



# ATCO<sup>2</sup> project

<https://www.atco2.org>

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Idiap Research Institute, Ecole Polytechnique Fédérale de Lausanne, Brno University of Technology, Saarland University, OpenSky Network, ReplayWell, Honeywell, Romagna Tech, Evaluations and Language Resources Distribution Agency (ELDA)





Title of proposal: **Automatic collection and processing of voice data from air-traffic communications**

Proposal acronym: **ATCO<sup>2</sup>**

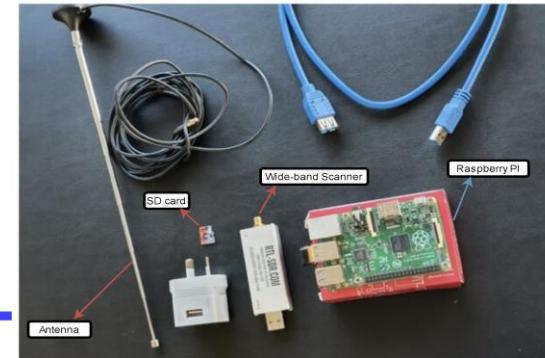
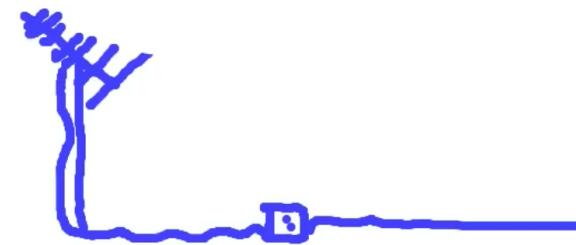
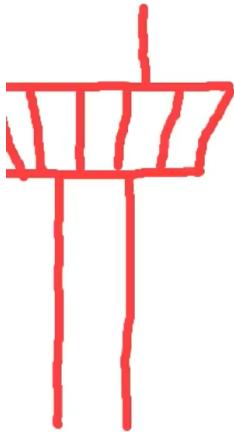
Proposal duration: **24 months**

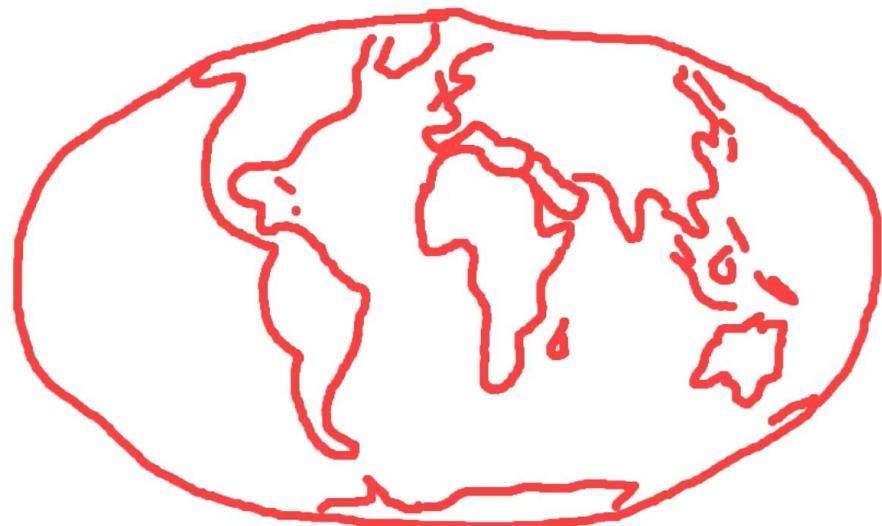
Topic identification: **Automated data collection and semi-supervised processing framework to deep learning (JTI-CS2-2018-CfP09-LPA-03-16)**

Topic leader: **Honeywell (Pavel Kolcarek), Airbus**

Types of action: **CS2-AI Innovation action (Project officer: Alexandra Gurau)**

Partners: **Idiap Research Institute, Brno University of Technology, Saarland university, Open Sky Network, ReplayWell, s. r. O., Evaluation and Language Resource Distribution Agency, Romagna Tech S.C.p.A.**







