



# Conversation AI: The new User Experience

Google Cloud



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Google Cloud



**@pvergadia**



Google Cloud


History



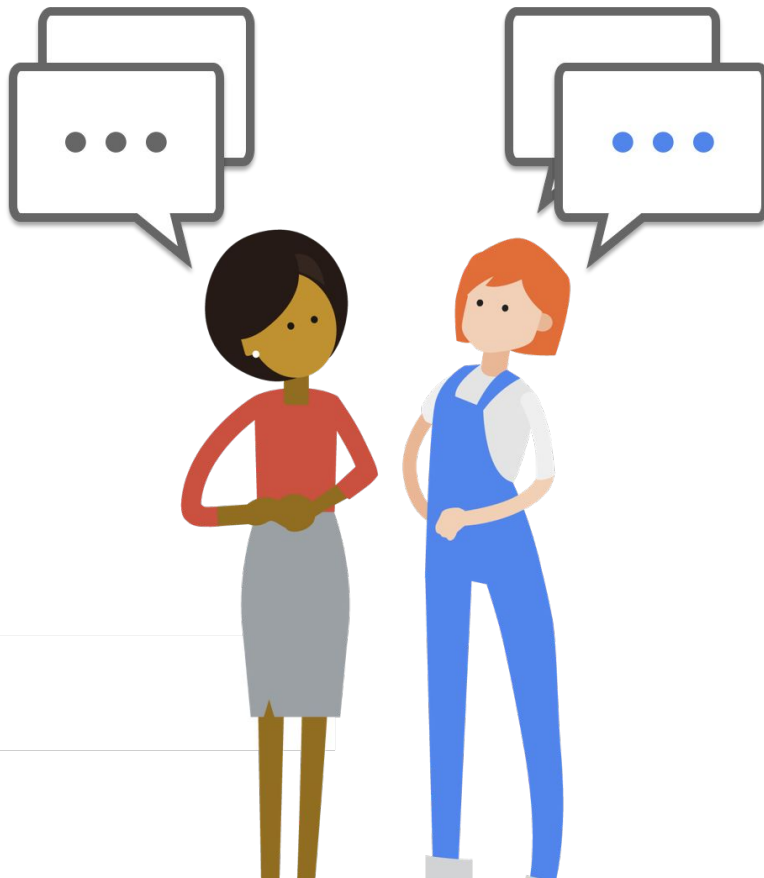


# Why do conversational experiences fail?

According to <https://chatbot.fail/> , there are 7 main drivers why chatbots fail to deliver delightful user experiences:

1. Artificial Intelligence (AI) is still not that accessible
  2. Use cases are not that strong
  3. Some bots lack transparency
  4. They don't understand context
  5. They don't communicate with existing business systems
  6. They try to handle too many things at once
  7. They lack proper human escalation protocols
- 

