SOLEDAD DATA SOLUTIONS

INTELLIGENCE AT SCALE

CASE STUDY

Early NLP Integration in Enterprise Telecommunications Customer Service

CLIENT

Confidential Telecom Infrastructure Partner

INDUSTRY

Enterprise Telecommunications

ENGAGEMENT TYPE

NLP Integration / UX Modernisation

CLASSIFICATION

Client Identity Withheld by Agreement

EXECUTIVE SUMMARY

At a pivotal inflection point in enterprise customer service — when text-based interaction was displacing voice as the primary channel — Soledad Data Solutions partnered with a leading telecommunications infrastructure provider to build and deploy an NLP-powered platform that transformed how agents understood, responded to, and learned from customer interactions in real time. The tools implemented were at the frontier of natural language processing, and the foundational work undertaken on this engagement contributed to a lineage of research that would ultimately inform the development of today's large language models.

THE CHALLENGE

A Channel Shift Without Supporting Intelligence

Enterprise telecommunications organisations were in the early stages of migrating their customer service operations from telephony to chat-based support. While text offered scalability advantages, it stripped away the paralinguistic cues — tone, pace, hesitation — that experienced agents had relied upon to gauge customer sentiment during voice interactions.	Without tooling to interpret the emotional and intentional content of text conversations, supervisors and quality assurance teams had no real-time visibility into how interactions were progressing. Escalation risks, dissatisfied customers, and missed resolution opportunities were identifiable only in retrospect — after the conversation had ended.

CHANNEL SHIFT	INSIGHT GAP	RESOLUTION RISK
Voice support transitioning to text-first channels	No tooling to interpret live conversation sentiment	Escalations visible only after conversation closed

OUR APPROACH

Four Disciplines, One Integrated Platform

01

Business Process Assessment

SOLUTIONS ENGINEERING

Soledad's Solutions Engineering team conducted on-site discovery sessions with the client's customer service leadership, QA managers, and frontline agents. The objective was to map the complete lifecycle of a support interaction — from initial customer contact through resolution — and to document the informal heuristics experienced agents applied when assessing conversation tone and escalation risk.

This phase surfaced critical requirements: agents needed unobtrusive, in-interface signals rather than separate monitoring dashboards; supervisors required queue-level sentiment aggregation; and QA teams needed retroactive conversation scoring. These requirements directly shaped the data science approach and the front-end engineering brief.

PROCESS MAPPING	**STAKEHOLDER DISCOVERY**	**REQUIREMENTS DEFINITION**	**UX RESEARCH**
ESCALATION MODELLING			

02

Natural Language Processing & Sentiment Modelling

DATA SCIENCE

Our Data Science team applied two foundational NLP techniques to the challenge of real-time sentiment analysis. Bag-of-Words modelling provided an efficient method for feature extraction from conversational text, enabling rapid classification of message-level tone against a labelled corpus of historical support interactions provided by the client.

Word2Vec embeddings extended this capability by capturing semantic relationships between terms — allowing the model to understand that contextually similar expressions carried equivalent sentiment weight, even when surface vocabulary differed. The combined approach produced a sentiment scoring pipeline capable of characterising the trajectory of a live conversation: identifying whether an interaction was trending toward resolution or deteriorating toward escalation, in near real time.

These techniques were among the most advanced NLP methods available at the time of deployment. The theoretical groundwork laid by this and similar applied projects contributed to the research lineage that culminated in transformer architectures and, ultimately, today's large language models.

BAG-OF-WORDS	**WORD2VEC**	**SENTIMENT ANALYSIS**	**TEXT CLASSIFICATION**
CORPUS LABELLING	**NLP PIPELINE**		

03

Agent Interface & Sentiment Visualisation

FRONT-END ENGINEERING

Front-End Engineers translated the data science output into a purpose-designed agent interface that surfaced sentiment signals without disrupting the conversational flow. A live sentiment indicator — embedded directly within the chat UI — updated continuously as the conversation progressed, providing agents with an at-a-glance reading of customer tone without requiring them to leave the interaction view.

A supervisor dashboard aggregated sentiment scores across active queues, enabling real-time identification of conversations at escalation risk. Colour-coded trajectory indicators replaced numerical scores, reducing cognitive overhead for agents managing concurrent interactions. The interface was designed and tested iteratively with frontline staff, ensuring adoption was driven by genuine utility rather than mandate.

CHAT UI DESIGN	REAL-TIME VISUALISATION	SENTIMENT DASHBOARD	SUPERVISOR VIEW
ITERATIVE UX TESTING	AGENT EXPERIENCE		

On the Frontier of Language Understanding

The NLP methods deployed in this engagement — Bag-of-Words feature extraction and Word2Vec semantic embeddings — represented the state of the art in applied natural language processing at the time of delivery. These were not established enterprise tools; they were research-grade techniques being operationalised in production environments for the first time.

The applied work done on this class of NLP problem — learning dense vector representations of language, building context-sensitive sentiment models from conversational corpora — formed a foundational thread in the research community. That thread, extended by successive generations of researchers, led directly to the attention mechanisms and transformer architectures underlying today's large language models. Soledad was not observing this transition; we were participants in it.

OUTCOMES

Sentiment Visibility at the Point of Conversation

Real-Time Agent Awareness

Agents received live sentiment signals embedded in the conversation interface, enabling dynamic adjustment of tone and approach before conversations deteriorated.

Proactive Supervisor Intervention

Queue-level sentiment aggregation gave supervisors the ability to identify at-risk interactions and intervene before escalation events occurred.

Retrospective QA at Scale

Automated conversation scoring replaced manual sampling, enabling quality assurance teams to review sentiment trajectories across the full interaction volume.

Foundational NLP in Production

Delivered one of the earliest production deployments of Word2Vec-based sentiment analysis in an enterprise customer service environment — years before such approaches became industry standard.

Channel Migration Support

Provided the client's leadership with data-backed confidence that text-based support could achieve quality parity with voice, accelerating the channel transition.

A Lineage That Endures

The applied NLP research embedded in this engagement contributed to a body of work whose influence is traceable to the development of transformer models and modern large language models.

Soledad Data Solutions

INTELLIGENCE AT SCALE

This engagement is illustrative of Soledad's approach to applied AI: deploying technically rigorous solutions at a moment when the broader industry had not yet caught up — and building platforms that remain meaningful long after the engagement closes.

CONFIDENTIALITY NOTICE — The identity of the client organisation, facility details, agent platform specifications, and all identifying operational data have been withheld pursuant to the terms of the engagement agreement. Conversation volumes, sentiment model performance metrics, and QA outcome figures are not disclosed. This document is intended for illustrative purposes only.