**Clean nice audio**



**Accented English**

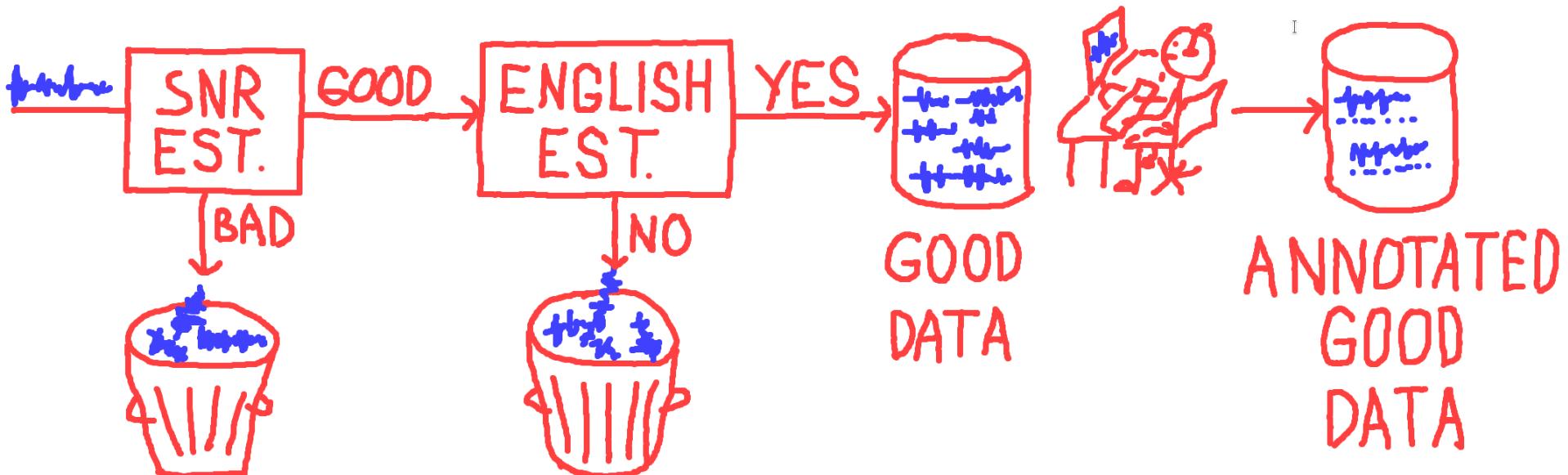


**Non-English**

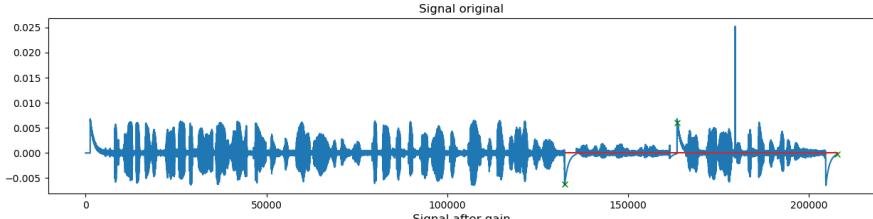
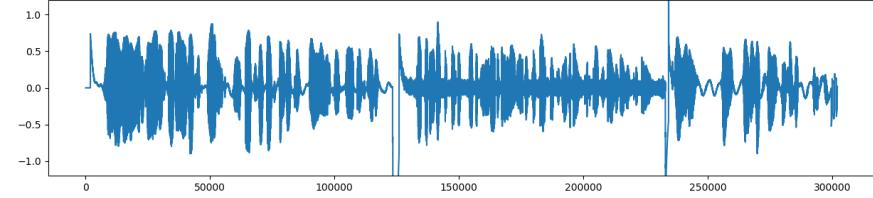
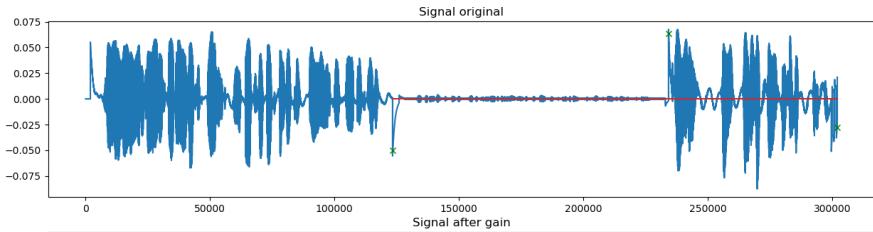


