Conversational AI, Demystified!

Priyanka Vergadia
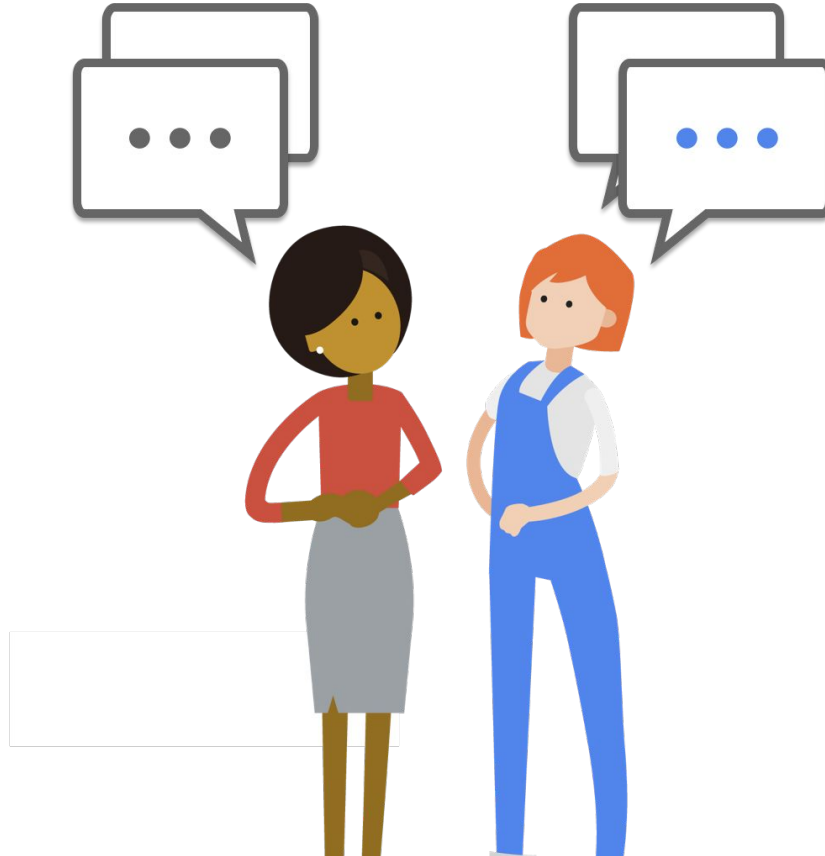## Developer Advocate @Google

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Why do conversational experiences fail?

- **Artificial Intelligence (AI)** is still not that accessible

- **Use cases** are not that strong

- Some bots lack **transparency**

- They don't understand **context**

- They don't **communicate** with existing business systems

- They try to **handle too many things** at once

- They lack proper **human escalation** protocols

Reference: https://chatbot.fail/

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Conversation is the new UI!

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Internet of Things

Conversation is the new UI!

80%
of customer interactions can be resolved by **well-designed** bots

— **Accenture**

60%
of consumers want easier access to **self-serve solutions** for customer service

— **Ovum**

50%
of enterprises will **spend more on bots** than traditional mobile app dev by 2021

— **Gartner**

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Use cases of Conversation AI and beyond

Connecting businesses with customers

- Customer service
- E-commerce

Controlling IoT devices

- Home entertainment
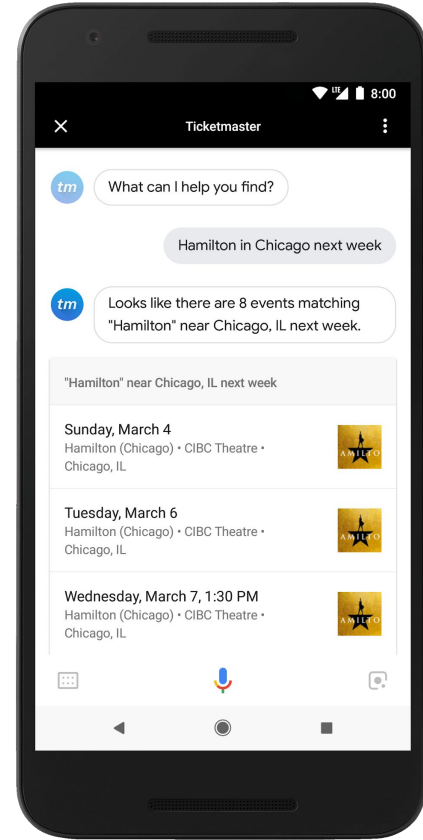- Auto

Connecting businesses with employees

- Organizational knowledge
- Onboarding & Helpdesk

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What is a "conversational experience"?

