Verint Verba Collaboration Compliance Platform

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Speech Analytics Guide

The system offers speech transcription and phonetic search to allow searching in voice conversations. Refer to the corresponding guides to understand the capabilities, language support, limitations and license requirements for each.

- Speech transcription
- Scribe - transcription for trader voice
- Phonetic search

The following table provides a brief overview of the options:

<table>
<thead>
<tr>
<th></th>
<th>Speech Transcription</th>
<th>Scribe / Transcription for Trader Voice</th>
<th>Phonetic Search</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Large Vocabulary Continuous Speech Recognition (LVCSR)</td>
<td>Large Vocabulary Continuous Speech Recognition (LVCSR)</td>
<td>Phonetic Indexing</td>
</tr>
<tr>
<td>Languages</td>
<td>48 languages</td>
<td>English</td>
<td>English-GB, English-US</td>
</tr>
<tr>
<td>Recognize persons, product, and company names with good accuracy</td>
<td>Yes, with limitations*</td>
<td>Yes, with limitations*</td>
<td>Yes</td>
</tr>
<tr>
<td>Trained for financial services</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Storage requirement</td>
<td>Small, compressed text file</td>
<td>Small, compressed text file</td>
<td>Index files are about the same size as media files</td>
</tr>
<tr>
<td>Recognition/Indexing time</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Fast</td>
</tr>
<tr>
<td>Search</td>
<td>Very Fast</td>
<td>Very Fast</td>
<td>Moderate**</td>
</tr>
<tr>
<td>View context</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Text analytics</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Requires 3rd party servers</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

* Might require phonetic boosting or language customization

** The system can search for pre-defined phrases automatically during indexing and the system is caching search results to make searching faster
Speech transcription

Overview

Speech transcription automatically creates a searchable, exportable full-text transcript of the audio portion of the recorded conversations. This allows users to identify, investigate and correct compliance and policy breaches.

- Installing transcription
- Configuring and running transcription
- Exporting transcripts
- Searching and viewing transcripts
- Improving transcription accuracy

Supported languages

Currently, the Verint Speech Transcription Engine supports the following languages-accent:

<table>
<thead>
<tr>
<th>Language</th>
<th>Language</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabic-BH</td>
<td>Arabic-EG</td>
<td>Arabic (Gulf)</td>
</tr>
<tr>
<td>Arabic (Levantine)</td>
<td>Azeri</td>
<td>Bengali</td>
</tr>
<tr>
<td>Cantonese</td>
<td>Catalan</td>
<td>Czech</td>
</tr>
<tr>
<td>Danish</td>
<td>Dutch</td>
<td>English-AU</td>
</tr>
<tr>
<td>English-GB</td>
<td>English (Hong Kong)</td>
<td>English-IN</td>
</tr>
<tr>
<td>English-MY</td>
<td>English-ZA</td>
<td>English-SG</td>
</tr>
<tr>
<td>English-US</td>
<td>French-CA</td>
<td>French-FR</td>
</tr>
<tr>
<td>Georgian</td>
<td>German</td>
<td>Hebrew</td>
</tr>
<tr>
<td>Hindi</td>
<td>Indonesian</td>
<td>Italian</td>
</tr>
<tr>
<td>Japanese</td>
<td>Kannada</td>
<td>Kazakh</td>
</tr>
<tr>
<td>Korean</td>
<td>Malayalam</td>
<td>Mandarin</td>
</tr>
<tr>
<td>Polish</td>
<td>Portuguese-BR</td>
<td>Portuguese-PT</td>
</tr>
<tr>
<td>Russian</td>
<td>Slovak</td>
<td>Swedish</td>
</tr>
<tr>
<td>Spanish-SA</td>
<td>Spanish-SP</td>
<td>Tagalog</td>
</tr>
<tr>
<td>Tamil</td>
<td>Telugu</td>
<td>Thai</td>
</tr>
<tr>
<td>Turkish</td>
<td>Ukrainian</td>
<td>Urdo</td>
</tr>
</tbody>
</table>

Some languages may need additional LAC boosting, depending upon the industry and locale. For more information, please contact us.

Transcription process

The following figure provides an overview of the transcription process.
1. Administrator configures the data processor and the transcription data processing policy.
2. The Verba Speech Analytics Service executes the transcription policy, retrieves the conversation record from the database and reads the related media file located on the storage target.
3. The Verba Speech Analytics Service transcribes the calls using the configured language model in the policy.
4. The Verba Speech Analytics Service stores the a JSON file with word level timestamp information on the storage.
5. The Verba Speech Analytics Service stores the transcript for full text search in the database.
6. During search, the Verba Media Repository Server uses the full text search index in the database. For playback, the system retrieves the media files and JSON file with word level timestamps.
Installing transcription

Dimensioning the server

A recommended Stand-alone Verba Speech Analytics Server Configuration:

4GB RAM + 2GB / language model

2 vCPU + 1 vCPU for every 200 hours of calls transcribed in 24 hours, scaling up to 16 vCPUs

Individual results may vary due to the talk time in recordings, the storage codec and the language model used.

Storage requirement

The transcription only works when the media is stored on SMB storages. If the media has to be stored on a WORM or non-SMB storage, the files should be hosted temporarily on SMB and moved to the final storage target after transcription.