**Noises and distortions**

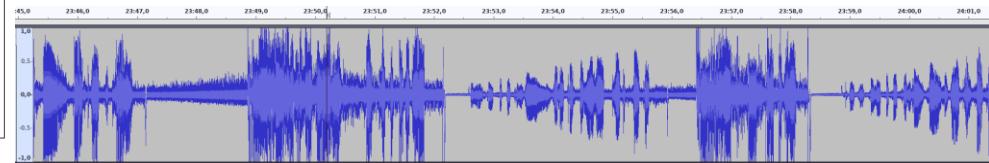
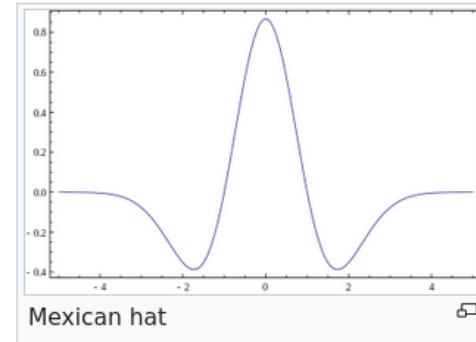




## Raw data post-processing - segment based gain

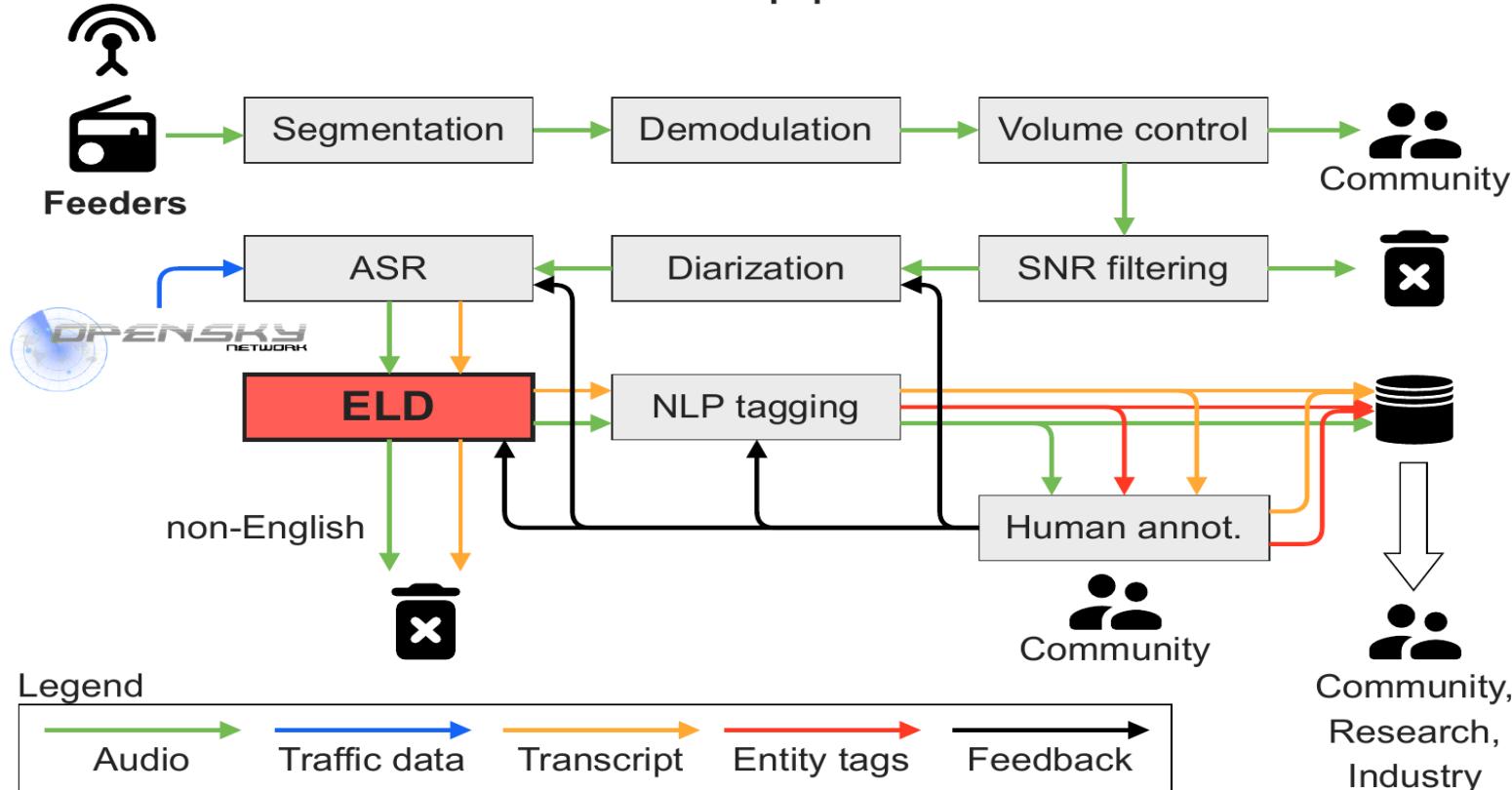


```
sig=signal.decimate(audio,8)
sig=np.abs(signal.decimate(sig,8))
peaks=signal.find_peaks_cwt(sig,[30])
```

