immigration policy lab

Staying Connected: Low-Cost, Automated WhatsApp Surveys

Technical Documentation and How-To Manual

September 2020

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Stanford

About the Immigration Policy Lab

The Immigration Policy Lab at Stanford University works with policymakers, NGOs, and service providers worldwide to provide answers to the urgent, practical questions they face. Together, we are lifting barriers to citizenship, creating programs to better integrate refugees and immigrants, and uncovering drivers of discrimination and health disparities. Through collaborations with the people who set public policy, as well as those who serve immigrant communities, our research generates solutions that can improve immigrants' lives and strengthen the communities receiving them.

Learn more about our research and partnerships at immigrationlab.org.

Contributors

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This survey method was developed in partnership with:

Lutheran Immigration and Refugee Service

MERCY CORPS

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1. Project Overview

1.1. Background

This documentation will identify considerations and steps to create the structure for building, sending, and collecting responses for a semi-automated survey to a large number of recipients via the WhatsApp Business API, which isn't possible within the normal use patterns of personal WhatsApp accounts.[1] This methodology enables participants to complete a survey entirely within the WhatsApp application, without linking to an external survey platform.

Our objective is to create an open source, low-cost survey tool for nonprofit service providers who are interested in leveraging commercial technology to automate communications over WhatsApp at scale. This methodology can also benefit organizations who need to maintain contact with hard-to-reach or mobile populations over time and systematically collect and record survey data at scale.

An automated, mobile message-based survey technology gives nonprofits the ability to connect with clients, learn about their needs, and allocate resources without expending valuable resources on repeatedly collecting data. Increasing the survey capability of nonprofits will open the door for them to explore more rigorous evaluation methodologies in the future, transforming the capabilities of the nonprofit sector to deliver insights, for example, about the way public health emergencies like the COVID-19 pandemic are affecting their clients.

[1] Personal WhatsApp accounts have messaging limits, and the end-to-end encryption prevents automation or systematic exports of data. Through collaboration with a third-party provider, verified businesses can send and receive higher message volumes through the WhatsApp for Business API.

The WhatsApp Business API can be accessed through several different third-party companies. We chose to work with Twilio due to its user-friendly interface, which is accessible to non-technical users, as well as its commitment to supporting nonprofit organizations through the Impact Access Program.

Disclaimer: Please note that throughout this documentation, we link to both IPL-produced resources (i.e. Github repositories, YouTube videos, etc.) as well as resources created by external institutions. It is your responsibility to visit these websites and use the resources within these links at your discretion based on your institutional context and project needs.

Systematized outreach via WhatsApp

This documentation will walk you through the primary steps and tools needed to design and manage systematized outreach via WhatsApp:

1. Obtaining Facebook Business Manager verification
2. Setting up a Twilio account & access to the WhatsApp Business API
3. Designing a semi-automated survey for large-scale outreach in Twilio Studio
    - Sending the survey via automated contact sheets on SMS or WhatsApp
    - Deploying bulk SMS surveys in multiple languages
    - Aggregating the response data and set up a standardized data export with Google Sheets & Twilio
4. Obtaining notification template approval from WhatsApp
5. Understanding the end-to-end process and getting all your accounts and tools set up; performing an end-to-end test survey over SMS or WhatsApp, including creating the script, deploying, debugging, and storing the results with significantly reduced data collection cost

1.2. Tools

These tools will help you create a seamless, end-to-end process.

Software / Account	**Purpose**
WhatsApp Business API access (via a third-party organization, like Twilio)	To enable large-scale messaging via WhatsApp, including automation and data export
Personal or business Facebook account	Required to set up Facebook Business Manager
Verified Facebook Business Manager	To provide proof of a verified business and access the WhatsApp Business API
Twilio account	To design semi-automated outreach surveys that can be sent over SMS or WhatsApp
Google account	To access the Google Sheets API via the Google Developers Console, enabling communication between Google and Twilio to create contact lists for sending outreach surveys and export responses systematically
Text editor	To view and edit JSON language files. Recommended text editor: Sublime (recommended JSON text editor)
Git	To get the required folders of Github code. Only needed if triggering the surveys directly from your computer, or to encrypt responses.
Python	To run the Git code that triggers the survey, or decrypts responses. Only needed if triggering the surveys directly from your computer, or to encrypt responses.

1.3. Software-specific support

This manual is intended to outline the framework for setting up low-cost, automated WhatsApp surveys for non-technical users. The organizations and platforms referenced in this document regularly update their policies and user interfaces as needed. It is each user's responsibility to ensure that the respective policies align with your organization's regulations.

For specific questions on any of these programs, or establishing links between them, refer to the respective organization's help team.

For help with Twilio, contact Twilio Support.

> Note: nonprofit organizations that qualify and register with the Impact Access Program can contact volunteer developers with short-term help requests through the Impact Service Corps.

For help with Facebook Business Manager and/or WhatsApp Business API, contact the Business Help Center.

For help with Google Developers Console, visit the API Console Help.

1.4. Supporting resources for this manual

To explore all code and resources that support this documentation, please see the public Github repository here for the most up-to-date versions. Additional materials to trigger the survey directly from your computer or to encrypt and decrypt responses are found in thisGithub repository created by IPA . Please note that the supplementary materials produced for this Manual were prepared in Fall 2020, and the user interface for each software may change over time. In order to kickstart

learning about this survey methodology, the manual also includes the following supporting materials:

demo-survey	Template Studio flow that can be uploaded and used to learn about creating surveys in Twilio Studio
Google Sheet Template Google Script source code	Template used to set up and send surveys to a contact list
post-responses	Template code that will be used in Twilio to set up and send responses to an external Google Sheet

There are video tutorials available to supplement this manual available on this Youtube playlist: Tutorials for Staying Connected: Low Cost Automated WhatsApp Surveys. These videos are also linked throughout the document in the relevant sections.

- Staying Connected: Technical System Overview
- Contact Sheet & Sending Surveys Tutorial
- Initiate Twilio Survey Script Tutorial
- Twilio Function Part 1
- Twilio Function Part 2
- Multi-Language Dictionary Part 1
- Multi-Language Dictionary Part 2

1.5. Estimating timelines

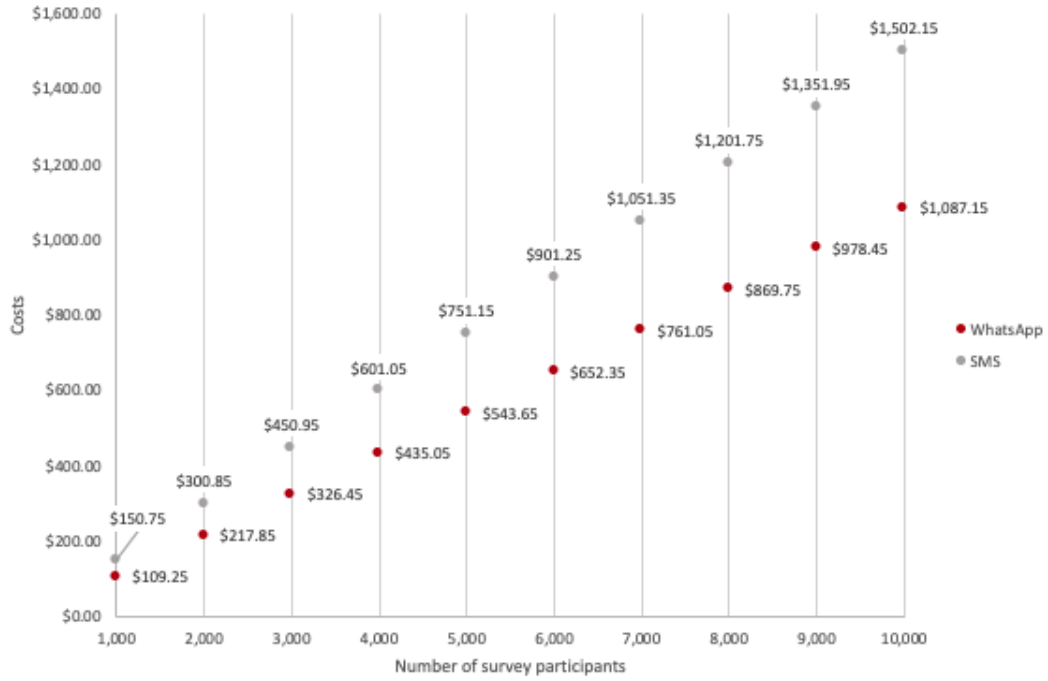
Task	**Duration**
Set up and run a test survey on Twilio, with automatic	For a first-time user: ~20 hours

data export to Google Sheets *Note: this can occur simultaneously with the following three steps.*	For a user who is familiar with the Twilio survey setup process: ~5 hours
Verify Facebook Business account (required for WhatsApp)	1–2 weeks
WhatsApp Profile verification (required for WhatsApp)	1–2 weeks
Notification template approval (required for WhatsApp)	1–2 days

1.6. Estimating costs

Item	**Cost**
Twilio phone number	$0.75–$2/month depending on the country and capabilities https://support.twilio.com/hc/en-us/articles/223135247-How-to-Search-for-and-Buy-a-Twilio-Phone-Number-from-Console
Twilio pricing	$0.0001 per Studio flow (after 1,000 free per month) and $0.0001 per function (after 10,000 free per month) https://www.twilio.com/runtime/pricing Note: for this setup, plan for one Studio flow and 1–2 functions per participant.
Sending SMS via Twilio	$0.0075 per text message https://www.twilio.com/sms/pricing/us
Sending WhatsApp via Twilio	$0.0085 per template message (first outbound notification message); $0.005 per session message (after first message) https://www.twilio.com/whatsapp/pricing/us

Estimated Costs to send a 10 Question Survey via Twilio to U.S. Phone Numbers
(assuming 100% response rate)



1.7. Privacy Policies

Before starting the use of this survey structure, please review the privacy policy and terms of service for all software and systems involved to assess potential risks with respect to your survey recipients and your organization's existing policies. We have

listed some of the privacy policies below for the software we use in our system, but please note that these may have been updated elsewhere and ensure that you are reviewing the most up-to-date version.

Software	Privacy Policy / Implications
WhatsApp Business API	WhatsApp Privacy Policy WhatsApp Business Terms of Service WhatsApp Business Policy *Note: WhatsApp joined Facebook companies in 2014. WhatsApp messages will never be shared across platforms. To learn about data privacy implications across platforms, see here.*
Twilio	Twilio Privacy Statement Twilio Terms of Service
Google	Google APIs Terms of Service

2. Getting Started

2.1. Twilio account setup

Twilio is a cloud communications platform that enables organizations to systematize digital communications via SMS, WhatsApp, voice and other channels.