Server Roles

The Verba Speech Analytics Service can be enabled on the following server roles:

- Speech Analytics Server
- Media Repository Server

Do not enable the service on any other server role. If the service is enabled on the Media Repository Server, the service has to be configured to limit the number of simultaneous transcription processes to 1 (Speech Analytics / Transcription / Task Processing Threads Count), this will use 1 core for transcription.

The service may be enabled on multiple servers, in this case, the system will automatically handle the load balancing between servers.

Installation

Step 1 - Copy the language model file to C:\Program Files\Verba\resources\transcription\eliza

Step 2 - In the Verba Web Interface go to System > Servers > Select your Server > Click on the Service Activation tab.

Step 3 - Activate the Verba Speech Analytics Service by clicking on the icon.

Step 4 - Go to System > Servers > Select your Server > Click on the Service Activation tab

Step 5 - Start the Verba Speech Analytics Service by clicking on the icon.

For additional languages, only Step 1 needs to be repeated for the additional languages. The service will detect the new language model within 30 minutes, or you can force the detection by restarting the service.

Creating a Data Processor

Step 1 - In the Verba Web Interface go to Data > Data Processors

Step 2 - In the top right corner click ‘Add new Data Processor’

Step 3 - Name the Data Processor

Step 4 - Select the Speech Transcription for Type

Step 5 - Select Verint for Engine

Step 6 - Click ‘Save’ to save your Data Processor
Configuring and running transcription

This article contains a description of the Speech Transcription Data Management Policy configuration.

A Data Management policy configured with the Speech Transcription action is used for specifying the recorded conversations to be transcribed. Servers running the Verba Speech Analytics Service read the media file from an SMB storage, then store the recorded conversations on their local disk temporarily while transcribing. After the transcript is created, the media files will be discarded, and the transcript files are relocated to the media’s storage location. Each policy you define can be set up for a different language/accent and a set of filters to determine which conversations should be transcribed. These filters are based on the metadata stored in the database for each conversation.

This is a good way to account for differences in languages used for conversations of different locations, groups etc.

Creating a Transcription Policy

**Step 1** - Follow the generic policy creation steps described on the following page: Data management policies

**Step 2** - Select **Speech Transcription** as the action

**Step 3** - Select the **Data Processor**

**Step 4** - Select the **Language** for the transcription

**Step 5** - Select your filters to specify which conversations should be checked by this policy

**Step 6** - Click on **Save**. The policy will run periodically,

| ID* | 10 |
| Name* | Corp Transcription NY site |
| Enabled* | Yes |
| Priority* | 30 |
| Action* | Speech Transcription |
| Data Processor* | Transcription - Verint (Speech Transcription / Eliza) - |
| Language | English (USA) |

Assigning transcription user licenses

Transcription is licensed on a per user basis. You can assign these licenses to roles, by setting the 'Speech Analytics > Transcribe Conversations' checkbox on the role configuration page, or you can assign the built-in Transcription User role. This option is used as the basis of speech search enabled user licensing, calls of users without this setting will not be transcribed.

Running and monitoring the transcription process

The transcription actions are executed by the Verba Speech Analytics Service on the servers where this service is enabled.

The transcription process can be monitored on the Dashboard with a **Background Tasks Widget** or in the list of background tasks in the Verba Web Interface at **System > Background Tasks**.

The **Log files** for the service can be found at (your application path might be different): C:\Program Files\Verba\log\speech-analytics.log
Exporting transcripts

The system allows exporting transcripts in the following ways:

- Running a report
- Exporting
- Using the API

Report

Following the Creating report guide, you can create a Users Speech Transcript Details report containing the transcripts from the filtered conversations.

Export

You can use the Export feature to obtain the media files and the transcripts. The transcript file is a compressed file with VTR extension, containing a plain text file. The text file contains the following fields for each recognized word:

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Value</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>word</td>
<td>the recognized word</td>
<td>hello</td>
</tr>
<tr>
<td>confidence</td>
<td>the confidence level</td>
<td>0.79000000</td>
</tr>
<tr>
<td>speaker</td>
<td>participant recognised</td>
<td>speaker1</td>
</tr>
<tr>
<td>time</td>
<td>time elapsed in seconds</td>
<td>189.35000000</td>
</tr>
<tr>
<td>duration</td>
<td>length of the word in seconds</td>
<td>0.50000000</td>
</tr>
</tbody>
</table>

API

It is possible to integrate an external application to retrieve a transcription file using the HTTP Business API. The Get Call Information API call can return either a plain text file or the transcription format, depending on the call.
Searching and viewing transcripts

Full-text search

In the Verba Web Interface under Conversations, you can search for words or phrases mentioned in the transcribed conversations. The search results will be highlighted in the transcript and in a small window of context will be shown in the results as well. You can find more in the Searching in IM conversations and voice transcripts article.

Playback

During the playback, the portion of the transcript corresponding to the currently played part of the media will be automatically highlighted. Clicking on a word on the transcription will jump the playback to the corresponding part of the media, and start the playback.

Automatic labeling rules

You can use the Automatic labeling to add labels based on transcripts. You can create an automatic labeling rule based on your current search by clicking on the "Create labeling rule from these" link. The text search query will be copied as filtering criteria to a newly created Label Rule. The filtering criteria for searching in IM conversations, SMS and voice transcripts is Text Search.
Improving transcription accuracy

This article is a guide on the possible ways of improving the recognition rate of the transcriptions. Speech transcription engine uses a language model that describes the spoken language acoustically and linguistically. There are two options for improving the generic language model: language and accent customization (LAC) and phonetic boosting.