# Conversation is the new UI!









# 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

# Use cases of Conversation AI and beyond



## Connecting businesses with customers

- Customer service
- E-commerce



## Controlling IoT devices

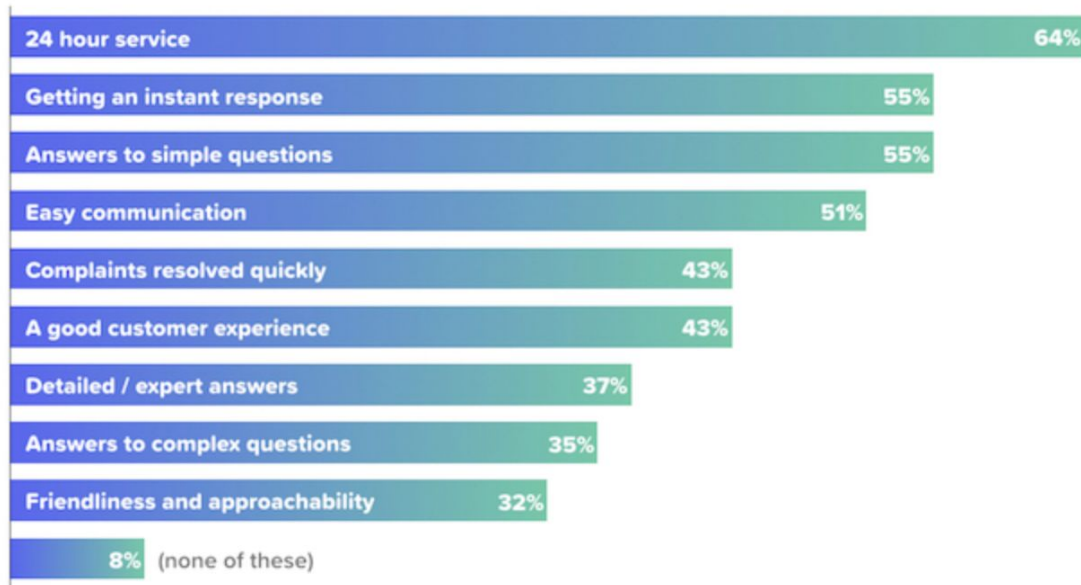
- Home entertainment
- Auto



## Connecting businesses with employees

- Organizational knowledge
- Onboarding & Helpdesk

