

# Multi – Level System of Voice Biometrics

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# About Speech Technology Center

Leading provider  
of speech technologies  
and security equipment

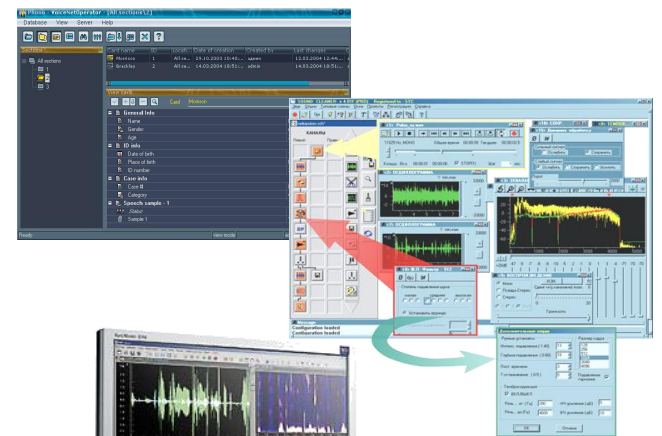
- ➔ Founded in 1990
- ➔ International ISO-9001:2000 certificate
- ➔ Member of International Biometric Society
- ➔ All proprietary technologies are patented
- ➔ Hardware units are CE/FCC certified
- ➔ Over 250 employees, 23 PhD
- ➔ Client base in over 60 countries



# Our Solutions

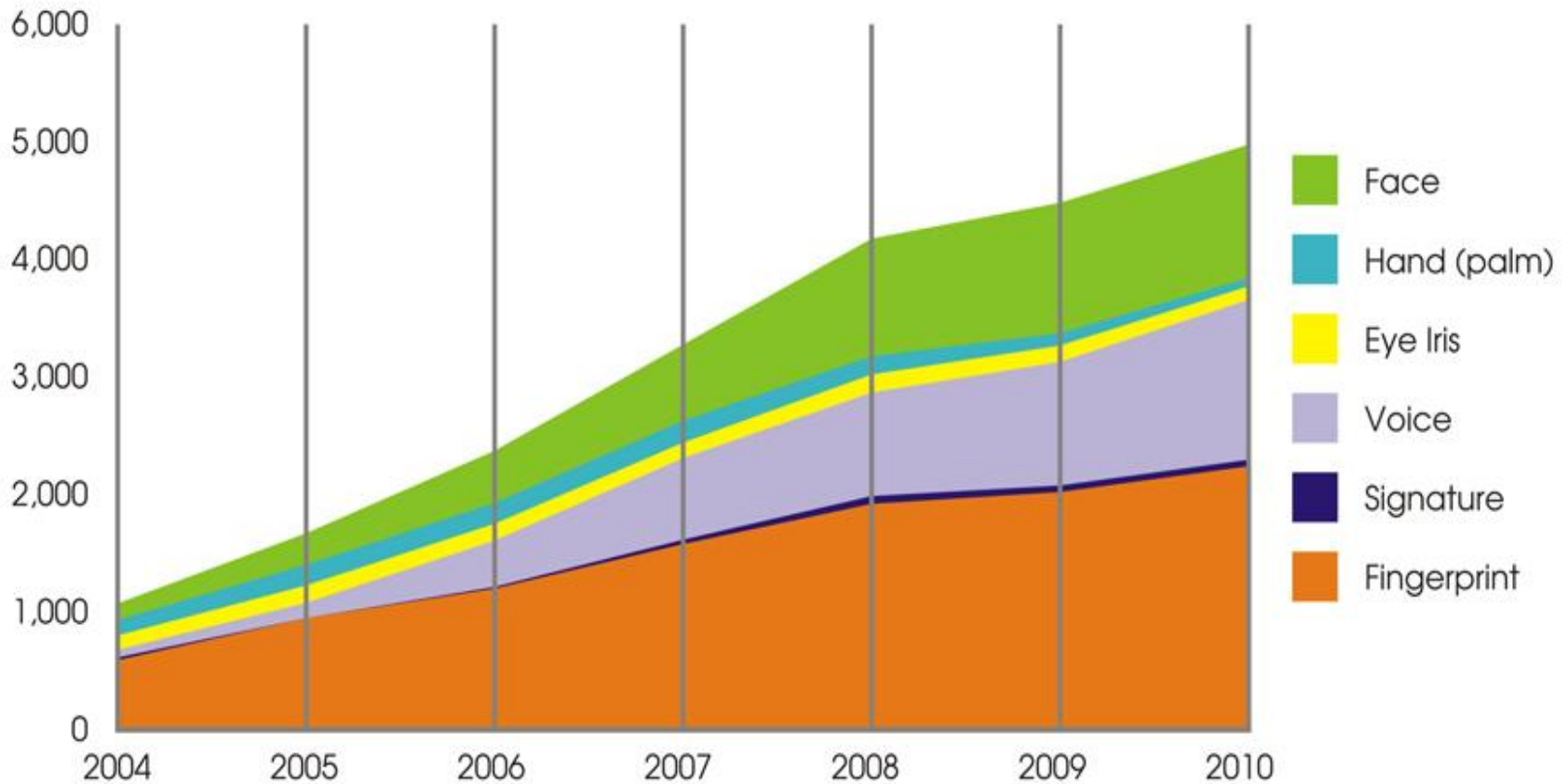
Comprehensive product line for government agencies and corporate clients:

