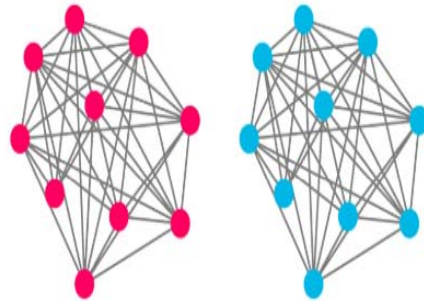




Distributed Ledgers



# AI Chatbot

January 8, 2020

Alex G. Lee (geunholee@gmail.com)

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- AI Chatbot Use Cases: Healthcare Industry
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- E-Commerce Integration Demo

# AI Revolution

Stanford | One Hundred Year Study on Artificial Intelligence (AI100)

Search this site...

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2016 Report

Preface

Executive Summary

Overview

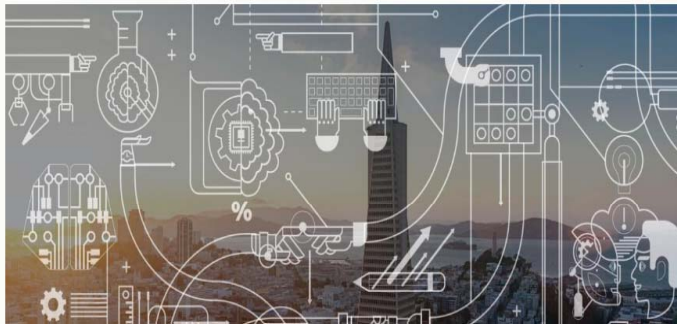
Section I: What is Artificial Intelligence?

Section II: AI by Domain

Section III: Prospects and Recommendations for Public Policy

Appendix I: A Short History of AI

2016 Report



## AI Research Trends

Large-scale machine learning

Deep learning

Reinforcement learning

Computer vision

Natural Language Processing

Robotics

Internet of Things (IoT)

Collaborative autonomous systems

## AI BY DOMAIN

### TRANSPORTATION

Smarter cars

Self-driving vehicles

Transportation planning

On-demand transportation

Interacting with people

### HOME/SERVICE ROBOTS

Vacuum cleaners

Home robots

### HEALTHCARE

The clinical setting

Healthcare analytics

Healthcare robotics

Mobile health

Elder care

### EDUCATION

Teaching robots

Intelligent Tutoring Systems (ITS) and online learning

Learning analytics

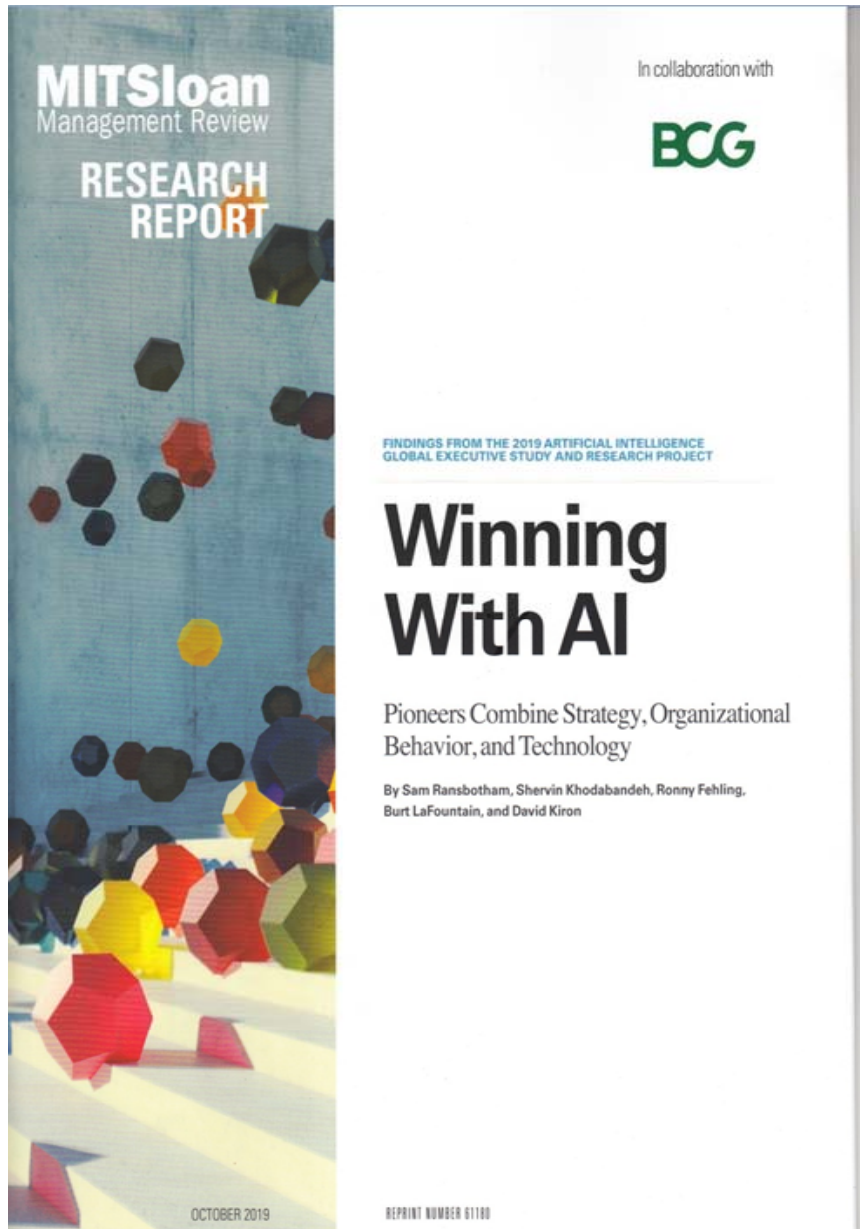
### PUBLIC SAFETY AND SECURITY

### EMPLOYMENT AND WORKPLACE

### ENTERTAINMENT

Pepper — The Humanoid Robot: [Link](#)

# AI Innovation Checkpoint



## Industry Disruption by AI

A caution: Most AI success stories focus on improving existing business processes, whether in sales, marketing, pricing, servicing, forecasting, manufacturing, or the like. But these improvements are comparable to improving the gas mileage of combustion engine vehicles in an era of new transportation possibilities. Business executives need to consider how they can reinvent and reimagine many of those processes in the context of what AI enables. This is where AI's true potential will emerge: not in doing the same thing better, faster, and cheaper but by doing new things altogether. This is where AI will disrupt industries the most.



# AI Innovative BM Development

## What to innovate:

Recognition

Prediction

Automation

Communication

Creation

## How to innovative:

Improvement

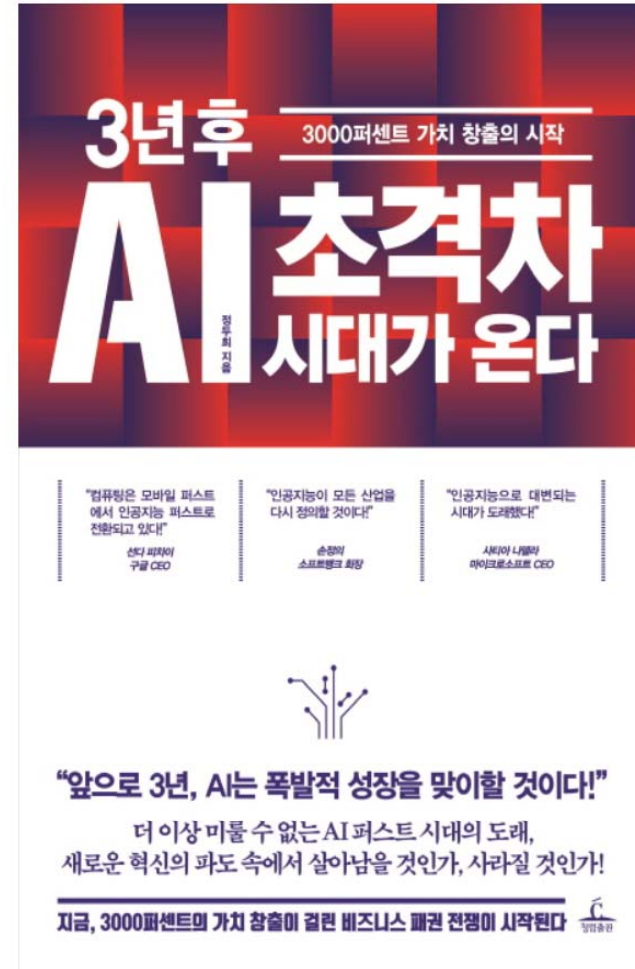
Replacement

Value Transformation

Creation/Technology Concergence

## Why innovative:

User/Customer Value Propositions/Experiences Innovation



# AI Chatbot for Customer Experience

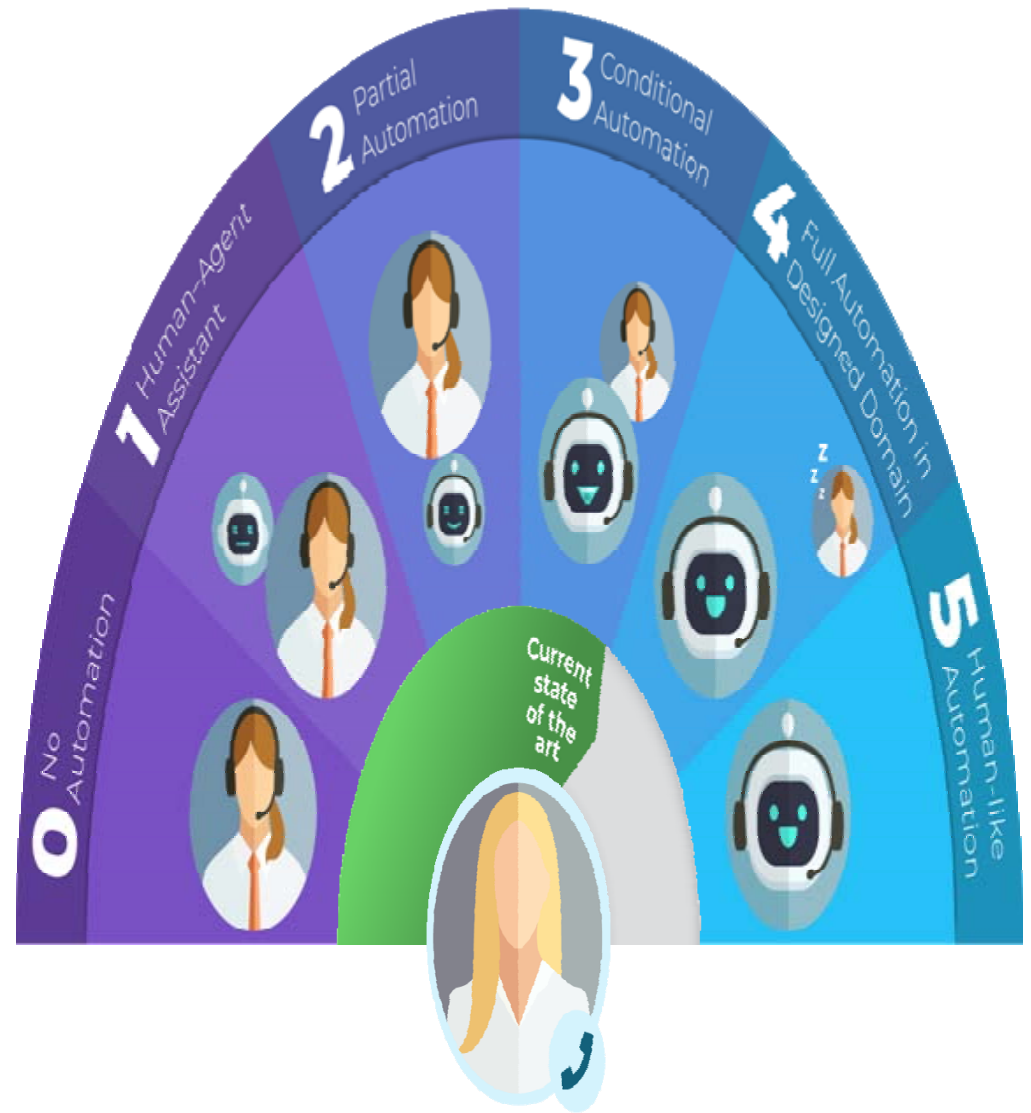
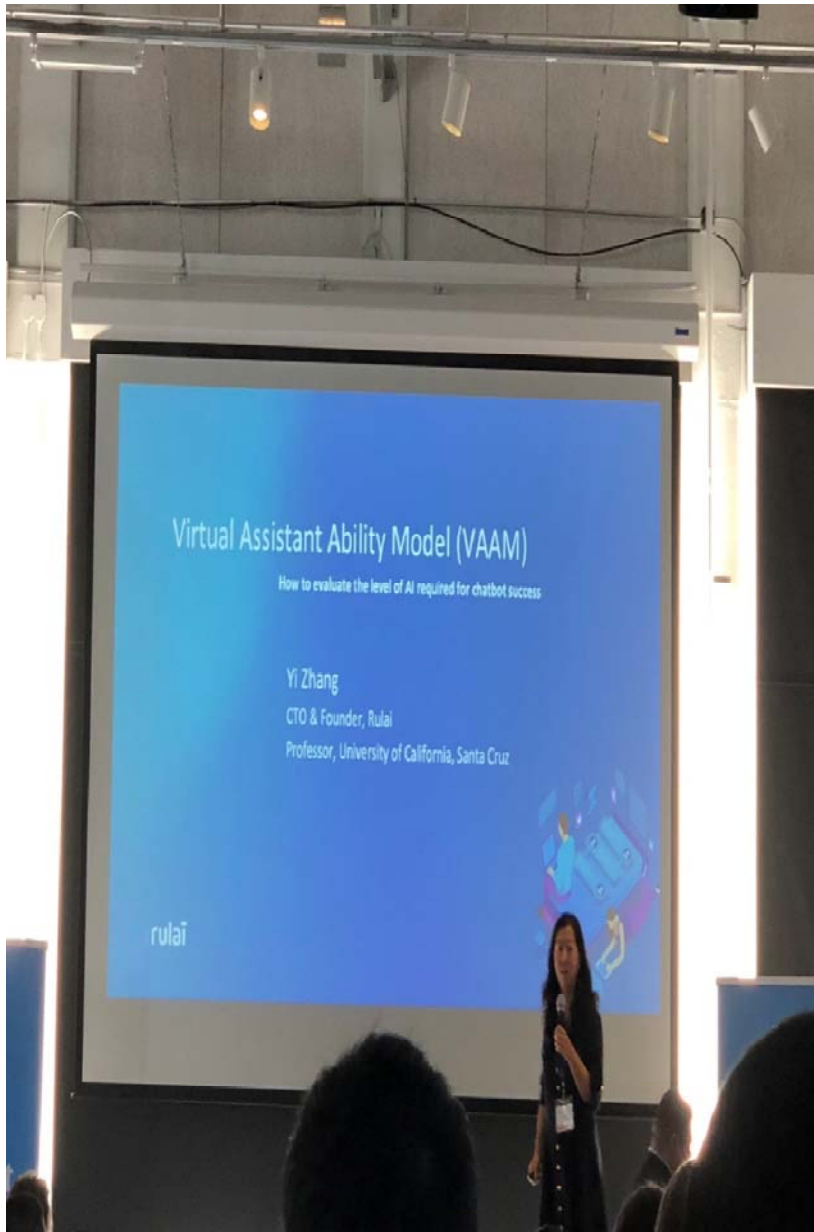
Chatbots are AI-based conversation agents that are being used in many different customer-engagement scenarios for **optimal customer experience**. Optimal customer experience is achieved when a business **remembers a customer and treats them with attention, respect and consideration**.

