ELITR, Bergamot
Our Participation

Ondřej Bojar; Dec 12, 2022
Two EU H2020 RIA projects (2019–2021 + a few months):

- **ELITR**
  - Targetting 40+ languages in simultaneous speech translation
  - Multilingual Speech Translation Minuting

- **Bergamot**
  - High-quality MT on consumer CPU
  - Privacy Trust in Communication

▶ Some remarks on project coordination.
EU research and innovation project ELITR aims:

- Highly multi-lingual machine and speech translation.
- Document-level machine translation.
- Automatic meeting summarization, “Minuting”.

... and the Supreme Audit Office of the Czech Republic as affiliated user partner.

Main ELITR event: Interpreting at EUROSAI Congress (Prague, May 2021).
H2020 RIA ELITR (2019–2021 +3 months)

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ELITR Technologies: ASR, MT, SLT, Minuting

Diagram showing the workflow of ASR (Automatic Speech Recognition), SLT (Speech-to-Text), and MT (Machine Translation) technologies. The process involves converting spoken or written content into text transcripts, which can then be used to create minutes from an agenda.
ELITR Technologies: ASR, MT, SLT, Minuting
Speech Translation at Conferences
Languages to be supported by the ELITR project:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Primary Focus</th>
<th>Covered</th>
<th>Experimental</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASR</td>
<td>En, De</td>
<td>Fr, Sp, It, Ru</td>
<td>Cs</td>
</tr>
<tr>
<td>SLT &amp; MT</td>
<td>{ En, De }</td>
<td>all EU languages</td>
<td>all EUROSAI langs</td>
</tr>
<tr>
<td></td>
<td>{ En, De, Cs}</td>
<td>{ all EU languages }</td>
<td>{ all EUROSAI langs }</td>
</tr>
<tr>
<td>Summarization</td>
<td>English, Czech</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

24 EU languages: Bulgarian, Croatian, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hungarian, Irish, Italian, Latvian, Lithuanian, Maltese, Polish, Portuguese, Romanian, Slovak, Slovene, Spanish, and Swedish.

Further 19 EUROSAI languages: Albanian, Arabic, Armenian, Azerbaijani, Belorussian, Bosnian, Georgian, Hebrew, Icelandic, Kazakh, Luxembourgish, Macedonian, Moldovan, Montenegrin, Norwegian, Russian, Serbian, Turkish, and Ukrainian.
Overall ELITR Architecture

- Components can run distributed, connected via “bi-sockets”.

- Many challenges along the pipeline, see my invited talk at WMT:
  http://ufallab.ms.mff.cuni.cz/~bojar/wmt22-invited
Multi-Target and Multi-Source MT

- **Multi-Target focus: Efficiency**
  - Decrease hardware resources compared using many separate models.

- **Multi-Source focus: Resolving ambiguity thanks to existing translations.**
  - E.g. Translating German “Schloss” to French is easier if we can feed in the English translation (“castle” or “lock”).
Training for Multilinguality

- Collect multi-parallel or bi-parallel multilingual corpora.
- Simply mix in all the language pairs:

<table>
<thead>
<tr>
<th>Source Sent 1 (De)</th>
<th>Target Sent 1 (En)</th>
</tr>
</thead>
<tbody>
<tr>
<td>versetzen Sie sich mal in meine Lage!</td>
<td>put yourselves in my position.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source Sent 2 (En)</th>
<th>Target Sent 2 (Nl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I flew on Air Force Two for eight years.</td>
<td>ik heb acht jaar lang met de Air Force Two gevlogen.</td>
</tr>
</tbody>
</table>

- There are challenges as well as wishful thinking; read more:

Speech Translation from Source or Interpreter?

Speech Translation from Source or Interpreter?

Speech Translation from Source or Interpreter?

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Speech Translation from Source or Interpreter?

ELITR’s Answer: Follow All

More details in Bojar et al. (2021), Operating a Complex SLT System with Speakers and Human Interpreters; https://aclanthology.org/2021.mtsummit-asltrw.3/
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Various Demo Videos

- Initial test at 2019 Student Firms Fair: https://elitr.eu/the-reverse-babelfish/
- CUNI Open Doors Day: https://elitr.eu/a-tireless-interpreter/
- Popularization of SLT in conference setting: https://www.youtube.com/watch?v=WZy5cGY7JFc
Automatic Meeting Summarization (Minuting)

AutoMin 2023:
- Second instance of our shared task.
- Automatic creation of meeting minutes from (manually corrected) ASR transcripts.
- **Task A**: Creating minutes.
- **Task B&C**: Matching minutes and transcripts.
- **Task D**: Evaluating minutes.