- ➔ Voice Recording
- ➔ Noise Cancellation
- ➔ Biometric Voice Verification and Identification
- ➔ Forensic Audio Analysis
- ➔ R&D projects



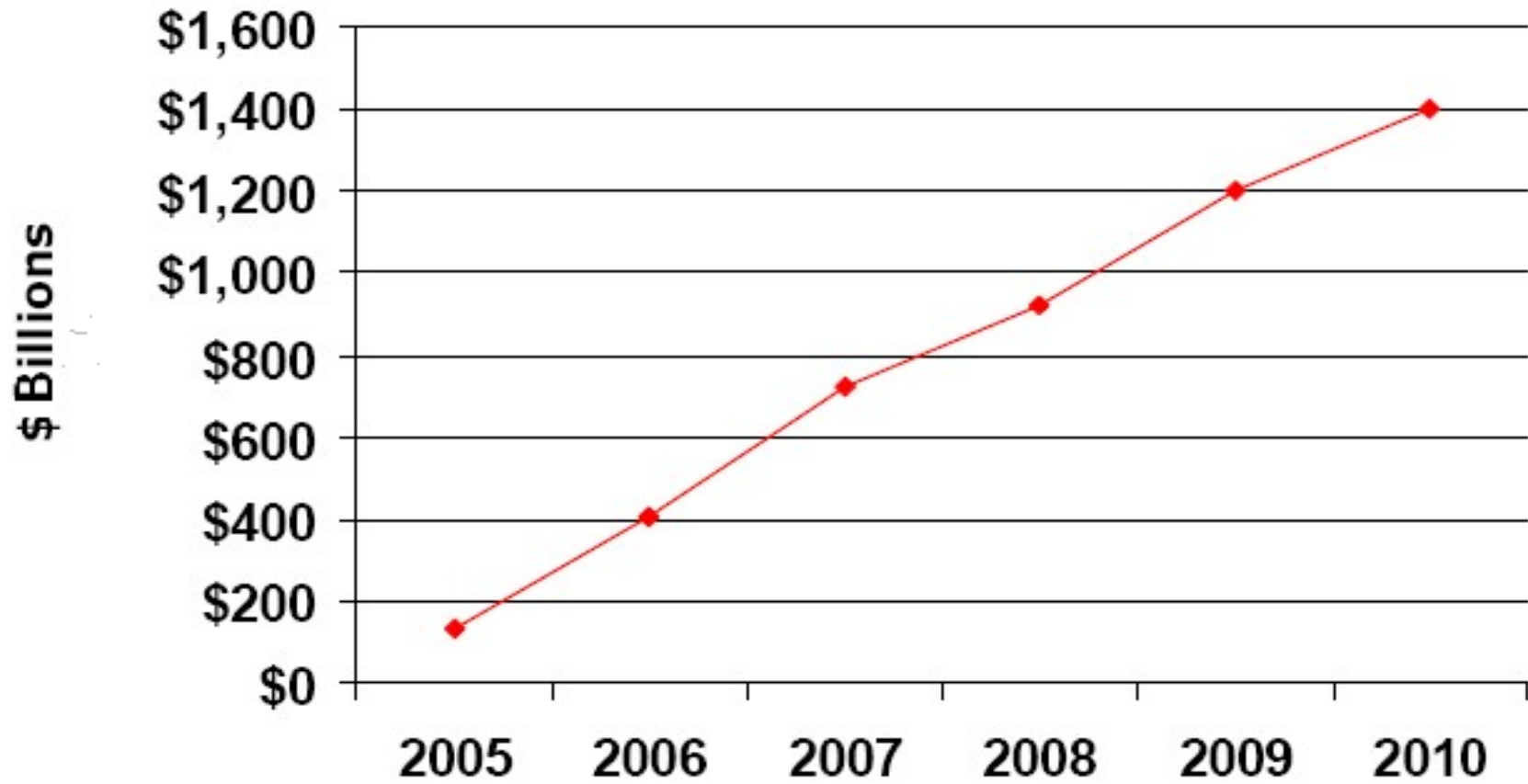
# Biometric Systems Demand Growth

materials from the reports of Dan Miller,  
Senior Analyst, Opus Research



# Voice Biometrics – Voice Patterns Analysis

materials from the reports of Dan Miller,  
Senior Analyst, Opus Research



# Voice Biometrics in LEA and Police

Speech is the major way of communication in all fields of the human activity



Speech allows to combine communication and identification procedures

Speech



Using speech we can identify the person without any direct contact with him





# Biometric Audio Analysis Systems Tasks



## Search

- ➔ Investigation units
- ➔ Preliminary investigation agencies

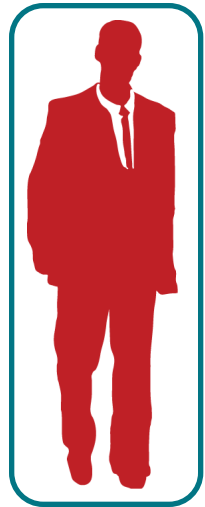


## Identification

- ➔ Audio Forensic Experts Departments

# Search Tasks

Wanted Criminal



*Individual voice patterns*  
*Anthropometric parameters*  
*Gender*  
*Age*  
*Accent or dialect*  
*Nationality*  
*Place of residing*