Any voice or chat interface that relies on Natural Language Understanding (NLU) for interacting with users -- not on static scripts or trees.

Synonyms:
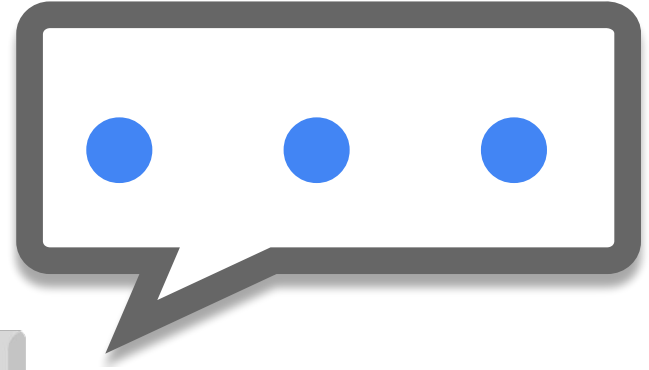Conversational interface, conversational UX, conversational app, voice bot, chat bot

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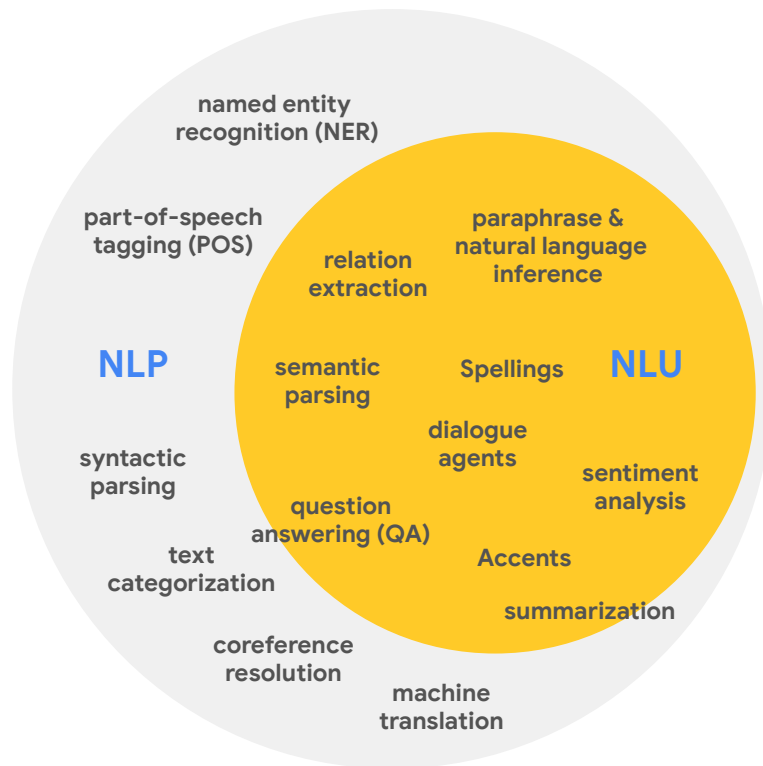# Technology behind Conversation AI