In order to access the WhatsApp Business API, smaller organizations need to open an account with a third-party provider that already has access. Only 60 companies worldwide currently have access to this API (see list here). Other organizations that

wish to have these capabilities must register an account with one of these companies (like Twilio). When opening an account with Twilio, access to the WhatsApp account happens entirely through its platform. You will be able to send messages over WhatsApp, but you will not have direct access to a profile in the WhatsApp app, as one does with a personal account.

You will use WhatsApp (via Twilio) to:

- Send and receive messages via the WhatsApp Business API

You will use Twilio to:

- Get access to the WhatsApp Business API
- Purchase a phone number
- Build surveys in Studio

Start a trial account on Twilio	Interested users can set up a trial account on Twilio, which includes $15 in credit to start. A Twilio account is necessary to set up the survey structure outlined in this manual. *Note: messages sent from the trial account will automatically start with "Sent from your Twilio trial account." This message is automatically removed when the account is upgraded to a full account. Certain features are not available for accounts on the trial setting.*
For eligible nonprofit organizations, consider applying to the Twilio.org Impact Access program	Twilio offers $500 in kickstarter credit, access to volunteer developer support, and discounted pricing schemes for eligible organizations. Details on the program and the application can be found at the Impact Access Program Overview page. There are many benefits to this program, particularly the access to volunteer developers who are already familiar with Twilio's platforms.

Buy a phone number	To send and receive messages, you will need to buy a phone number through Twilio that supports SMS. Most phone numbers are $1/month (or $0.75 for Impact Access Program members). *Note: not all phone numbers allow SMS/WhatsApp messaging. If phone numbers with a specific country code don't allow that, users would need to purchase phone numbers from a different country.* *In some cases, it may be possible to port an existing phone number to the Twilio account, but that process was not included in the scope of this manual. If this is of interest, engage with Twilio Support to learn the necessary requirements.*
Enable country codes	Before sending SMS/WhatsApp messages, you need to enable the Twilio account to send to multiple country codes. Click to enable relevant countries in Programmable Messaging → Settings → Geo Permissions
Add account users (optional)	You can add multiple users to your Twilio account and customize each with unique account permissions and access. To be added to a partner organization's Twilio account to build a survey on their behalf (or import a pre-built flow), request to be added as a developer.

2.2. Facebook Business Manager account setup (skip if using SMS only)

As WhatsApp is now owned by Facebook, the verification process to gain access to the API actually occurs through Facebook.

Note: this process is required to send messages in WhatsApp via Twilio. The survey structure outlined in this document can also be set up and tested with SMS messages before an organization receives verification. Redirecting a survey designed in SMS to deploy over WhatsApp is a simple process (see here). We recommend starting these verification processes as soon as possible if you would like to send messages over

WhatsApp, as they can take a couple of weeks. If you would like to advance without verification to send messages over WhatsApp and just set up the survey structure on SMS, skip ahead to Designing a survey.

You will use Facebook Business Manager to:

- Complete Business Verification, which serves as the verification for the WhatsApp Business API account

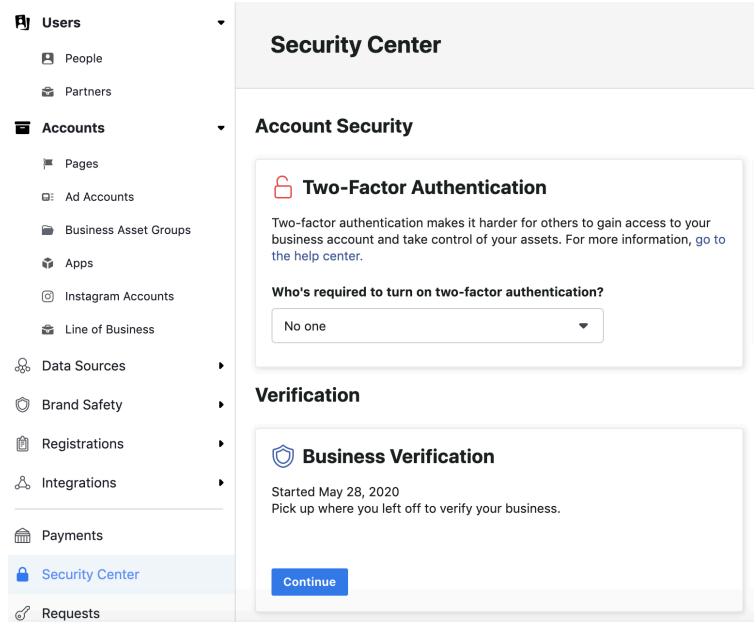
Setting up Facebook Business Manager

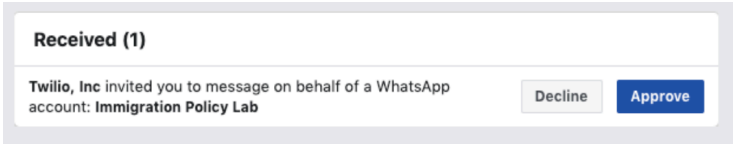
If you don't already have one, set up Facebook Business Manager, which is a back-end manager designed for businesses to manage public-facing Facebook pages. Setting up this manager enables additional functionality for any Facebook pages that it manages as an asset, such as running ads on Facebook. The Business Manager must be linked to a personal Facebook page.

Business Verification

In order to use the Facebook Business Manager to access the WhatsApp Business API, you must complete Business Verification. This process ensures that your business is a legal entity and that you have access to the business. You can complete verification in the Security Center. The business name that is verified for the Business Manager account will be the basis for the WhatsApp Business Account name.

If the verification is rejected for any reason, you can re-submit twice before being banned for 30 days. This is a different process than "Blue Badge Verification," which is a visible badge verifying public-facing Facebook pages.

1	**Start verification** In the Security Center of the Facebook Business Manager, click on “Start Verification.” If the “Start Verification” or “Continue” button is greyed out and unclickable, that may be because your Business Manager account has not yet used any functionalities requiring verification. If so, advance to Steps 2 and 3. After the third-party provider initiates a new account request, the “Start Verification” button should be available. Then, return to this step to complete Business Verification of the Business Manager.	
2	**Set up an account with Twilio** Set up an account with Twilio (see Account setup) and purchase the phone number that will be used for messaging on WhatsApp.	
3	**Enable your Twilio number for WhatsApp** Submit a request to enable your Twilio number for WhatsApp here. You will need the following information: ● Complete company name ● Facebook Business Manager ID ● Company phone number	

	• Future WhatsApp profile name; confirm that your future WhatsApp Business Account display name is compliant Twilio will initiate a new account request on your behalf with WhatsApp and will submit your WhatsApp profile details for verification (which is different from Business Verification of the Business Manager), which takes 1–2 business days.	
4	**Enable messaging permissions** Give Twilio messaging permissions via Facebook Business Manager. After the request is initiated by Twilio in Step 3, a notification will appear within the Facebook Business Manager. Approve the notification to give permission for Twilio to message on your behalf. This effectively allows it to create a WhatsApp Business Account via the WhatsApp business API.	

3. Designing Surveys for WhatsApp (skip if using SMS only)

3.1. Key WhatsApp terminology

Term	Explanation

WhatsApp Business App	This is a type of WhatsApp account that allows users to create a business profile, label conversations to categorize them, pre-program "quick reply" messages, and send automated away messages. It is free for any WhatsApp user, though it can only be used on one device by one user. You can send a "broadcast" message to up to 256 existing contacts. *Note: the WhatsApp Business App can be registered to a SIM card or to a landline.*
WhatsApp Business Account	Anyone can have this type of account in the WhatsApp Business App; anyone using the WhatsApp Business API automatically has this type of account.
WhatsApp Official Business Account	A WhatsApp verified authentic brand with a green checkmark badge in the profile; the name of the business is visible even if users haven't added this number to their address book. Accessing the WhatsApp Business API via a third party will enable users to create an Official Business Account.
Opt-In	When messaging within the WhatsApp Business API, WhatsApp requires "explicit user opt-in," a process in which users explicitly consent to receive messages via WhatsApp. Opt-in can be gathered on a separate web page or mobile app, or via paper/verbal consent. Not obtaining opt-in from users may result in blocking or suspension of the business account. *Note: there is some evidence that using a paper or verbal consent process to secure opt-in is possible, but these methods may prove more challenging since they cannot be systematically tracked.*
Notifications	When messaging within the WhatsApp Business API, businesses can send push messages, initiating a conversation with users, for a small but variable fee depending on the quantity and country. . There are ten types of allowed notifications based on templates from WhatsApp. These notifications must fit a template design and be pre-approved by WhatsApp.

Customer Care	A message type when a user sends the first message to a WhatsApp business number. This triggers a 24-hour session of open messaging during which non-templated messages, beyond pre-approved notifications, can be sent.

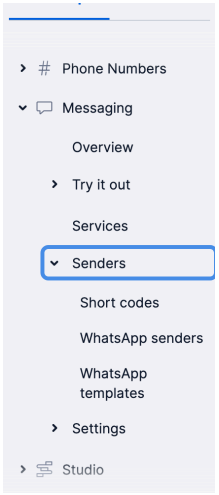
3.2. Preparation before sending surveys

Securing opt-in

WhatsApp requires that you secure opt-in from recipients before sending them any messages on WhatsApp. For example, you can obtain opt-in from participants on a digital platform (web form). Securing active opt-in needs to happen through a separate, unique question. Tips on securing opt-in can be found here. For most organizations, this should happen at the same time as securing consent to participate in the survey. Specific guidance on wording requirements can be found in the WhatsApp Business Policy.

- Opt-in is important, as WhatApp can put a hold on your account if it believes you are contacting too many people who have not opted in. One method of evaluation is the percentage of people who do not have your phone number saved in their contact list, as well as the percentage of non-respondents.
- One way to avoid this is to ask participants to add your WhatsApp number to their contact list.
- Consider Twilio's built-in opt-out keywords on SMS and their relation to keywords in your survey.