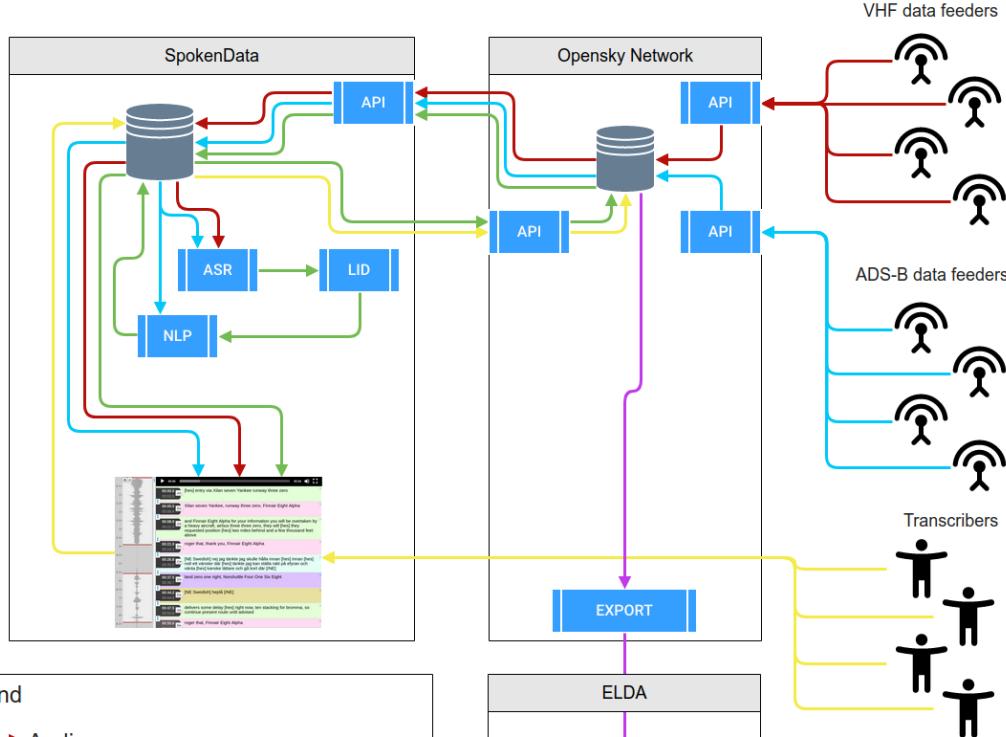


# Pipeline

## ATCO<sup>2</sup> pipeline



# ATCO2 communication - Version C



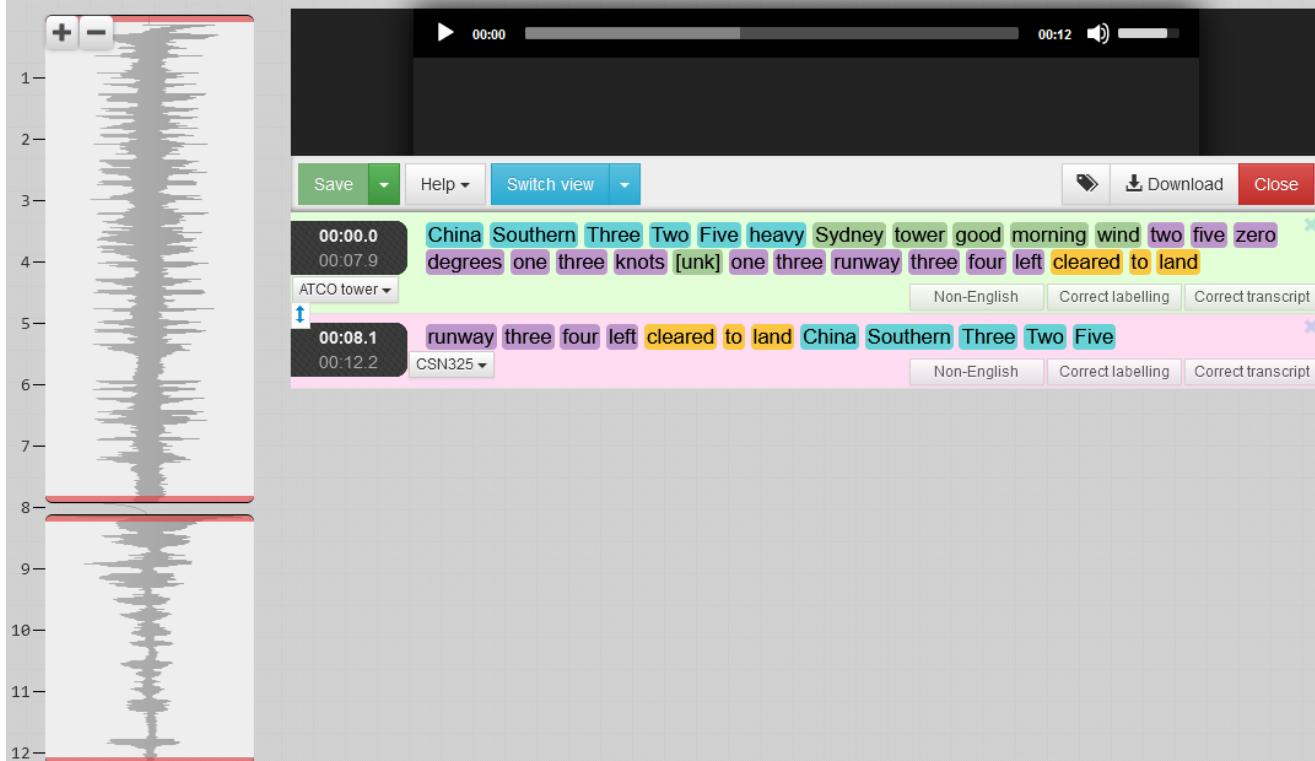
## Legend

- Audio
- Automatic transcription and tags
- Human annotations
- Audio metadata (callsigns, airport, ...)
- Audio with annotations

## ELDA

ATCO2 data release

# Annotation platform



The screenshot displays a digital audio workstation (DAW) interface for ATCO communication annotation. On the left, a vertical timeline shows a waveform with red markers at frame 8 and 12. The main area features a playback bar with a play button, time markers (00:00, 00:12), volume, and a zoom slider. Below the bar are buttons for Save, Help, Switch view, and Close. The transcript editor shows two rows of text. The first row starts at 00:00.0 with "China Southern Three Two Five heavy Sydney tower good morning wind two five zero degrees one three knots [unk] one three runway three four left cleared to land". The second row starts at 00:08.1 with "runway three four left cleared to land China Southern Three Two Five". Both rows have timestamp markers (00:07.9, 00:12.2) and dropdown menus for ATCO tower (ATCO tower, CSN325) and subtitle source (Non-English, Correct labelling, Correct transcript). To the right is a detailed sidebar with navigation, settings, and text label definitions (Call-sign, Command, Value, Unnamed phrase, Anonymize, nonEnglish). The sidebar also lists basic and advanced keyboard shortcuts for editing, and speaker labels A through G.