Language and accent customization (LAC)

The language and accent customization is a professional service that focuses on the acoustic characteristics of the language model. It takes into consideration specific environmental and spoken elements, such as background noises, organization scripts or language patterns. For this process, it is necessary to collect audio.

Please contact us for further details.

Phonetic boosting
Phonetic boosting is a fine tuning customization option for the linguistic characteristics. It helps to increase the recognition rate if the transcription system needs improvements with company-specific words. The following actions can be done:

- Expanding the language model vocabulary
  Add terms and phrases that are unique to your business or to an ongoing campaign to boost their recognition by the Speech Engine.
- Boosting recognition of existing terms and phrases
  The most common cause for poor recognition of a term or phrase is the fact that its probability is higher in your field. Changing the weight of an existing term or phrase increases its probability, changing its impact on the Speech Analytics results.
- Suppressing a competing phrase
  An incorrect transcription of a term or phrase causes it to compete with the “correct” transcription. With Phonetics Boosting, you can suppress the incorrect phrase by decreasing its band probability.
- Supplementing pronunciations
  If a term has several pronunciations, adding all the pronunciation variants boosts recognition

Please contact the support service for assistance in phonetic boosting.
Scribe - transcription for trader voice

Overview

Speech transcription automatically creates a searchable, exportable full-text transcript of the audio portion of the recorded conversations. This allows users to identify, investigate and correct compliance and policy breaches. Scribe is an advanced transcription solution specifically created for financial trading. Scribe has language models fine-tuned for trader voice recordings with advanced analytics features to extract information such as key terms, key phrases, quotes, and product classes.

- Installing Scribe transcription
- Configuring and running Scribe transcription
- Scribe analytics

Supported languages

Currently, the Scribe transcription solution supports the following languages-acents:

<table>
<thead>
<tr>
<th>Language</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td></td>
</tr>
</tbody>
</table>

In order to achieve high accuracy customers may need additional customization, depending upon the industry and locale. For more information, please contact us.

Transcription process

The following figure provides an overview of the transcription process using Scribe.
1. Administrator configures the data processor and the transcription data processing policy.
2. The Verba Speech Analytics Service executes the transcription policy, retrieves the conversation record from the database and reads the related media file.
3. The Verba Speech Analytics Service sends the media file to the Scribe transcription container. Once the transcription is complete, the transcription service returns the result in JSON.
4. The Verba Speech Analytics Service stores the JSON file with word-level timestamp and analytics information on the storage.
5. The Verba Speech Analytics Service stores the transcript and analytics information for full text search in the database.
6. During search, the Verba Media Repository Server uses the full text search index in the database. For playback, the system retrieves the media files and JSON file with word-level timestamps and analytics information.
Installing Scribe transcription

Dimensioning the servers running the Scribe Docker containers

Min 2 CPUs and 6 GB RAM.

For more details contact Verba.

Dimensioning the Verba servers running the Speech Analytics Service

No additional resources are required. The service only orchestrates the transcription process, the actual transcription is done on the Scribe containers.

Storage requirements

The transcription only works when the media is stored on SMB storages. If the media has to be stored on a WORM or non-SMB storage, the files should be hosted temporarily on SMB and moved to the final storage target after transcription.

Server Roles

The Verba Speech Analytics Service can be enabled on the following server roles:

- Speech Analytics Server
- Media Repository Server
- Media Repository and Recording Server

Installing and configuring the Scribe containers

Contact support for more information.

Enabling the Speech Analytics Service

Step 1 - On the web interface go to System / Servers / Select your Server / Click on the Service Activation tab.
Step 2 - Activate the Verba Speech Analytics Service by clicking on the

icon.

Step 3 - Go to System / Servers / Select your Server / Click on the Service Activation tab
Step 4 - Start the Verba Speech Analytics Service by clicking on the

icon.

Creating a Data Processor

Step 1 - On the web interface go to Data / Data Processors.
Step 2 - In the top right corner click on the Add new Data Processor link.
Step 3 - Define a Name for the data processor.
Step 4 - Select the Speech Transcription for Type.
Step 5 - Select Scribe for Engine.
Step 6 - Choose the analytics features you want to use. Some features might require additional licenses.

<p>| Enable Speaker Diarisation | Separates the speaker in the transcript |</p>
<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable Gender Classification</td>
<td>Not supported</td>
</tr>
<tr>
<td>Enable Identify Quotes</td>
<td>Identify quotes by creating the IM text of the quotes and identify the product class traded</td>
</tr>
<tr>
<td>Enable Insights</td>
<td>Extracts key terms and key phrases</td>
</tr>
</tbody>
</table>

**Step 7** - Click **Save** to save the data processor.
Configuring and running Scribe transcription

This article contains a description of the Speech Transcription Data Management Policy configuration.

A Data Management policy configured with the Speech Transcription action is used for specifying the recorded conversations to be transcribed. Servers running the Verba Speech Analytics Service read the media file from an SMB storage, then store the recorded conversations on their local disk temporarily while transcribing. The audio files are then sent to the Scribe servers for transcription over HTTPS. After the transcript is created, the media files will be discarded, and the transcript and analytics files are moved to the media’s storage location. Each policy you define can be set up for a set of filters to determine which conversations should be transcribed. These filters are based on the metadata stored in the database for each conversation.

This is a good way to account for differences used for conversations of different locations, groups etc.