3.3. Setting up a WhatsApp sender profile

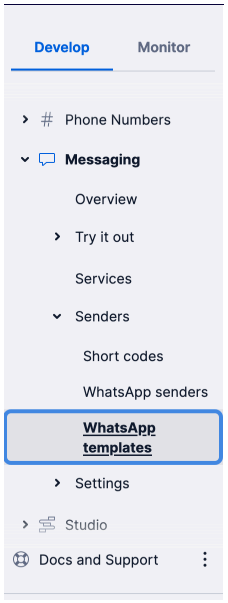
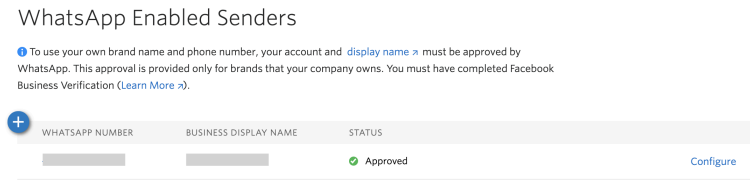
1	**Submit WhatsApp sender profile request** After completing Facebook verification, in your Twilio account, go to Develop —> Messaging → Senders—> WhatsApp senders. Select “New WhatsApp Sender” and fill out the request with the information that will be affiliated with your WhatsApp account. It will take a few business days for Twilio to transmit this request to WhatsApp for review. Additional details about creating the sender profile can be found here. Note: if Messaging does not appear in the toolbars, click on Explore Products to add this category.	
2	**Create an Official WhatsApp Business Account (optional)**. The name of an organization and an image of choice can appear automatically to respondents, even if the number is not saved in their contacts, for Official Business Accounts. After the Twilio phone number has been approved, a request can be made by opening a support ticket with Twilio, according to the steps detailed here.	

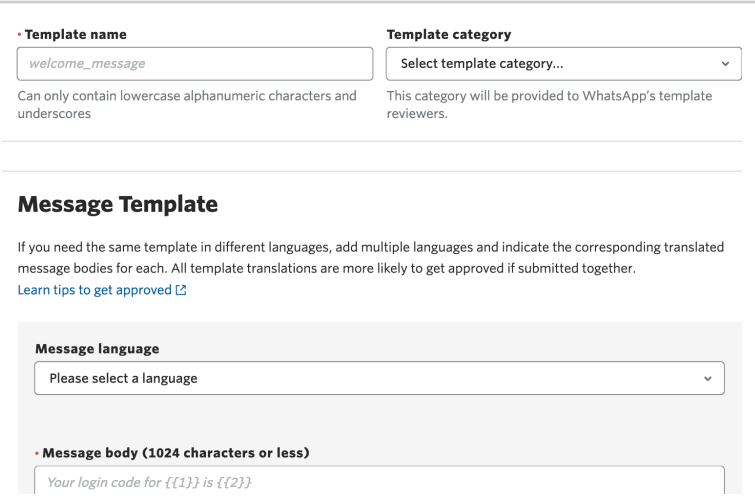
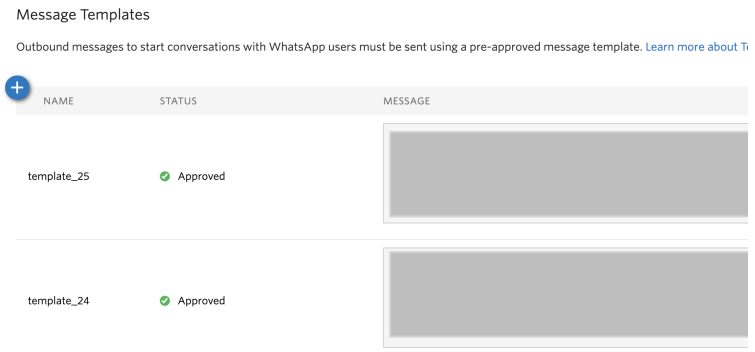
3.4. Requesting template approval for first outbound message

Notification templates for WhatsApp
If you intend to initiate a WhatsApp conversation or survey by sending the first outbound WhatsApp message, that is considered a notification, and it must receive approval from WhatsApp. There are specific guidelines for the notification template creation process that must be met.

Any outbound message sent to participants before they send a response message is considered a notification and must be approved. Once a participant sends a response message, a Customer Care session is initiated for 24 hours. During a Customer Care session, non-template messages may be sent freely, which means that subsequent outbound messages or survey questions do not require template approval. Additional documentation here.

Requesting approval for the first message notification template in Twilio
The following steps outline how to submit a notification template for approval within Twilio. You will need a Twilio account (see Account Setup if not already completed) with a number that is set up for WhatsApp.

1	Click on “Develop” on the left-hand Twilio menu bar, and then “Messaging”.	
2	Click on “Senders,” then “WhatsApp Templates.”	
3	Scroll down and click on the blue “+” button to add your template message.	

	Select a name, category for your message template, language of the message, and enter the message template itself in the corresponding text box.	
4	Click “Create,” and your proposed message should show up under “Message Templates” with the status “Waiting for Approval from WhatsApp.” It takes 1–2 days for a template to be reviewed.	

Most notably for the purposes of sending surveys over WhatsApp, there is a high chance that template messages will be tagged as “promotional content,” which is not allowed to be sent over the WhatsApp Business API.

Advice received directly from Facebook about templates rejected for this reason: "Per the Business Policy, 'You may only initiate chats if you are sending a transactional notification' and this message appears to be informational. Please read more here https://www.whatsapp.com/legal/business-policy/. Here's what you can do: Add more

context to show that your message was requested by the customer and contains transactional information." This could mean referencing previous correspondence that enabled you to obtain people's consent to receive WhatsApp messages or a survey, and/or requesting confirmation or consent to continue with the survey.

Tips

- Customize messages per participant/group of participants by including variables indicating familiarity with the recipient. In Twilio, a pair of curly brackets indicates a variable: "Hello {{*name*}}!" or "Thanks for completing your interview in {{*March*}}."
- If an original English message is approved but translations of that same message in other languages are not, send a help ticket to Twilio asking to be connected with their WhatsApp Onboarding Team, who can assist with an appeal of the decision.

3.5. Identity verification

In some cases, multiple people or households rely on the same cellphone, so it may be important to confirm the identity of the person who is responding to the messages. Confirming the identity of the respondents will also allow you to merge data collected from WhatsApp surveys with other datasets.

Particularly when managing outreach to a large group, it will be highly beneficial to standardize the approach to identity verification within the WhatsApp survey. One approach is to rely on constant characteristics collected in a baseline survey or client intake data, such as year of birth or first name. Upon completion of the WhatsApp outreach, it is possible to merge responses to the identity verification questions via WhatsApp with the responses from the baseline to build a more complete picture of each respondent.

3.6. Messaging limits

All WhatsApp Business accounts automatically start at Tier 1, which allows up to 1,000 messages to unique users in a 24-hour period.

In order to raise the Tier and messaging capacity, you must send two times your existing limit in a seven-day period and retain a medium or high quality rating. (In other words, if you are currently in Tier 1 and want to raise to Tier 2, you must send messages to at least 2,000 unique users in seven days.) Tier 2 allows up to 10,000 messages to unique users in 24 hours. Tier 3 allows up to 100,000. More details here.

3.7. WhatsApp Business API account quality rating

All accounts in the WhatsApp Business API are quality checked with an account rating. The limited guidance from WhatsApp about maintaining high account quality focuses on the importance of receiving opt-in from all respondents and sending personalized, helpful messages. More information on account quality rating from Twilio can be found here.

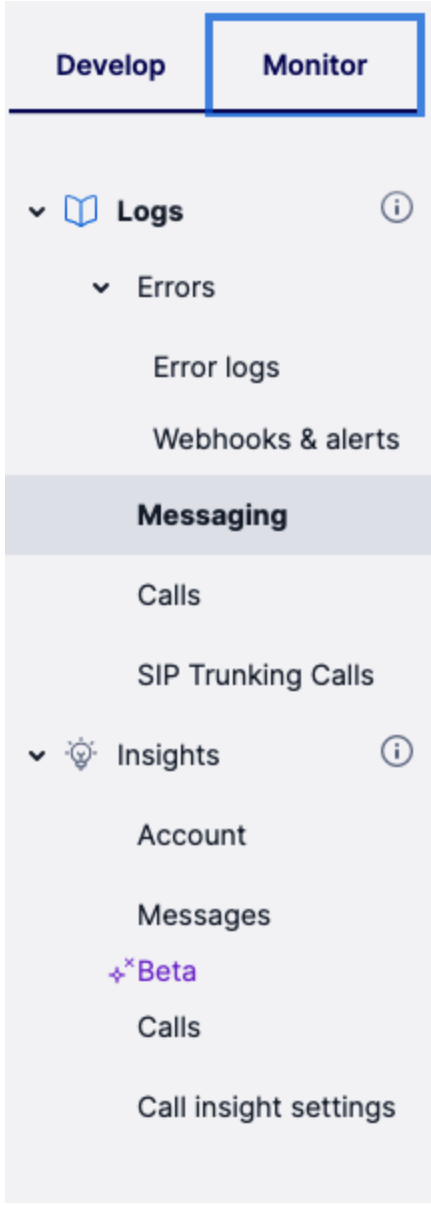
Note: In order to prevent a decrease in account quality rating on account of sending many unanswered messages, Twilio automatically checks whether a number is registered with WhatsApp and will fail the message before sending if it is not registered. This appears in the Twilio as an Error 63003.

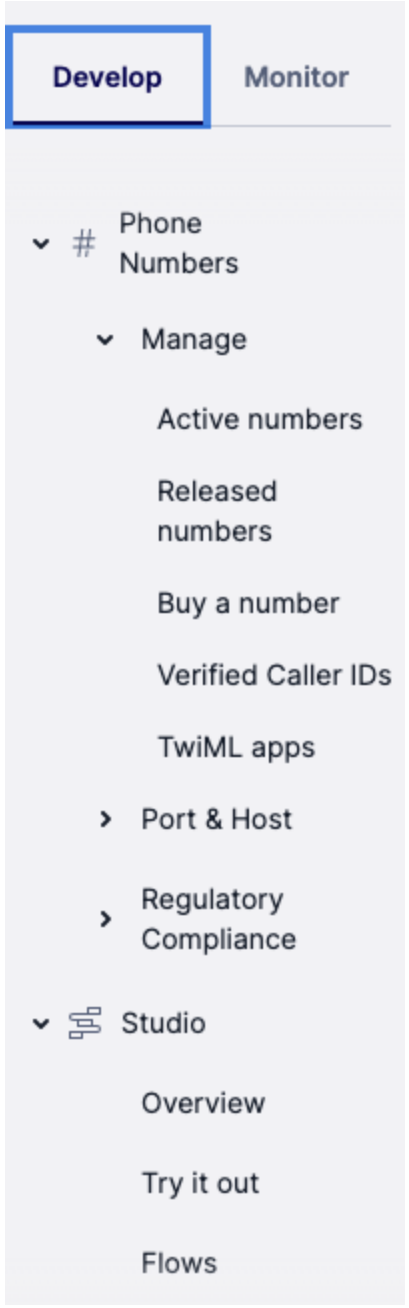
4. Designing a Survey

For additional details on the following steps, feel free to watch the accompanying video available online: Low-Cost, Automated WhatsApp Surveys.Navigate Twilio

For complete documentation, see Twilio Studio docs.

