The Telemeta platform and the TimeSide framework
Audio archives management and Automatic analysis.

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Introduction

▶ Since 2007, ethnomusicologists from the *Center for Research in Ethnomusicology* (CREM) and engineers from Parisson have joined their efforts to develop *Telemeta*, a scalable and collaborative *open-source* web platform for management of and access to digital sound archives.

▶ The design of Telemeta focuses on the enhanced and collaborative user-experience in accessing audio items and their associated metadata and on the possibility for the expert user to further enrich those metadata.

▶ Telemeta architecture relies on *TimeSide*, an open audio processing framework written in Python which :
  ▶ Provides decoding, encoding and streaming methods for various formats together with a smart embeddable HTML audio player.
  ▶ Includes a set of audio analysis plugins and additionally wraps several audio features extraction libraries to provide automatic annotation, segmentation and musicological analysis.

▶ A fully operational deployment of this platform is online since 2011 : « **Sound archives of the CNRS - Musée de l'Homme** »

telemeta
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Telemeta
Open web audio platform for digital sound archives

https://github.com/Parisson/Telemeta/

python   django

Web audio content management

▶ *Telemeta* is a free and open source (CeCILL Free Software License Agreement) web audio content management system which introduces efficient and secure methods for backuping, indexing, transcoding, analysing and publishing any digitalized audio file with its metadata and in accordance with open web standards.

▶ *Telemeta* architecture is flexible and can easily be adapted to particular database organization of a given sound archives.

The main features of *Telemeta* are :

▶ Pure HTML web user interface including high level search engine

▶ Smart workflow management with contextual user lists, profiles and rights

▶ Model-View-Controller (MVC) architecture

▶ Strong Structured Query Language (SQL) or Oracle backend

Beside database management, the audio support is mainly provided through an external component, *TimeSide*.

Metadata - Semantic Web

▶ In addition to the audio data, dynamically handling metadata in a collaborative manner optimises the continuous process of knowledge gathering and enrichment of the materials in the database.

▶ Interoperability : integration of the metadata standards protocols Dublin Core and OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting) [?, ?].

Contextual Information
In ethnomusicology, contextual information could be geographic, cultural and musical. It could also store archive related information and include related materials in any multimedia format.

Annotations and segmentation (time-indexed information)

▶ a list of time-coded markers associated with annotations

▶ a list of of time-segments associated with labels (*in development*) .

Sound archives of the CNRS - Musée de l'Homme

http://archives.crem-cnrs.fr

The ressources are available to researchers and to the extent possible, the public, in compliance with the intellectual and moral rights of musicians and collectors. These archives are the most important in Europe :

▶ Nearly 3,500 hours of recordings of unpublished field.

▶ Approximately 3700 hours of material published (more than 5000 discs, many of which are very rare).

Usages

▶ **Research** :
  ▶ Publish collected ressources together with research work.
  ▶ Exchange data online and collaborate with other researchers or communities producing their music in their home countries.

▶ **Teaching** : Ressources for teachers in *anthropology* or *ethnomusicology* as it provides the students an access to materials for lessons, academic works and exams.