Chatbots are designed to simulate human interactions and provide immediate, personalized responses 24\*7.

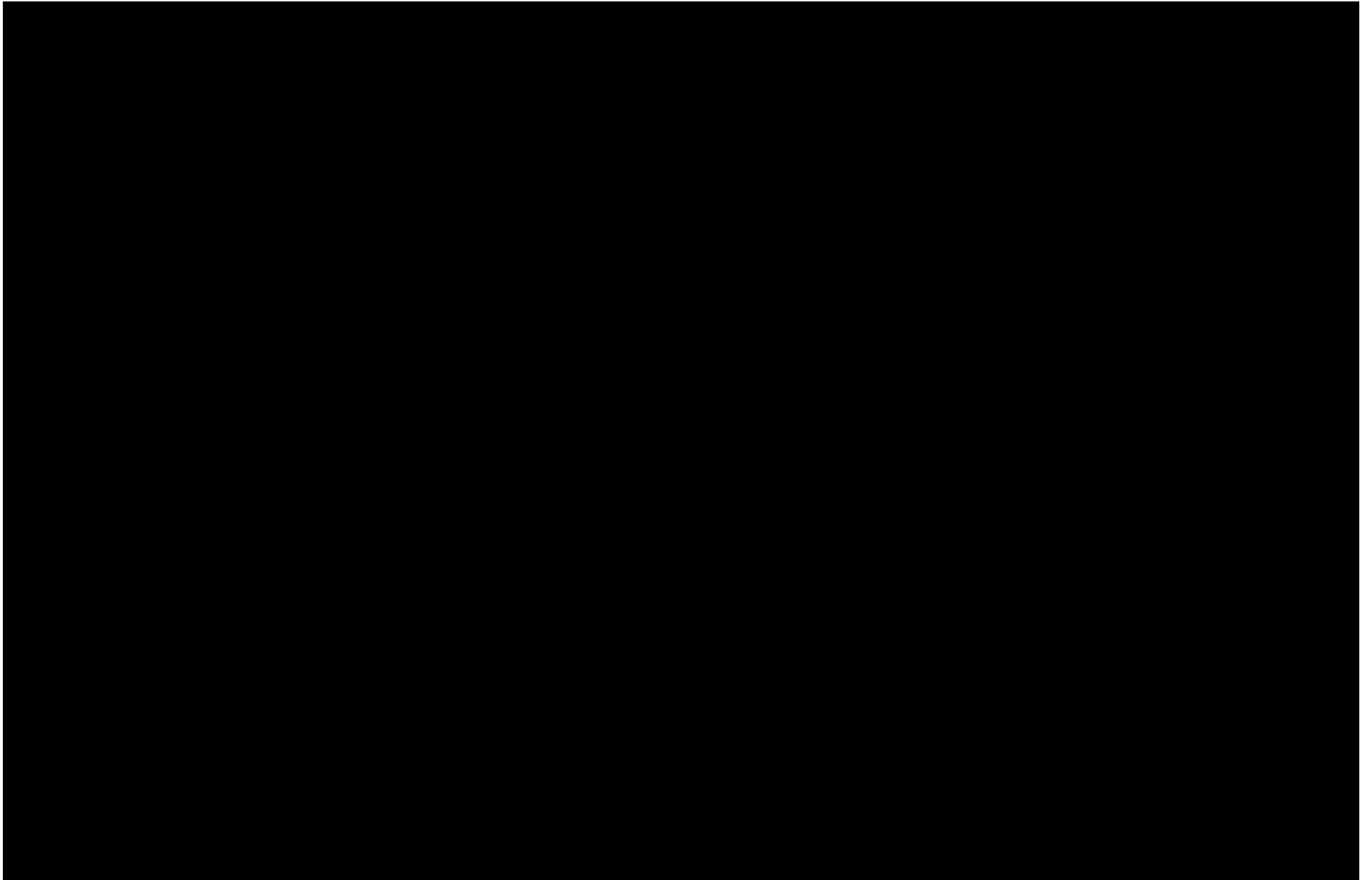
Chatbots interact directly with customers to provide information, process support inquiries, or solve simple problems.

Chatbots vary in technical complexity, ranging from being simple scripted experiences to leveraging state-of-the-art natural language processing (NLP), understanding (NLU), generation (NLG) techniques.

# AI Chatbot Evolution



## AI Chatbot Evolution: Level 2/3 Demo

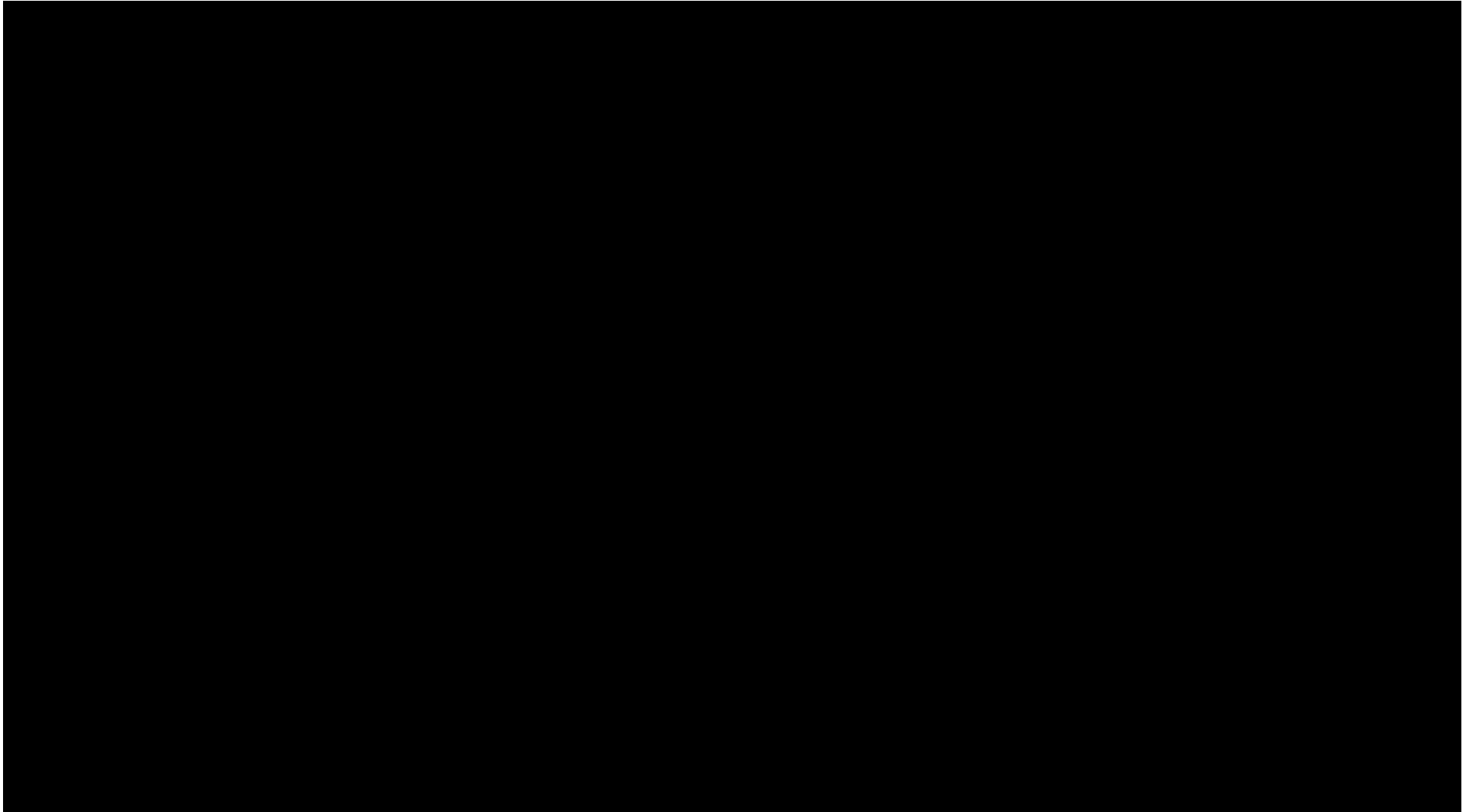




# AI Chatbot Use Cases: Travel Industry

Automating Booking Request for Travel Agency via Chatbot.

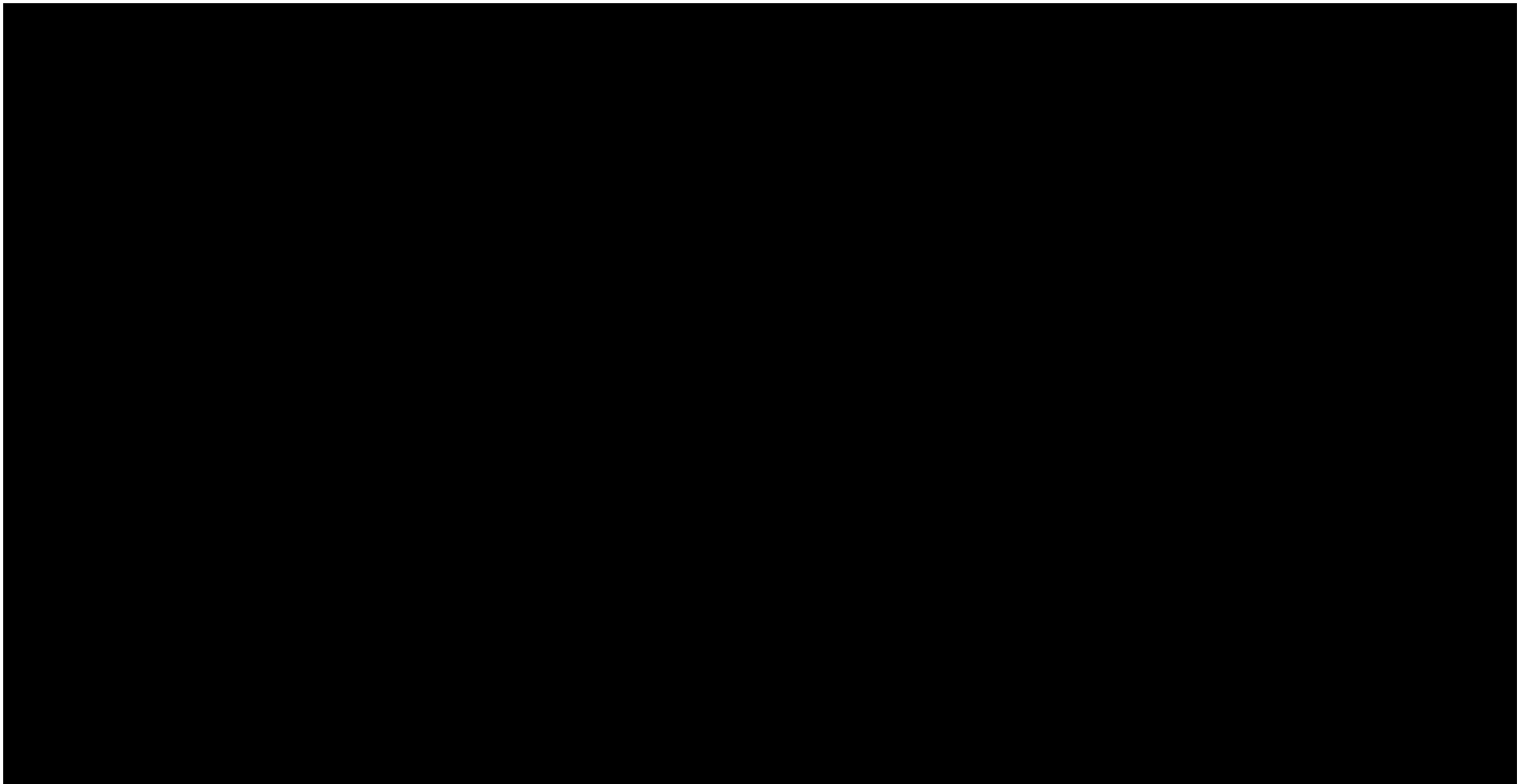
Source: BLASTASIA Inc. (<https://www.youtube.com/watch?v=A8TVLIE1A9k>)



# AI Chatbot Use Cases: Food & Beverage Industry

A chatbot based reservation system for Facebook pages is a better way to have a conversation with your customers.

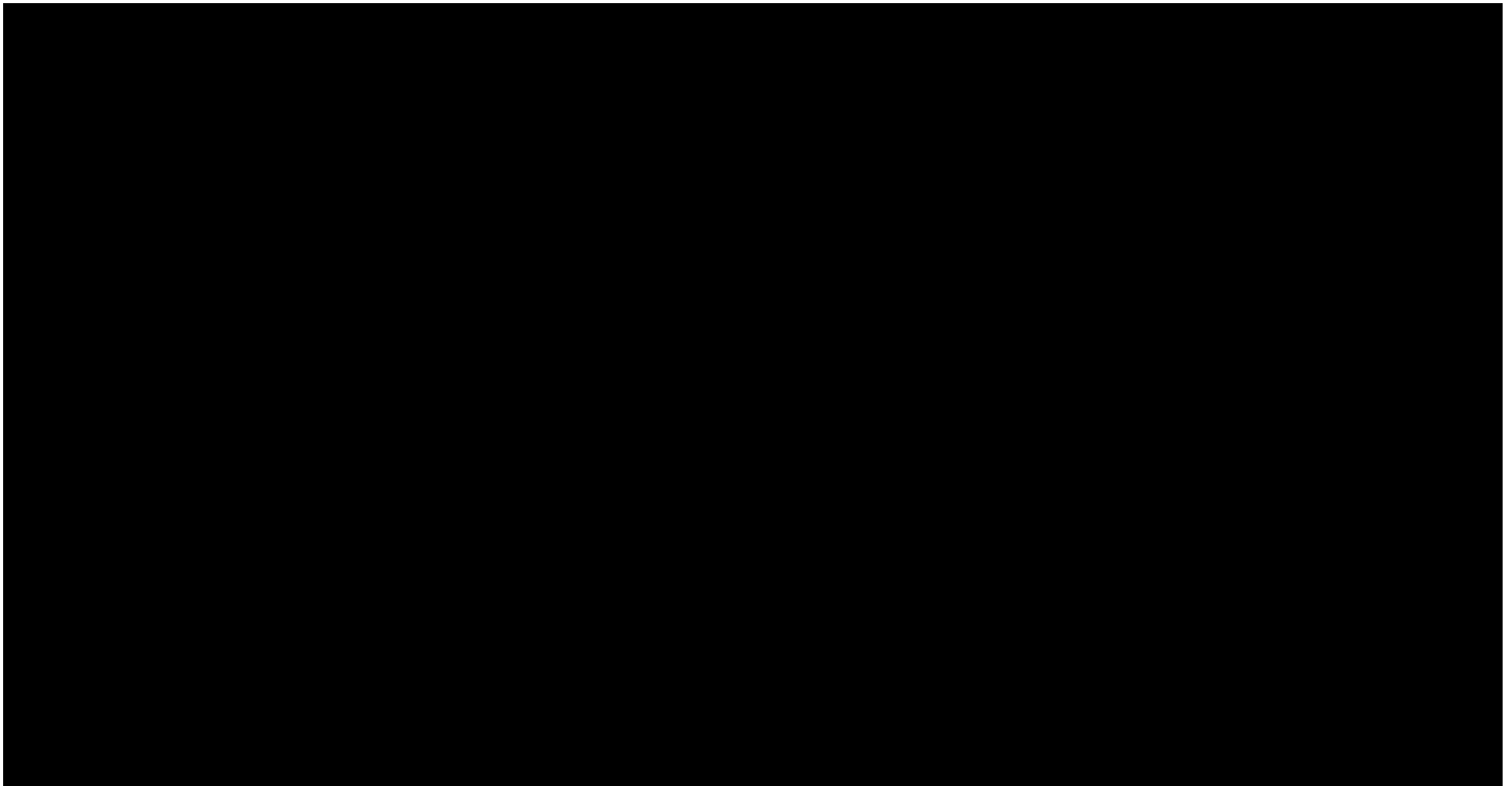
Source: ADEO WEB ([https://www.youtube.com/watch?v=Y84M\\_7AiJto](https://www.youtube.com/watch?v=Y84M_7AiJto))



## AI Chatbot Use Cases: Banking Industry

Capital One SMS chatbot checks balances and recent payments, looks up account info (e.g. routing number), transfers money between accounts.