On the left hand side panel in the Twilio Console, we recommend pinning the following Twilio products under Develop: Phone Numbers, Studio, Messaging, and Functions. Under Monitor, pin Logs and Insights. **Here are the locations of the various Twilio features:** ● Account SID & Auth token: Account > General Settings ● Phone number settings: Develop > Phone Numbers ● Studio flows and SIDs: Develop > Studio > Flows ● ● Studio flow logs: Monitor > Logs ● WhatsApp phone number details: Develop > Messaging > Senders > WhatsApp senders ● WhatsApp message log: Monitor > Logs > Messaging ● Error messages: Monitor > Errors > Error logs	


Develop
Monitor
Logs
Errors
Error logs
Webhooks & alerts
Messaging
Calls
SIP Trunking Calls
Insights
Account
Messages
Beta
Calls
Call insight settings


Develop
Monitor
Phone Numbers
Manage
Active numbers
Released numbers
Buy a number
Verified Caller IDs
TwiML apps
Port & Host
Regulatory Compliance
Studio
Overview
Try it out
Flows

4.1. Upload a template flow in Twilio Studio

For individuals without extensive software development skills, Twilio offers Twilio Studio, a platform that uses drag-and-drop widgets to design SMS and IVR exchanges. The widgets are a visual representation of underlying JSON code (which can also be edited manually in a text editor) that outlines the conversation flow. A survey built through Twilio Studio will be referred to as a "Studio Flow" in this document.

Studio includes widgets that can represent messages, split to different branches based on the inbound message or other evaluation criteria, and run customized functions. (See here for a more detailed explanation on the widgets.)

For the purposes of this documentation manual, we created a demo survey to illustrate the methodology and show some of the ways we have used Studio widgets to design our surveys. However, this is not meant to be a comprehensive guide to all of the possible ways to set up and link different components of an SMS or IVR conversation.

Demo Survey:

Hello! This is a test survey. Do you want to continue with the survey?

1. Yes
2. No

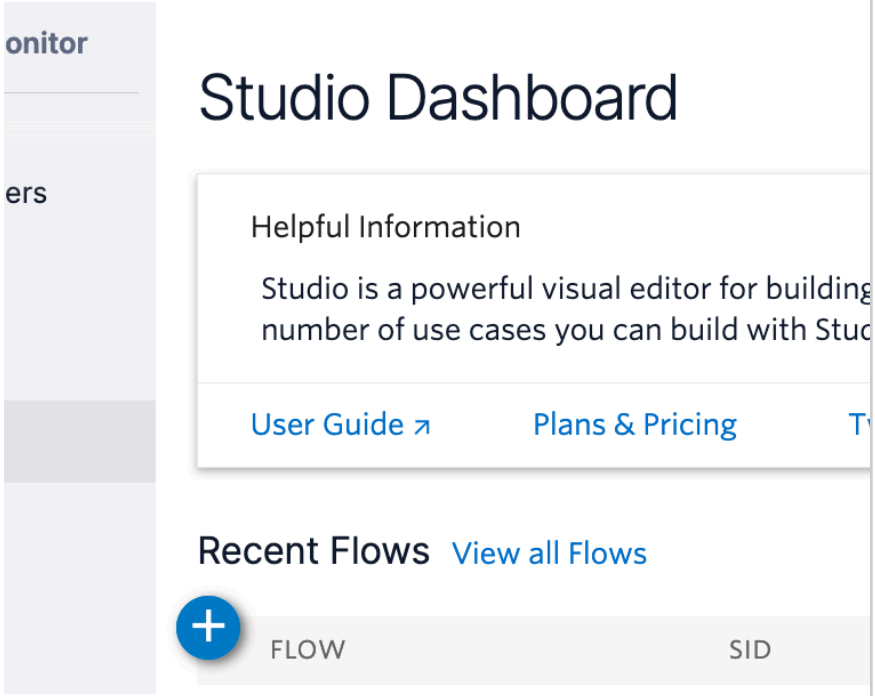
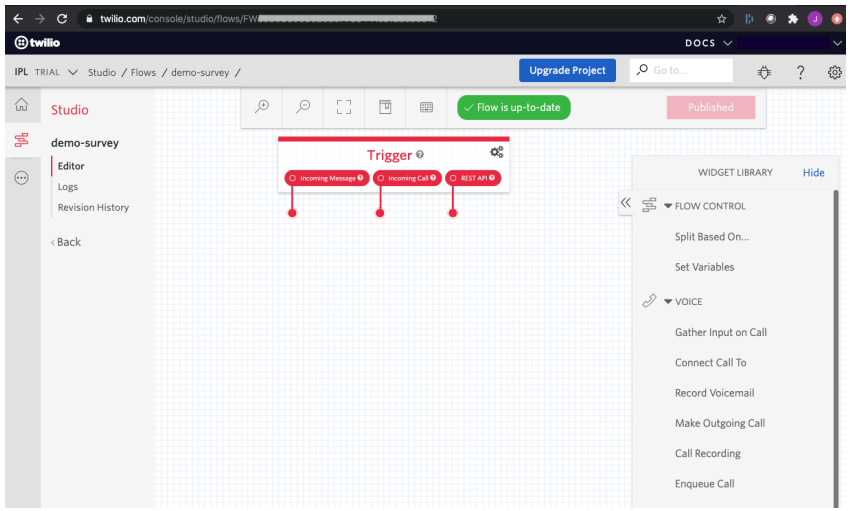
Thank you for agreeing to take the survey! If you want to skip any of the questions, respond with the word "skip" at any time.

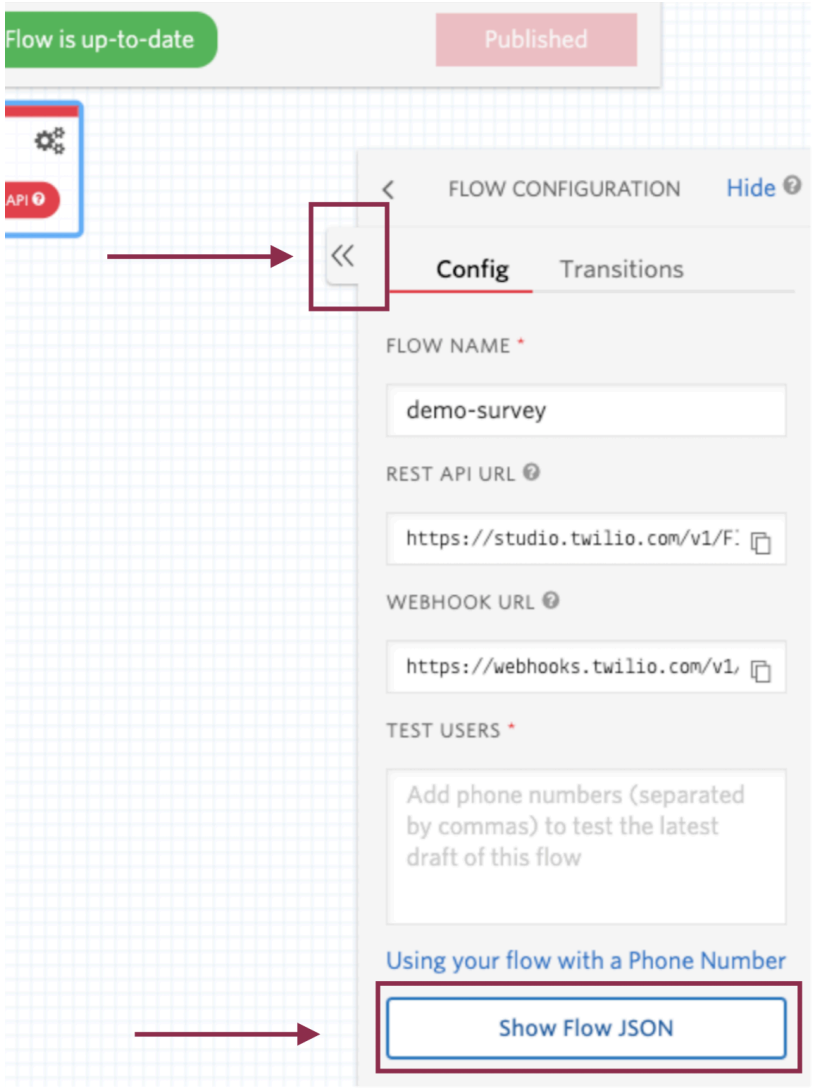
1. What is your favorite animal? Please respond with the number of your answer.
    1. Koala bear
    2. Rattlesnake

