# AUTOKPI

Performs speaker-wise sentiment and tonal emotion analysis on call recordings, along with compliance verification against a predefined call structure or rule book.

Manual monitoring of customer service calls is **slow, biased, and inefficient**. This project introduces an automated system that analyzes sentiment and emotion per speaker using diarized audio, while also verifying adherence to predefined call structures. It streamlines quality assurance, ensures compliance, and enhances the overall customer experience.

Our system integrates automated ruleset validation, tonal emotion identification, and diarized sentiment analysis into a single pipeline. In contrast to conventional call analysis techniques that handle the call as a single text block, our method uses audio diarization to differentiate between speakers, allowing for speaker-specific emotional understanding. This multi-layered investigation verifies not only what was said but also how it was stated and whether organizational procedures were followed.
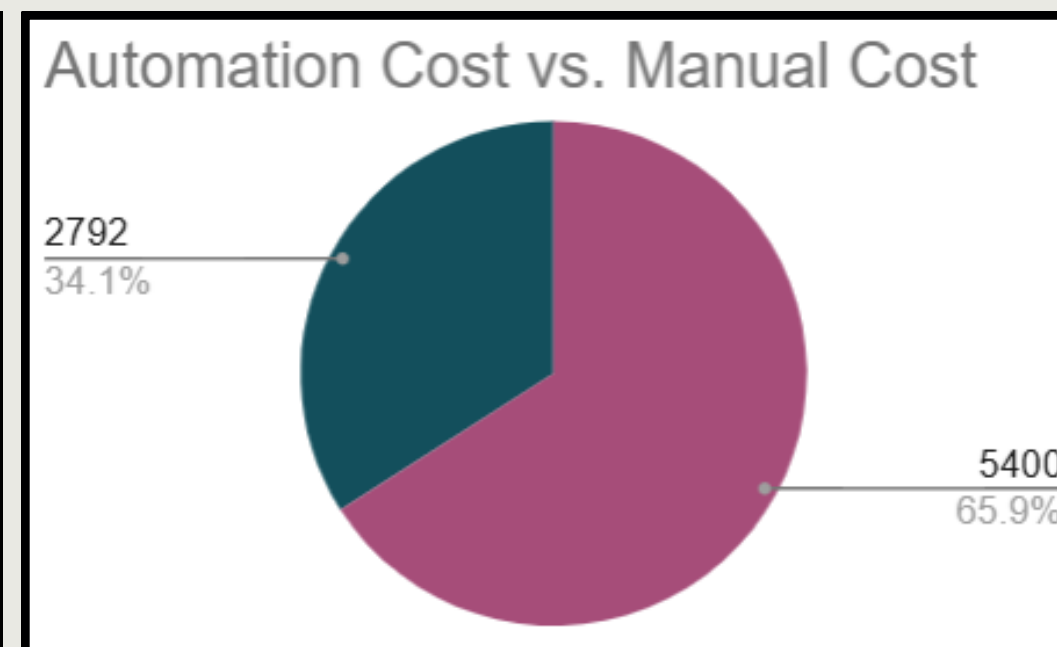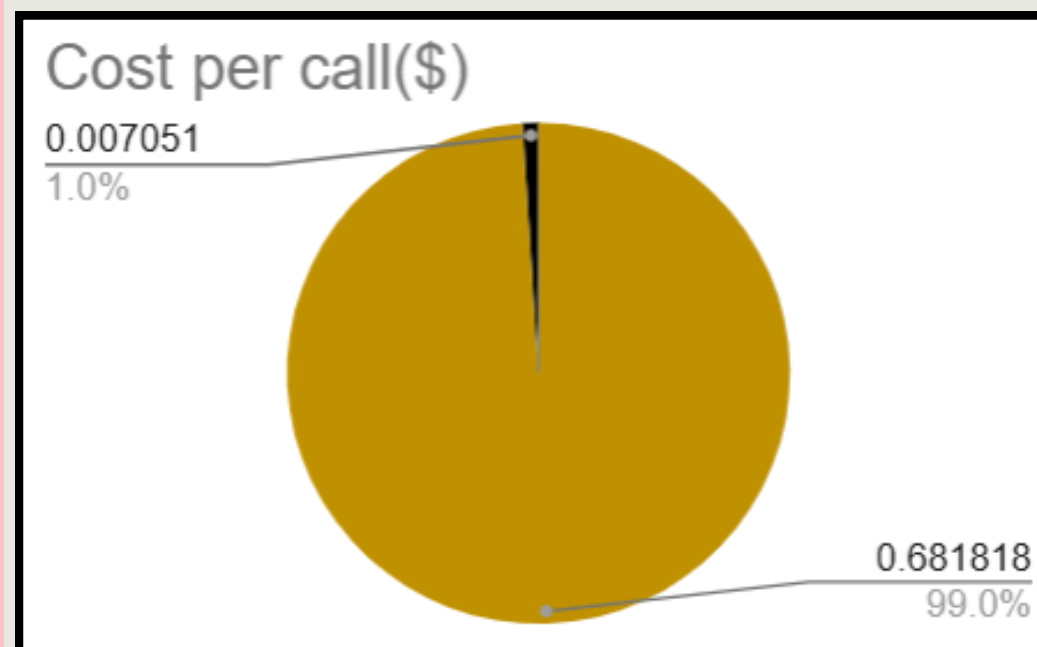
Internal QA Teams

Regulatory/Compliance Teams

Reduced Human Effort

Bias Mitigation

Reduces manual QA effort by 70−90%

Potential to save ~$500K/year

Cost per call($)