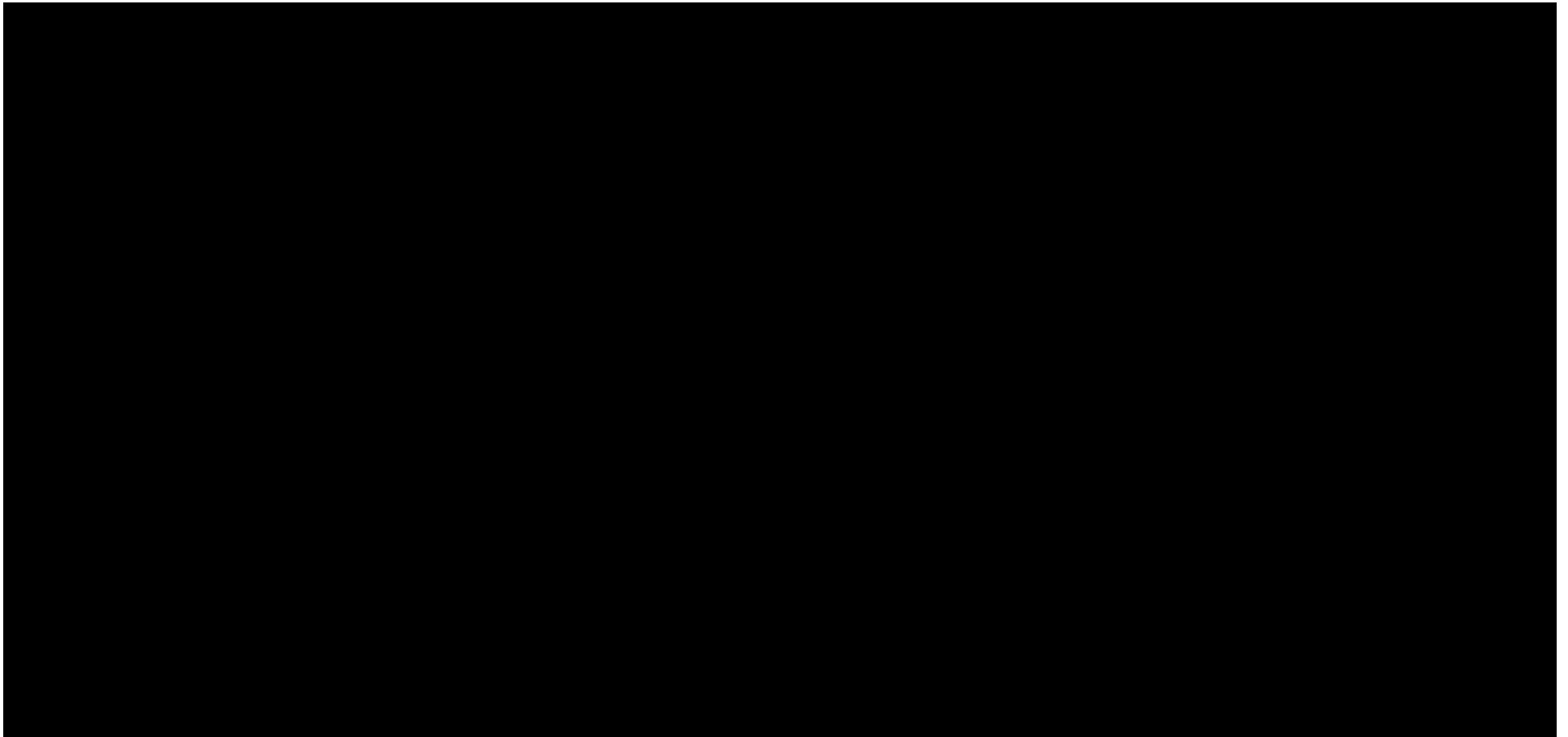
Source: Capital One (<https://www.youtube.com/watch?v=jvyHcjZoGJk>)



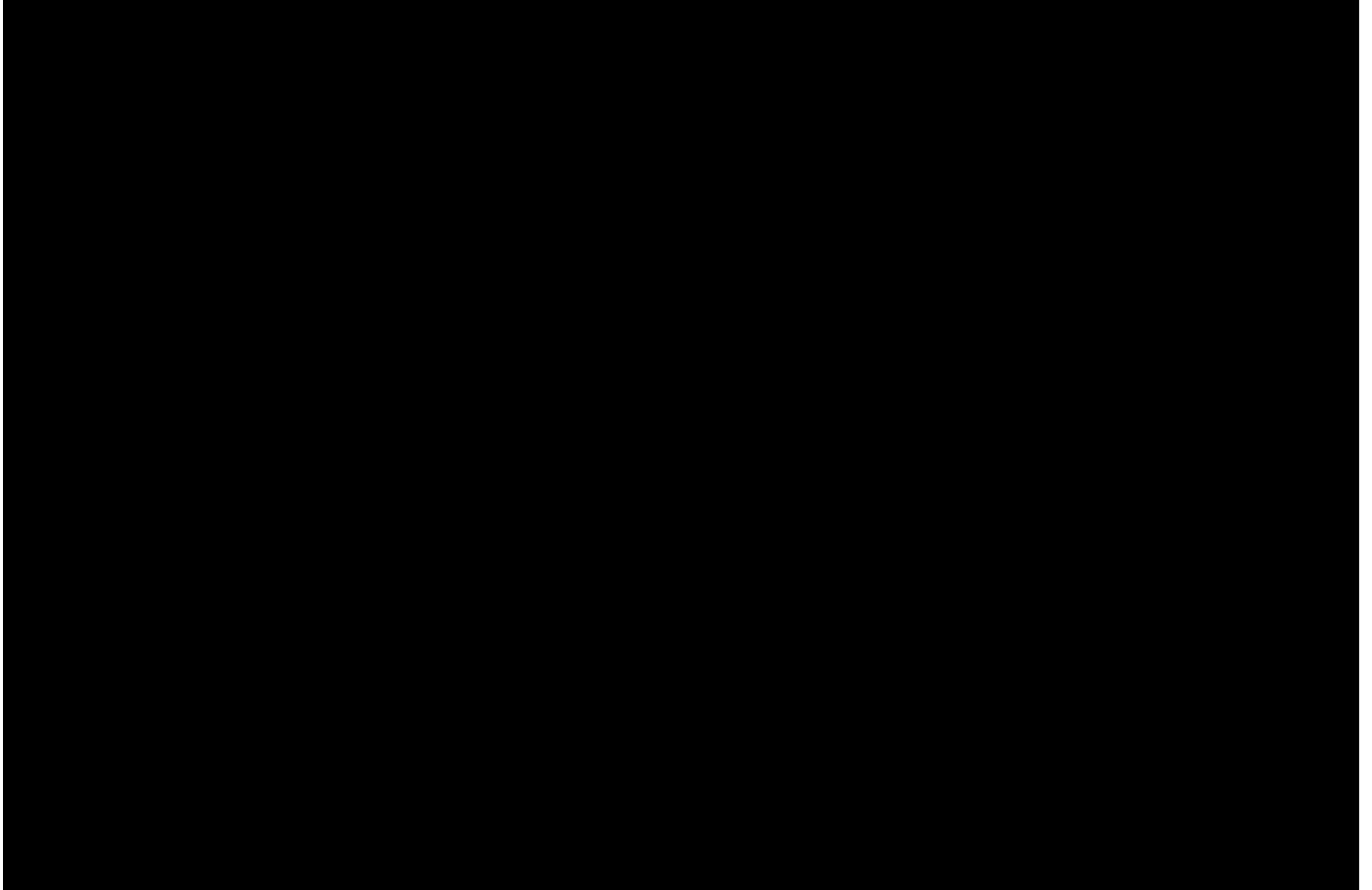
## AI Chatbot Use Cases: Healthcare Industry I

Healthcare chatbot helps patients obtain information they require without having to interact with agents. It uses learned and directed dialog interactions from historical data to address patient queries, or where necessary, handover to agents for further assistance.

Source: Avaya (<https://www.youtube.com/watch?v=nvOJQ4JttP0>)