**Text labels**

- Call-sign
- Command
- Value
- Unnamed phrase
- Anonymize
- nonEnglish

**Basic shortcuts**

- Ctrl + S Save subtitles
- Ctrl + click Edit highlighted caption
- Double click Edit highlighted caption
- Tab Edit next caption
- Shift + Tab Edit previous caption
- Esc Leave edit mode
- Ctrl + Space Play / pause
- Shift + Space Play caption
- Ctrl + Home
- Shift + Enter New line when editing
- Ctrl + Enter Split caption at cursor position at current time

**Advanced shortcuts**

**Speaker labels**

- A ATCO tower
- B CSN325
- C
- D UNK-1
- E UNK-2
- F UNK-3
- G Crosstalk

# ATCO2 output

- **Data collected so far:**
- All: **1517 (hours)**
  - LZIB: 22
  - LKPR: 590
  - LSZH: 287
  - LKTB: 341
  - EETN: 4
  - LSGS: 68
  - LSZB: 138
  - YSSY: 65
- **~3 hours transcribed, ~1 hour tagged**
- **We have published**
  - LID data: English/Czech/French/German 15 hours of speech
  - ASR data: 60 minutes of transcribed English ATC speech

# ATCO2 legal and ethical issues

The ATCO2 Consortium is also investigating the **legal** and **ethical** aspects of ATC data collection, sharing and analysing.

Main ambitions of interest:

- **privacy and data protection,**
- **data management and security,**
- **Intellectual Property/ownership** of ATC databases,
- **ATC as open/public data**, etc.

Critical aspects:

- difficulty in finding clear, specific rules and regulations,
- diverging nation-based rules.



# Questions?