

Remote analysis of human voice –  
case study of SaaS and test  
deployment in NGI/EGI  
**Tomáš Kulhánek**

Academy of Performing Arts

Institute of Pathological Physiology, First Faculty  
of Medicine, Charles University in Prague

CESNET z.s.p.o.

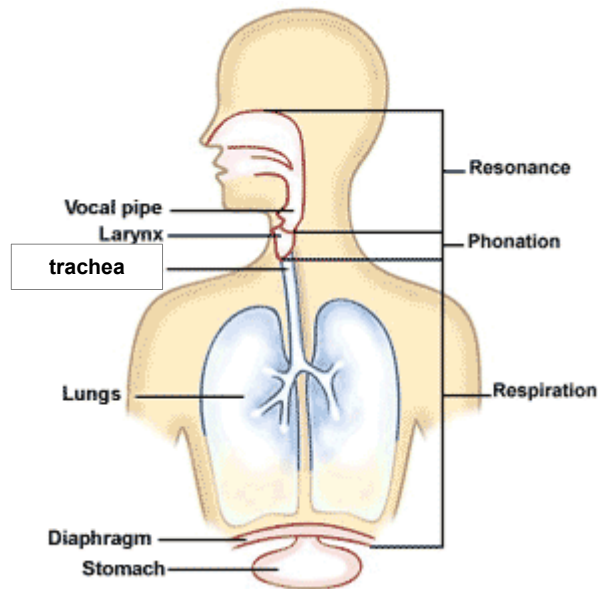
- Workshop question
  - Who plays (used to play) musical instruments or sings
  - Who never played or thinks that he doesn't have talent for it

# What we do

- Academy of performing arts – Musical acoustic research centre (~7 people)
- Voice Science
  - support ORL, support voice pedagogy, acoustic & psychoacoustic research ...



