

## Midterm meeting, September 2015 Marseille, France

### Programme

#### Tuesday September 22

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| 20:30 | Arrival of the Vienna team at the airport |
| 21:30 | Restaurant in Marseille (to be defined)   |

#### Wednesday September 23

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| 10:00 – 10:45 | Welcome coffee on the CNRS campus “Joseph Aiguier”, building AA<br>Moving to CNRS “Seminar 1” meeting room, building G  |
| 10:45 – 11:30 | Welcome talk – Richard and Olivier<br>Summary of the first 36 month – Olivier, Piotr & Thibaud  |
| 11:30 – 12:15 | Scientific presentation 1 and open discussion:<br><i>ERB-MDCT, current knowledge and perspectives</i> – Olivier   |
| 12:15 – 14:00 | Lunch at CNRS Cafeteria   |
| 14:00 – 15:00 | Scientific presentation 2 and open discussion:<br><i>Sparse decompositions with distortion measure and sparsity constraint, application to audio coding, first results</i> – Ichrak & Olivier |
| 15:00 – 15:15 | Coffee break  |
| 15:15 – 16:30 | Task-specific meeting:<br><i>Task 1: Perception-based time-frequency representations. Current knowledge, work-plan and publication strategies</i> – Olivier & Peter                           |
| 16:30 – 17:30 | Scientific presentation 3 and open discussion:<br><i>Predicting time-frequency masking kernels using a model of the auditory periphery</i> – Johannes, Thibaud & Bernhard                     |
| 17:30 – 18:00 | Task-specific meeting:<br><i>Task 4: Administrative work and management of the project</i> – Olivier, Piotr & Thibaud   |
| 20:30         | Restaurant in Marseille (to be defined)   |

## Thursday September 24

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| 10:30 – 11:00 | Welcome coffee on the CNRS campus “Joseph Aiguier”, building AA<br>Meeting room to be defined  |
| 11:00 – 12:00 | Scientific presentation 4 and open discussion:<br><i>A fast and efficient protocol for measuring time-frequency masking kernels</i> – Johannes, Thibaud & Bernhard                           |
| 12:00 – 13:30 | Lunch at CNRS Cafeteria  |
| 13:30 – 14:45 | Task-specific meeting:<br><i>Task 2: Development and implementation of time-frequency masking model. Current knowledge, work-plan and publication strategies</i> – Thibaud, Bernhard & Piotr |
| 14:45 – 15:45 | Task-specific meeting:<br><i>Task 3: Optimization of perceptual audio codecs. Workplan and perspectives</i> – Olivier  |
| 15:45 – 16:00 | Conclusion<br>Olivier, Piotr & Thibaud   |
| 16:00         | Goodbye coffee in building AA  |
| 19:00         | Departure of the Vienna team at the airport  |

### Summaries of scientific presentations:

#### **Presentation 1:** *ERB-MDCT, current knowledge and perspectives* – Olivier

The ERB-MDCT is an invertible, real-values time-frequency transform based on MDCT, which is widely used in audio coding. It was designed similarly to ERBLet, with a resolution evolving across frequency to match the perceptual ERB scale. The main improvement is that atoms are quasi-orthogonal, and the redundancy is very close to 1. However, the issue of overlap between macro-blocs is still open. We will also discuss the possible implementation of a perceptual audio coder (AAC-like) using ERB-MDCT instead of standard MDCT. Results of preliminary tests on the effect of quantization noise in MDCT and in ERB-MDCT domain will be presented.

#### **Presentation 2:** *Sparse decompositions with distortion measure and sparsity constraint, application to audio coding, first results* – Ichrak & Olivier

In 2008, Ravelli et. al. proposed an adaptive sparse decomposition method on an over-complete dictionary and applied it to audio coding. However, this was based on the MP algorithm (highly time-consuming), and no perception is taken into account in the decomposition. We propose a new formulation with a measure of distortion and a sparsity constraint. A simple quantization and coding algorithm (without perceptive quantization) was evaluated and we observed a significant improvement over Ravelli's intermediate results. Actually, a second quantization and coding scheme (with perceptive quantization) is tested and compared to Ravelli's final results.

#### **Presentation 3:** *Predicting time-frequency masking kernels using a model of the auditory periphery* – Johannes, Thibaud & Bernhard

The model of the auditory periphery proposed by Plack et al. (2002) has been previously tested on time-frequency masking conditions. Recently, this model was shown to be able to predict most of the time-frequency data collected by the project partners in 2010. In this previous study, the time-frequency masking kernel for a Gaussian masker at a frequency of 4 kHz and a sensation level of 60 dB was measured. The model was thus used to simulate the time-frequency masking kernels for a wide range of masker frequencies and levels. The model and simulation results will be presented.

**Presentation 4:** *A fast and efficient protocol for measuring time-frequency masking kernels* –

Johannes, Thibaud & Bernhard

To assess the validity of the simulated masking kernels, an experiment has to be performed. Since measuring all conditions (4 masker frequencies x 2 masker levels x 6  $\Delta T$  x 8  $\Delta F$ ) using the traditional 3AFC method is very time consuming, a recently-introduced fast threshold measurement method will be used: The single-interval up-down procedure [Lecluyse & Meddis, 2009]. The general method will be presented and discussed.