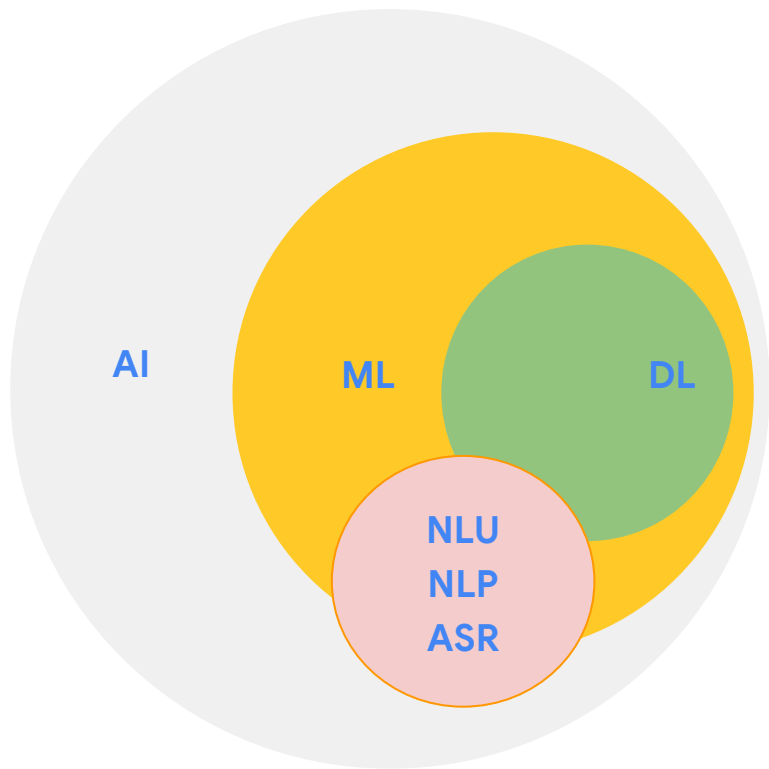# NLU vs. NLP vs. ASR vs TTS

(NLP) Natural Language Processing

(NLU) Natural Language Understanding

(ASR) automatic speech recognition

(TTS) text-to-speech

(STT) speech-to-text

named entity recognition (NER)

part-of-speech tagging (POS)

NLP

relation extraction

paraphrase & natural language inference

semantic parsing

Spellings

NLU

syntactic parsing

dialogue agents

sentiment analysis

text categorization

question answering (QA)

Accents

coreference resolution

summarization

machine translation

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AI

ML

DL

NLU
NLP
ASR

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What does it take to build a
GOOD
conversational experience?

Intents

- The verbs in your dialog

- The action a user wants to take that they expect your chatbot to fulfill or facilitate

- Translated needs and wants

- How the application branches logic

I need my coffee
Intent: Get coffee

Tell me I'm pretty
Intent: Positive affirmation

My laptop is broken
Intent: Tech support

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Entities

- The nouns in your dialog

- Composed of root terms and their synonyms

- Maps to variables

- Augmented by built-in entities

My **name** is **Lily**

The **food** was terrible

April 4, 2017

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Context

- How the chatbot keeps track of where the user is at in the conversation

- The background history you need when entering a conversation in progress

- Method for an application to store and access variables

Book a flight from Los Angeles to Hawaii for less than $300

You got it!

"id": "4f932df9-56...
"timestamp": "2017-05-26...
"lang": "en",
"result": {
"source": "agent",
"action": "flight.book", "parameters": {"geo-city": "Los Angeles",
"geo-state-us": "Hawaii", "price": {"amount": 300, "currency": "USD"},
"contexts": [{"name": "flightbook", "parameters": {
"geo-state-us.original": "Hawaii",
"price": {
"amount": 300,
"currency": "USD"
},
"geo-city": "Los Angeles",
"price.original": "$300",
"geo-state-us": "Hawaii",

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Multi Channel

Text
- 💬 Chat on web
- ⓕ Facebook Messenger
- 🐦 Twitter
- 📱 Google Assistant on mobile

Digital Voice
- 📱 Mobile app
- 🚗 Car
- 🖥 TV
- 🔊 Google home

Phone
- 📞 Phone calls through gateway

Integration

Multiple Language support

Intent Detection

Context

ML

Training

NLP

Analytics

Serverless Fulfillment option

Small talk frequent intent

Fulfillment

Orchestration

Microservice

Platform

Infrastructure

Directory

CRM

Other systems & APIs

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Meeting expectations is hard without the right tools

NLU doesn't grow on trees!
Few companies have the expertise to do NLU as well as consumers expect

Maximizing reach takes effort
Building support for multiple languages, platforms, devices, and apps is complex

Enterprise integration is critical
Integration with backend services and websites requires open, flexible infrastructure

