serbia: Language resources and Tools

- **Resources for Serbian**
  - Corpus of Contemporary Serbian
  - aligned Corpora (TEI, TMX, HTML...)
    - Serbian-English (general & literature)
    - Serbian-French (literature)
    - multilingual (Verne’s *Around the World in 80 days*...) & Serbian-Serbian
  - morphological e-dictionaries (simple & MWU, proper names)
  - Serbian Wordnet & Multilingual database of proper names
  - Multimedia ethnographic database

- **Tools**
  - Serbian module for *Unitex* (shallow parser, NER) and *NooJ*
  - lemmatiser, MSD-tagger (*MulText-East* compliant)
  - *LeXimir* (development and interaction between different resources)
  - *VebRanka* (multilingual lexically supported query expansion)
  - *AlfaNum* (TTS & ASR)
Serbia: A number of applications for a small market

- IVR systems, call centers, audio logging, etc.
  - AlfaNum
- Web monitoring
  - e-dictionaries + web crawler
- lexicographic workstation
  - Serbian Unitex module and resources
- enformation extraction
  - Local grammars, lexical resources, named entities
- organizing digitized content
  - Wordnet, e-dictionaries, NXD and GIS (ethnographic Serbian material)
- query expansion for specific domain (e.g. geodata)
  - Wordnet, e-dictionaries, GIS
- press clipping
  - e-dictionaries, named entities extraction
- Transpoetika – exploring literature on web
  - e-dictionaries
Language resources for ore retrieval in Serbia

Without LR

With LR
Slovakia
Slovakia: research in LT

- **Slovak Academy of Sciences, L. Štúr Institute of Linguistics**
  - today
    - Slovak National Corpus, since 2003, http://korpus.juls.savba.sk
    - parallel corpora (sk-en, sk-cz, fr-sk, ru-sk)
    - Lemmatizer & MSD-tagger
    - Slovak treebank
    - Slovak WordNet
  - projects
    - National: Slovak National Corpus
    - EU: Mondilex, EuroMatrixPlus, Slovak Online

- **Slovak Academy of Sciences, Institute of Informatics**
  - processing of written Slovak, since 2006
  - projects
    - NAZOU, acquisition, organisation and maintenance of knowledge, http://nazou.fiit.stuba.sk
    - Ontea tool for IE and domain dependant metadata generation (incl. language identification and lemmatisation)
Slovakia: research in LT 2

- Slovak Academy of Sciences, Institute of Informatics, Department of Speech Analysis and Synthesis
  - acoustic models for telephony speech (SpeechDat-E project)
  - acoustic models for TTS, ASR
- Slovak Technical University, Department of Telecommunication
  - speech signal processing in noisy conditions
- Technical University Košice
  - voice information retrieval dialogue system for Slovak
  - SAMPA
  - JBOWL (Java Bag-of-Words Library), modular system for NLP comprising tokenization, morphological analysis, lemmatization, disambiguation, syntactic analysis based on ATN networks, clustering and phrase identification, term weighting and indexing
- University of Žilina, Department of Telecommunications and Multimedia
Slovakia: LT industry

- Forma s.r.o., http://www.forma.sk
  - spelling-checker (MS-Office)
  - lemmatizer
  - thesaurus
- TEOS Trenčín, http://www.teos.sk/
  - bilingual dictionaries
  - PC Translator, MT system, en-sk
  - Language Teacher, CALL system
- Softec s.r.o., http://www.softec.sk/
  - embedding LT solutions into wider list of IT solutions
- ESET s.r.o., http://www.eset.com/sk/
  - antispam solutions
Conclusions
Conclusions

- **NooJ** development environment, http://www.nooj4nlp.net
  - it will play a significant role in raising the popularity of LT
  - based on the widened concept of local grammars
  - easy to implement and use
  - developed for five CESAR languages already
  - selected in CESAR as a showcase how multilingual and multilevel processing tools can be developed and applied to all languages
  - CESAR will make NooJ open source software available for all platforms

- **CESAR** is aiming to
  - bring the existing LT for respective languages to the level compatible with other EU languages
  - make the respective LRT accessible also through META-SHARE platform
  - enable cooperation with industrial partners for emerging market of 70+M speakers
Thank you for your attention.

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