Suspected Persons



Minimizing the list of suspected persons



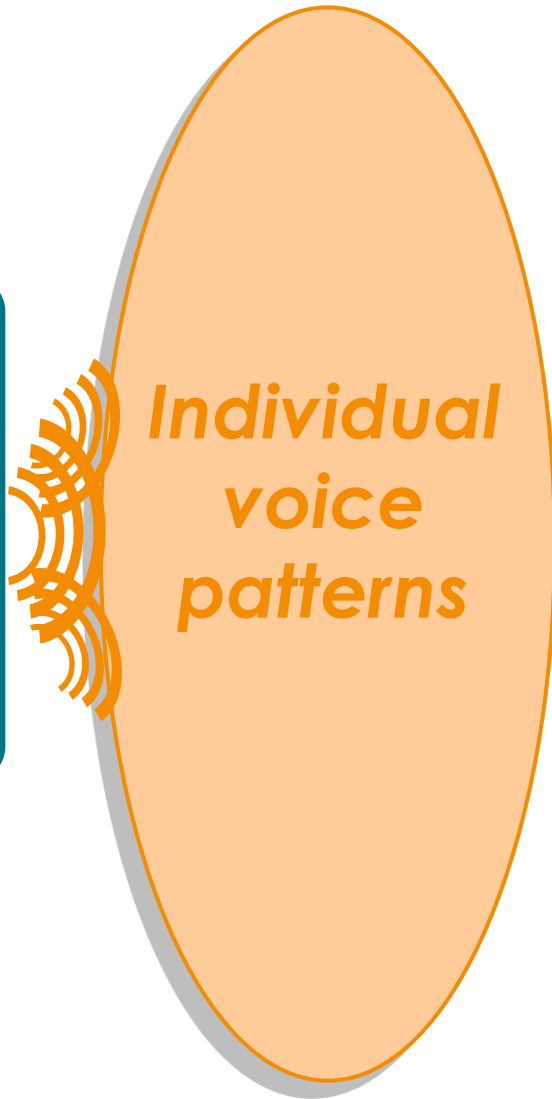
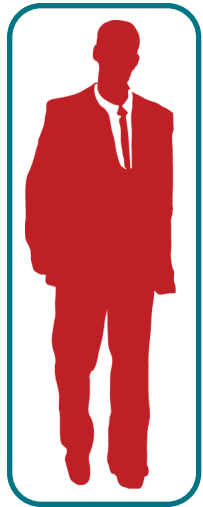
Criminal Profiling