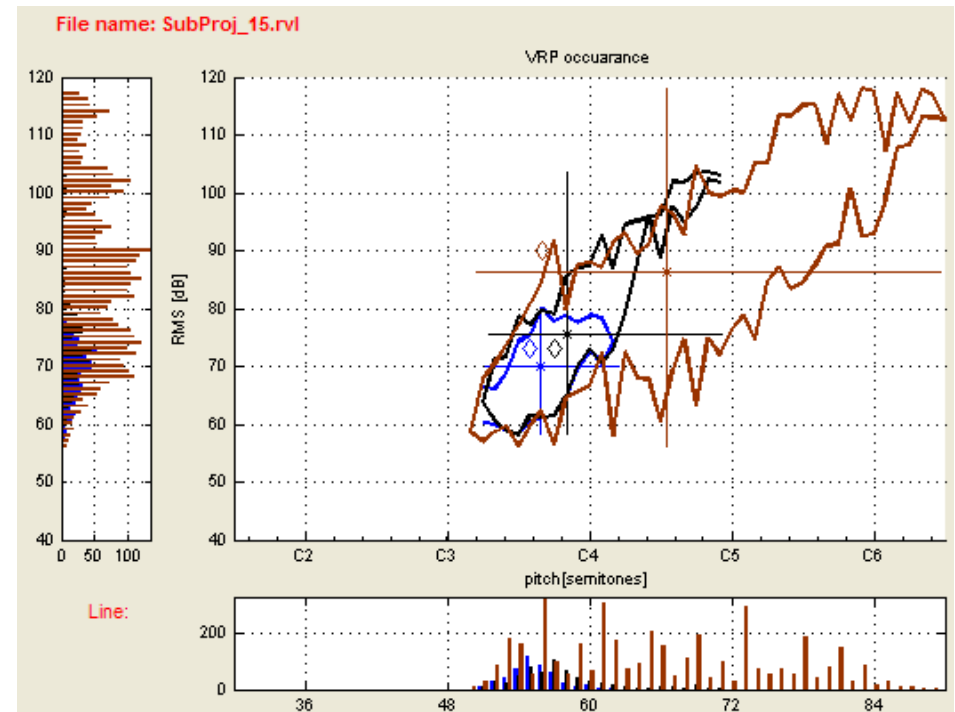
# Voice science



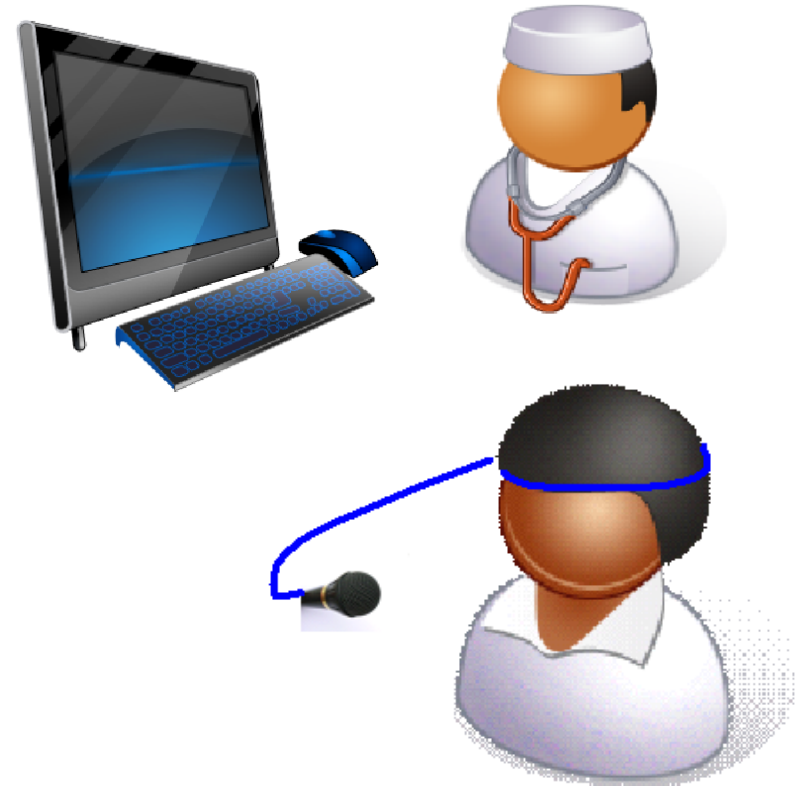
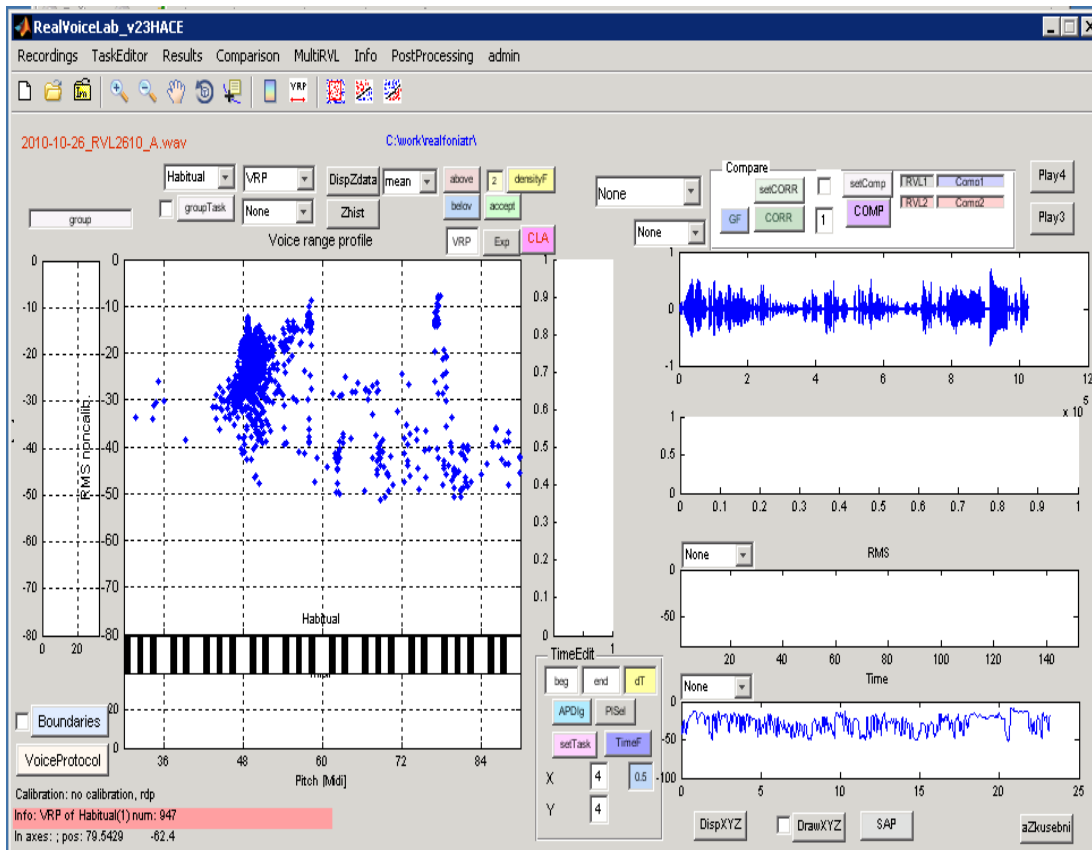
- Sound waves
- Breathing
- Phonation – anatomy of larynx, physiology of phonatory control
- Production & perception of voice ...
- ...