Google Cloud

Tools for Conversation AI

Natural Language Toolkit

gensim
topic modelling for humans

spaCy

Stanford University
S
NLP
Natural Language Processing
CoreNLP

TextBlob

Natural Language API

AutoML Natural Language

Text-to-Speech

Speech-to-text

Orders

Receipts

Invoices

Notes

Info Requests

Complaints

1. Upload your documents

Label text based on your domain-specific keywords and phrases

-1.0   +1.0

2. Train your custom model

Classify, extract, and detect sentiment

3. Evaluate

Get insights that are relevant to your specific needs

Multi Channel

Text
- Chat on web
- Facebook Messenger
- Twitter
- Google Assistant on mobile

Digital Voice
- Mobile app
- Car
- TV
- Google home

Phone
- Phone calls through gateway

Conversation management

Dialogflow

Fulfillment

Google Cloud Orchestration

- Microservice
  Cloud Function
- Platform
  AppEngine
- Infrastructure
  Compute Engine

Directory

CRM

Other systems
& APIs

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What is Dialogflow?

- The emerging standard for building natural and rich conversational experiences for customer service and other applications across devices, websites, messaging platforms, and apps

- Powered by Google AI

- Built on Google Cloud Platform infrastructure, with Cloud Support and SLA available

- Multilingual and platform-agnostic: 20+ languages supported, 14 single-click integrations, and 7 SDKs

Demo

Retail Demo

Appointment Scheduler with Calendar integration

Google Cloud

Chatbot integrated with Google Vision API

Chat with Dialogflow

hi

Hello! I can help you set appointment and find landmarks in pictures. How can I help you today?

This is Eiffel Tower

Type something to begin...   Submit

Choose File eiffel.jpeg

Appointment Scheduler with Calendar integration

Chatbot integrated with Google Vision API

What is happening behind the scenes?

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Dialogflow benefits for users

Build faster

Start training with only a few examples

40+ pre-built agents and "small talk" features

Go-to-market with a simple bots in hours

Engage more efficiently

Built-in, world-class natural language understanding

Multiple fulfillment options, including built-in code editor

Training and analytics across platforms

Maximize reach

Build once, deploy everywhere

20+ languages supported (most in product category)

14 single-click platform integrations & 7 SDKs

Google Cloud

Intent Matching

Recognizing what a user
wants to do.

Response

Output automatically unless webhook intervenes
Embed entity values if desired

Responses ❓ ⌃

DEFAULT   GOOGLE ASSISTANT   TELEPHONY   SKYPE   FACEBOOK MESSENGER   +

Text response	⑦ 🗑
1	You are all set for your $AppointmentType on $date at $time, see you then!
2	Enter a text response variant

ADD RESPONSES

Entity Extraction

Identify key words and
phrases spoken by the user.

AppointmentType

SAVE ⋮

☑ Define synonyms ❓   ☐ Allow automated expansion   ☐ Fuzzy matching ❓

Drivers License	DL, Drivers License, driving test, license, real ID, test
Others	Others, none, something else
Vehicle registration	Vehicle registration, car registration, register, registration
	Click here to edit entry

> set an appointment at 2pm on Monday for license

PARAMETER NAME	ENTITY	RESOLVED VALUE	
time	@sys.time	at 2pm	✕
date	@sys.date	on Monday	✕
AppointmentType	@AppointmentType	license	✕

Action and parameters ⌃

	Enter action name

REQUIRED ❔	PARAMETER NAME ❔	ENTITY ❔	VALUE	IS LIST ❔	PROMPTS ❔
☑	time	@sys.time	$time	☐	What time would...
☑	date	@sys.date	$date	☐	What date? [1]
☑	AppointmentType	@AppointmentType	$AppointmentType	☐	What services a...
☐	Enter name	Enter entity	Enter value	☐	—

Dialogflow

Google

Parameters

Action and parameters

Enter action name

REQUIRED	PARAMETER NAME	ENTITY	VALUE	IS LIST	PROMPTS
☑	time	@sys.time	$time	☐	What time would...
☑	date	@sys.date	$date	☐	What date? [1]
☑	AppointmentType	@AppointmentType	$AppointmentType	☐	What services a...
☐	Enter name	Enter entity	Enter value	☐	—

Dialogflow

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Fulfillment

Connect an agent with your
back end code.