# Consumers have high expectations



2018 State of Chatbots Report

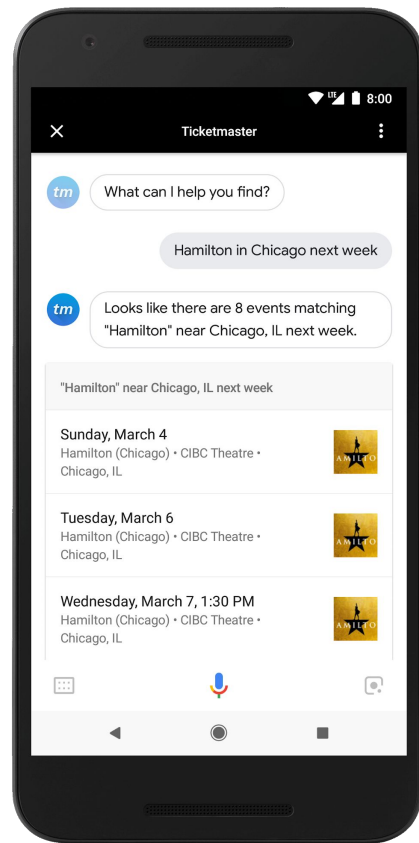
Based on data collected in Fall 2017 from sample of 1,051 U.S. adults, ages 18-64.

# What is a “conversational experience”?

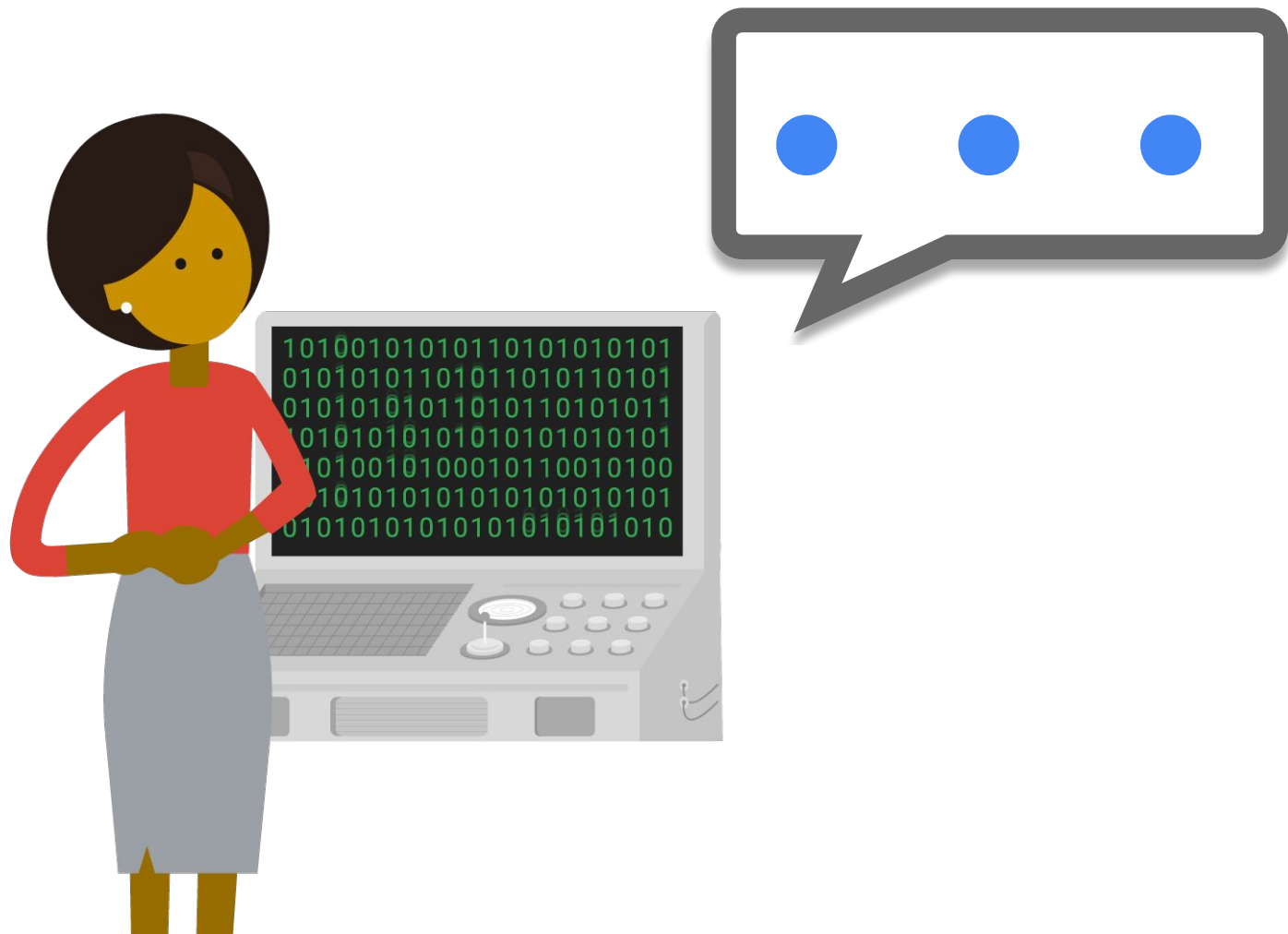
Any voice or chat interface that relies on **Natural Language Understanding (NLU)** for interacting with users -- not on static scripts or trees.