▶ **Museology** : Access through *interactive kiosks* (full access given to IP ranges)
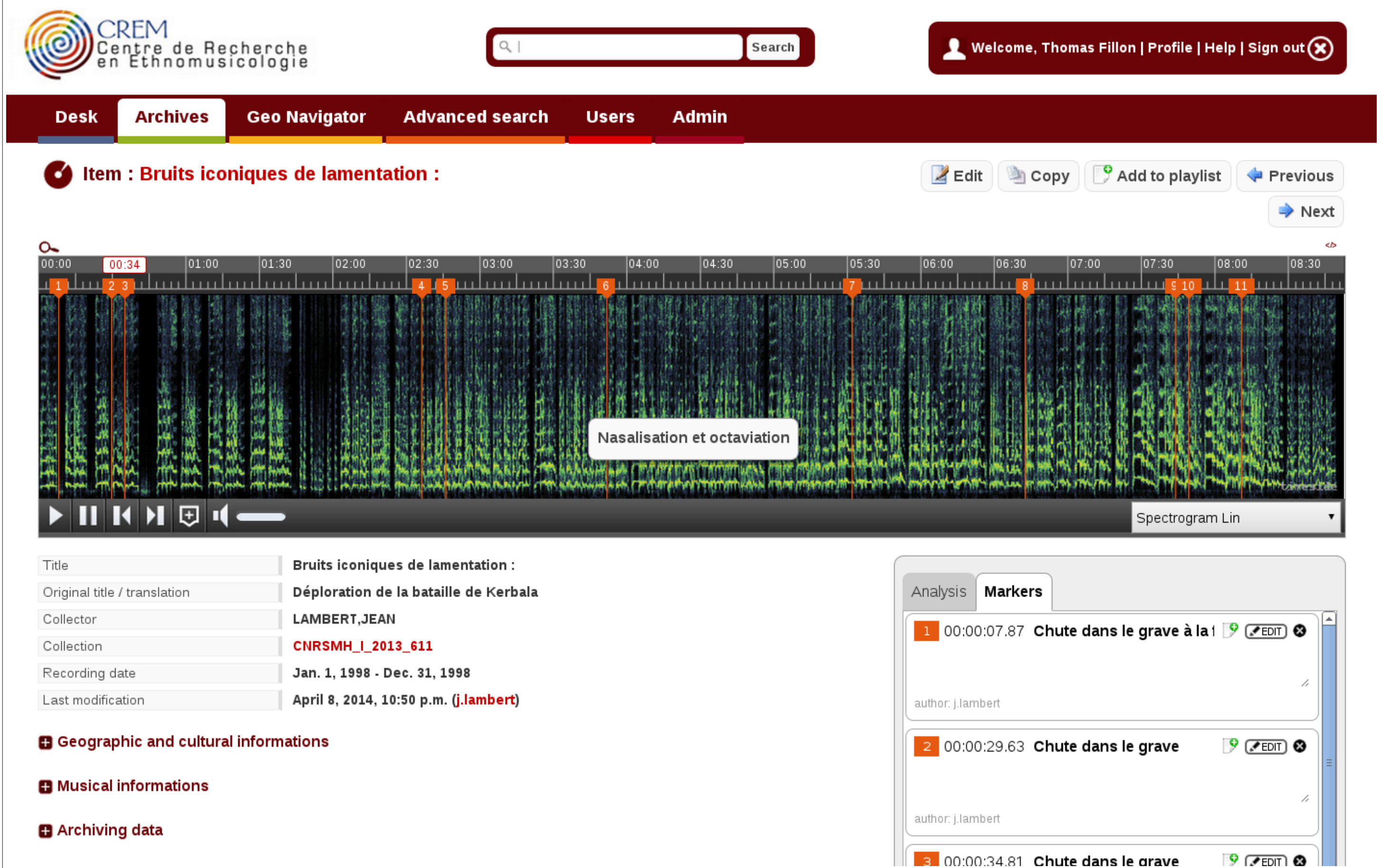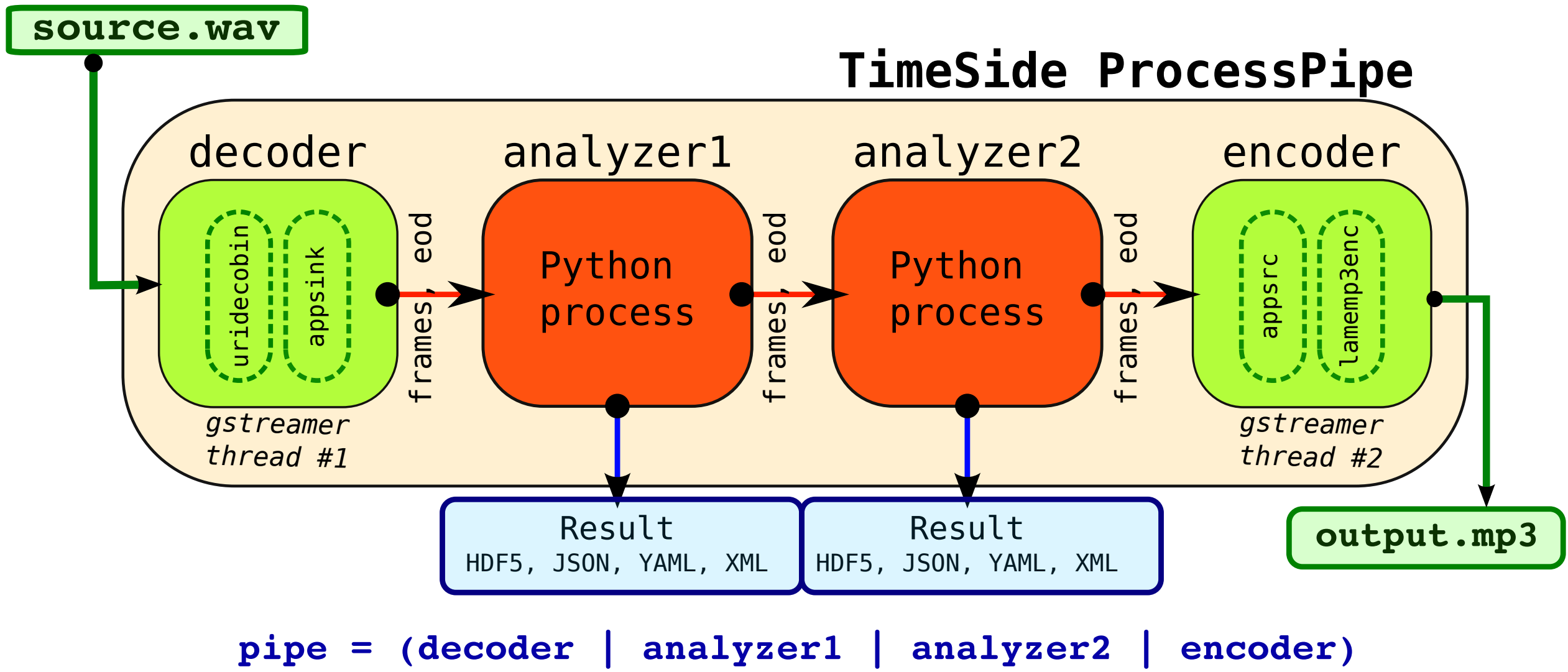