Creating a transcription policy

**Step 1** - Follow the generic policy creation steps described on the following page: [Data management policies](#)

**Step 2** - Select **Speech Transcription** as the action.

**Step 3** - Select the **Scribe** data processor.

**Step 5** - Select your filters to specify which conversations should be processed by this policy.

**Step 6** - Click on Save. The policy will run periodically.

![Policy configuration table](#)

Running and monitoring the transcription process

The transcription actions are executed by the Verba Speech Analytics Service on the servers where this service is enabled in combination with the Scribe transcription containers.

The transcription process can be monitored on the Dashboard with a Background Tasks Widget or in the list of background tasks in the Verba Web Interface at **System > Background Tasks**.

The Log files for the service can be found at (your application path might be different):

C:\Program Files\Verba\log\speech-analytics.log
Scribe analytics

The Scribe transcription solution is able to extract additional information from the transcribed text such as key terms, key phrases, quotes, and product classes. The information is stored in standard metadata fields and can be access at various playec in the system. It can be used during search, data management policy configuration, labeling rules, export configuration, etc.

- Enabling analytics for Scribe
- Accessing analytics in search
  - Configuring the conversation list layout
  - Searching
- Analytics in player
  - Transcription tab
  - Analytics tab

Enabling analytics for Scribe

In order to use the analytics capabilities of Scribe, the related features have to be enabled in the data processor configuration, and Scribe Docker containers have to be deployed with the right configuration. Certain features might require additional licenses. For more information contact support. To enable analytics in the data processor configuration, follow the steps below:

Step 1 - On the web interface go to Data / Data Processors.
Step 2 - Select the already existing data processor or add a new one by clicking on the Add new Data Processor link.
Step 3 - Verify the Name for the data processor.
Step 4 - Verify the Type and select the Speech Transcription.
Step 5 - Verify Engine and select Scribe.
Step 6 - Choose the analytics features you want to use. Some features might require additional licenses.

<table>
<thead>
<tr>
<th>Enable Speaker Diarisation</th>
<th>Separates the speaker in the transcript</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable Gender Classification</td>
<td>Not supported</td>
</tr>
<tr>
<td>Enable Identify Quotes</td>
<td>Identify quotes by creating the IM text of the quotes and identify the product class traded</td>
</tr>
<tr>
<td>Enable Insights</td>
<td>Extracts key terms and key phrases</td>
</tr>
</tbody>
</table>

Step 7 - Click Save to save the data processor.

Once the analytics features are enabled, the Verba system will call the Scribe APIs and ask for the additional analytics information. The Scribe Docker containers have to be configured accordingly in order to produce the analytics.

Accessing analytics in search

Configuring the conversation list layout

In order to access the analytics in search, the search layout has to be changed as follows:

Step 1 - On the web interface go to Conversations.
Step 2 - Click on the icon in the top right corner to configure the conversation list layout. This will change the layout for the logged in user only. Administrators can also change the default list layout for all users (only before the users are created).
Step 3 - Select and add the customer metadata fields labeled as Scribe | ...
Step 4 - Click on Save.
Step 5 - Optionally, the appearance of the custom metadata fields can be changed under System \ Metadata Templates. Administrators can define if the metadata field should appear as a column or as a new line in the search grid. The maximum length of the fields can also be defined.
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Searching

Standard metadata search is available for Scribe related analytics:

**Step 1** - On the web interface go to **Conversations**.

**Step 2** - Drill down the **Metadata and Markers** section.

**Step 3** - Under **Metadata fields**, select one of the fields labeled as **Scribe** | ...

**Step 4** - Select the operation and define the filter criteria.

**Step 5** - Press **Search** to execute the query.

Analytics in player

The advanced analytics information is available in the player as well:

<table>
<thead>
<tr>
<th>Information</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key terms</td>
<td>Displayed on the <strong>Transcription</strong> and on the <strong>Analytics</strong> tab. Clicking on the terms, the system highlights all occurrences of the term in the transcript.</td>
</tr>
<tr>
<td>Key phrases</td>
<td>Displayed on the <strong>Analytics</strong> tab.</td>
</tr>
</tbody>
</table>
Quotes are marked on the Transcription tab with a Transcription icon. On mouse over, the IM text of the quote and the identified product class is displayed.

On the Analytics tab, detailed information for all identified quotes is displayed. It shows the timestamp, the IM text of the quote, the product class, and the related original transcript. By clicking on the quote, the player jumps to the beginning of the quote in the recording.

The information is displayed on the Analytics tab under the Quotes section.

Transcription tab

The transcription tab shows the full transcript with speaker separated (when enabled). The speakers are indicated as Speaker 1, Speaker 2, etc.

Analytics tab

The analytics tab shows advanced analytics for the transcription.
Phonetic search

Overview
This guide is for users who want to search in recordings and manage speech analytics.
The Verba Speech Analytics Solution provides ad-hoc phonetic search and categorization of your recorded voice and video conversations.

This solution does not provide transcripts of your recordings, but uses phoneme recognition technology to find phrases that you are searching for.

The following articles provide detailed descriptions about

- Configuring Speech Analytics
- Administration of Search Phrases
- Using Speech Search

Why do I need Speech Analytics?
Searching the audio of your recordings will speed up quality assurance and compliance processes. We have collected a selection of ideas for using speech search as inspiration.

Licensing Speech Analytics
In order to use Verba Speech Analytics you need Speech Analytics User Add-On licenses for each recorded user whose calls will be analyzed.