## Synonyms:

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



# Technology behind Conversation AI



# NLU vs. NLP vs. ASR vs TTS

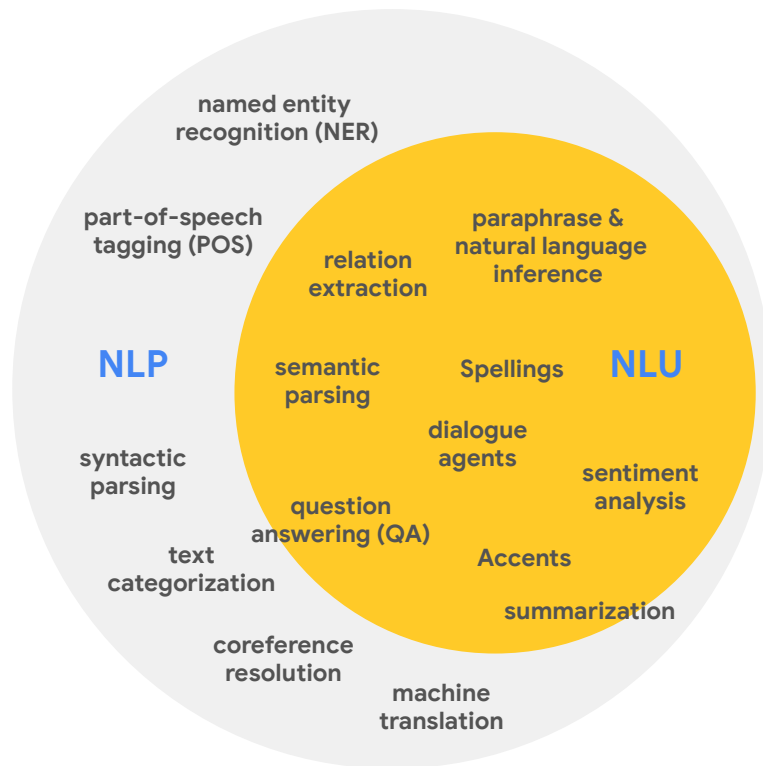
(NLP) Natural Language Processing

(NLU) Natural Language Understanding

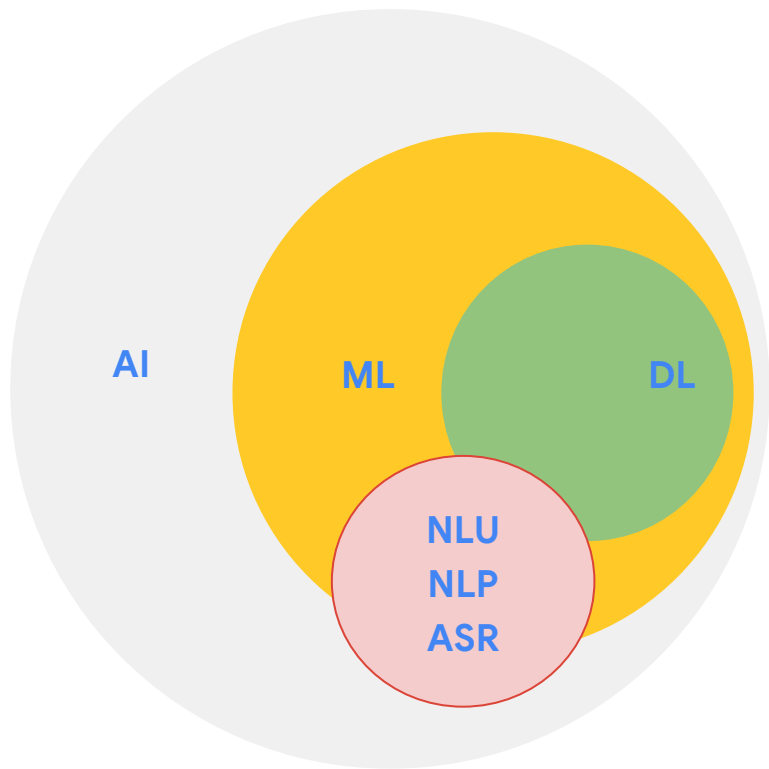
(ASR) automatic speech recognition

(TTS) text-to-speech

(STT) speech-to-text







What does it take to build a  
**GOOD**  
conversational experience?

# Intents

- ❖ Intents
- ❖ Utterances
- ❖ Entities
- ❖ Context

- 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

**My laptop is broken**  
Intent: Tech support

**Tell me I'm pretty**  
Intent: Positive affirmation

# Entities

- ❖ Intents
- ❖ Utterances
- ❖ **Entities**
- ❖ Context

- The nouns in your dialog
- Composed of root terms and their synonyms
- Maps to variables
- Augmented by built-in entities