TimeSide
Open web audio processing framework

https://github.com/Parisson/TimeSide/

Functionality

▶ Decode ANY audio or video format into Python numpy arrays with img/misc/Gstreamer-logo.png

▶ Analyze audio content through its own plugins API

▶ Organize, serialize and save analysis metadata through various formats.

▶ Draw various waveforms, spectrograms and other representations from audio analysis.

▶ Transcode audio data in various media formats and stream them through web apps.

▶ Playback, index, tag and interact on demand with a smart high-level HTML5 extensible player.

TimeSide *processing pipe*

pipe = (decoder | analyzer1 | analyzer2 | encoder)

Automatic audio analysis

Audio features extraction
TimeSide incorporates some state-of-the-art audio feature extraction libraries such as :

▶ **Aubio :** http://aubio.org [?]

▶ **Yaafe :** http://yaafe.sourceforge.net [?]

▶ **Vamp plugins :** http://www.vamp-plugins.org [?]

Given the extracted features, every sound item in a given collection can be automatically analyze.
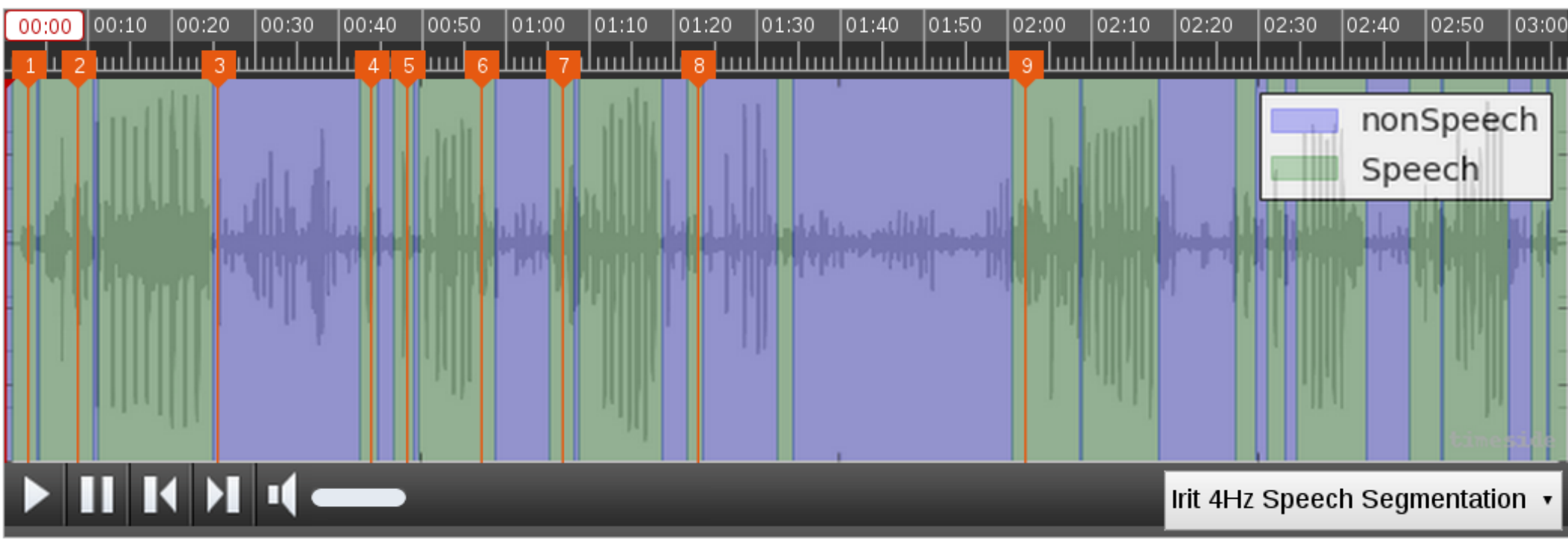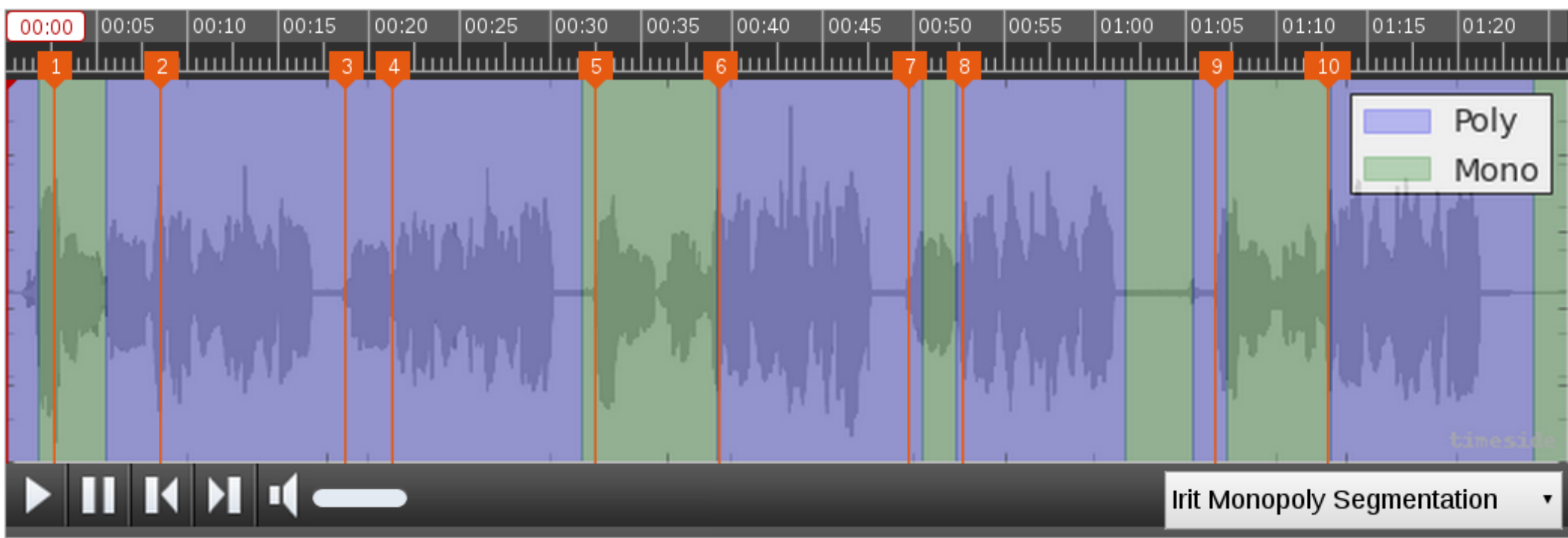

FIGURE: Speech activity detection

FIGURE: Monody / polyphony detection

Ongoing developments

▶ Enhance the audio player (Web audio API)

▶ Provide a flexible user-interface with time-synchronized visualization panels for *audio, signal analysis and annotations*.

▶ Enhance user interaction with X-Y zoom and annotation capabilities

▶ Integrates WAVES.JS JavaScript library from the Wave project (http://wave.ircam.fr/)

▶ Provide a REST web API (TimeSide server) to design, manage and run audio signal analysis on large audio corpus and serve the result over the web

▶ Provide new audio analysis plugins

▶ Provide a collaborative workflow for users (define workgroups, share data and annotations, ...)

Références