## **AI Chatbot Use Cases: Healthcare Industry II**





# **AI Chatbot for Retail Services Innovation**

Provide personalized customer experience

Provide customer's life-style advisor

Increase understanding each customer's needs & wants

Real time CRM

Customer royalty maximization

Target customer marketing

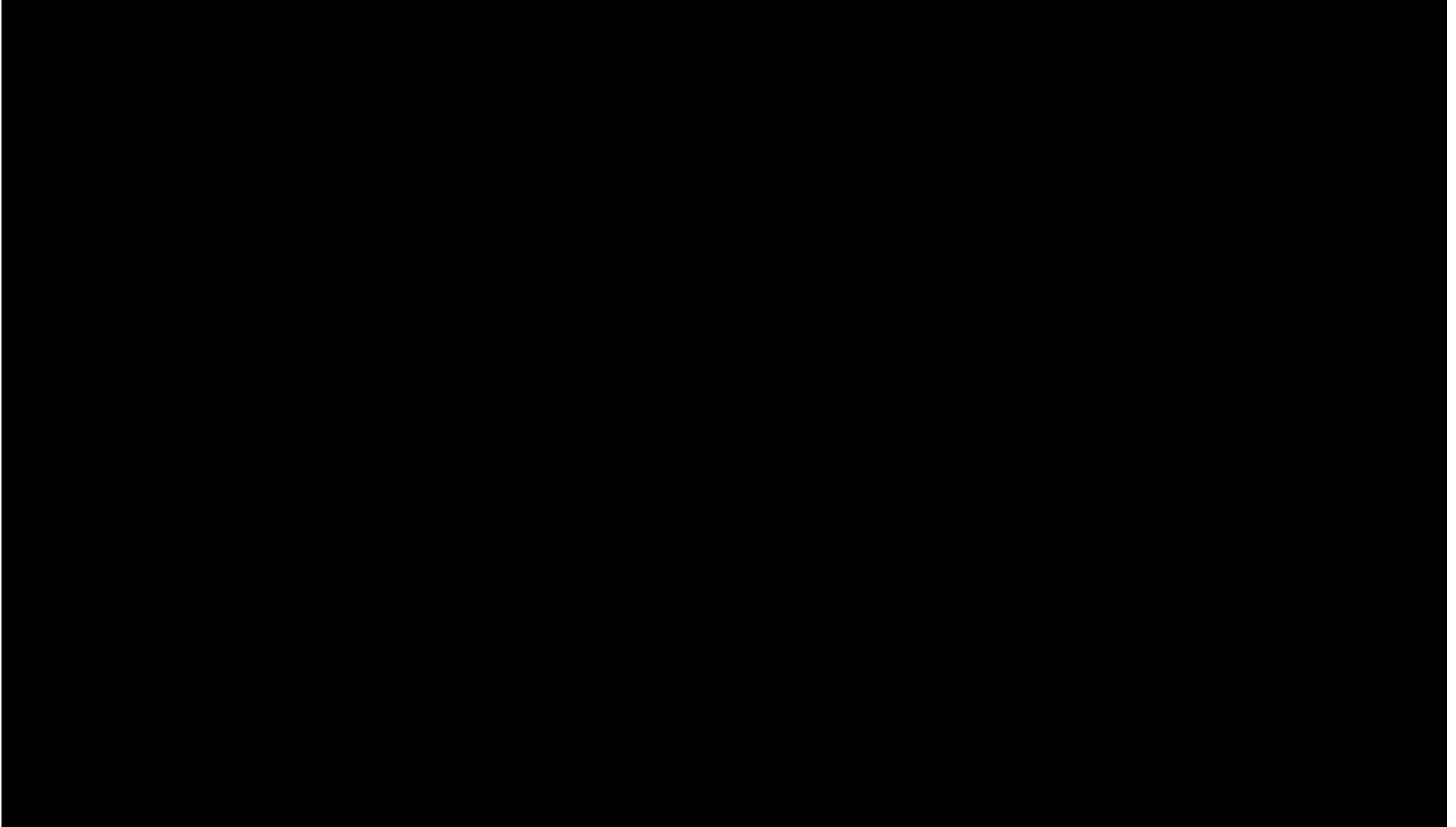
Maximize customer recognition

Mobile-Online-Offline shopping integration

# AI Chatbot Use Cases: Retail & Fashion Industry I

Experimenting for the best use cases to enhance customer experience

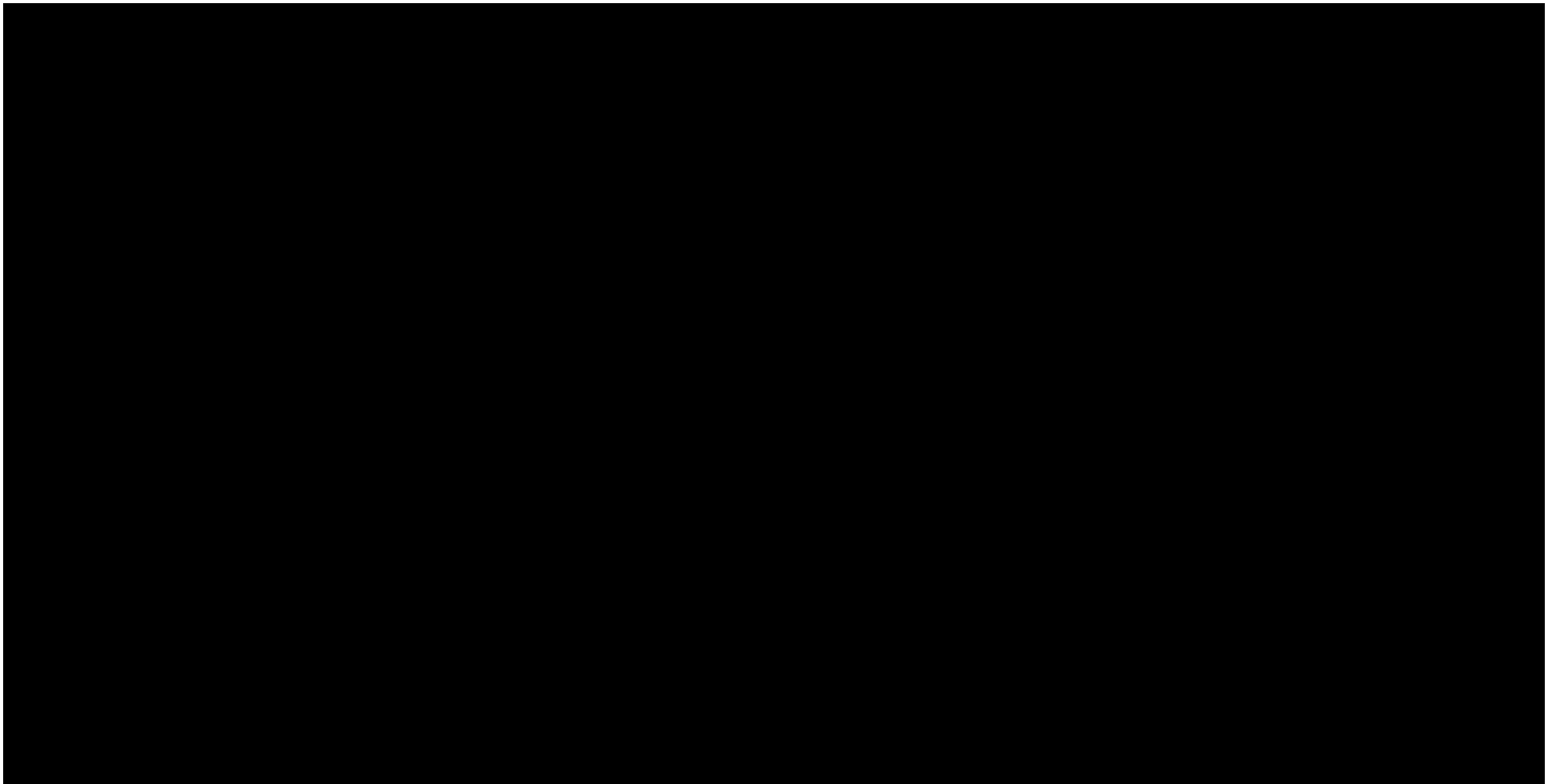
Source: Trendbrew (<https://www.youtube.com/watch?v=74JEJlpX9w4>)



## AI Chatbot Use Cases: Retail & Fashion Industry II

Clothing retailer Uniqlo chatbot enables shoppers can search for items, get recommendations for outfits for different occasions and voice or text chat with the app itself for more specific information.

Source: Uniqlo (<https://adage.com/creativity/work/uniqlo-iq-demo/55129?>)



# AI Chatbot Use Cases: Retail & Fashion Industry III

Lotte shopping advisor chatbot Charlotte

Source: IBM Korea (<https://www.youtube.com/watch?v=VuPBczD2AUg>)

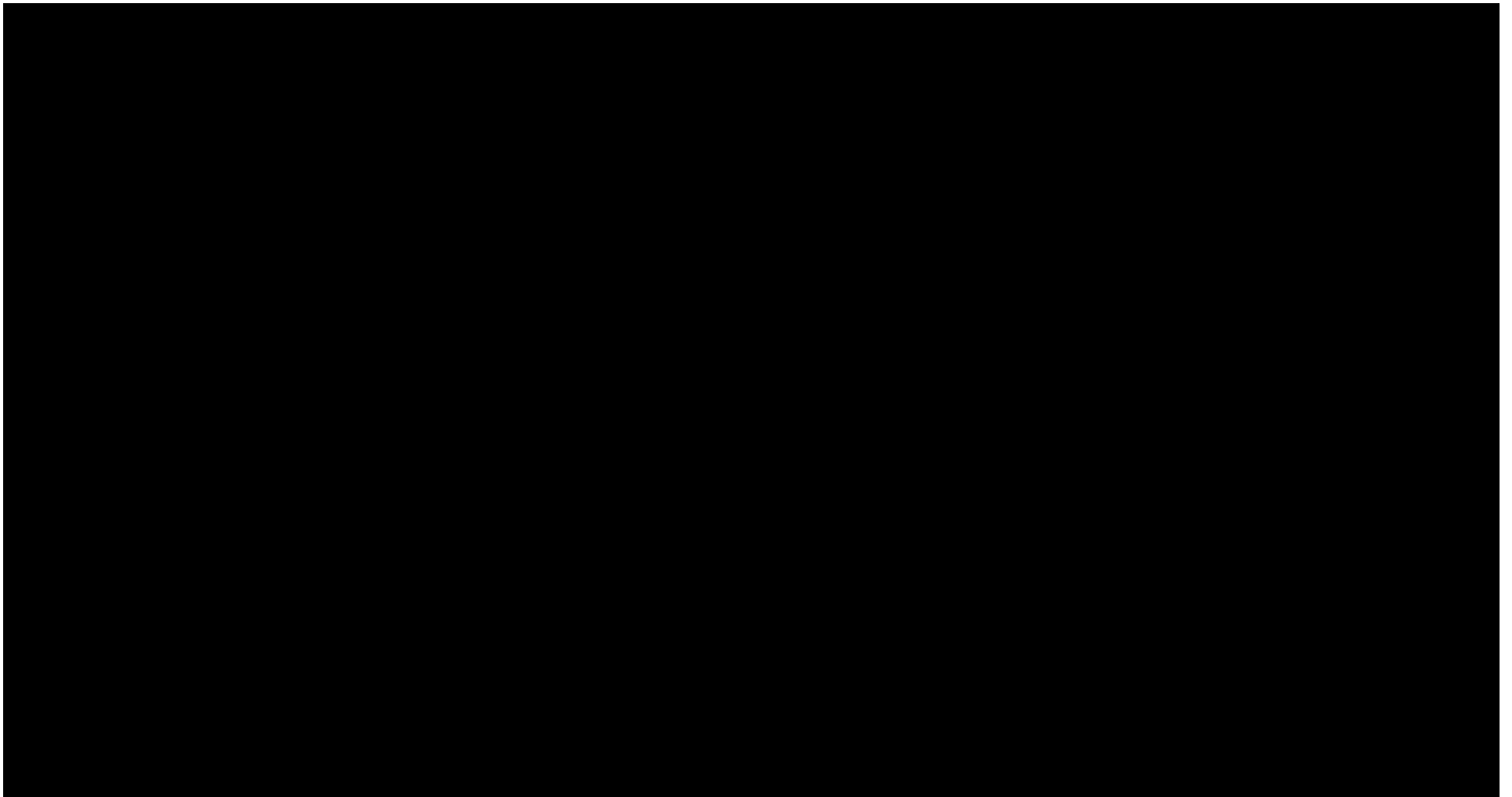
Reference: [https://blog.naver.com/ibm\\_korea/221504531163](https://blog.naver.com/ibm_korea/221504531163)



## **AI Chatbot Use Cases: Retail & Fashion Industry IV**

1-800-Flowers is the largest gifting retailer in the US, \$1.2 billion in sales a year.  
Gwyn is a personal gift concierge chatbot.

Source: ChatBottle (<https://www.youtube.com/watch?v=5WfS93Pgibg>)





# AI Chatbot for Retail Additional Use Cases I

**Tommy Hilfiger:** American apparel brand

On opening the conversation on Facebook Messenger, the chatbot greets the user, then instantly introduces the consumer to the collection and gives them three options for the conversation: **style advice, browsing, or a behind-the-scenes look at the latest fashion show**. The bot reacts to keywords typed by customers and offers solutions. Customers are presented with an opportunity to browse by either looks or categories, such as accessories or bags.

**Burberry:** luxury clothing brand

By sharing their location on Facebook Messenger, users can be informed where their nearest Burberry store is. The chatbot also **introduces customers to the brand's latest collection of bags**; by clicking the 'Discover More' option, the chatbot lets users browse the collection, get to know more about the craftsmanship, or find out how to style a bag with Burberry's apparel and accessories. Burberry's chatbot offers pre-made suggestions that guide users through their shopping experience.

Source: <https://www.retail-insight-network.com/features/chatbots-in-retail-ai-experience/>

## AI Chatbot Retail Additional Use Cases II

**Sephora:** France-headquartered international beauty stores chain  
The first time a shopper starts a conversation with the chatbot they are invited to take part in a short quiz that helps the bot learn more about them. Users can then ask for tips or reviews on specific types of product or application. Each of these comes with **product recommendations** that the customer can shop. **The experience aims to mimic the way the shopper might chat with their friends about products and advice.**

**Whole Foods:** An Amazon company-US-based healthy food supermarket  
Customers can enter a zip code or an address, or simply share their location to get results immediately. The grocer is using the Facebook Messenger chatbot to make finding the ingredients people want easier. **Shoppers can use the chatbot to ask for recipes and to find where products are positioned in the store.** For those with special dietary restrictions, the chatbot can also consider those and help them find foods and meals that leave a particular ingredient out. **It aims to improve customers experience in store, not just online.**

Source: <https://www.retail-insight-network.com/features/chatbots-in-retail-ai-experience/>

# Emotion AI Introduction

Emotional Intelligence enhances AI's ability to understand emotional input, and continually adapt to and learn from information to provide **human-like responses in real time.**

Emotion AI, or affective computing, trains AI to recognize, interpret, and respond to human emotion in text, voice, facial expressions, or body language.

As customers increased their level of emotional connectedness with a brand/product/service, their value increased alongside it. And there was **a massive increase in value when they reached the highest level of emotional connectedness.**

# Emotion AI Technology I

Humans use a lot of non-verbal cues, such as facial expressions, gesture, body language and tone of voice, to communicate their emotions.

## ***Emotion detection – Face***

Emotion AI measures facial expressions of emotion, using any optical sensor. Emotion AI technology first identifies a human face in real time or in an image or video. Computer vision algorithms identify key landmarks on the face – for example, the corners of eyebrows, the tip of nose, the corners of your mouth. Deep learning algorithms then analyze pixels in those regions to classify facial expressions. Combinations of these facial expressions are then mapped to emotions (anger, contempt, disgust, fear, joy, sadness and surprise).

## Emotion AI Technology II

Emotion AI uses a combination of a convolutional neural network (CNN) and long short-term memory (LSTM) that is capable of recognizing patterns in sequences of images.

### ***Emotion detection – Speech***

Emotion AI analyzes how it is said, observing changes in speech paralinguistics, tone, loudness, tempo, and voice quality to distinguish speech events, emotions, and gender.

Multimodal Emotion AI combines analysis of both face and speech as complementary signals to provide richer insight into the human expression of emotion.



# Emotion AI Technology III

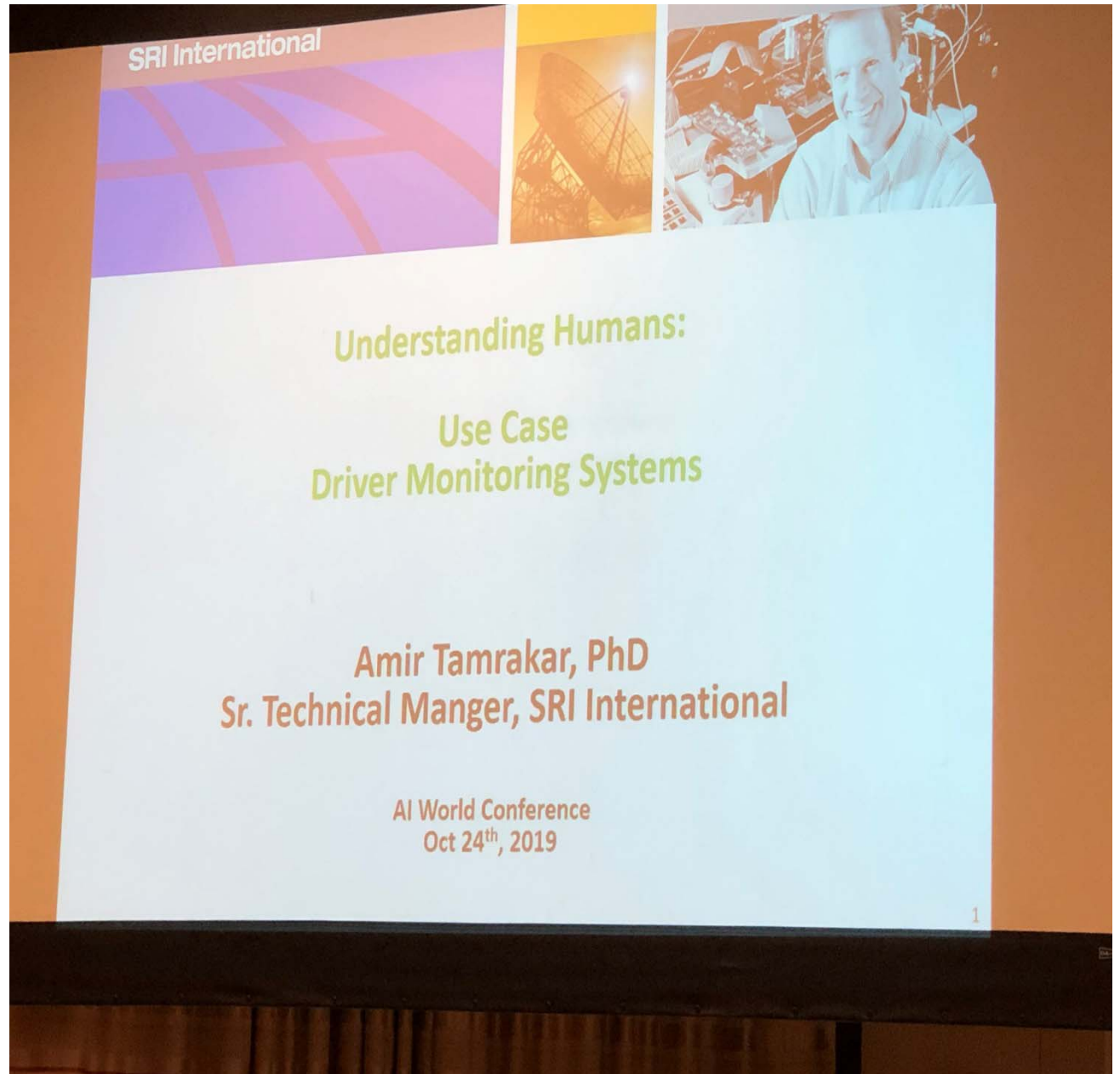
## ***Sentiment Analysis***

Sentiment analysis analyzes textual data, such as emails, social media posts, survey responses, or chat and call logs, for emotional information.

Sentiment analysis can transform subtle nuances in textual data into accurate insights about a customer's feelings, needs, and wants.

Sentiment analysis can find out when customers are having a specific issue with a product, which help to take more focused action in a timely manner.