0.007051
1.0%

0.681818
99.0%

Automation Cost vs. Manual Cost

2792
34.1%

5400
65.9%

TECHNOLOGIES USED

Speech-to-Text (ASR)	Whisper/Whisper X
Speaker Diarization	WhisperX / pyannote-audio
Sentiment Analysis	CardiffNLP (twitter-roberta-base-sentiment)
Tonal Analysis	HuBERT-based SER (superb/hubert-large-superb-er)
Rule Book Compliance Checking	Mistral-7B (mistralai/Mistral-7B-Instruct-v0.1)
Dense Retrieval	FAISS
Context Building	LangChain
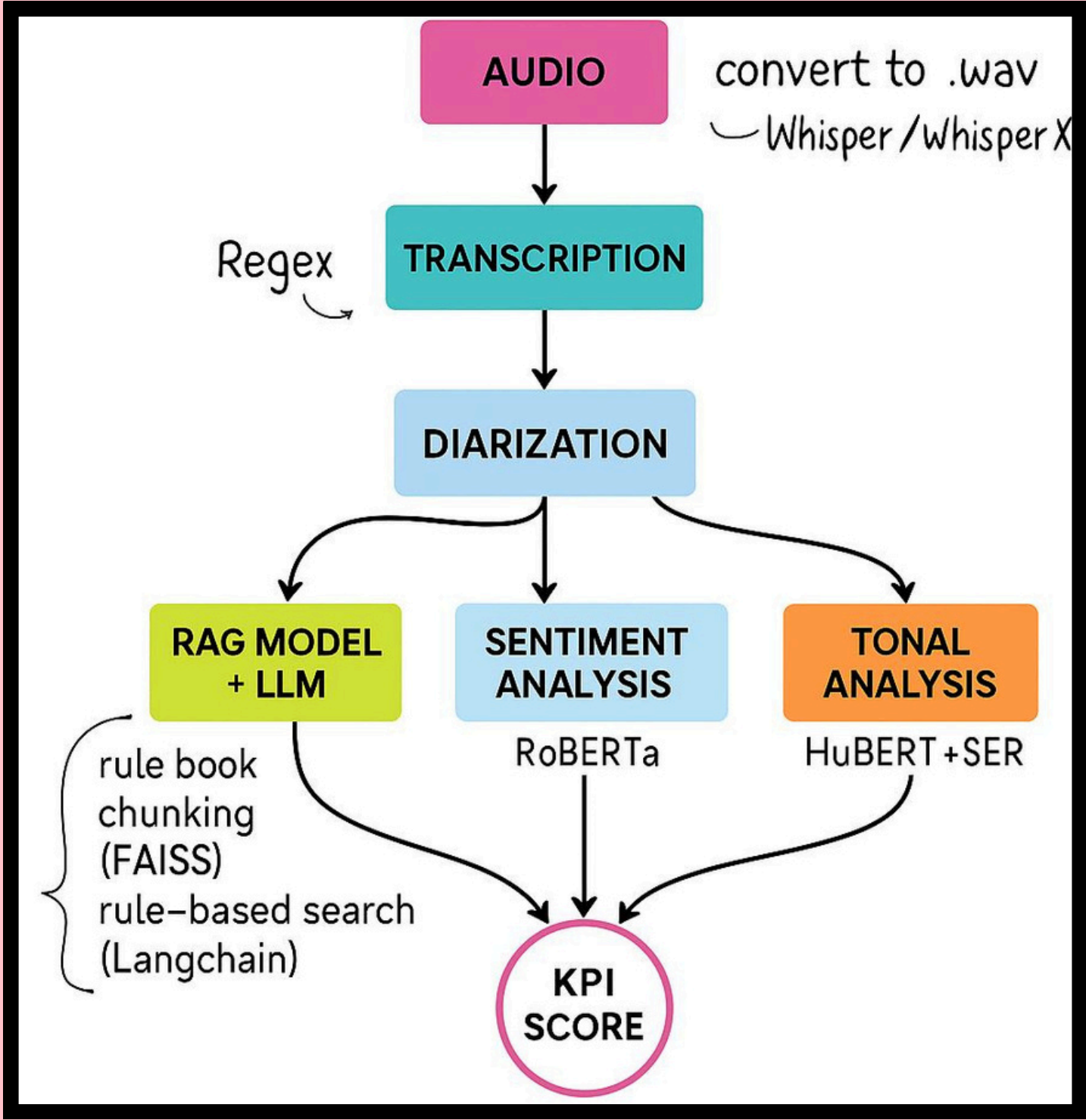
DELIVERABLES AS PER PROPOSAL

Transcription	✓
Sentiment Analysis (Customer & Agent)	✓
Tonal Analysis (Customer & Agent)	✓
Tonal Analysis	✓
Rule Book Compliance Checking	✓
KPI Calculations	✓

What is working well?

Trancription

Diarization

Sentiment Analysis

Tonal Analysis

RAG

Score Calculations

F1 - SENTIMENT

	PredP	PredNeu	PredN
TP	2	1	0
TNeu	0	6	0
TN	0	1	2

POSITIVE:
Precision = 2 / (2 + 0) = 1.00
Recall = 2 / (2 + 1) = 0.6667
F1 = 2 x (1 x 0.6667) / (1 + 0.6667) = 0.8
NEGATIVE:
Precision = 6 / (6 + 2) = 0.75
Recall = 6 / (6 + 0) = 1.00
F1 = 2 X (0.75 X 1) / (0.75 + 1) = 0.8571
NEUTRAL:
Precision = 2 / (2 + 0) = 1.00
Recall = 2 / (2 + 1) = 0.6667
F1 = 2 X (1 X 0.6667) / (1 + 0.6667) = 0.8

AVERAGE F1

=(0.8 + 0.8571 + 0.8) / 3
= 0.819

F1 - TONAL

	PredN	PredNeu
Actual N	6	1
Actual Neu	1	2

AVERAGE F1=0.7618

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Thank You