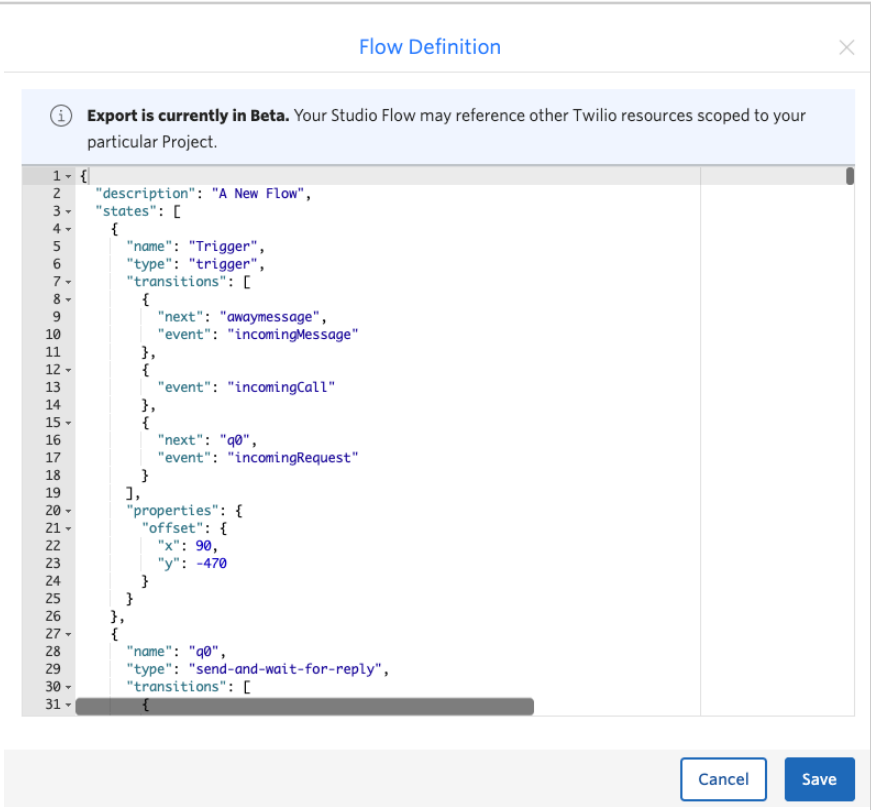
3. Octopus
4. Cheetah
5. Chipmunk

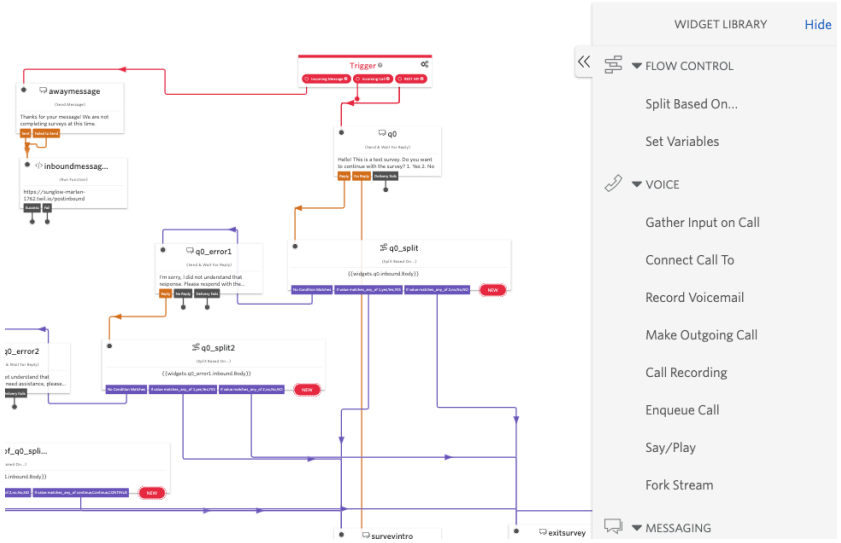
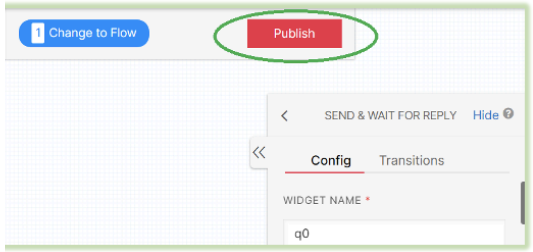
2. What is your favorite color?
   (open ended response)
3. Do you want to answer one more question? Please respond with the number of your answer.
   1. Yes
   2. No
4. What is your favorite number between 1-100? Please respond by typing in that number.
   (open ended response)

This concludes our survey. Thank you for your time!

1	To import the demo survey template to begin learning in Studio, go to Github and download the demo-survey file. In Develop > Studio > Flows and click on the blue "+" button.	
2	Type out any name for your flow and then select "Start From Scratch." A blank canvas in Studio will appear. This is where you will build a flow using Twilio Studio.	

3	To upload the template flow, click on the “Trigger” box, and then on “Show Flow JSON.”	

4	Delete any lines of code that appear. Open the [demo-survey.json] file, and copy and paste it into the “Flow Definition” box and then save.	

5	Studio should auto-populate the demo survey, and it should look like this.	
6	Note: any changes made in Twilio Studio will be saved in the Flow. In order to make the changes applicable for future surveys, be sure to click “Publish.”	

4.2. Recreate common survey questions in Twilio Studio

A primary benefit of designing surveys in the Twilio Studio environment is the ability to build a conversation flow visually with embedded logic, similar to how one would set up a survey platform. This is the semi-automated portion of survey development. Building in logic to a Studio Flow requires upfront investment in manual preparation, but once you are familiar with the Studio environment, creating new surveys is a relatively quick process.

Key widgets to know:

- **Send Message**: this widget sends an outbound message from your phone number. It does not listen for a response and, upon receiving an inbound message, immediately advances to the next step in the flow.
- **Send & Wait for Reply**: this widget sends an outbound message and then waits for an inbound message response before advancing to the next step in the flow.
- **Split Based On**: this widget is used to embed logic flows in the conversation. It interprets the content of inbound messages and, depending on preset parameters manually created , then creates multiple conversation branches to continue to the next step. This widget can also be used to branch survey paths based on piped variables. *Note: the content of this type of widget is never seen by the respondent, but it does define what are accepted and unaccepted answers to each question.*
- **Set Variables:** this widget allows the user to save key/value pairs in the context of the flow execution. Variables set via the widget are accessible in your flow using {{flow.variables.key_name}}. Also, this widget allows dynamic values set via the Liquid templating language. For additional examples, visit this Liquid Language resource .
- **Run Function**: this widget runs Node.js code inside Twilio, making it a great asset for many uses.

For complete details on all of the widgets available in Twilio Studio, see the Widget Library.

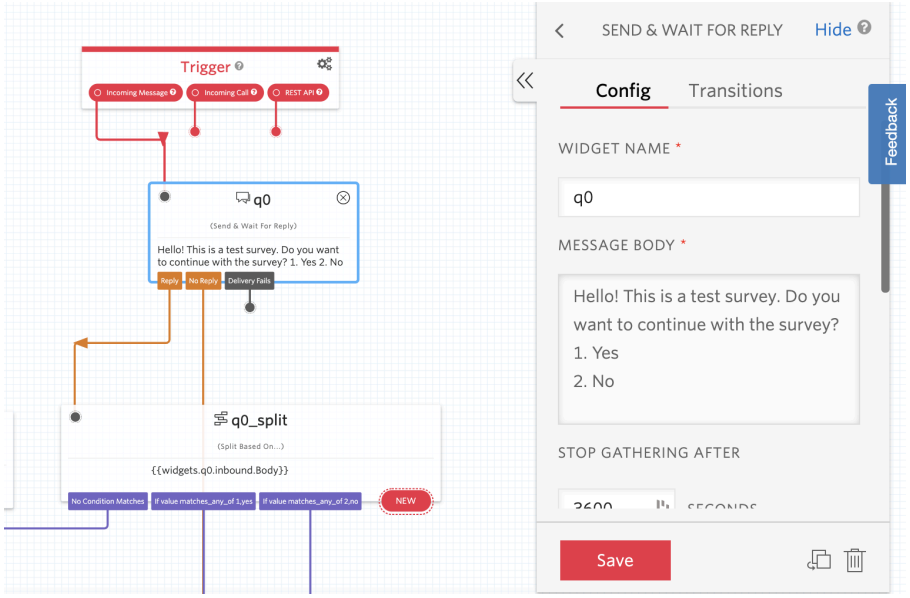
Recreating Common Survey Questions in Twilio Studio

This section outlines how to use pairings of the widgets above to create common types of survey questions in Studio. We include examples from the demo survey.

Yes/No Questions - q0 and q3 in Demo Survey

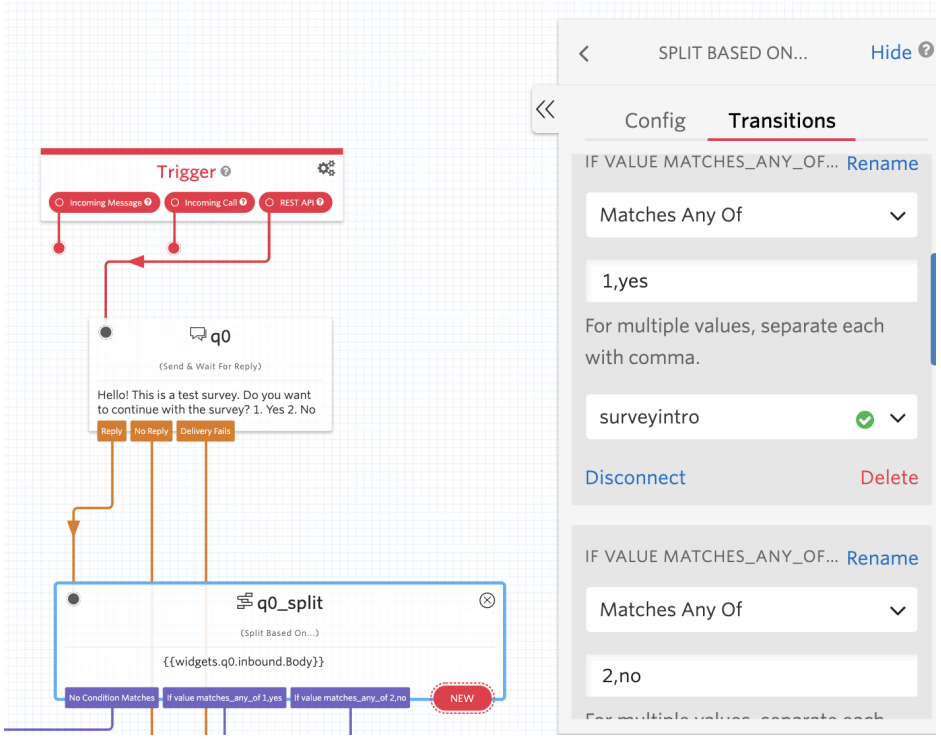
Uses “Send & Wait For Reply” & “Split Based On”

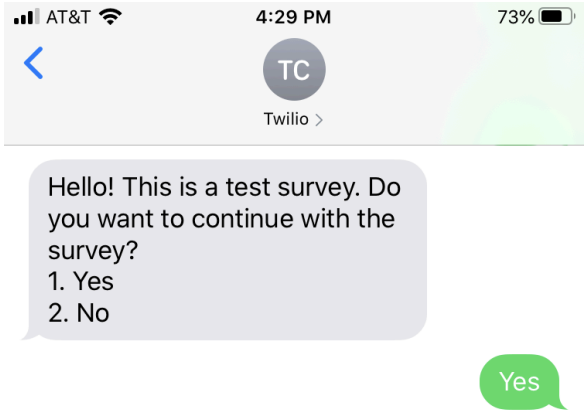
A question is asked (q0) by using a “Send & Wait for Reply” widget.