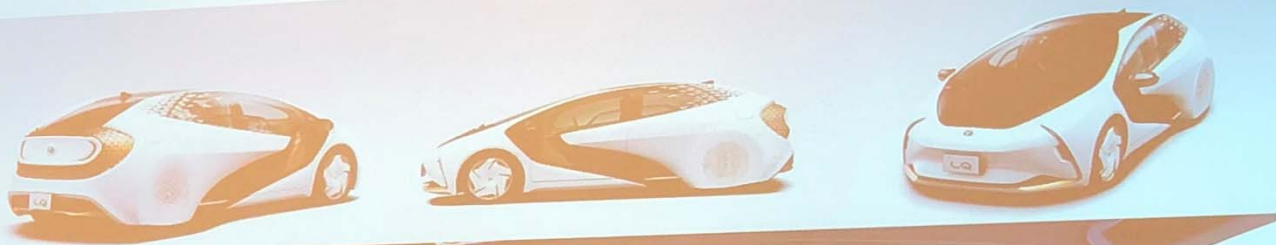
# Emotion AI Use Case



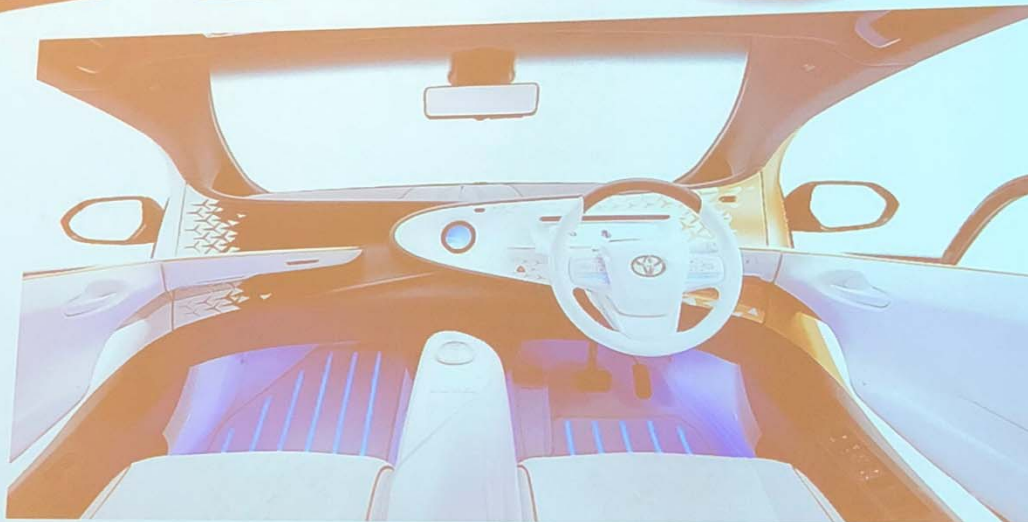
# Emotion AI Use Case

SRI International

Toyota's LQ Concept Car at Tokyo Motor Show 2019  
Next Gen of Toyota Concept-Ai



- Deliver a personalized mobility experience
- Cater to driver's preferences, habits, needs
- Stronger bond between the car and driver

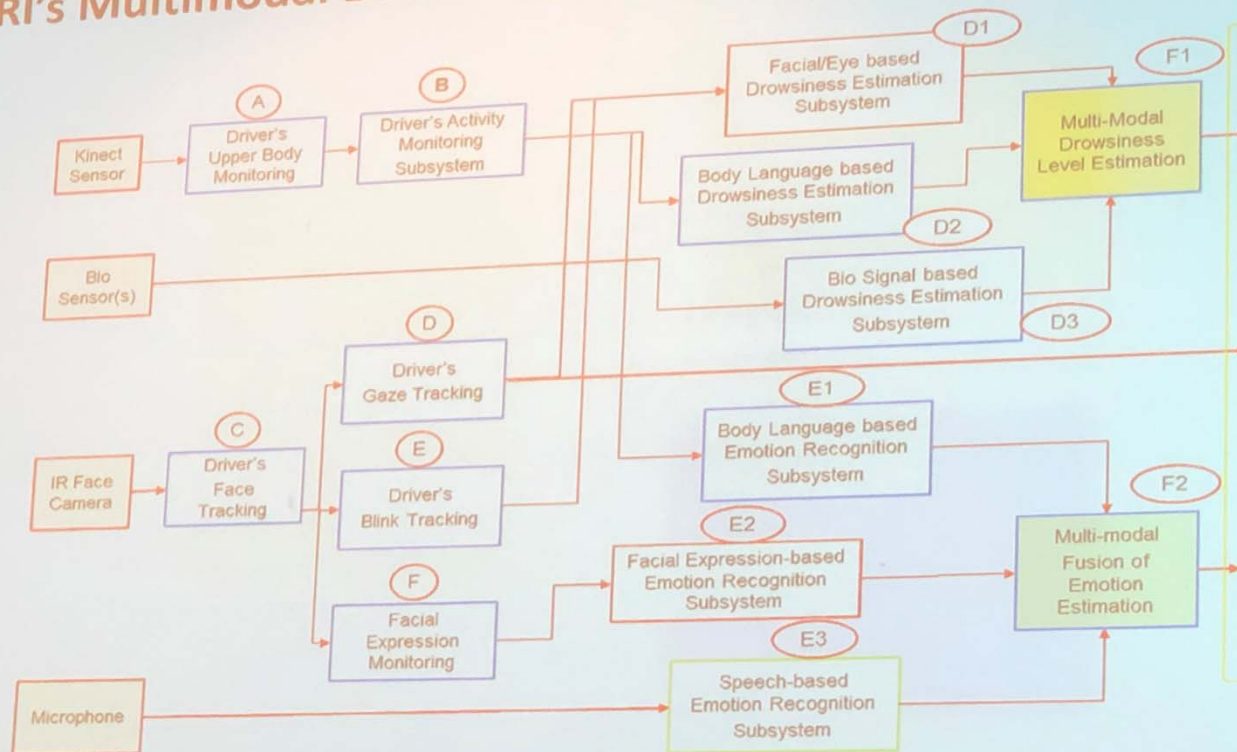


Toyota Yui Project Tours 2020: Public Test Drive Event from June - September 2020, Tokyo



# Emotion AI Use Case

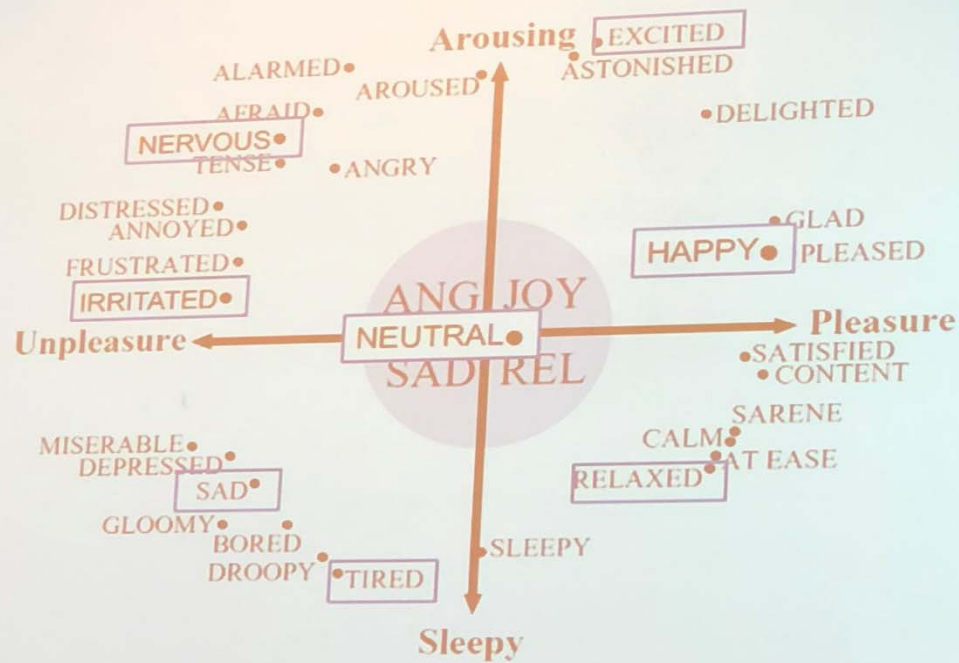
## SRI International SRI's Multimodal Driver Monitoring System (DMS) System



# Emotion AI Use Case

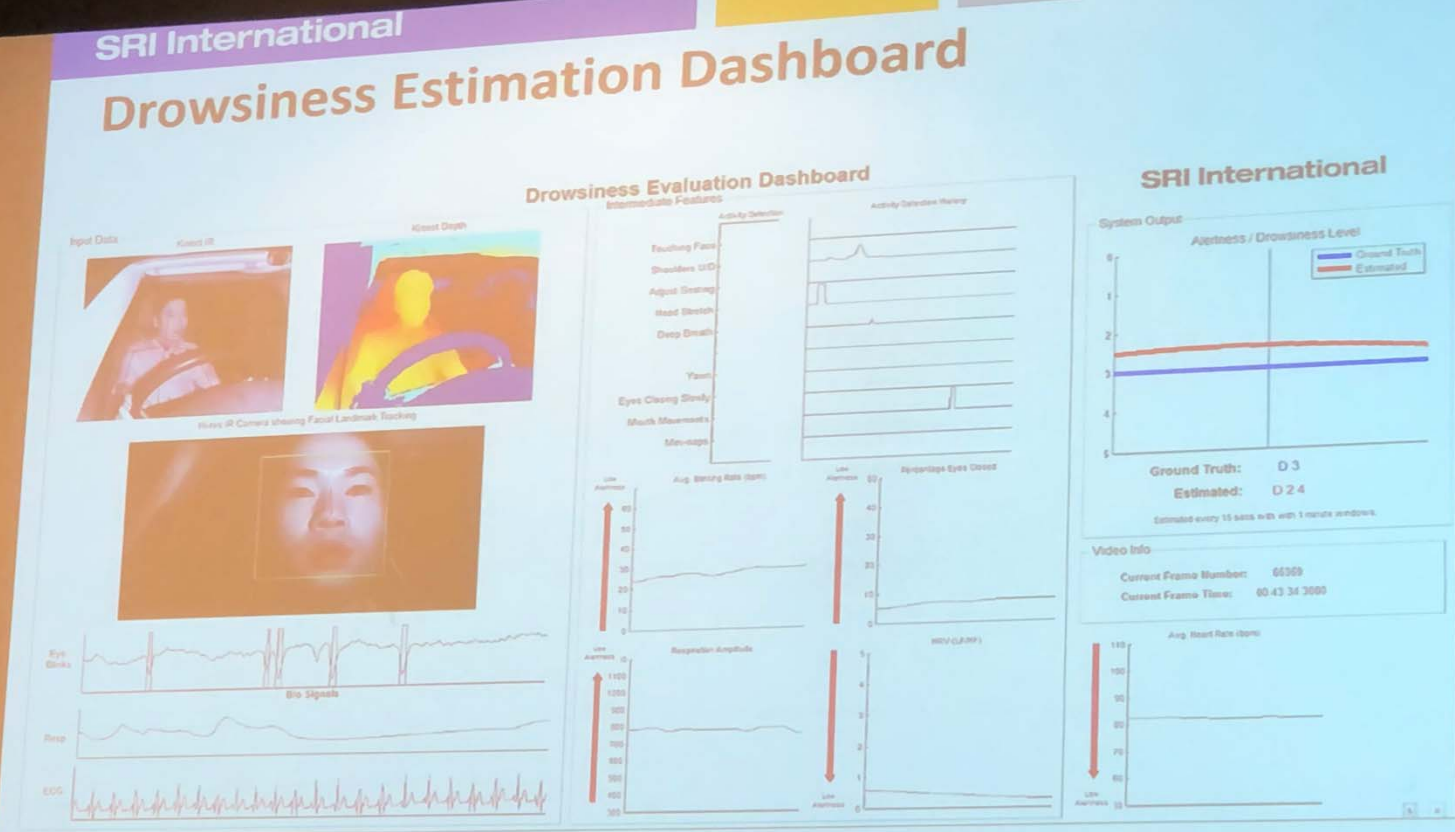
SRI International

## Driver's Affective State





# AI Innovation Frontline



# Emotion AI Use Case

SRI International

## Comprehensive Driver Monitoring Requires Context

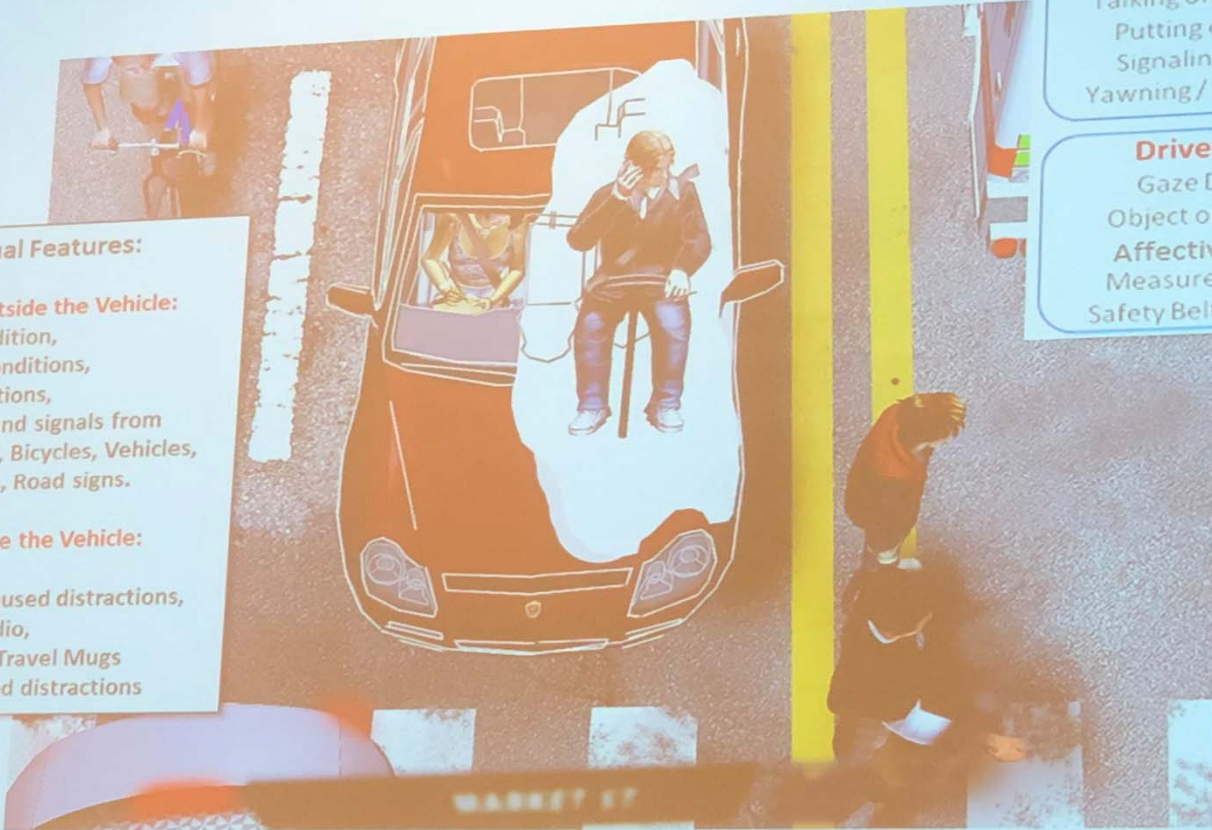
### Contextual Features:

#### Factors Outside the Vehicle:

Traffic condition,  
Weather conditions,  
Road conditions,  
Actions of and signals from  
Pedestrians, Bicycles, Vehicles,  
Traffic lights, Road signs.