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

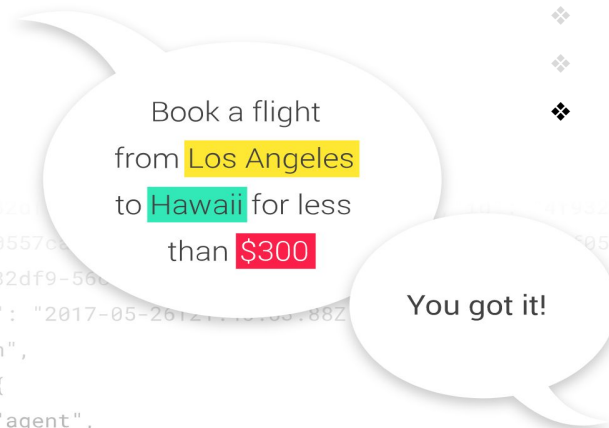
The **food** was terrible

**April 4, 2017**

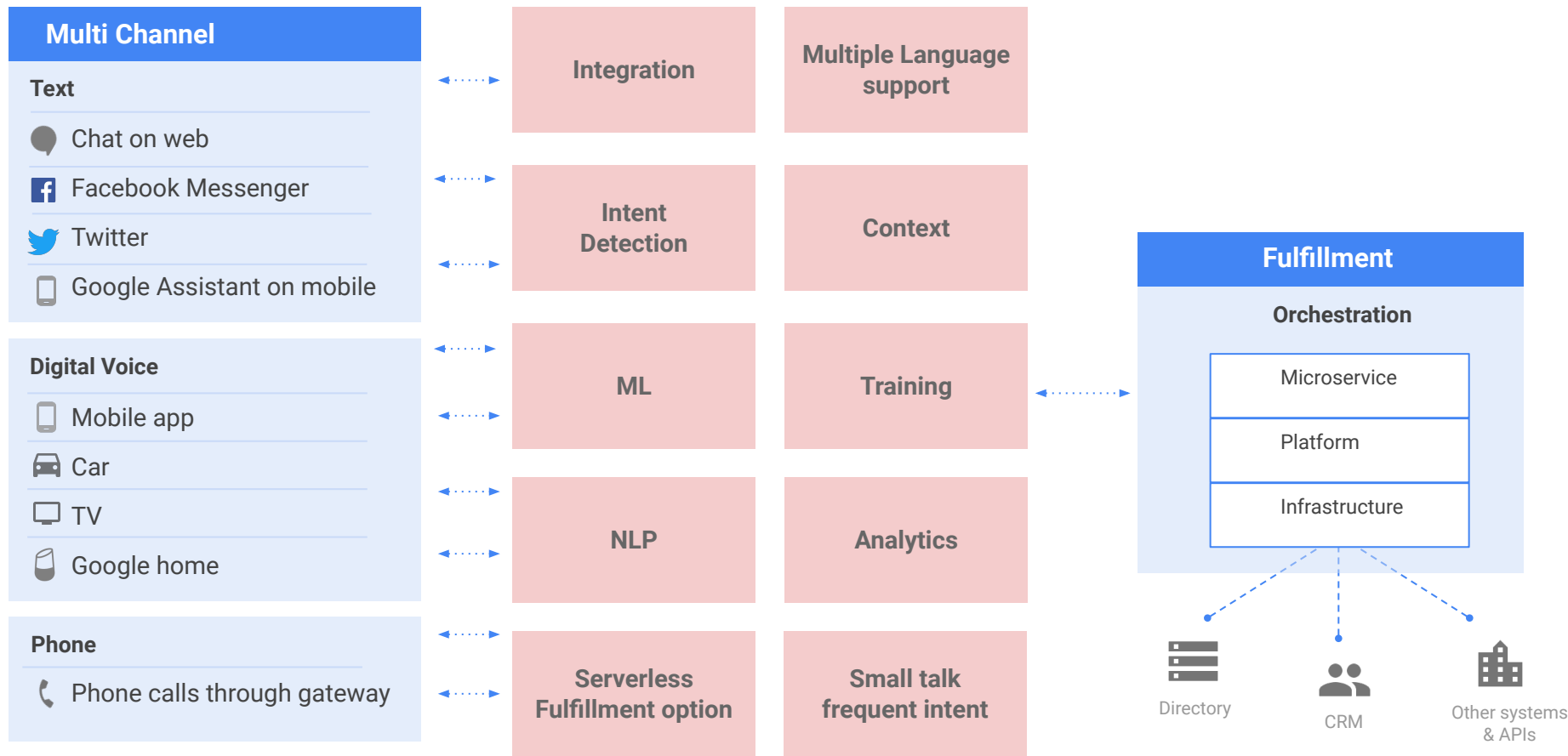
# Context

- 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

- ❖ Intents
- ❖ Utterances
- ❖ Entities
- ❖ Context



```
{
  "id": "4f932df9-56...",
  "timestamp": "2017-05-26T17:13:08Z",
  "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"
  }
}
```



# 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



# Tools for Conversation AI

## 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

	<b>Microservice</b> Cloud Function
	<b>Platform</b> AppEngine
	<b>Infrastructure</b> Compute Engine



Directory



CRM



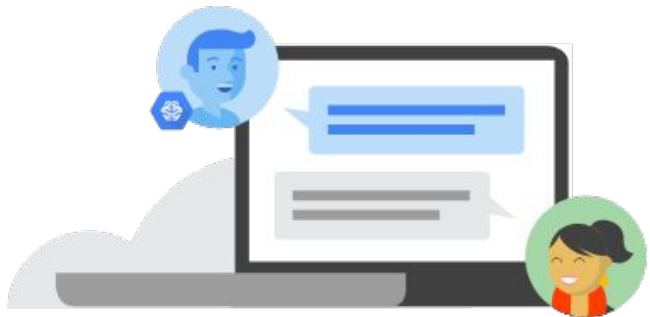
Other systems  
& APIs



# 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

\$14.30



Selet a Size

S

M

L

XL

ADD TO CART

Product Details

The "Blueprint for better Inbox" now available for the ladies! This USA made American Apparel t-shirt sports a more fitted design and the new Inbox logo.

Additional Features:

- 50% cotton / 50% polyester for a super soft fit.
- Available in royal blue heather with the "New Inbox" logo screen printed on the center chest.
- Sizing runs smaller than normal. Please reference sizing chart prior to ordering.

# Appointment Scheduler with Calendar integration

**Chat with Dialogflow**

hi

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

set appointment for license at 3pm tomorrow

Ok, let me see if we can fit you in. June 10, 3 PM is fine!.