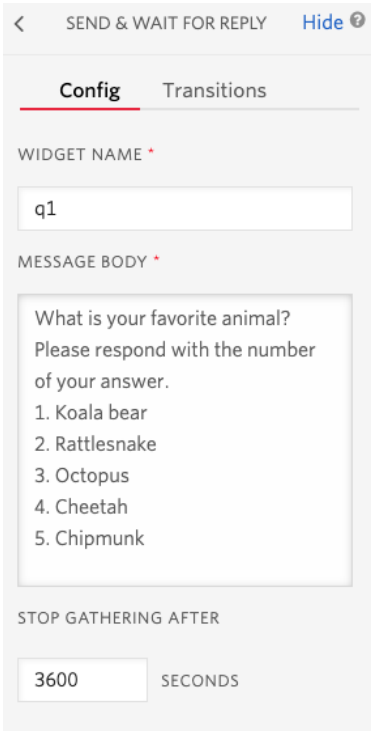
The Studio Flow is then effectively listening for the response.

- We tell the flow which inbound message to evaluate by assigning the Split Based On to reference {{widgets.q0.inbound.Body}}. This means that the body of the inbound message sent in response to q0 will be used by the split.
- The text of the inbound message after q0 is then assessed against the manually created logic (q0_split). These branches are created manually and can be customized to include any set of accepted responses. For this question, we designed the split to accept any messages that match the numerical responses (1, 2) or answer responses (yes, no).
- Based on the split, the flow advances to one of three branches: "No Condition Matches," "If value matches any of 1,yes," or "If value matches any of 2,no." Each of these branches can be given a different path throughout the flow, which is how embedded logic can be manually designed in Studio. *Note: the condition matches are not case sensitive, i.e. an incoming message "YES" or "Yes" or "yEs" would be counted as matching the preset condition "yes".*



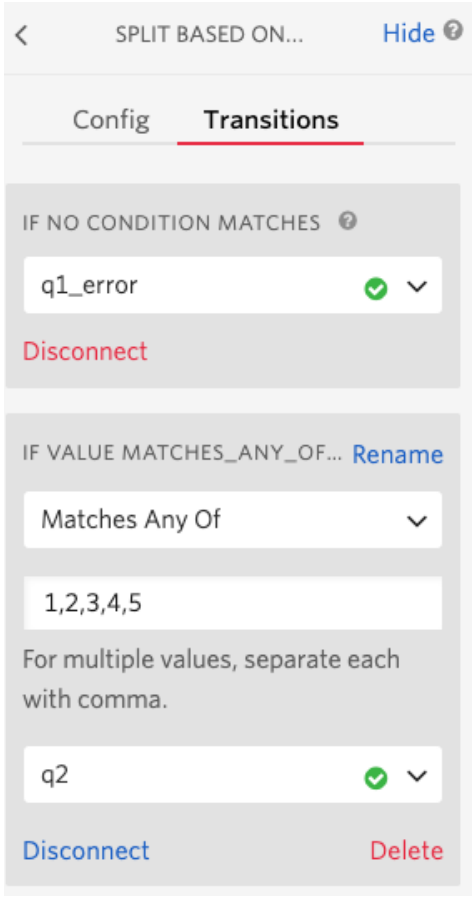
As seen on the phone by the respondent:	

Multiple-Choice Questions - q1 in Demo Survey

Uses “Send & Wait For Reply” & “Split Based On” A question is asked (q1) by sending out a message using a “Send & Wait for Reply” widget. The text of that message includes multiple answer choices, each linked to a number, and prompts the respondent to respond only with the number of their answer.	

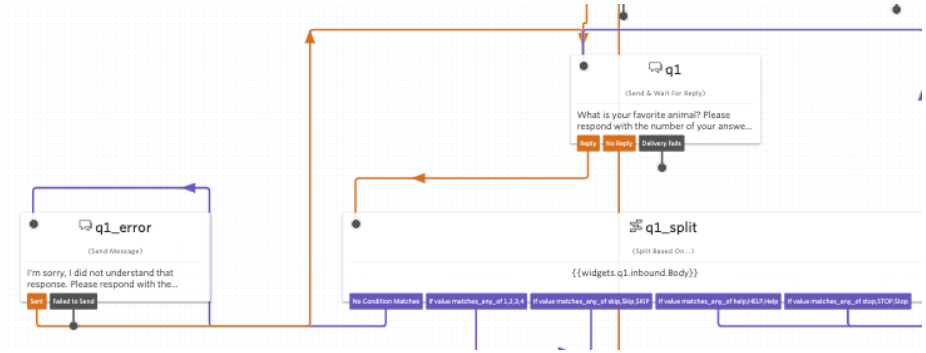
The “Split Based On” is designed to validate responses from the next inbound message with the number of the answer. The split logic only accepts the numbers and no other text responses. If there are no condition matches, meaning the next inbound message contains text other than the numbers 1–5, the flow directs the conversation to an error message.

We offer numbers for each answer for data analysis purposes to try to replicate a survey platform. In order to have a clean database of survey responses, it is important that all the responses to this question are consistent. It would be challenging to compare responses if this were an open-ended question inviting respondents to type out their own answers. Without limiting responses to the numerical choices, using the “Split Based On” widget, the responses for option 1 could include 1, koala bear, KOALA, the one who eats bamboo, the first one. This would make data cleaning and quick analysis to identify all freeform responses for option 1 very challenging.

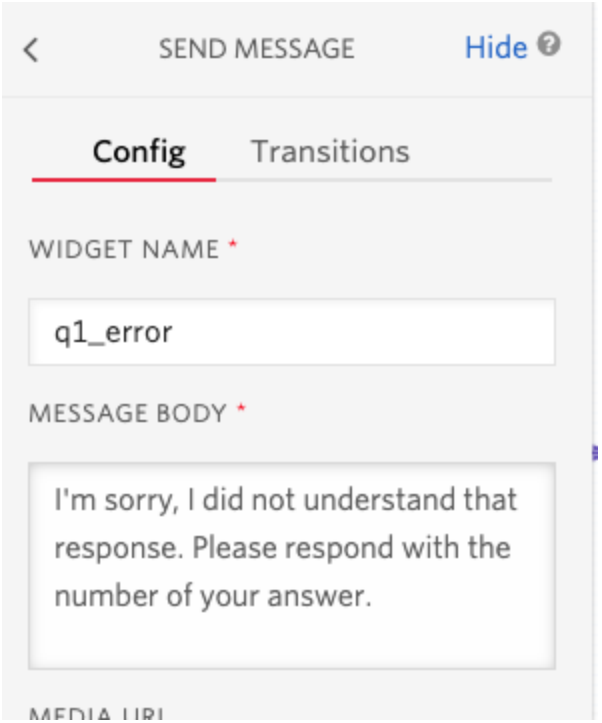


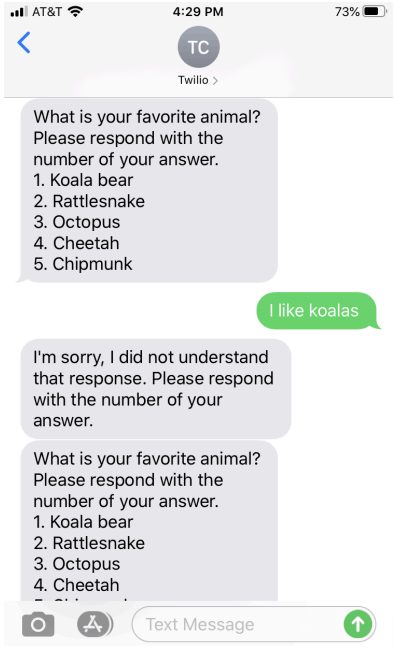
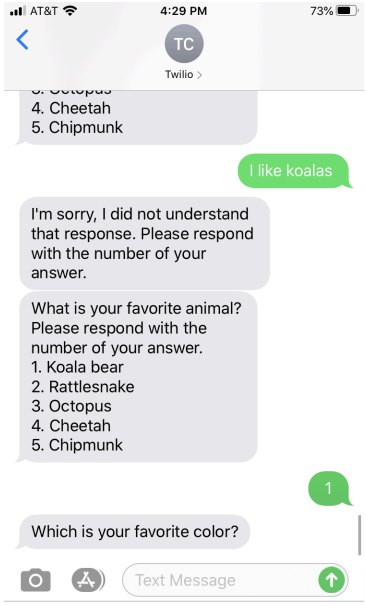
Error Messages

For questions that use the “Split Based On” widget to embed logic or limit accepted answer choices, there will always be a branch for “No Condition Matches.” This means that the inbound message text does not meet any of the other defined branches. In order to inform respondents that they need to provide a specific answer (such as the number of their chosen response), the “No Condition Matches” branch can be linked to a “Send Message” widget that includes an error message.



By using a “Send Message” widget, Studio will send the error message and immediately proceed to the next step in the flow. In order to ask the same question again, we link the “sent” branch of this error message back to the q1 widget. The q1 message will be sent a second time. The next inbound message response will be treated as a unique response and assessed against the split in the same way. If the respondent sends an accepted answer (in this case it would be the numbers 1–5), then the survey will proceed. If the respondent sends an answer that still does not meet the accepted answers, the “No Condition Matches” branch will begin again.

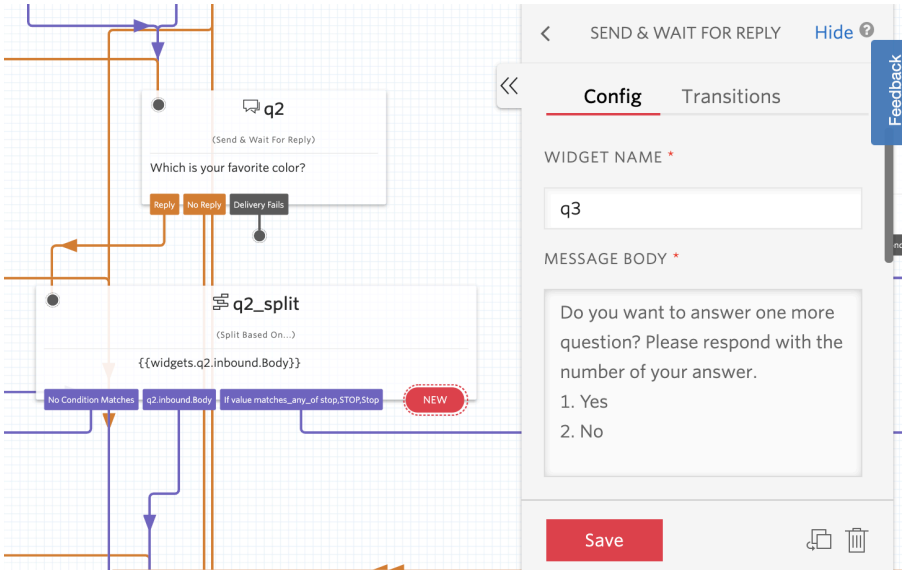


Unaccepted response that goes through the “No Condition Matches” branch.	
Accepted response that goes through the “Matches any of 1,2,3,4,5” branch to the following question.	