Please contact your Verba partner or Verba sales in order to obtain the necessary licenses or to request a pilot.

Our per user speech analytics licenses are subject to fair use capacity constraints e.g. max no. of hours audio indexed per day.

Language support
The Speech Search solution currently officially supports US and UK English. We will be adding more languages going forward.
Configuring Speech Analytics

Configuring your Verba Speech Analytics solution

Follow these steps to start using your speech search module:

1. Dimension your Speech Server
2. Configure speech search user rights
3. Configure speech indexes

How speech indexing works

Speech indexing is the foundation of the Verba Speech Analytics solution. The following 3 layered process is used:

- **Indexing**
  - Creates a phonetic index of voice for faster searches (processing runs at speeds *hundreds of times faster* than real time)
  - You can control the creation of phonetic indexes by Configuring speech indexes

- **Search in Indexes**
  - Searches for phrases in the phonetic indexes (searches are done at speeds of *tens of thousands times faster* than real time)

- **Result caching**
  - Stores results in a database cache for even faster retrieval (at speeds of *millions of times faster* than real time)
  - Add phrases to Configuring Phrase Auto Search to make sure results are automatically added to cache for each new call

Actual speed results may vary based on hardware, software environment and usage patterns. See Dimensioning your Speech Server.

Review the concept of **Extended Search** in the Using Speech Search article, as your users will need to understand it, to use effectively.
Dimensioning your Speech Server

Dimensioning rules

The Verba Speech Server is a server role, which can be installed as a

- **standalone** server, or
- **co-located** with a Verba Media Repository (both Express and Enterprise Edition).

Here are a couple of rule of thumbs for dimensioning your Speech Server:

<table>
<thead>
<tr>
<th></th>
<th>Standalone Server</th>
<th>Co-located with a Verba Media Repository (installed within the same Windows Server OS)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of CPU Cores</strong></td>
<td>Provide one CPU core per 30 simultaneous audio calls, but use minimum 2 cores. (E.g. 240 simultaneous calls: 8 CPU cores)</td>
<td>Provide one CPU core per 20 simultaneous audio calls, but use minimum 2 cores. (E.g. 160 simultaneous calls: 8 CPU cores)</td>
</tr>
<tr>
<td><strong>Memory usage</strong></td>
<td>Minimum 4 GB (8 GB or more is recommend)</td>
<td>8 GB or more</td>
</tr>
</tbody>
</table>
| **Impact on disk capacity** | The size of the speech search index is ~10-12 Mbyte / hour (This is up to 2x the size of WAV files using the GSM codec, which means your storage requirements can be up to 3x higher when you are using WAV/GSM.) | You can estimate your speech index storage requirements using the Storage requirements (make sure you select the GSM audio codec). Manage index storage impact by:
  • indexing only what is needed for search
  • deleting indexes that are not needed in the future
  • compromising search result confidence (not recommended - contact support, if you need help with this) |

Reference test result

Here is a reference test result run on a standard Intel server.

**Server configuration**

- 2.4 Ghz Quad Core Intel CPU
- 4 GB RAM 1066mhz DDR3
- Samsung hd502IJ 500GB (not SSD)

**Data input**

- ~22 hours of bidirectional phone calls in WAV/PCM format (~2.5 Gbyte - 1322 minutes)

**Results**

- **Indexing ready in ~10 minutes** - 133x realtime - CPU above 90% (tests on SSD disks showed higher performance)
- **Search ready in ~16 seconds** - 4957x realtime - CPU at 10% due to IO bottleneck (tests on SSD disks showed much higher performance)

In our most optimized server scenarios, we have seen single server indexing performances up to 300x realtime and search results close to ~50,000x realtime.
Configuring speech search user rights

The availability and the level of access to the Speech Analytics module for a Verba user depends on two separate user rights which can be granted by a user with system administrator rights on a per-user basis (With the necessary role settings).

Speech analytics user rights

Speech rights can be configured on the configuration screens of Verba Roles Administration > Roles > <select a role>

- **Speech Search Right** - Allows the use of the speech search feature on the ‘Search’ page
- **Speech Analytics Administrator Right** - Speech Administrators can set up and modify the storage policies which schedule the speech indexing operation, and can also manage the Search Phrase list (add / remove phrases and set up auto search for select phrases)

These user rights are only available in Verba Recording Systems with valid Speech Analytics licenses.

Assigning speech analytics user licenses

Speech analytics is licensed on a per user basis. Each person/user whose calls will be analyzed needs a Speech Analytics User Add-On license.

You can assign these licenses to roles, by setting the ‘Speech Analytics > Indexed User’ checkbox on the role configuration page. This option is used as the basis of speech search enabled user licensing. This setting overrides indexing storage policies, calls of users without this setting will not be indexed and searched.
Configuring speech indexes

Index files that allow fast speech search in recorded media are stored in separate files next to the recordings (see Dimensioning your Speech Server to understand the storage impact of these index files).

You can define the scope of indexing using the standard, built-in Verba Data Retention system. Users with Speech Administrator rights can create and manage the policies to create and delete indexes by using the appropriate page (Speech Search > Data Retention Policies) in the Verba Web interface.