Submit

Choose File

No file chosen

# 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

## Dialogflow

Chat with Dialogflow

Submit

Choose File

No file chosen

# Chatbot integrated with Google Vision API

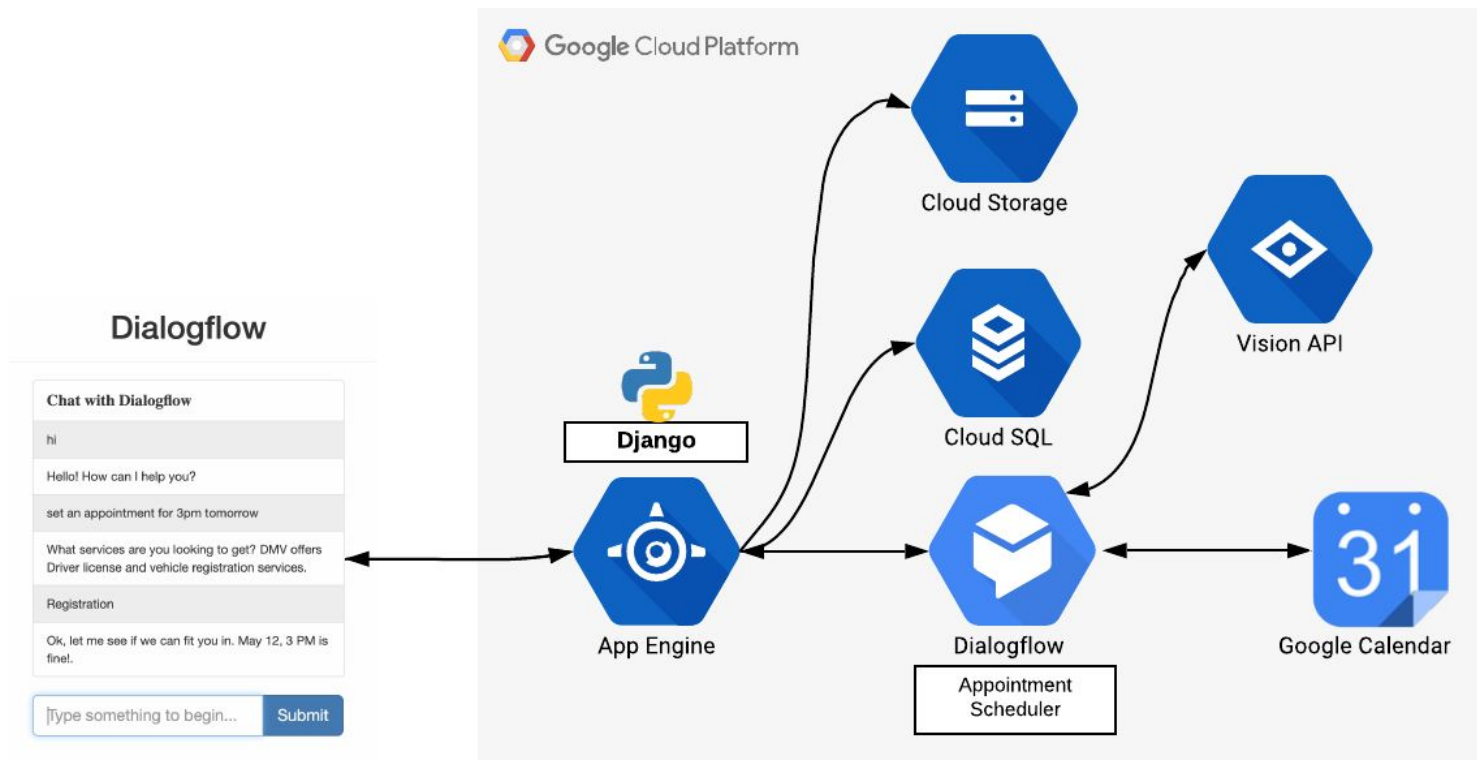
## Dialogflow

Chat with Dialogflow

Choose File

No file chosen

# What is happening behind the scenes



# 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

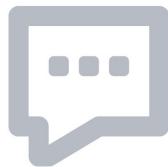


## Maximize reach

Build once, deploy everywhere

20+ languages supported (most in product category)

14 single-click platform integrations & 7 SDKs



## Intent Matching

Recognizing what a user wants to do.

## • Schedule Appointment

SAVE



Training phrases ?