Take part! https://ufal.github.io/automin-2023/.
Motivation for Bergamot

- Statoil (Norwegian state oil company) employment information and contracts leaked on Translate.com – Norsk Rikskringkasting, 2017
  - Translate.com: There was a clear note on our homepage stating:
    ‘All translations will be sent to our community to improve accuracy’;
    ‘some of these requests were indexed by search engines such as Google and Microsoft at that time.’

- At European Commission, eTranslation runs on Azure
  - Security concerns.
    See e.g. https://firewalltimes.com/microsoft-data-breach-timeline/
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Don’t trade your privacy for Google Translate.
Bergamot Goals and Features

*Client-side* neural machine translation as a Firefox extension.

Local processing $\implies Private.$
Bergamot Goals and Features

*Client-side* neural machine translation as a Firefox extension.

- Local processing $\implies$ *Private.*

- Broad dissemination as a Firefox extension + open platform (Marian)
- Fast on a desktop
- Trustworthy
- Support web forms
Inbound vs. Outbound Translation (OT)

Inbound translation

Lang=F

F→E MT

Lang=E

Recipient
Inbound vs. Outbound Translation (OT)

Inbound translation

Lang=F

F→E

MT

Recipient

Outbound translation

Lang=E

E→F

MT

Sender
Inbound vs. Outbound Translation (OT)

**Inbound translation**

- **Lang=F**
- F→E
- MT

**Outbound translation**

- **Lang=E**
- E→F
- MT
- **correct MT output**
- **confident**
Outbound MT as an Interactive Process

1. User provides and modifies their input.
Outbound MT as an Interactive Process

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2. System signals translation quality and suggests modifications.
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![Translation interface](image)

Results: Only back-translation helps, only in confidence (not quality).
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Result: Only back-translation helps, only in confidence (not quality).
Remarks on Coordination
Project Preparation

- Allow plenty of time (3 months minimum) for the vision to settle.
  - Even if you have the vision clear, almost all partners have to share it.
- Try to match the call requirements as closely as possible.
  - ... this is the hardest part to me.
- Observe all formal conditions; although the EC focuses on the content more than formalities.
- Start submitting early; unexpected questions will emerge in the process.
Once awarded, expect *a lot* of formal work.

- Consortium agreement has to be prepared and signed by all.

- Stick to the vision as it was written, and follow it.
Project Execution

▶ Be ready to respond to unexpected developments.
▶ Do not worry to deviate from the plan.
▶ Just be honest with yourselves as scientists.
▶ Report and explain everything.
  ▶ You will be evaluated by your fellows, they know the business.
Communication Strategies

- Every team has their own and specific established means of communication.
- Rather than forcing unified communication platforms, let most people keep working as they were used to.
- Learn and use all the individual means your members use.
  - Yes, we made landline calls in German to extract the information from our partners.
Be Stable, Believe in Self-Organization

- Conditions may (and will) change abruptly in the project lifetime.
  - Change in the state of the art.
  - Change at one of the members institution.
- Be ready to digest them, modify project as needed.
- Show full trust in your partners, have and let them play their roles.
Fight with the Nature, not Fellows

- Whenever you sense a tension, always refocus to the original vision and goal of the project.
- It makes no sense to prove who was the culprit.
- The goal is to solve the problem.

- Use tiny psychological tricks on yourselves.
  - Put very simply, it is much more helpful to say “I am sorry” instead of “You foolish stubborn freak.”
Summary

Multilinguality & Minuting

- ELITR used *multiple sources and multi-lingual target.*
  - Ideal setup for *expanding the set of offered languages,* complementing human interpreters.

- Join us for *AutoMin 2023,* minuting and its evaluation.

Privacy & Trust

- Open-source MT toolkit + models scaled down for CPU.
- Released as *Firefox Translation Add-On.*

- Allows to *write in a language you do not speak* with some confidence.

- Some remarks on project coordination.
Thank you!