#### Factors Inside the Vehicle:

Passengers,  
Passenger-caused distractions,  
Sat. Nav., Radio,  
Cell phones, Travel Mugs  
Gadget-caused distractions



### Driver Actions :

Talking on a cell phone  
Putting on seatbelt  
Signaling to others  
Yawning / Drinking, etc.

### Driver State :

Gaze Direction  
Object of Attention  
Affective State  
Measure of Fatigue  
Safety Belt Usage, etc.

# Replika: An Emotion AI Chatbot

## ***Sentiment Analysis***

Sentiment analysis analyzes textual data, such as emails, social media posts, survey responses, or chat and call logs, for emotional information.

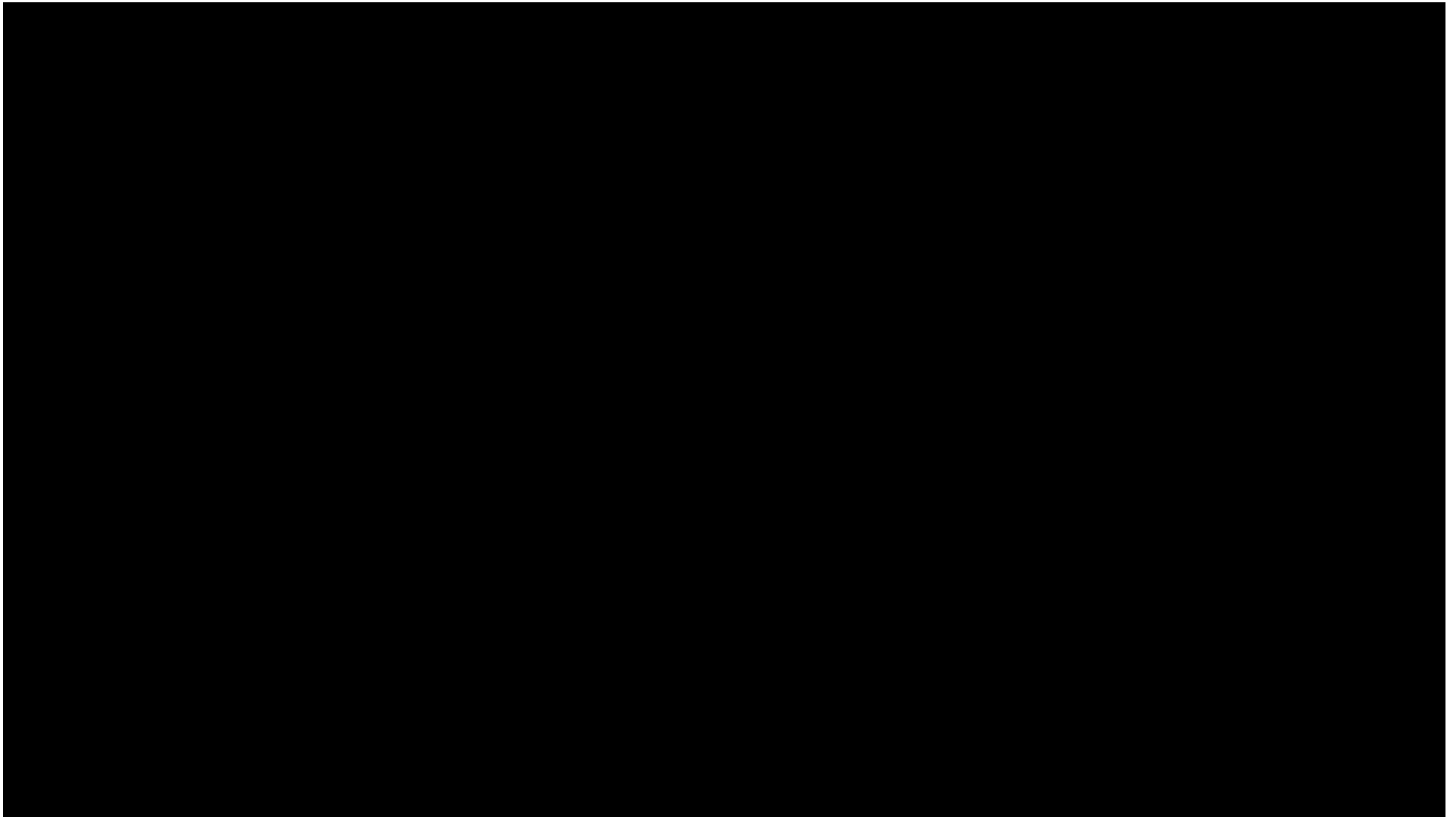
Sentiment analysis can transform subtle nuances in textual data into accurate insights about a customer's feelings, needs, and wants.

Sentiment analysis can find out when customers are having a specific issue with a product, which help to take more focused action in a timely manner.

# Replika: An Emotion AI Chatbot

Replika learns to imitate the user through the emotional conversation.

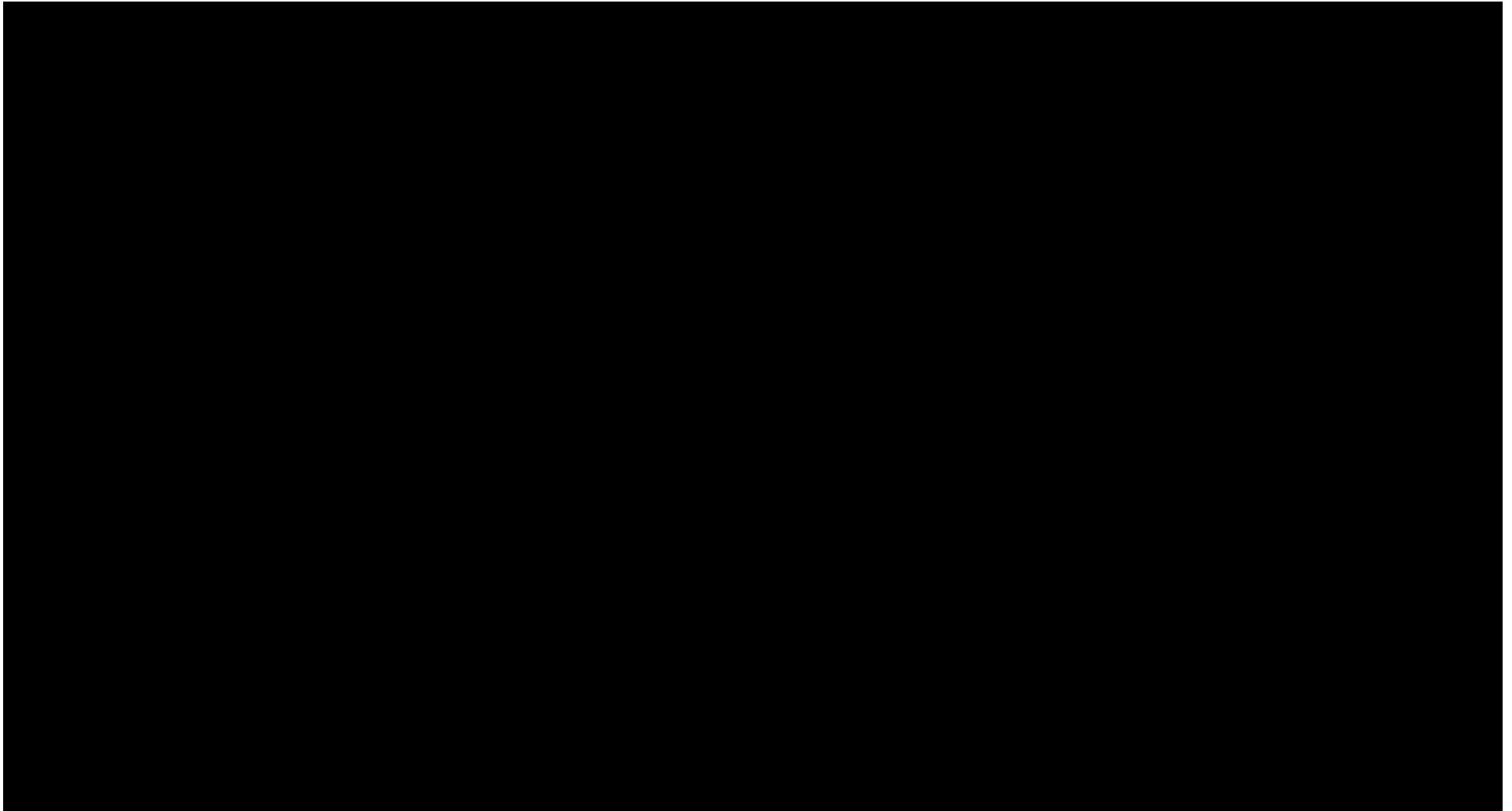
Source: Bruno Coelho (<https://www.youtube.com/watch?v=TyUPHbU3TQ8>)



## Woebot: Robot Therapist

Woebot is an emotion AI chatbot who can help you track your mood and manage your feelings. Source: TWiT Netcast Network

([https://www.youtube.com/watch?v=Js\\_E4ap\\_zOg](https://www.youtube.com/watch?v=Js_E4ap_zOg))



# AI Chatbot Design

## **Purpose Identification:**

use cases, user's wants/needs, why AI chatbot?, user's benefits

## **Interaction Identification:**

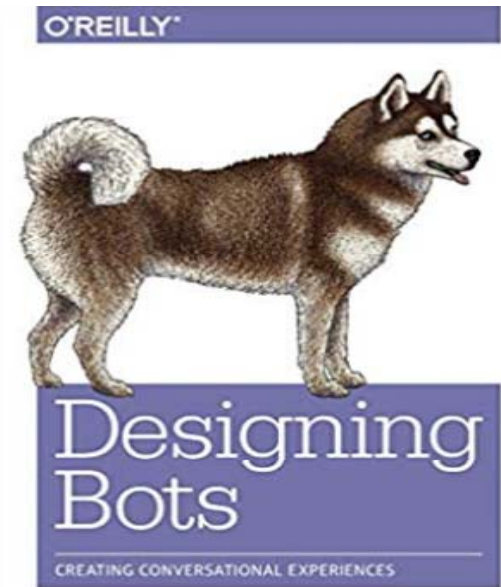
user's activities with chatbot, user's expectation

## **Conversation scripts development:**

use case scenario, Q&A

## **Workflow development:**

flowchart for user-chatbot interactions



Amir Shevat

Ref. Designing Bots: Creating Conversational Experiences

[https://www.amazon.com/Designing-Bots-Creating-Conversational-Experiences/dp/1491974826/ref=sr\\_1\\_2?keywords=chatbot+design&qid=1578329323&s=books&sr=1-2](https://www.amazon.com/Designing-Bots-Creating-Conversational-Experiences/dp/1491974826/ref=sr_1_2?keywords=chatbot+design&qid=1578329323&s=books&sr=1-2)

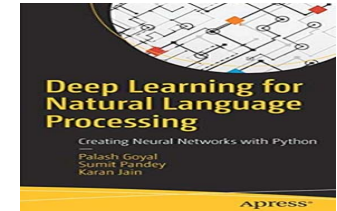


# AI Chatbot Development

## Build chatbots from scratch:

deep learning engine (Tensorflow) + NLP API (NLTK, spaCy, gensim)

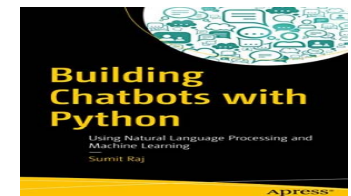
Ref. Deep Learning for Natural Language Processing: Creating Neural Networks with Python [https://www.amazon.com/Deep-Learning-Natural-Language-Processing/dp/148423684X/ref=sr\\_1\\_4?keywords=deep+learning+chatbot&qid=1578330342&s=books&sr=1-4](https://www.amazon.com/Deep-Learning-Natural-Language-Processing/dp/148423684X/ref=sr_1_4?keywords=deep+learning+chatbot&qid=1578330342&s=books&sr=1-4)



## Custom chatbot development:

use open-source chatbot development library such as Rasa (<https://rasa.com/>)

Ref. Building Chatbots with Python: Using Natural Language Processing and Machine Learning [https://www.amazon.com/Building-Chatbots-Python-Language-Processing-ebook/dp/B07LC1WWP8/ref=sr\\_1\\_1?keywords=building+chatbot&qid=1578330849&s=books&sr=1-1](https://www.amazon.com/Building-Chatbots-Python-Language-Processing-ebook/dp/B07LC1WWP8/ref=sr_1_1?keywords=building+chatbot&qid=1578330849&s=books&sr=1-1)



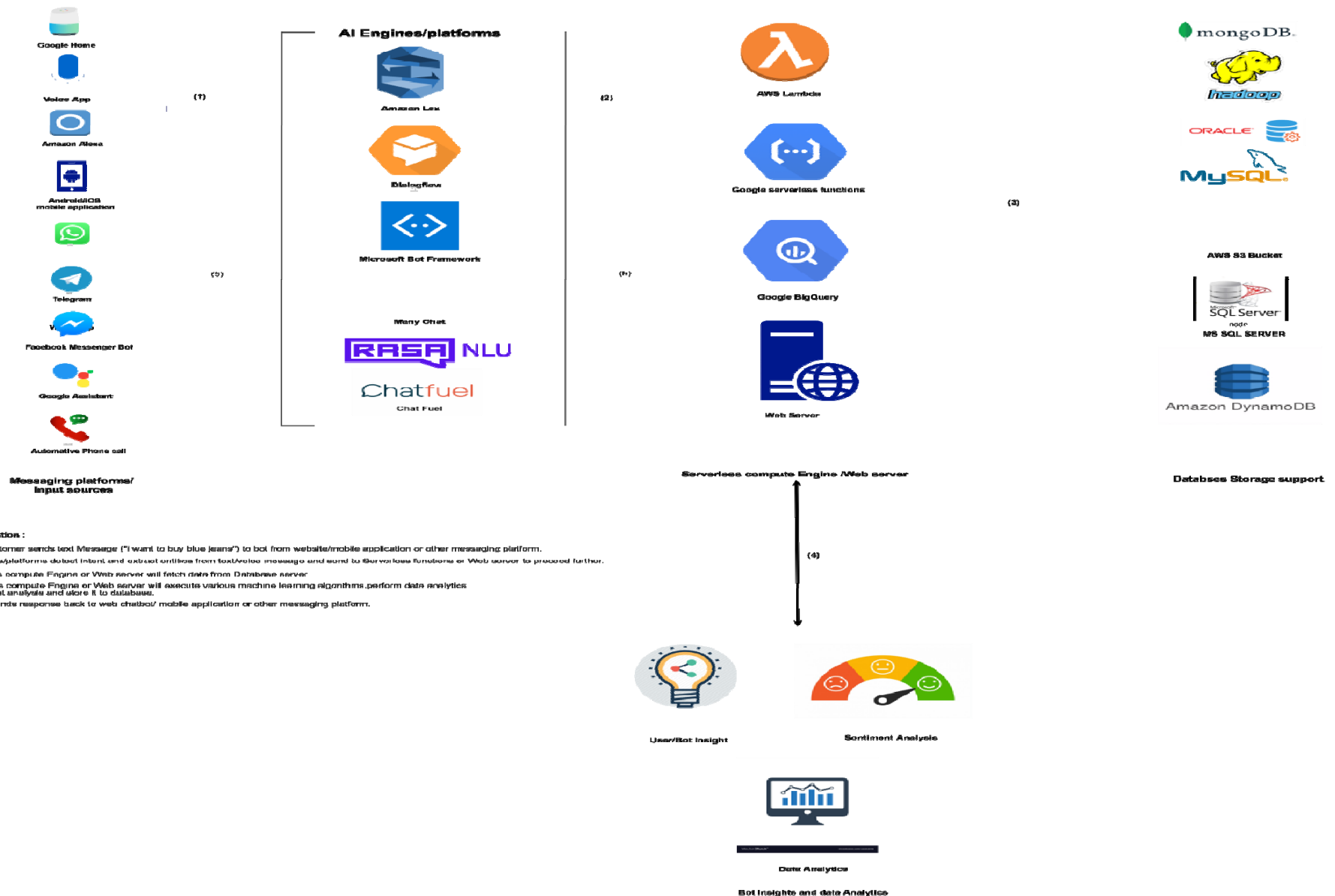
## Solution based chatbot development:

build chatbots using any cloud services like Dialogflow

Ref. Build a chatbot with DialogFlow, NodeJS and Slack [https://www.amazon.com/Build-chatbot-DialogFlow-NodeJS-Slack-ebook/dp/B07CXW7TD3/ref=sr\\_1\\_2?keywords=dialogflow+chatbot&qid=1578331185&s=books&sr=1-2](https://www.amazon.com/Build-chatbot-DialogFlow-NodeJS-Slack-ebook/dp/B07CXW7TD3/ref=sr_1_2?keywords=dialogflow+chatbot&qid=1578331185&s=books&sr=1-2)