# Identification Tasks

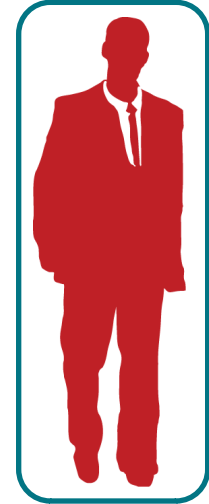
Wanted Criminal



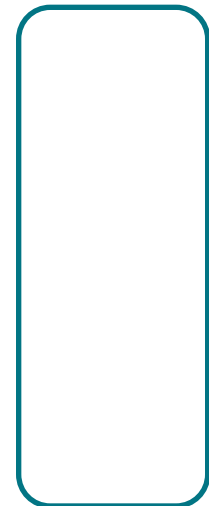
Suspected Persons



Guilty



Innocent



# Multi – Level System of Voice Biometrics

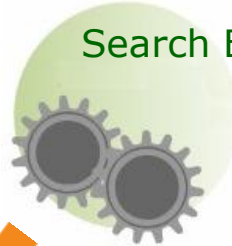
Automatic Speaker Search



Database of Suspected Persons



Search Engine



Criminal Voice Recording



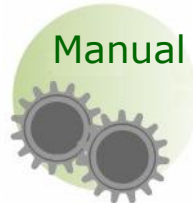
Forensic Audio Analysis

and Speaker Identification

Minimized list of Suspected Persons