Open-Ended Questions - q2 in Demo Survey

Uses “Send & Wait For Reply”

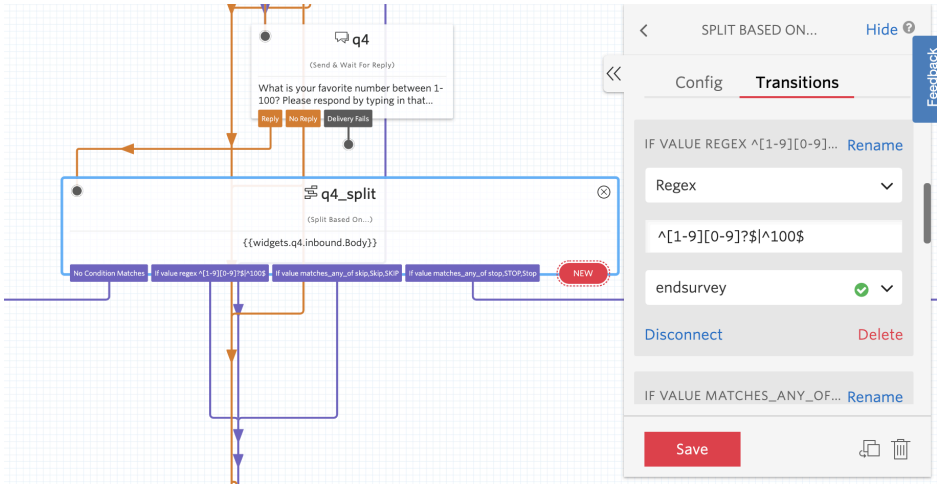
A question is asked (q2) by sending out a message using a “Send & Wait for Reply” widget. However, as this is an open-ended question and any answer will be accepted, we don’t need a “Split Based On.” The q2 widget can be linked directly to the next question widget.

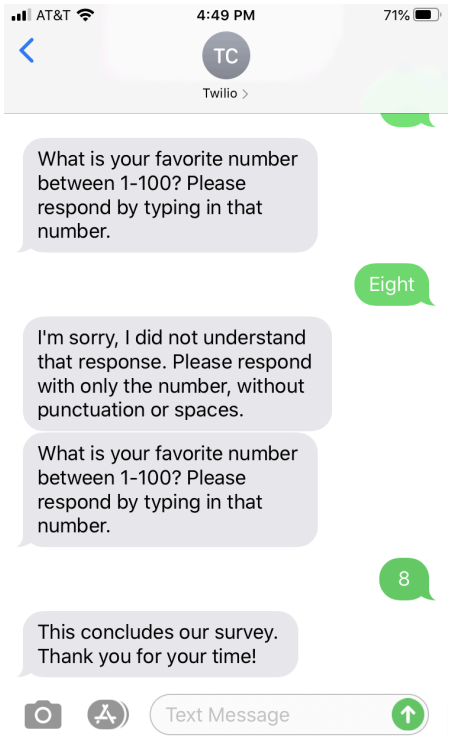


Questions with Numerical Validation - q4 in Demo Survey

Uses “Send & Wait For Reply” and “Split Based On”

A question is asked (q4) by sending out a message using a “Send & Wait for Reply” widget. The following split using Regex, short for “regular expression,” to validate numerical responses. In the Demo Survey, the Regex is set to accept numbers 1–100. If the response is not a number in this range, the flow will follow the “No Condition Matches” branch and send an error message. Regex defines a sequence of characters; there are guides and generators to set this sequence available online.

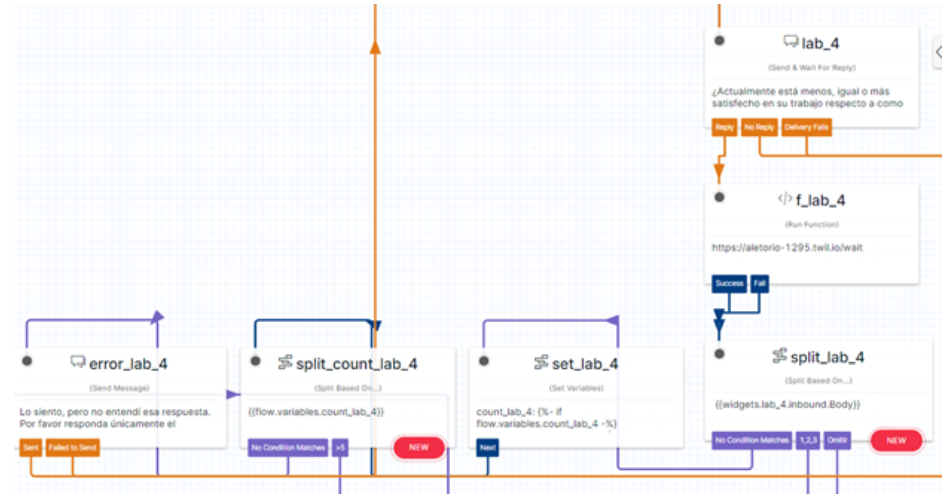


As seen on the phone by the respondent.	

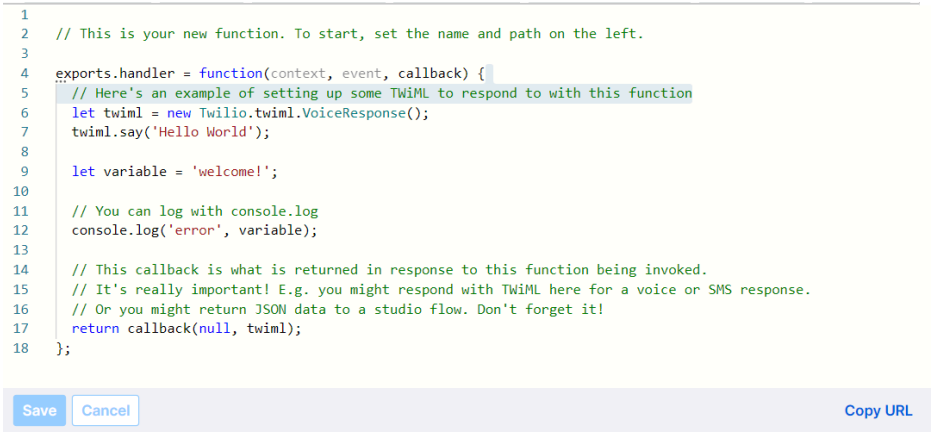
4.3. Advanced Twilio Studio tips

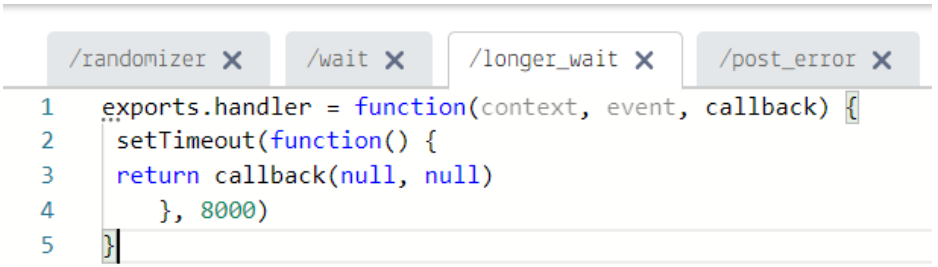
Prevent infinite error loops

Use set variables to prevent an infinite error loop when the participant is not responding with pre-defined accepted responses.	{%- if flow.variables.key_variable_name -%} {{flow.variables.key_variable_name| plus: 1}} {%- else -%} 1 {%- endif -%}

For this, create a Set Variable widget, and add the code to the right inside. Changing the “key_variable_name” to a recognizable title.	
In this example, the first Set Variable widget is “f_lab_4.” When an unaccepted is sent in response to question “lab_4”, the split redirects to the widget “set_lab_4” which creates a new variable called “count_lab_4.” Then, the flow continues to another split that decides the path depending on the value of that count. If less than 5 mistakes have been made, it sends an error message and then the question again; if more than 5 mistakes have been made, it skips the question.	

Make use of functions

The function widget in Twilio is very powerful for a range of uses. The functions run with Node.js code. To create a function, go to Develop > Functions, then “Create Service”, and then inside the service you can create many functions. If you want to send a variable from your survey to the function environment, add it as a parameter in the function widget. You will be able to use it in the function environment calling it as “event.variable_name”.	

If you want to send a variable from your function environment back to Twilio, make sure to put it in the callback line. To use a function-created variable inside the survey, you can call it as "widgets.function_widget_name.parsed.variable_name".	
Add short delays between widgets When you connect widgets, Twilio transitions from one to the next very quickly. Imagine you send a long message that you want the respondent to read and then send another message that contains a question. If these two messages arrive immediately after the other, there is a chance that your respondent does not see the first one. Or there might be other cases where you want Twilio to wait a couple of seconds before sending the following message. The code shown will help you to introduce a delay of 8 seconds (value in milliseconds). *Note: The maximum delay you can add is 10 seconds.*	

Create random numbers

You may want to generate a random number between 1 to 10, for example for a split. The code shown generates 2 different-between-them random numbers from 1 to 10.

/randomizer | /wait | /longer_wait | /post_error

```
1
2   exports.handler = function(context, event, callback) {
3   var randomNumber=(1+Math.floor(Math.random() * 10));
4   var randomNumber2=(1+Math.floor(Math.random() * 10));
5   while(randomNumber == randomNumber2)
6   {
7     randomNumber2=(1+Math.floor(Math.random()*10));
8   }
9   return callback(null, {randomNumber,randomNumber2})
10  };
```

Currency formatter

You may want to have a value formatted in some way. In the picture example, it was desired to confirm an income question. But the value the person was asked to write was plain (like 100000), and it was wanted the question to appear as $100.000. In this example, you see that “lab_7” was the variable passed as a parameter from the function, and “formatted_number” was the number passed from the function to the flow.