Google

JSON

```json
{
  "id": "7072bac9-e185-4b2d-b88f-4992b85a49a0",
  "timestamp": "2017-08-08T21:10:56.571Z",
  "lang": "en",
  "result": {
    "source": "agent",
    "resolvedQuery": "3pm",
    "action": "",
    "actionIncomplete": false,
    "parameters": {
      "appointment-type": "fix",
      "date": "2017-08-09",
      "time": "15:00:00"
    },
    "contexts": [],
    "metadata": {
      "intentId": "88222d6f-68b3-4a41-a58a-ed04f450bf46",
      "webhookUsed": "true",
      "webhookForSlotFillingUsed": "false",
      "webhookResponseTime": 3670,
      "intentName": "Bike Service Intent"
    },
    "fulfillment": {
      "speech": "Great! I've setup your appointment for 2017-08-09 at 15:00:00.  See you then",
      "displayText": "Great! I've setup your appointment for 2017-08-09 at 15:00:00.  See you then",
      "messages": [
        {
          "type": 0,
          "speech": "Great! I've setup your appointment for 2017-08-09 at 15:00:00.  See you then"
        }
      ]
    },
    "score": 1
  },
  "status": {
    "code": 200,
    "errorType": "success"
  },
  "sessionId": "8b0891c1-50c8-43c6-99c4-8f77261acf86"
}
```

CLOSE   COPY

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One-click integrations

Actions on Google	Web Demo	Facebook Messenger	Slack
SETTINGS		SETTINGS	
Viber	Twitter	Twilio IP	Twilio (Text messaging)
	SETTINGS		SETTINGS
Skype	Tropo (Text messaging)	Telegram	Kik
LINE	Cisco Spark	Amazon Alexa	Microsoft Cortana

Dialogflow

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Phone Gateway

Lets you instantly convert any Dialogflow virtual agent into a conversational IVR (Interactive Voice Response) system.

Based on the same Google infrastructure used by Google Voice, Project Fi, Google Hangouts.

Telephony service, speech recognition, NLU, and speech synthesis are handled out-of-the-box.

Dialogflow Phone Gateway BETA

Any phone call to the number below will be answered by this Dialogflow agent, starting with the Welcome intent. View our docs for more detail.

① Configure Phone Gateway —————— ② Select Phone Number —————— ③ Finish

Language

English (United States)

Country Code

+1 (United States)

Area Codes (Optional)

NEXT

Google Cloud

Knowledge Connectors

Dialogflow lets you pre-build explicit responses to specific user intents.

Knowledge Connectors enrich the conversation by complementing explicit intents with automated responses sourced from internal knowledge bases (articles, FAQs, etc.).

Google Cloud

Automatic Spelling Correction

Users commonly use abbreviations and incorrect spelling or grammar, particularly when typing in a hurry.

Our new Automatic Spelling Correction feature uses technology developed for Google Search to correct for user typos.

Google Cloud

Built-in Sentiment Analysis

Measures sentiment of a user request to provide a data point about the user's emotional state of mind.

That data can be used to help determine the need for bringing in live agent help.

Agent

USER SAYS   COPY CURL
The service here really sucks!

⬡ DEFAULT RESPONSE   ▼   PLAY
I didn't get that. Can you say it again?

INTENT
Default Fallback Intent

ACTION
input.unknown

SENTIMENT
Query Score: -0.9

DIAGNOSTIC INFO

Google Cloud

Built-in
Text-to-Speech

Dialogflow uses Cloud Text-to-Speech powered by DeepMind's WaveNet technology (closes audio-quality gap with human speech by 70%) to deliver natural, precise speech responses.

Useful for telephony as well as IoT applications (e.g., cars, TVs).

Google Cloud

Steps to Create Conversation Experience

A world-class conversational interface is a multi-step process

1 Identify top user **journeys** that could be automated

2 Build **business** plan

3 Design a **persona**

4 Write professional **scripts**

5 Connect to backend **enterprise systems**

6 Build PoC and **collect feedback**

7 Connect to **human agent** system for human intervention

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[Deconstructing Chatbots](#)

New features

Phone Gateway ^{Beta}
Lets you instantly convert any Dialogflow virtual agent into a conversational IVR

Knowledge Connectors ^{Beta}
Complements explicit intents with automated responses sourced from knowledge bases

Automatic Spelling Correction ^{Beta}
Uses technology similar to that used in Google Search to correct for user typos

Built-in sentiment analysis ^{Beta}
Measures sentiment to provide a data point about need for live agent handover

Built-in Text-to-Speech ^{Beta}
Powered by DeepMind's WaveNet to deliver high-quality speech responses for telephony & IoT