Configuring speech indexing related data retention policies

Follow the steps below to create a new Data Retention Policy for Speech Search indexing:

Step 1 - Open the Verba Web interface and log in with a user that has the ‘Speech Administrator’ right.
Step 2 - From the top menu select Speech Search > Data Retention Policies
Step 3 - In the top right corner click ‘Add new Data Retention Policy’
Step 4 - Fill in the Data retention policy data form according to your requirements. The following list provides details on each setting:
- Name - Choose a name for the new policy.
- Enabled - Set to yes if you want the policy to start functioning right after you save the settings.
- Priority - Higher priority policies get executed first for calls that are selected by multiple policies.
- Action - Choose the action the policy takes for selected calls. This can either be Creating or Deleting Phonetic Indexes.
- Language and Engine - Select the appropriate Language / Indexing Engine. Currently supported languages: English (United States), English (United Kingdom).
- Decrypt encrypted calls - Select this if you want to let the system decrypt formerly encrypted calls for indexing purposes.
- Transcode - Check this if you want the policy to transcode the selected calls.
- Format - This is only available if the previous Transcode option is checked. Select an audio codec from the list you wish to transcode the calls with. The most typical setting is gsm_fr.

Step 5 - Specify your Data retention filtering criteria to select the calls you want the policy to apply to. You can use this section to restrict the scope of indexing to reflect your organization’s policies.
- With the ‘Calls more recent than’ filter you can restrict the policy to only create / delete indexes for the desired time period.
- You can apply more complex filters by enabling one or more call detail record criteria. To do so, click on the ‘+’ button, select the field you want to filter, and type / select your filter. You can add additional filters by clicking the ‘+’ button again and repeating the process.

Step 6 - Once you are done with filling out the settings form, click ‘Save’ to save your policy.
If the Role setting 'Speech Analytics > Indexed User' is not enabled, it will override your retention policies and remove a user's calls from indexing.
Administration of Search Phrases

Search Phrases

The foundation of the Verba Speech Analytics solution is a highly efficient speech search platform. If you have the Speech Administrator right, you can manage phrases to enhance the user experience by configuring Auto Search and Phrase Suggestions.

There are a couple of guidelines to consider when managing phrases:

- **Numeric characters are not allowed** in search phrases (type numbers as words instead).
- **Using longer search phrases** will improve the accuracy of searches, reducing the amount of false hits.

Users with Speech Search right can search and find any phrase they type into search in an ad-hoc manner. **No phrase preconfiguration is required.**

Managing Search Phrases

The following articles will help you work with the above contacts in the web interface:

- List Phrases
- Manage Phrases
- Configuring Phrase Auto Search
- Configuring Phrase Suggestions
List Phrases

Search phrase list and statistics

To view the configured search phrases and some statistics about them, navigate to the phrase list in the Verba web interface Speech Search > Search Phrases.

The list displays the following information about each search phrase:

- **Language** - language is defined for each phrase, needed for multilingual systems
- **Auto Search** - shows whether the phrase is in auto-search
- **Exclude from suggestions** - phrases with this setting will not show up in search phrase suggestions
- **Searches** - the number of speech searches performed where the phrase was included (high number here signals, that the phrase is a good auto-search candidate)
- **Number of hits** - the total number of hits for the phrase since it was added to the list
- **Hit Frequency (%)** - shows the percent of analyzed calls where the phrase is present (multiple hits in the same file are counted multiple times, therefore this might become larger than 100%)
- **Added** - the date the phrase was added to the list
- **Last searched** - the date of the last search where the phrase was included (rarely used old phrases can be purged from the system to free storage and processing resources)
- **ID** - internal phrase ID

Adding New Search Phrases

All search phrases are automatically added to the system when users search in the system.

It is also possible to add new search phrases manually:

- **Step 1** - Log in to the Verba web interface with a user that has the 'Speech Administrator' right (Users with system administrator rights can assign that right).
- **Step 2** - Navigate to the search phrase list using the top menu: Speech Search > Search Phrases
- **Step 3** - Click on the 'Add New Search Phrase' button in the top right corner.
- **Step 4** - Type the phrase you wish to add
- **Step 5** - Select the language. Languages currently available: English (United States), English (United Kingdom)
Step 6 - Check the ‘Auto Search’ option if you want to enable auto search for the phrase.

Step 7 - Check the ‘Exclude from suggestions’ option if you want to exclude this phrase from the auto suggestion list.

Step 8 - Click ‘Save’ to save the phrase. Note that the rest of the fields in the form can’t be filled out manually, those are populated by the system later on.

Under the Speech Search / Manage Phrases menu item, you can add multiple phrases at once.
Manage Phrases

Bulk Phrase Update

Using the tool under the Speech Search / Manage Phrases menu item you can add, update or remove multiple search phrases at once.

Adding multiple search phrases

1. Go to Speech Search / Manage Phrases
2. Select the language you are using in your searches
3. Set Operation to Add/Update
4. Set Auto Search as required (see below)
5. List the phrases (one per line)
6. Click Submit

Enabling Auto Search will make searches very fast for those phrases. This will increase the system load, since the phrase will be searched in every new incoming call.

Removing multiple search phrases

1. Go to Speech Search / Manage Phrases
2. Select the language you are using in your searches
3. Set Operation to Remove
4. List the phrases (one per line)
5. Click Submit

When a phrase is removed, it will not show up in suggestions and auto search information will be deleted, which will make subsequent searches slower.