Manual Analysis



Criminal Voice Recording



Guilty

Innocent



Automated Speaker Identity Diagnosis

Criminal Profiling



Diagnosis Engine



Criminal Voice Recording



# VoiceNET – Automatic Speaker Search

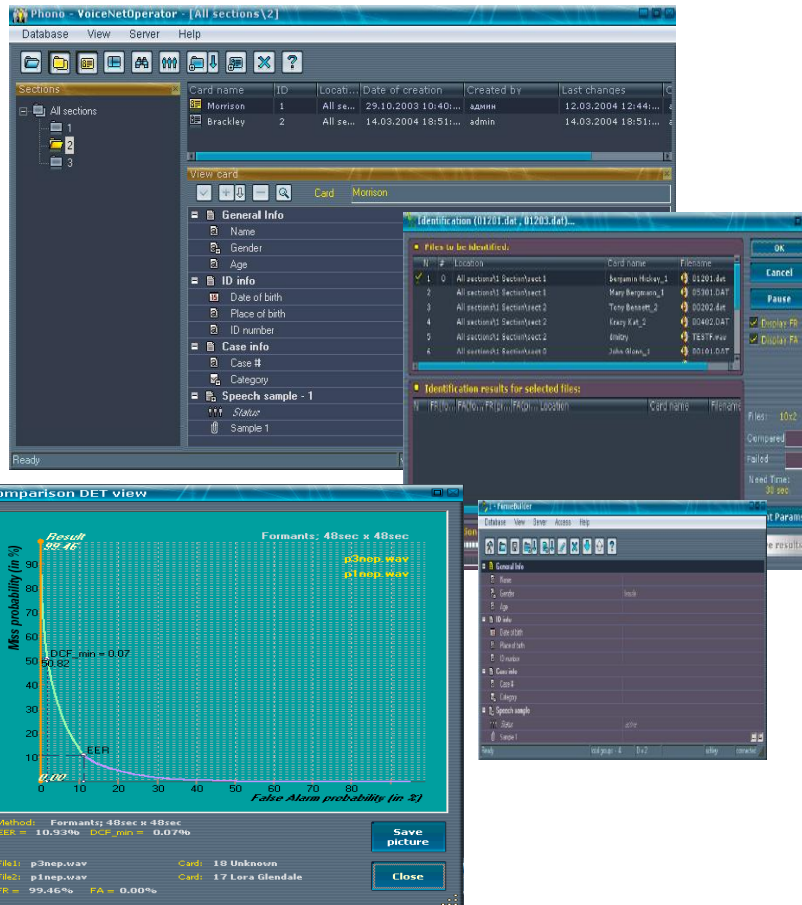
**VoiceNet** is a system intended for automatic speaker search.

**VoiceNET** is widely used by

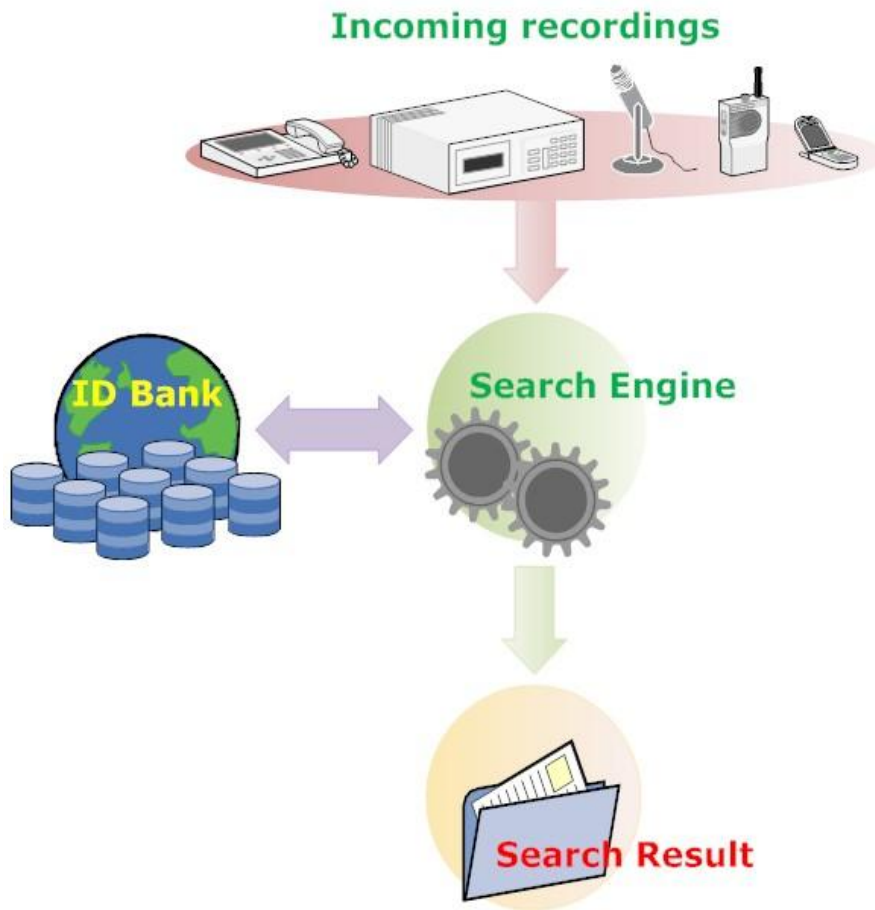
- ➔ Police and Law Enforcement
- ➔ Crime Investigation
- ➔ Audio Forensic departments