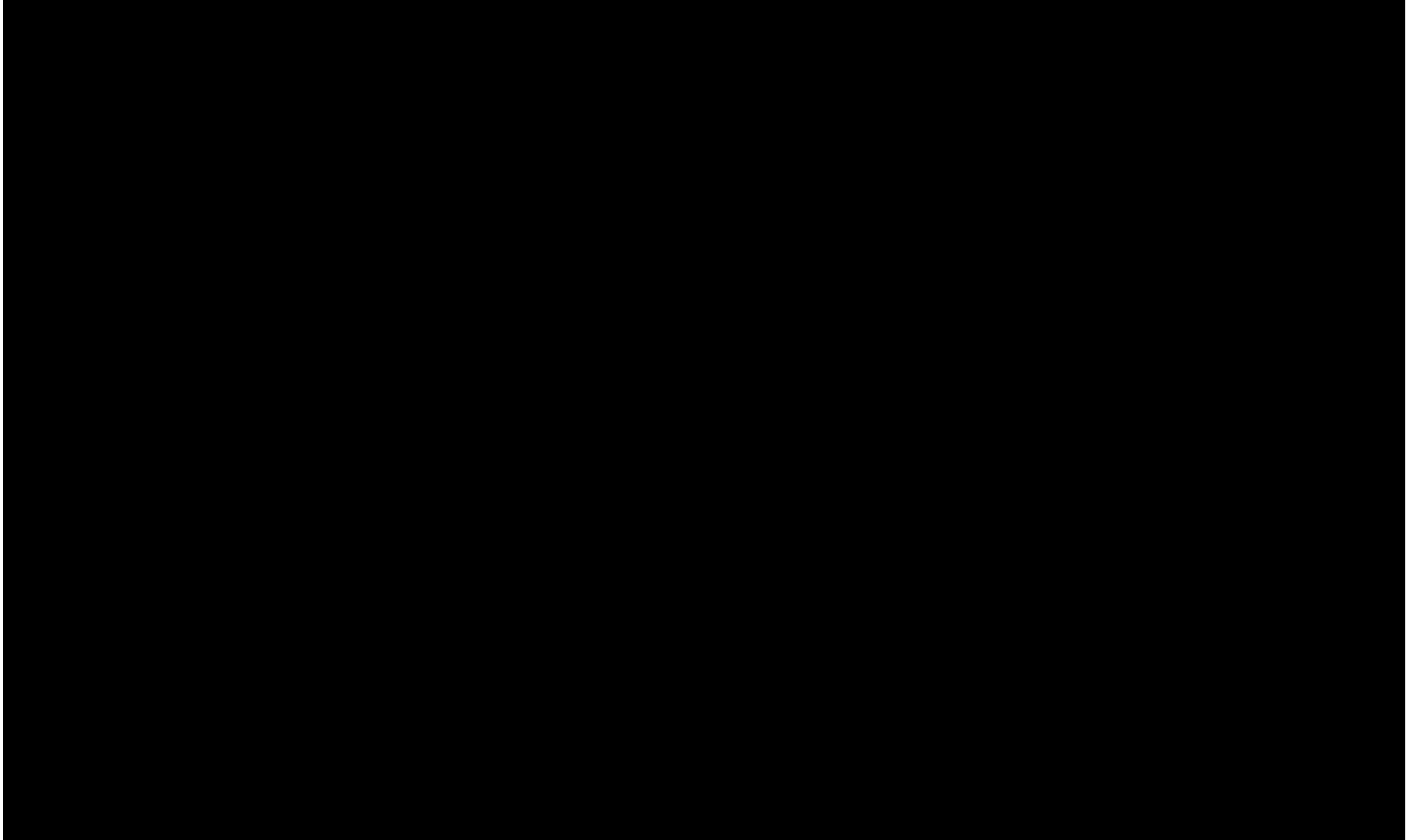
# End-to-End AI Chatbot Solution Development





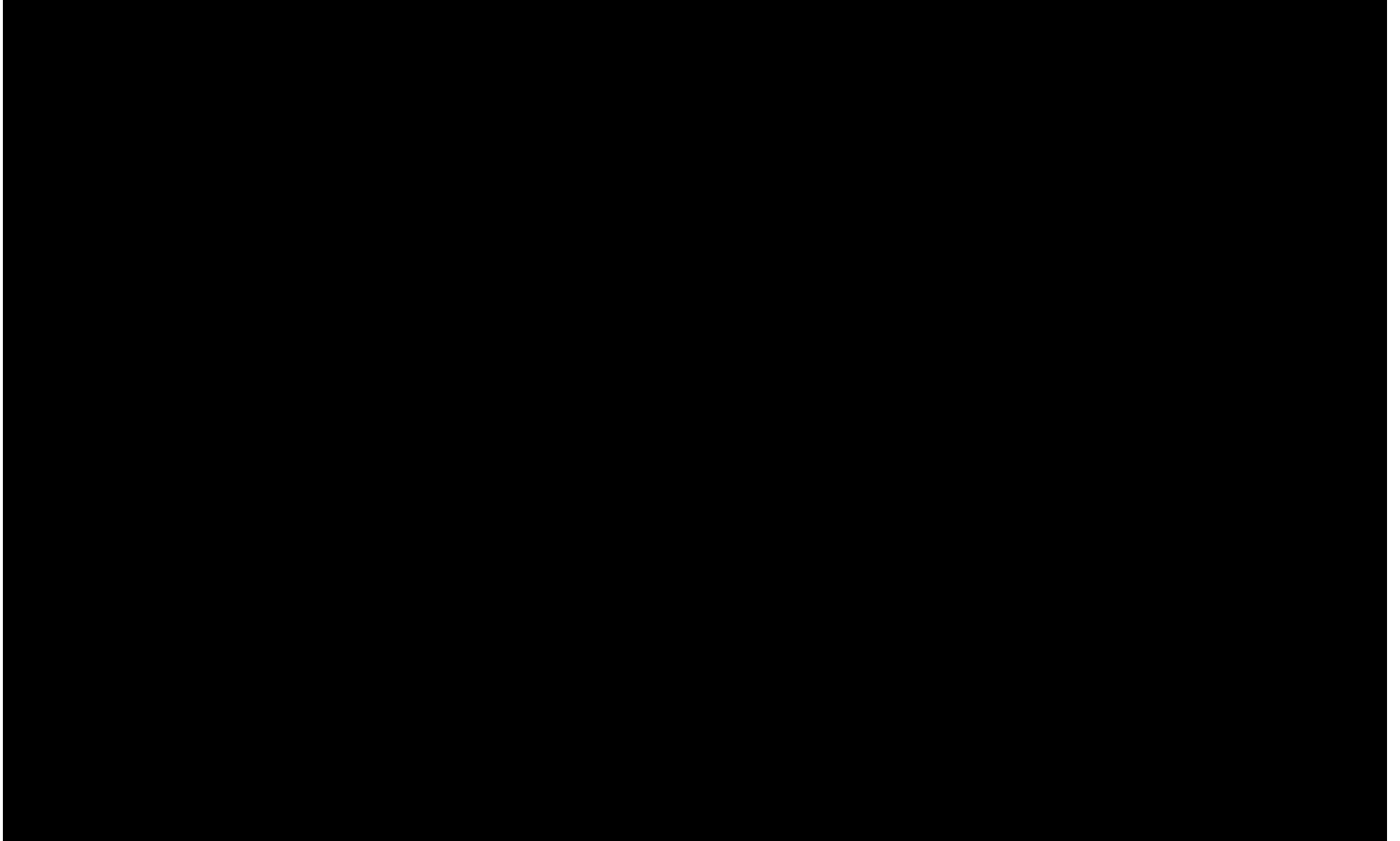
# AI Chatbot Prototype Development Demo: Web UI

Link: [https://www.youtube.com/watch?v=fFYzlqugPPs&list=UUkERuP7J9mW1tY1dgN\\_PttQ&index=25](https://www.youtube.com/watch?v=fFYzlqugPPs&list=UUkERuP7J9mW1tY1dgN_PttQ&index=25)