Adding existing phrases to Auto Search

1. Go to Speech Search / Manage Phrases
2. Select the language you are using in your searches
3. Set Operation to Add/Update
4. Set Auto Search as Add to Auto Search
5. List the phrases (one per line)
6. Click Submit

This will add all listed phrases to Auto Search (it will also create non-existent phrases).
Configuring Phrase Auto Search

Auto Search

Speech administrators can enable auto-search for phrases:

- phrases in auto-search are automatically searched on all new calls
- actual search results are stored in database

This process makes searches for auto-searched phrases very fast.

Configuring Auto Search

Typically Speech Administrators should add most used phrases to auto-search:

- See List Phrases to see how to identify most used phrases
- Add multiple phrases can be added automatically using the Bulk Phrase tool under Manage Phrases
Configuring Phrase Suggestions

Phrase Suggestions

Every time a user is searching for a phrase, it will be automatically added to the global phrase list inside the system. Already used phrases are used for suggestions when a user is defining speech search criteria.

The system provides a couple of safeguards for phrase suggestions:

- by default phrases are suggested only the user who have already used it by typing it in
- phrases added by administrators also become part of suggestions
- administrators have the right to remove phrases from suggestions (e.g. inappropriate words)

Excluding a phrase from suggestions

Search phrases are automatically added to the suggestion system when users search in the system.

You can exclude phrases from suggestions, by following these steps:

1. Log in to the Verba web interface with a user that has the 'Speech Administrator' right (Users with system administrator rights can assign that right)
2. Navigate to the search phrase list using the top menu: Speech Search > Search Phrases
3. Click on the phrase you would like to exclude
4. Check the 'Exclude from suggestions' option
5. Click 'Save' to save the phrase
Using Speech Search

Integrated Speech Search

Speech Search is integrated into the regular Verba search interface:

1. **Speech Search Filters** on the left Search tab allow you to specify phrase based searches
2. **Search Results** show a Confidence column, to show how reliable the results are
3. When you click play on a result, the player shows search phrases directly on the waveform diagram

Understanding Extended Search

The concept of **Extended Search** is vital to understand when working with speech search in Verba.

In order to provide a highly responsive search experience, the search is separated into two steps:

<table>
<thead>
<tr>
<th>Summary</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Initial Results</strong></td>
<td>These are shown every time you press the Search button (with speech phrases included). To achieve faster response times this will only show results from the database:</td>
</tr>
<tr>
<td></td>
<td>• results of previous searches</td>
</tr>
<tr>
<td></td>
<td>• results of auto searches</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Extended Search</strong></td>
<td>When the Initial Results are not sufficient, you can ask the system to do discovers further calls that:</td>
</tr>
<tr>
<td></td>
<td>• have not been searched before or</td>
</tr>
<tr>
<td></td>
<td>• were not in auto search for the phrases in question</td>
</tr>
<tr>
<td></td>
<td>Since this step might take longer, a counter at the top of the results will show you progress.</td>
</tr>
</tbody>
</table>

After performing a Search, the Initial Results are shown in the list to the right and an **Extended Search button** appears above the list.

**Extended Search** takes longer to complete, since it potentially requires processing thousands of speech index files. Therefore, Extended Search is performed as a **background task** with a progress indicator above the
search results. If you leave the search interface and come back (even logout and login later), you will see the updated progress in the Search interface.

During the Extended Search you **can not modify your search criteria**. In order to do that, **Cancel** the Extended Search using the button above the call list and start a new search.

**Limitations of speech search**

Speech search solutions are never 100% accurate. Sound quality and regional language variations impact the actual accuracy of searches.

For all speech search results the system calculates a **Confidence value**. High (>90%) confidence values mean, that the hits are most likely correct.

Always consider this value to determine the success of your search. If you notice a **false hit** there is an option in the Verba player to remove that result from future searches.

Searching for longer phrases will drastically reduce the possibility of false hits.
Speech Search Filters

Using Speech Search

The Speech Search function is integrated into the main Search tool of the Verba web interface. Users who have the 'Speech Search' right are able to see additional search filters on the Verba Search page called 'Speech Search'. Note that if the user performing the search is not a System (or group) Supervisor, they will only be able to search among their own calls, just like with regular searches.

Speech Search related filtering options include the following:

- **Language**: This shows the language of the search phrases you are entering
- **Confidence**: Allows filtering based on the 'Probability' value of the hits (see details on probability below)
- **Search in**: Allows restricting the search to just one party of the call (recorded party, other party or both)
- **All of these keywords**: The search will only return calls where all of the specified keywords are found.
- **Any of these keywords**: The search will only return calls where at least one of the specified keywords are found
- **None of these keywords**: The search will only return calls where none of the specified keywords can be found.

The last three fields can be used together in the same search to form complex search criteria. There is an auto-complete function integrated to allow fast application of previously used keywords.