Search training phrases



” Add user expression

” vehicle registration appointment for monday

” set an appointment at 2pm on Monday for license

” I would like to set an appointment for 3pm on Tuesday

” set an appointment for drivers license at 3pm tomorrow

” license renewal appointment on Monday

” Need an appointment for 4pm tomorrow

” Set an appointment on Wednesday at 2pm



# Response

Output automatically unless webhook intervenes

Embed entity values if desired

Responses ?



DEFAULT

GOOGLE ASSISTANT

TELEPHONY

SKYPE

FACEBOOK MESSENGER



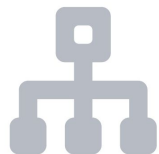
Text response



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
<a href="#">Click here to edit entry</a>	

” 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 ?
<input checked="" type="checkbox"/>	time	@sys.time	\$time	<input type="checkbox"/>	What time would...
<input checked="" type="checkbox"/>	date	@sys.date	\$date	<input type="checkbox"/>	What date? [1]
<input checked="" type="checkbox"/>	AppointmentType	@AppointmentType	\$AppointmentType	<input type="checkbox"/>	What services a...
<input type="checkbox"/>	Enter name	Enter entity	Enter value	<input type="checkbox"/>	—

# Parameters

## Action and parameters



REQUIRED ?	PARAMETER NAME ?	ENTITY ?	VALUE	IS LIST ?	PROMPTS ?
<input checked="" type="checkbox"/>	time	@sys.time	\$time	<input type="checkbox"/>	What time would...
<input checked="" type="checkbox"/>	date	@sys.date	\$date	<input type="checkbox"/>	What date? [1]
<input checked="" type="checkbox"/>	AppointmentType	@AppointmentType	\$AppointmentType	<input type="checkbox"/>	What services a...
<input type="checkbox"/>	Enter name	Enter entity	Enter value	<input type="checkbox"/>	—



## Fulfillment

Connect an agent with your  
back end code.

PersonalChef

 Intents + Entities + Domains Training <sup>[beta]</sup> Integrations Fulfillment

&gt; Docs

&gt; Forum

 Account Logout

## Webhook

Your web service will receive a POST request from API.AI in the [form of the response](#) to a user query matched by intents with webhook enabled. Be sure that your web service meets all the [webhook requirements](#).

[Webhook example](#)

ENABLED



URL\*

BASIC AUTH

HEADERS



Add header

DOMAINS

## JSON

```
1 {  
2   "id": "7072bac9-e185-4b2d-b88f-4992b85a49a0",  
3   "timestamp": "2017-08-08T21:10:56.571Z",  
4   "lang": "en",  
5   "result": {  
6     "source": "agent",  
7     "resolvedQuery": "3pm",  
8     "action": "",  
9     "actionIncomplete": false,  
10    "parameters": {  
11      "appointment-type": "fix",  
12      "date": "2017-08-09",  
13      "time": "15:00:00"  
14    },  
15    "contexts": [],  
16    "metadata": {  
17      "intentId": "88222d6f-68b3-4a41-a58a-ed04f450bf46",  
18      "webhookUsed": "true",  
19      "webhookForSlotFillingUsed": "false",  
20      "webhookResponseTime": 3670,  
21      "intentName": "Bike Service Intent"  
22    },  
23    "fulfillment": {  
24      "speech": "Great! I've setup your appointment for 2017-08-09 at 15:00:00. See you  
25        then",  
26      "displayText": "Great! I've setup your appointment for 2017-08-09 at 15:00:00.  
27        See you then",  
28      "messages": [  
29        {  
30          "type": 0,  
31          "speech": "Great! I've setup your appointment for 2017-08-09 at 15:00:00. See  
32            you then"  
33        }  
34      ],  
35      "score": 1  
36    },  
37    "status": {  
38      "code": 200,  
39      "errorType": "success"  
40    },  
41    "sessionId": "8b0891c1-50c8-43c6-99c4-8f77261acf86"  
42  }
```




































## Integration

Connect with your users  
across multiple platforms.

## One-click integrations

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

# 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.

A screenshot of the 'Dialogflow Phone Gateway BETA' configuration page. The page has a white background with a dark grey border. At the top left is an orange phone icon. To its right is the title 'Dialogflow Phone Gateway BETA'. Below the title is a paragraph: '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.' Below this is a progress bar with three steps: '1 Configure Phone Gateway' (active, blue circle), '2 Select Phone Number' (grey circle), and '3 Finish' (grey circle). Under the first step, there are three input fields: 'Language' with a dropdown menu showing 'English (United States)', 'Country Code' with a dropdown menu showing '+1 (United States)', and 'Area Codes (Optional)' with an empty text input field. At the bottom left is a blue button with the text 'NEXT' in white capital letters.