**VoiceNET**

- ➔ minimises the list of suspected persons
- ➔ results are used for further forensic audio analysis



# VoiceNET Work Scheme



**VoiceNet** automatically compares “speaker cards” of database (suspected) and “unknown” (wanted) speakers.

“**Speaker card**” -

individual biometric patterns of speaker’s voice necessary for identification.

**VoiceNET** gives a result of match probability with each certain speaker.

# VoiceNET Highlights

- ➔ Fully automated. Easy and handy usage
- ➔ Supports all file formats (mono, stereo, wav, mp3, etc.)
- ➔ Works with natural spontaneous speech
- ➔ Works with poor quality recordings
- ➔ Language independent
- ➔ Requires minimum of recording duration
- ➔ Provides high level of search reliability
- ➔ Uses 3 methods of analysis (Formant, Pitch, GMM)
- ➔ High speed of search
- ➔ High system scalability

# IKAR Lab – Forensic Audio Analysis



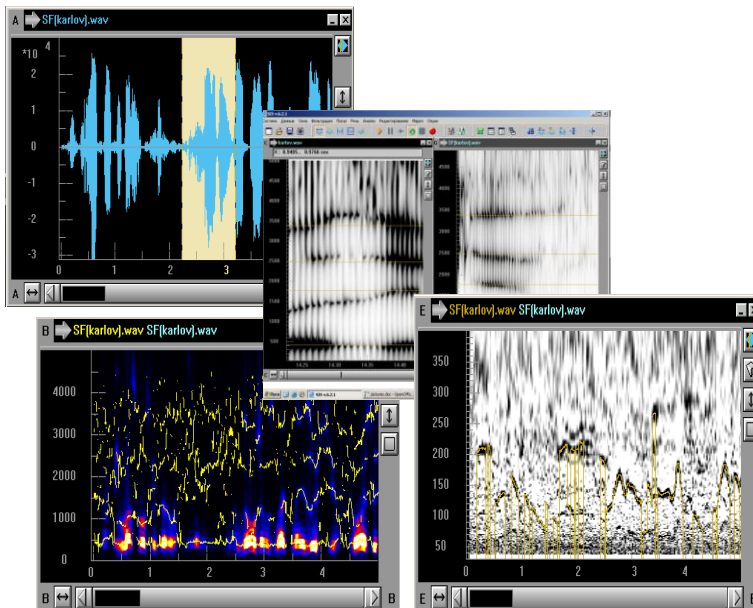
**IKAR Lab** is intended for forensic audio analysis and speakers identification.

Provides a complex approach:

- ➔ Input/Output, Visualization, Editing
- ➔ Different types of audio analysis
  - ➔ Instrumental
  - ➔ Auditory – Linguistic
  - ➔ Psychological
- ➔ Noise cancellation
- ➔ Record authentication

**IKAR Lab is**

- ➔ An indispensable tool for forensic audio examinations
- ➔ Used in a large number of forensic labs of the world





# Region - automated speaker identity diagnosis

The screenshot displays the Region software interface. On the left, a tree view shows the software's structure, including 'ГЛАСНЫЕ' (Vowels) and 'ДИФТОНГИ' (Diphthongs). The main window is divided into several panes: a list of phonetic features with their IDs and resolutions, a map of Russia with colored regions, and audio waveforms for 'Sound Mark v.2.00. russia\_01.wav'. A table on the right lists various phonetic features and their corresponding regions.