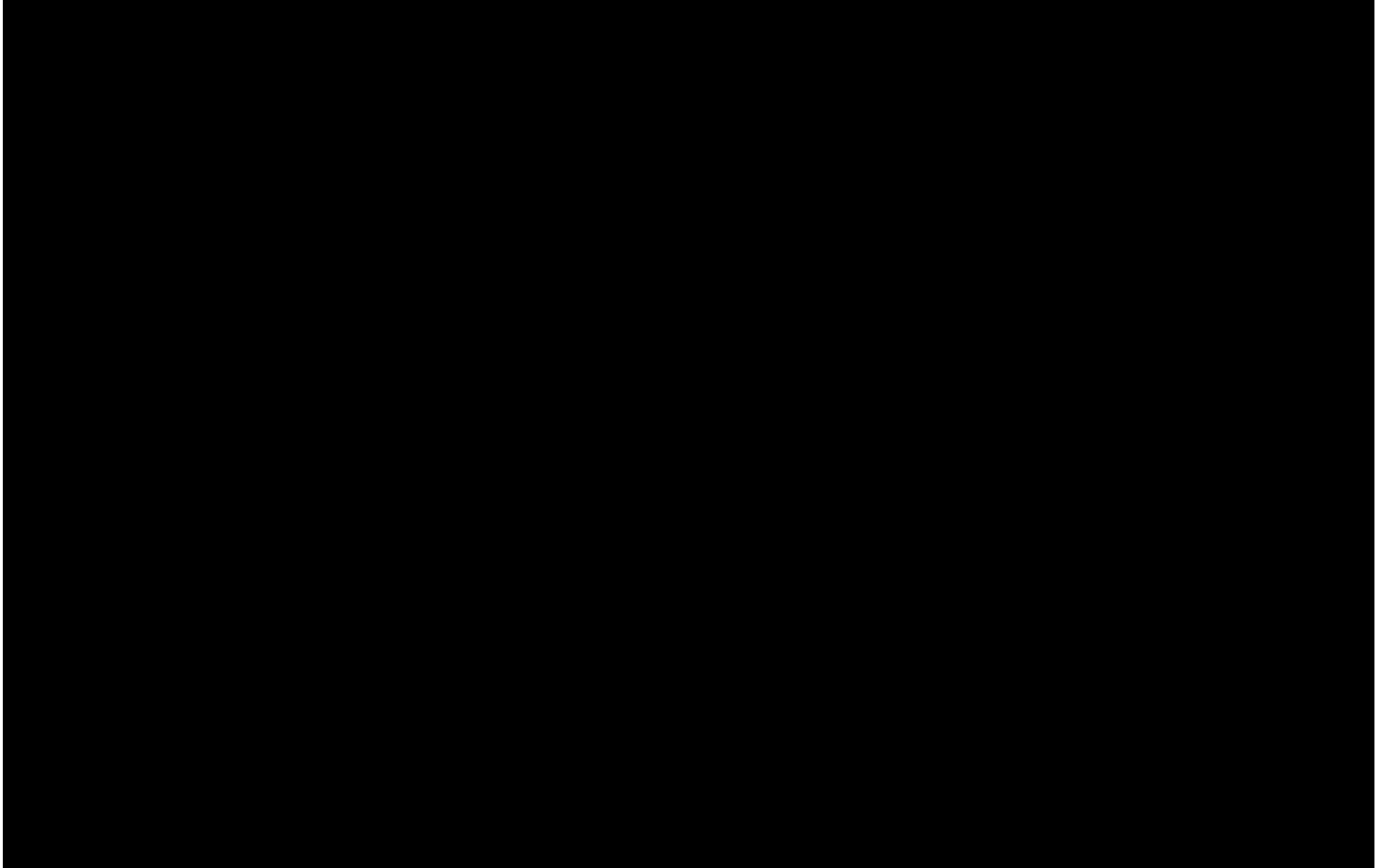


# AI Chatbot Prototype Development Demo: Mobile Text UI

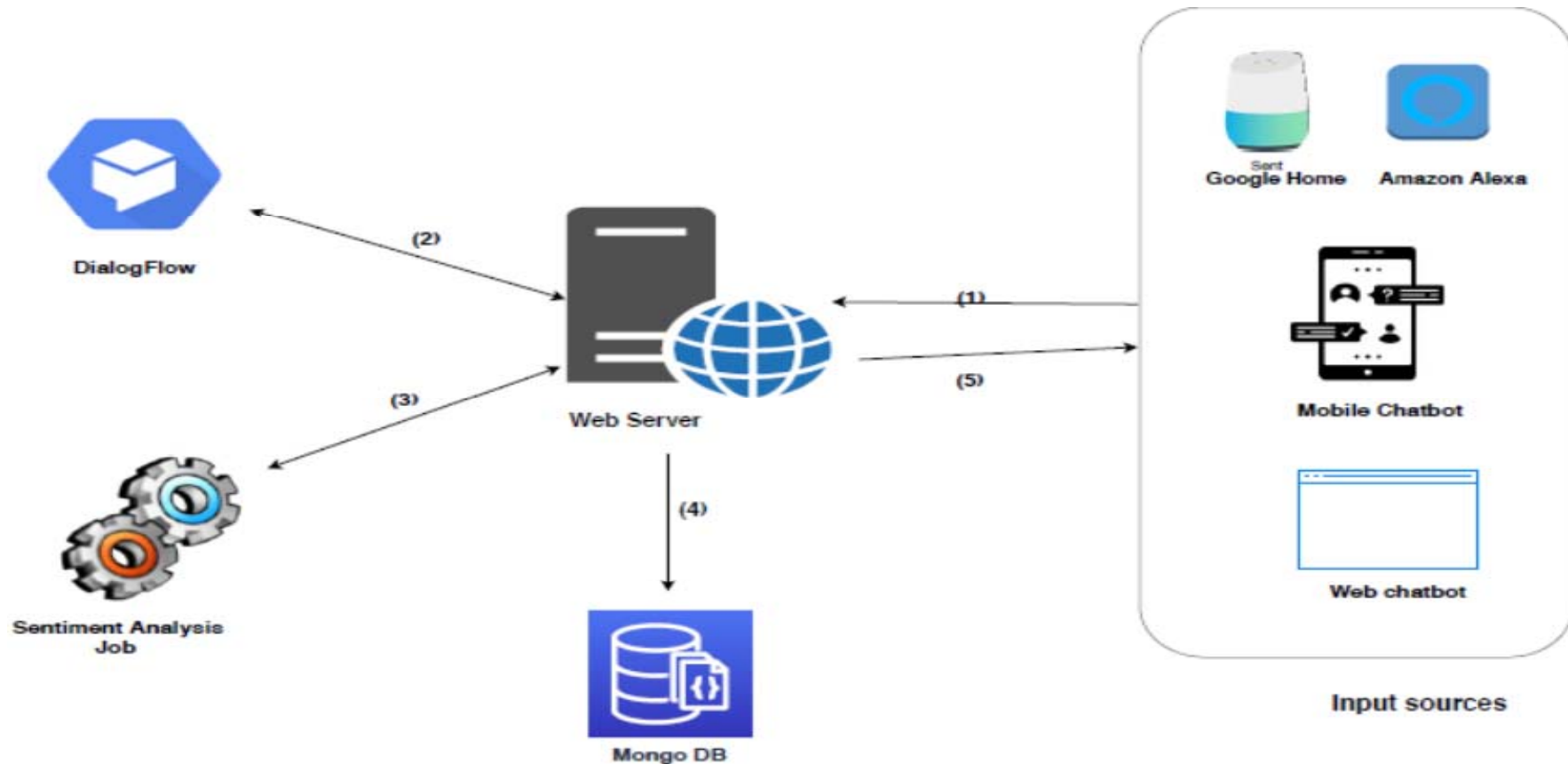
Link: [https://www.youtube.com/watch?v=a-ypdTnIdI&list=UUkERuP7J9mW1tY1dgN\\_PttQ&index=11](https://www.youtube.com/watch?v=a-ypdTnIdI&list=UUkERuP7J9mW1tY1dgN_PttQ&index=11)



## **AI Chatbot Prototype Development Demo: Mobile Voice UI**



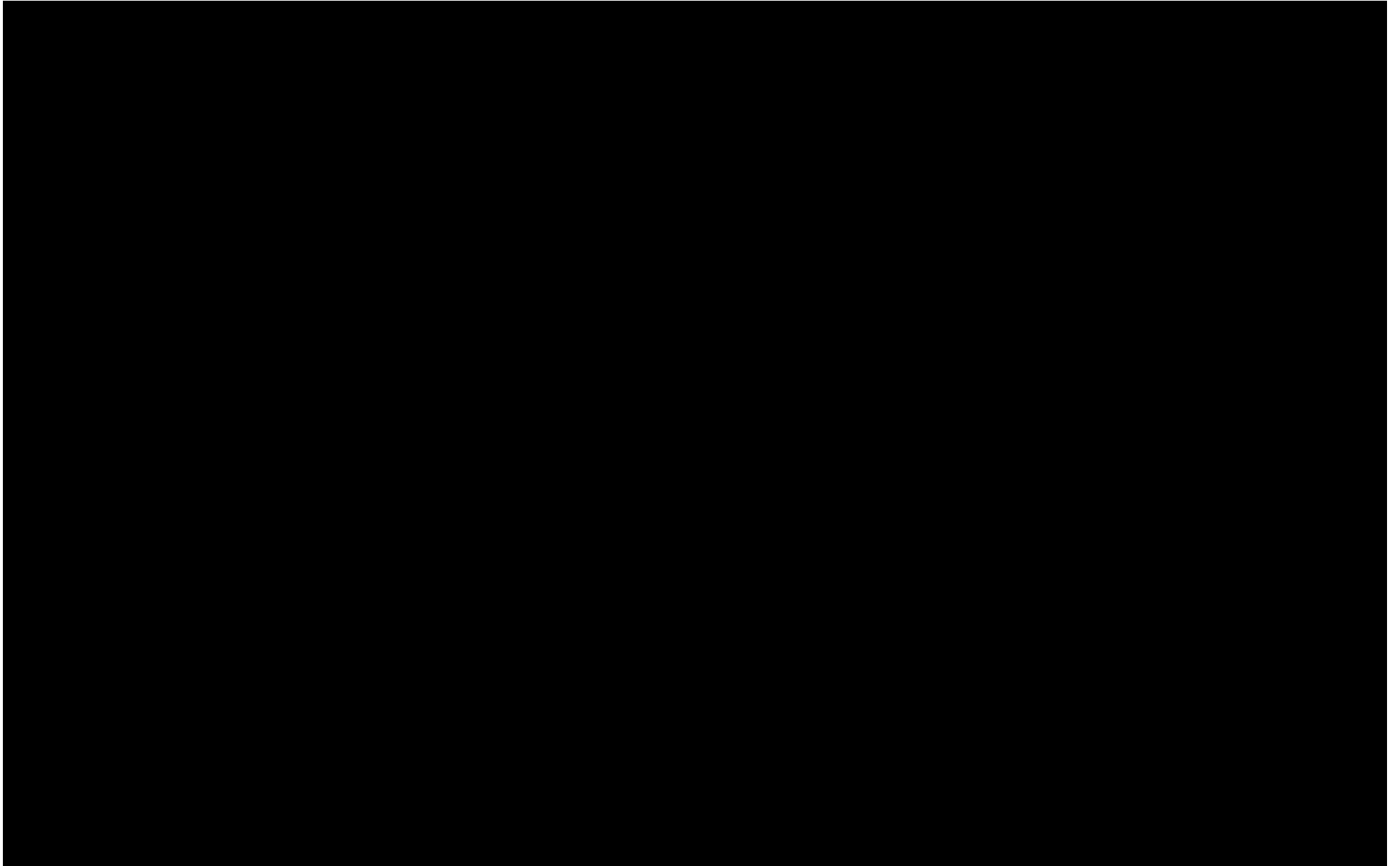
# AI Chatbot Sentiment Analysis + Big Data Analytics



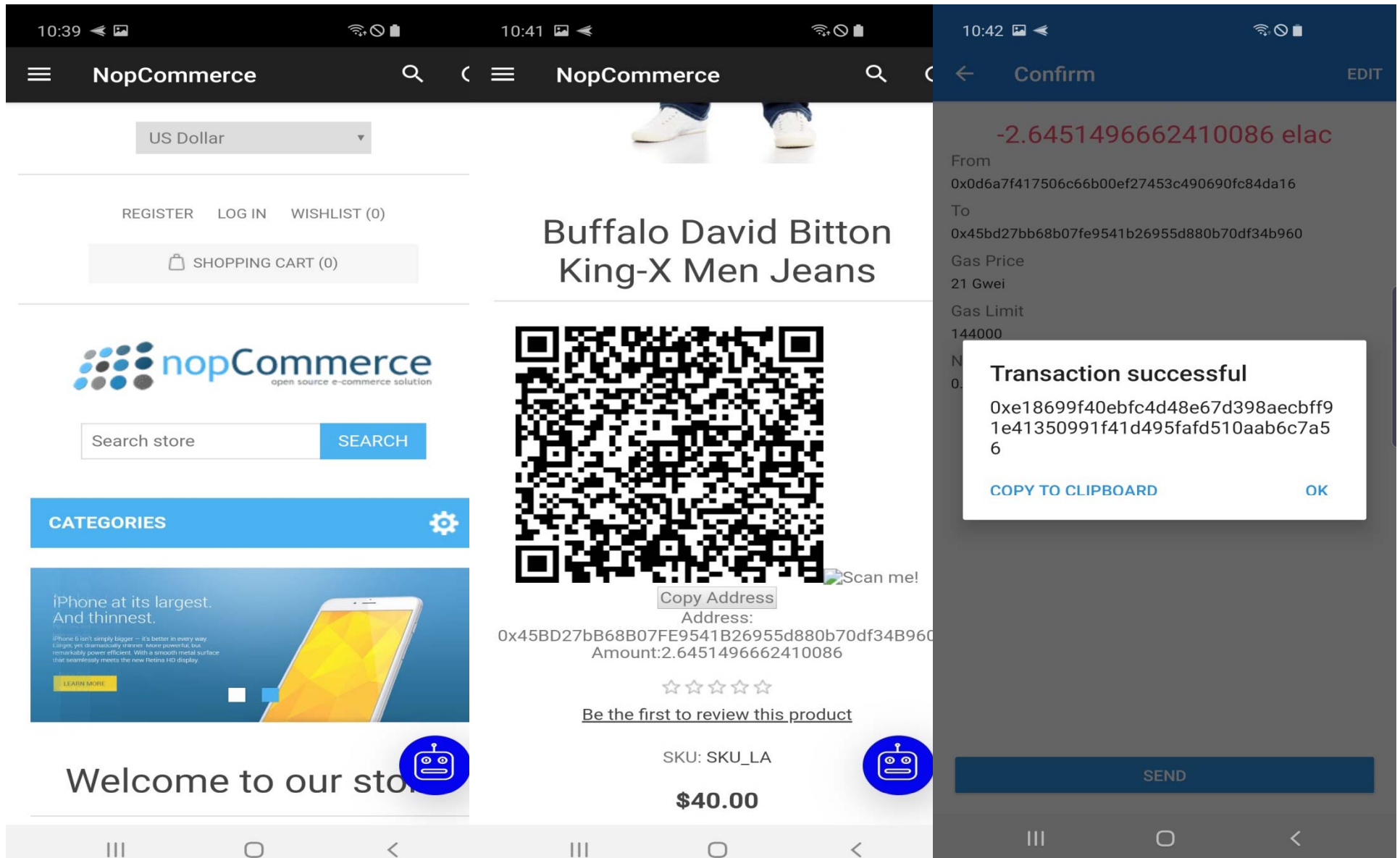
## Flow Explanation:

- (1) Text Message comes from Input sources (Mobile chatbot, Web chatbot, Smart Devices)
- (2) Web Server will send text message to DialogFlow to analyze intent and entities from text message.
- (3) Execute sentiment analysis job on conversation (customer and bot), retrieve sentiment result (POSITIVE, NEGATIVE, NUTRAL).
- (4) Store sentiment result and conversations details into MongoDB for data analytics.
- (5) Prepare response and send it back to devices

# AI Chatbot Sentiment Analysis + Big Data Analytics Demo

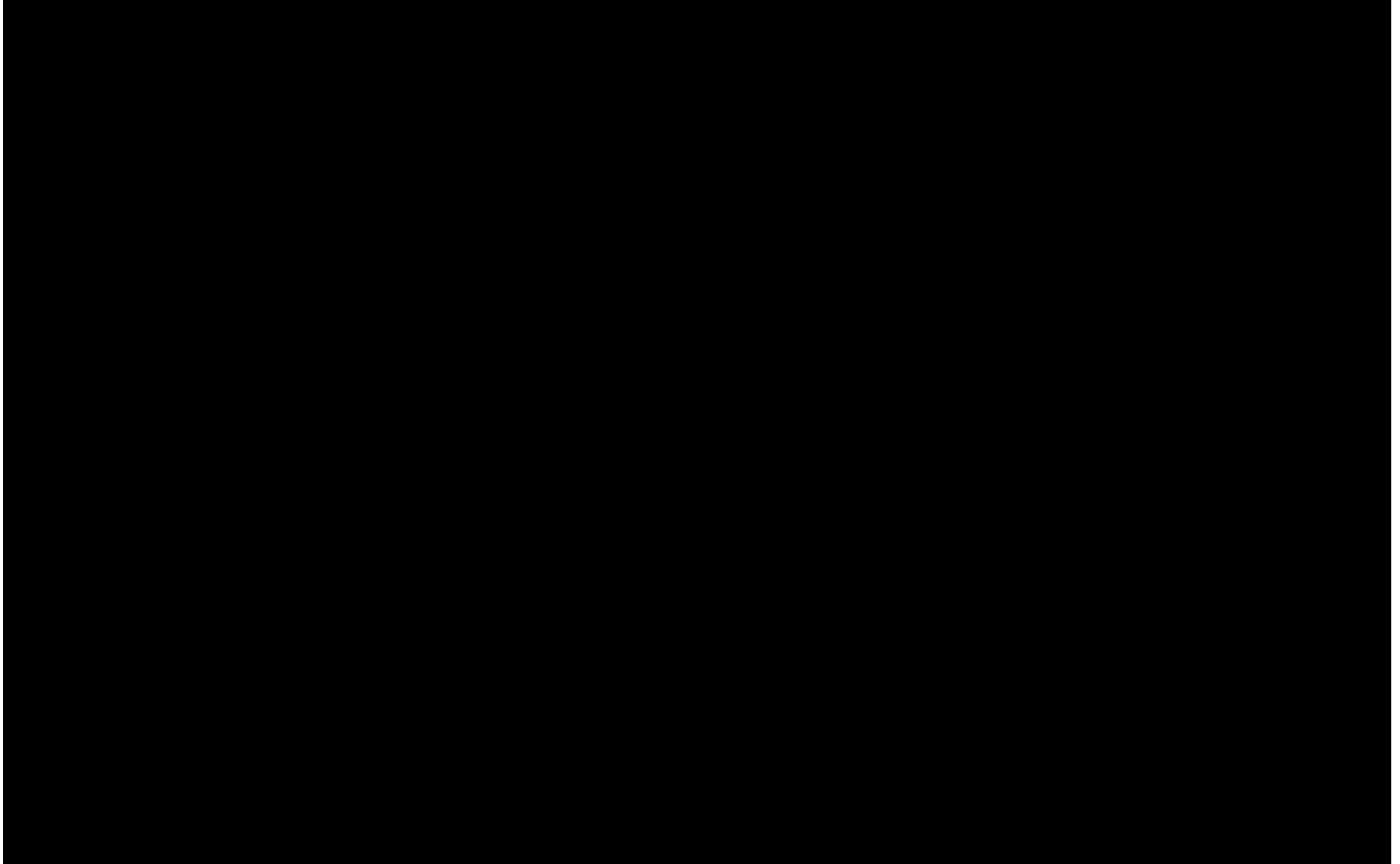


# Mobile E-Commerce Integration



# Mobile E-Commerce Integration Demo

Link: [https://www.youtube.com/watch?v=eJwFrdaq9Q&list=UUkERuP7J9mW1tY1dgN\\_PttQ&index=7](https://www.youtube.com/watch?v=eJwFrdaq9Q&list=UUkERuP7J9mW1tY1dgN_PttQ&index=7)







Thank you!  
Xanadu Big Data, LLC  
Elamachain USA, LLC