# 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.).



The image shows a 'Create New Document' dialog box with a blue header bar containing the title and a close button. The main area is white and contains several form elements: a 'Document Name' field with a placeholder 'Enter document name', a 'Mime Type' dropdown menu currently showing 'text/plain', and a list of document types including 'FAQ' (which is highlighted), 'Knowledge Base Article (experimental)', and 'File on Cloud Storage'. Below these are three radio button options: 'File on Cloud Storage' with a placeholder 'gs://bucket-name/object-name', 'URL' with a placeholder 'http://www.example.com/faq', and 'Upload file from your computer'. At the bottom, there is a 'SELECT FILE' button and a 'CREATE' button.

Create New Document

Document Name \*

Enter document name

Mime Type \*

text/plain

- FAQ
- Knowledge Base Article (experimental)
- File on Cloud Storage

gs://bucket-name/object-name

URL

http://www.example.com/faq

Upload file from your computer

SELECT FILE

CREATE

# 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.



Madonna songs

See how it works in [Google Assistant](#).

Agent

USER SAYS

Madonna songs

COPY CURL

DEFAULT RESPONSE

Not available

INTENT

test

ACTION

Not available

PARAMETER

artist

VALUE

Madonna

DIAGNOSTIC INFO

howare you

See how it works in [Google Assistant](#).

Agent

USER SAYS

how are you

COPY CURL

DEFAULT RESPONSE

Not available

INTENT

howareyou

ACTION

Not available

DIAGNOSTIC INFO

# 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

# 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).



DEFAULT RESPONSE PLAY

What address would you like me to ship it to?

---

CONTEXTS RESET CONTEXTS

commerce\_dialog\_context

c5d51567-c528-44e3-b6ac-198a3959706e\_id\_dialog\_context

commerce\_dialog\_params\_address

---

INTENT

Commerce

---

ACTION

Buy

PARAMETER	VALUE
product	google pixel
address	
quantity	3

---

OUTPUT AUDIO ⓘ

▶ 0:00 / 0:02 🔊 ⋮

---

SENTIMENT

Query Score: -0.1

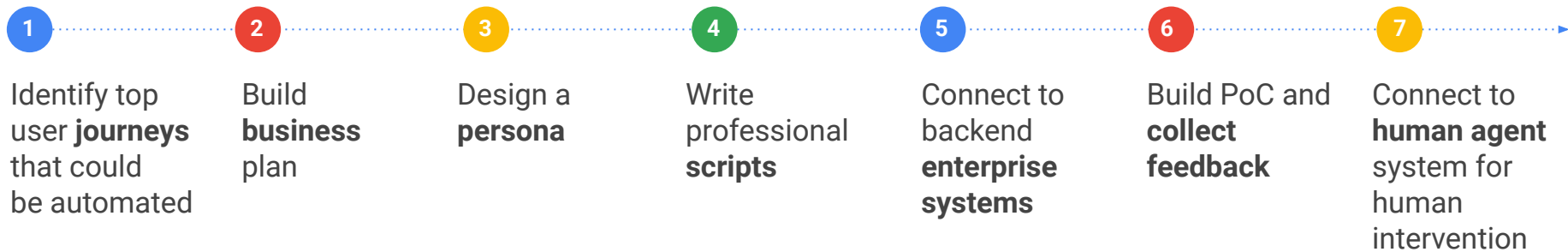
---

DIAGNOSTIC INFO

# Steps to Create Conversation Experience



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





@pvergadia



# Deconstructing Chatbots



Google Cloud

# New features



## Phone Gateway<sup>Beta</sup>

Lets you instantly convert any Dialogflow virtual agent into a conversational IVR



## Knowledge Connectors<sup>Beta</sup>

Complements explicit intents with automated responses sourced from knowledge bases



## Automatic Spelling Correction<sup>Beta</sup>

Uses technology similar to that used in Google Search to correct for user typos



## Built-in sentiment analysis<sup>Beta</sup>

Measures sentiment to provide a data point about need for live agent handover



## Built-in Text-to-Speech<sup>Beta</sup>

Powered by DeepMind's WaveNet to deliver high-quality speech responses for telephony & IoT



Google Cloud