Название признака	ID	Решение
Чрезмерно закрытый задний...	1	ГЛАСНЫЕ ЧУДА
Более открытый и подтянутый...	2	ГЛАСНЫЕ ЧУДА
[и] с [а] [обручен] и более...	3	ГЛАСНЫЕ ЧУДА
Более закрытый и смещенный...	4	ГЛАСНЫЕ ЧУДА
Чрезмерно закрытый [а] [обру...	5	ГЛАСНЫЕ ЧУДА
Более закрытый и/или более...	6	ГЛАСНЫЕ ЧУДА
Более закрытый и подтянутый...	7	ГЛАСНЫЕ ЧУДА
Более открытый и смещенный...	8	ГЛАСНЫЕ ЧУДА
Отсутствие и образования пере...	9	ГЛАСНЫЕ ЧУДА
Липализированный гласный [о]...	10	ГЛАСНЫЕ ЧУДА
Слова с отсутствием историческ...	11	ГЛАСНЫЕ ЧУДА
Продвинутый вперед [а] [и] и...	12	ГЛАСНЫЕ ЧУДА
Нерасширенный [а] [и] и [и]...	13	ГЛАСНЫЕ ЧУДА
Смещенный по ряду вперед [а ]...	14	ГЛАСНЫЕ ЧУДА
Смещенный по ряду вперед [а ]...	15	ГЛАСНЫЕ ЧУДА
Более открытый и смещенный...	16	ГЛАСНЫЕ ЧУДА
Чрезмерно закрытый артезиан...	17	ГЛАСНЫЕ ЧУДА
Смещенный по ряду вперед [а ]...	18	ГЛАСНЫЕ ЧУДА
Продвинутый вперед [а ] после...	19	ГЛАСНЫЕ ЧУДА
Более закрытый и смещенный...	20	ГЛАСНЫЕ ЧУДА
Более закрытый [а ]	21	ГЛАСНЫЕ ЧУДА
Смещенный по ряду вперед [а ]...	22	ГЛАСНЫЕ ЧУДА
Гласный переднего ряда [е] и...	23	ГЛАСНЫЕ ЧУДА
Гласный [е] [и] вместо [а ] после...	24	ГЛАСНЫЕ ЧУДА
Гласный [е] вместо [а ] после...	25	ГЛАСНЫЕ ЧУДА
Чрезмерно открытый артезиан...	26	ГЛАСНЫЕ ЧУДА
Более открытый и смещенный...	27	ГЛАСНЫЕ ЧУДА
Смещенный по ряду назад [а ]...	28	ГЛАСНЫЕ ЧУДА
Более закрытый и/или более...	29	ГЛАСНЫЕ ЧУДА
Более закрытый гласный [а ] в...	30	ГЛАСНЫЕ ЧУДА
Закрепленная лабиализация [о ]...	31	ГЛАСНЫЕ ЧУДА
Более открытый [а ]	32	ГЛАСНЫЕ ЧУДА
Более открытый [а ]	33	ГЛАСНЫЕ ЧУДА

**Region** is intended for automated speaker identity diagnosis.

**Region** allows to receive info about:

- ➔ Anthropometric characteristics
- ➔ Age, Gender
- ➔ Accent or dialect
- ➔ Nationality, Places of long residing

**Region** is used in Crime Investigation departments.

**Region**

- ➔ Minimizes the list of suspected persons
- ➔ Greatly helps investigation to find criminals

- ➔ Accurate and reliable identity diagnosis
- ➔ Works with poor quality recordings
- ➔ Easy, intuitive, handy usage
- ➔ Text and language independent
- ➔ Can be developed for any language group

Thank you for your attention!

[WWW.SPEECHPRO.COM](http://WWW.SPEECHPRO.COM)

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