Make sure **Language** in the search interface is properly set, otherwise phrase suggestions and speech search results will be incorrect.
Speech Search Results

Search results

Speech search results include an additional **Confidence** field, it shows how confident the system is regarding the accuracy of a particular hit. *There is only one confidence value for each call, if there are multiple phrase hits in a call, the highest confidence value will be shown here.*

<table>
<thead>
<tr>
<th>Confidence</th>
<th>Start/DateTime</th>
<th>Duration</th>
<th>Caller Number</th>
<th>Caller Info</th>
<th>Called Number</th>
<th>Called Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>94%</td>
<td>Apr 30, 2014 2:41:23 PM 00:05:23:00</td>
<td>1848</td>
<td>Sharon Harrington</td>
<td>1-800-555-1234</td>
<td></td>
<td>Microsoft Fiscal Year 2014 - Second Quarter Earnings Conference Call</td>
</tr>
<tr>
<td>94%</td>
<td>Apr 30, 2014 2:15:16 PM 01:15:00</td>
<td>1848</td>
<td>Sharon Harrington</td>
<td>1-800-555-1234</td>
<td></td>
<td>Google 2012 Annual Meeting of Stockholders</td>
</tr>
<tr>
<td>93%</td>
<td>Apr 30, 2014 2:30:08 PM 00:56:00</td>
<td>1848</td>
<td>Sharon Harrington</td>
<td>1-800-555-1234</td>
<td></td>
<td>Google Q3 2011 Earnings Call</td>
</tr>
<tr>
<td>92%</td>
<td>Apr 30, 2014 2:44:40 PM 01:45:19</td>
<td>1848</td>
<td>Sharon Harrington</td>
<td>1-800-555-1234</td>
<td></td>
<td>Netflix Q4 2013 Earnings Interview</td>
</tr>
<tr>
<td>92%</td>
<td>Apr 30, 2014 2:43:42 PM 01:00:00</td>
<td>1848</td>
<td>Sharon Harrington</td>
<td>1-800-555-1234</td>
<td></td>
<td>Netflix Q3 2013 Earnings Call</td>
</tr>
</tbody>
</table>

Speech search will only work for calls that have been **indexed**. Indexes are created automatically based on configured **Data Retention Policies**.

Showing search phrases

When performing a speech search and playing the media in the Verba Player (pressing the play button) the system automatically places **markers** in the audio to **highlight the location of the keywords** the user searched for.

The Verba Player will present speech search results tab (the **Ear icon** in the Verba player in two cases:

- **During speech search** - when a speech search is executed the player will only show the keywords used in the search criteria
- **Outside speech search** - when there are no speech phrases in the search criteria, the player will show all stored phrase hits

Removing false hits
From time to time the system might find phrase hits, that are not actually corresponding with the actual search phrases.

If you notice a false hit, click the 'false hit' link next to the phrase marker of every hit.

By pressing this link (twice) the system will remove that hit from your future searches.
Ideas for using speech search

Overview

This article provides some ideas and use cases for the Verba speech search feature. Most used scenarios all revolve around finding certain topics in a particular conversation and identifying sentiments on either party.

Search is a great tool for quality assurance and enables e.g. contact center supervisors to quickly find key points in conversations and provide feedback to agents. Enabling Auto Search for frequently used phrases with greatly increase the speed of searches for those phrases.

Examples of speech search in quality assurance and compliance

The ideas presented here are just the tip of the iceberg. Speech search and analytics requires an ongoing refinement process. The effective techniques are heavily dependent on your field of business.

The following categories represent just a few of the countless scenarios, where your business can benefit from the Verba Recording System with Quality Management and Speech Analytics.

- **Agent evaluations**
  - Proper greetings
  - Compliance message
  - Inappropriate phrases
  - Agent insecurities
- **Voice of Customer**
  - Customer satisfaction
  - Campaign responses
  - Competitors’ names
  - Money back policies
- **Sales Performance**
  - Opportunities for up-selling and cross-selling
  - Identify buying signals
  - Sales delivery

**Agent evaluations**

You can use Verba speech analytics to support your contact center agent evaluation process.

**Proper greetings**

Checking if agents properly greeting your customers:

- "Welcome to <your company name>"
- "Thanks for calling <your company name>"

**Compliance message**

You might want to check if your agents properly inform the customer about recording:

- "Call will be monitored"
- "Call will be recorded"

Verify if your agents are following legal compliance guidelines:

- "Your contract comes with 2 years binding period"
- "Past performance does not guarantee"

**Inappropriate phrases**

Spot rude or inappropriate language quickly and efficiently.

**Agent insecurities**

Certain phrases point to situations where the agent needs more training or better processes:
Voice of Customer

Customer satisfaction

Collect and auto-search phrases that indicate satisfaction and dissatisfaction with your services, like:

- "I am not happy"
- "I would expect better service"

Campaign responses

Your ongoing marketing campaigns will change communication patterns of your customers:

- "Buy One, Get Two" (notice, how numbers are written as text, it is a requirement of the search solution)
- "Complimentary Subscription"

Using this technique your marketing team can get qualitative feedback about campaigns.

Competitors' names

You can learn a lot by listening to what your customers have to say about your competition. If those names are too short, try to put them into relevant phrases that provide good context for the recognizer.

Money back policies

If you want to investigate your money back policies in action, try to create saved searches for:

- money back (might be too short for high accuracy, so you can try longer typical phrases)
- credit on the invoice
- service credit
- reimbursement

Sales Performance

Opportunities for up-selling and cross-selling

Find opportunities by searching for customer needs:

- "My internet connection is slow"
- "My new car" - you might sell insurance

Identify buying signals

Search for buying signals and train agents when opportunities are missed:

- "Before I order, I would like to"
- "Can you go into more details"

Sales delivery

Evaluate how your sales team talks to customers and listen to responses.

Identify typical phrases from your companies pitch and focus on reactions after the pitch is delivered.

- "Is that something you are looking for?"
- "Do you find this information valuable for you?"

You can use Saved Searches in Verba, to easily create reusable queries that focus on multiple phrases. In Q3 2014 we will release functionality that allows you to create and use categories (like Money Back Policy in the example above), that will
automatically classify calls based on your phrases and rules.