# Voice science – sound waves

- Voice analysis → Voice range profile (VRP)
- noninvasive
- Maximum and minimum intensity levels across the vocal range
  - Normal speech
  - singing
- phoniatic examination, voice professional training

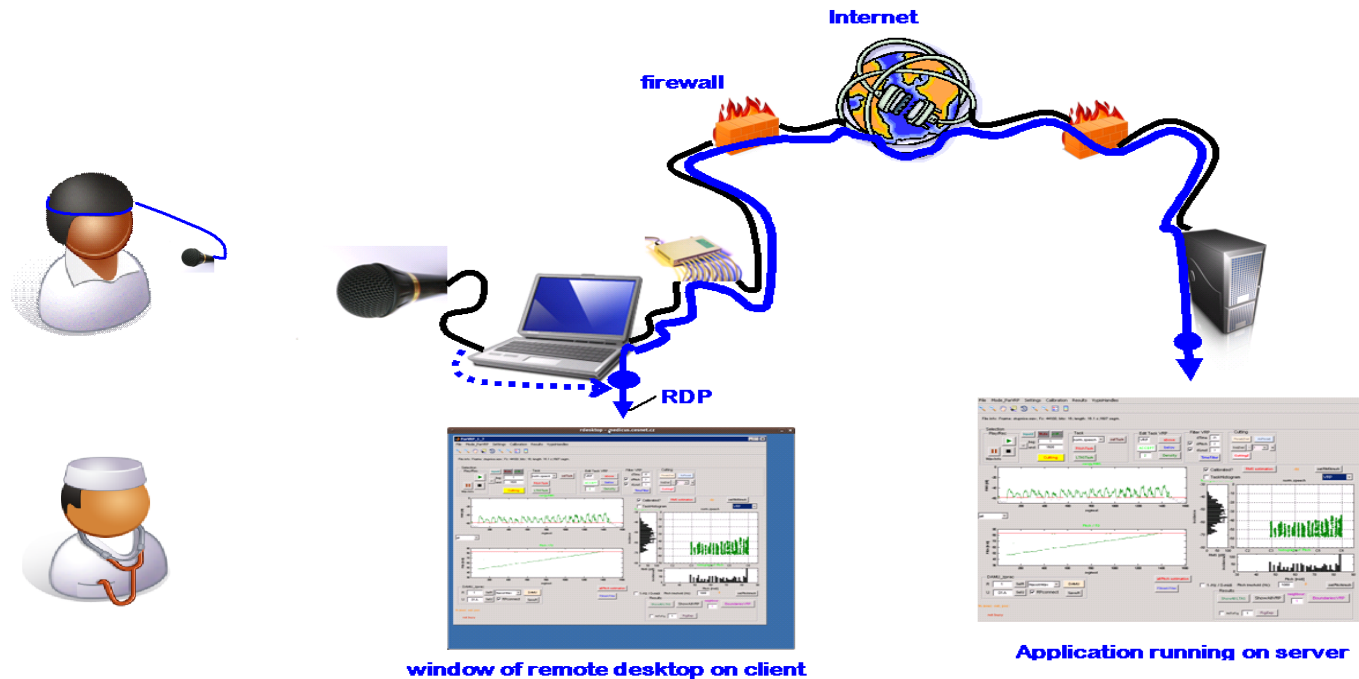


# Real time voice analysis



# How we do it remotely?

- Application in MATLAB, remote desktop, Customized RDP protocol
- VM in cluster for clinical users – VM in MetaCloud for scientific users
- Voice analysis as a Service



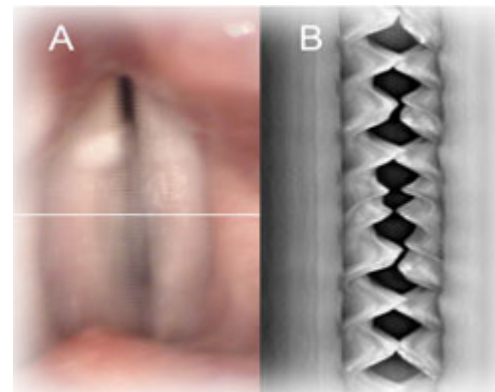
# What is it good for?

- Metric for disorders & therapy effect
- Metric for voice training
- Workshop introduction
  - Overblown flute therapy
  - ORL – centre of treatment of voice disorders



# Voice science - phonation

- Laryngoscopy
- **Videokymography**
  - Standard video 50 /s
  - High speed row 8000 /s
  - ~ 1-5MB/s
  - 1994 Jan G. Švec and Harm Schutte, low-cost, high-speed imaging method
- Videostroboscopy
- High speed laryngoscopy
  - 100-500 MB/s



# Voice science - challenge for future / with grid/cloud

- Analysis of sound - VRP
- Analysis of videokymography
  - current research - automatic detection of abnormalities
- Analysis of high speed laryngoscopy
  - GB per record ~ 1 hour to watch
- Psychoacoustic perception tests
- Breathing measurements
  - analysis of chest movement

# Voice science & grid/clouds - open questions

- Access to application for clinical (not scientific) users
  - Payment / license policy
  - Seamless migration between scientific & commercial grid/cloud providers (OCCI ...)

# Thank you!



**AMU = DAMU + FAMU + HAMU**  
AKADEMIE MÚZICKÝCH UMĚNÍ V PRAZE  
ACADEMY OF PERFORMING ARTS IN PRAGUE