/randomizer | /wait | /longer_wait | /post_error | /format_currency | /hasher2 | /hasher

```
1   exports.handler = function(context,event, callback) {
2   formatted_number="$"+new Intl.NumberFormat('es-CO', { maximumFractionDigits: 0 }).format(event.lab_7)
3   return callback(null, {formatted_number})
4   };
```

4.4. Tips for building in Twilio Studio

Preparation

- Start by drawing out any survey logic and question branching you may have by hand; this will help streamline the building process and ensure that you consider the entire end-to-end flow.

Naming conventions

- Establish a consistent naming convention. For example, you could start with the question number and then identify the type of widget: “q1” for the first question, “q1_help” for the help message that corresponds to the first question, “q1_split” for the split that corresponds to the first question, and “q1_error” for the error message that corresponds to the first question. Naming these consistently will make it easier to identify widgets when building functions or adjusting the JSON code.

Design considerations

- Keep the questions even in horizontal and vertical alignment, with space in between, for ease of visualizing the survey flow. If replicating the survey flow via JSON code (i.e. to export and import, or to generate translated flows) or through the “Duplicate flow” functionality in Twilio Studio, the widget spacing and placement will remain consistent.
- Keep widgets organized in chronological order with the survey logic; if a “Split Based On” widget happens after a “Send & Wait for Reply” widget, align them vertically.
- Remain consistent: If you will be using many yes/no splits, always send the “yes” branch to the left and the “no” branch to the right.

- If using a Twilio Function to post survey responses to a Google Sheet (as described here), link all “No Reply” and “Delivery Failed” branches to that Function. This setup ensures that partial responses (respondents who stop partway through the Studio Flow) will also be recorded in the exported data. You can also add a set variable counter before connecting to the publishing function.
- “Send & Wait for Reply” widgets have a timer that designates how long they wait for an inbound message response before closing the Studio Flow execution. They are pre-set to wait for one hour. To vary the response window timeframe, update the section in each individual widget that says “Stop Gathering after XXX seconds.”

4.5. Studio tutorials

- Build a survey in Twilio Studio following this Youtube tutorial: How to Build SMS Surveys in Twilio Studio. (You can skip the last send_results widget part for now; data export is covered later.)
- Barista Bot tutorial (You can leave out the section on transferring to phone calls if that will not be a part of your surveys.)
- There are various templates available to learn and build within Twilio Studio - go to Develop > Studio > Try it out

5. Sending surveys

Sender Platform Options for Studio Flows

Studio Flows are triggered and interacted with in the same way via SMS and WhatsApp. If your account isn’t yet authorized for the Twilio for WhatsApp API, building out a survey and testing in SMS is a great place to start. It is easy to reconfigure the flow to send through WhatsApp later on, as the logic remains the same with a few exceptions. (The first outbound message will need to be approved before it can be triggered via REST API in WhatsApp surveys.See here for more information.)

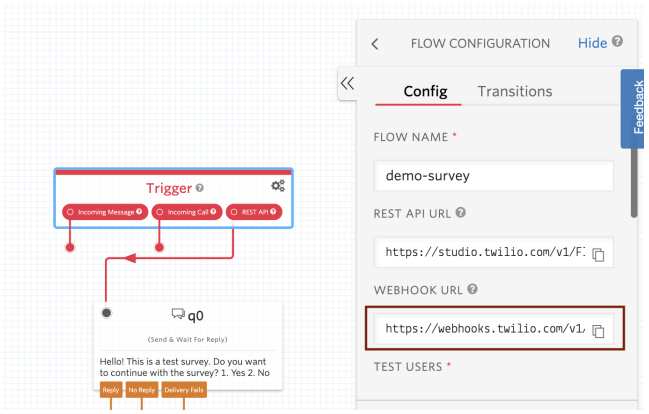
There are charges for incoming and outgoing messages. Please review pricing structures before sending messages.

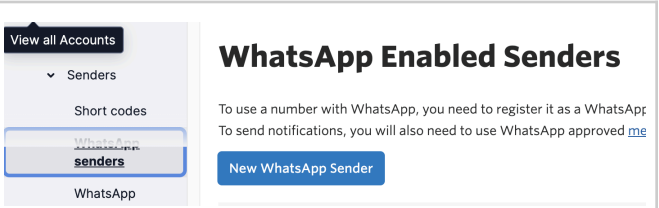
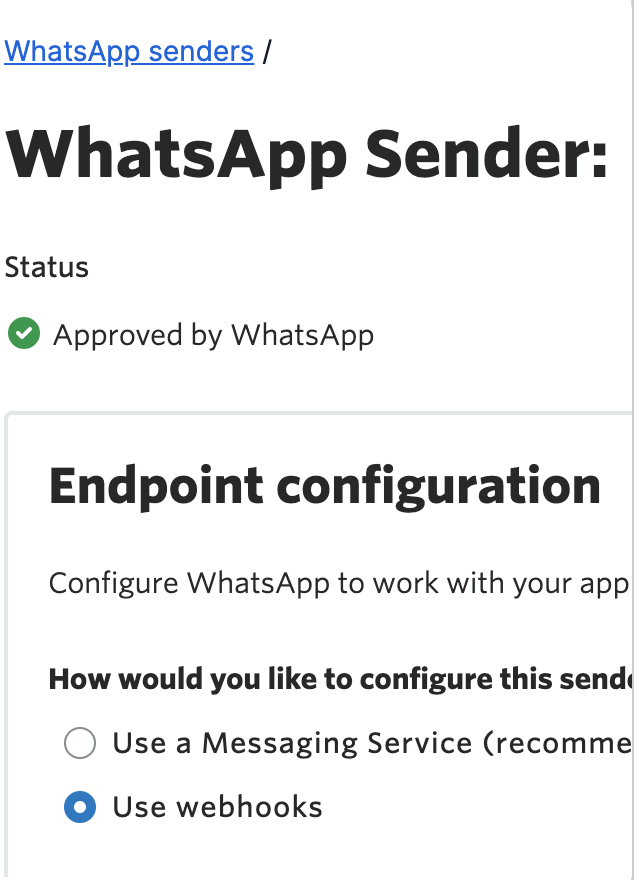
- SMS pricing
- WhatsApp pricing

5.1. Setup for WhatsApp versus SMS

To send a Studio Flow via WhatsApp:

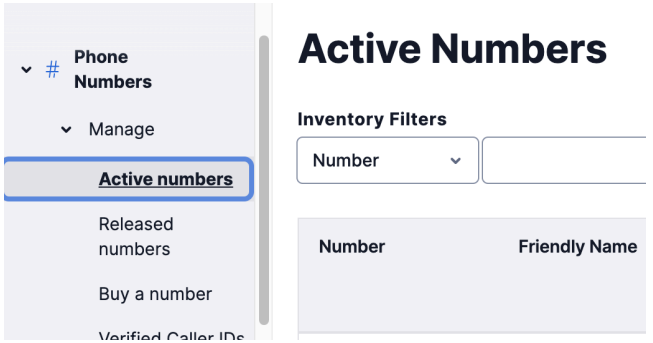
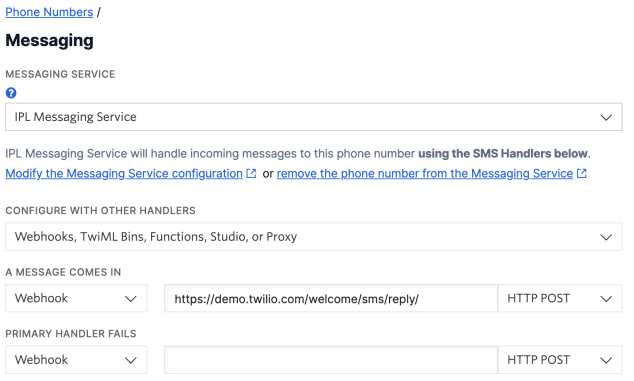
- You must have a verified Business Manager account, and your Twilio number must be approved for WhatsApp (see here).
- If the Flow starts with an outbound message, the first message must be an approved template notification (see here).
- If using the contact sheet to deploy surveys, both your Twilio number and the numbers included on the contact sheet must be formatted for WhatsApp (see here). The numbers should be written out as "whatsapp:+1xxxxxxxxxx" with the appropriate country code.

1	**Copy the Studio Flow Webhook URL** • Navigate to Studio (Develop > Studio > Flows) and click on the Flow you would like to use. Click on the Trigger and copy the Webhook URL.	
2	**Configure your Twilio phone number for a Studio Flow via WhatsApp**	

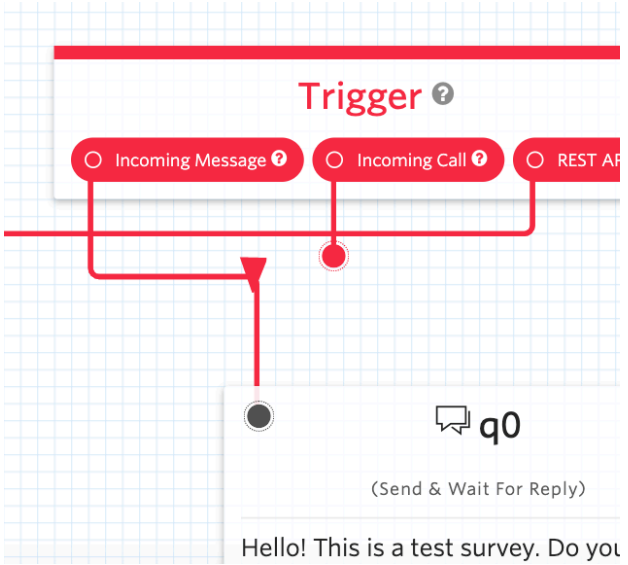
	• Navigate to Develop > Messaging > Senders > WhatsApp senders Click on the number you want to use.	
2	**Link to the designated Studio Flow** • This manual describes how to set up the number using webhooks. Select “Use webooks” as the configuration. • Under “Webhook URL for incoming messages,” paste the Studio Flow Webhook URL. Ensure that the drop-down menu indicates “HTTP POST.” Scroll to the bottom of the page and save. • Refresh the page and double check that the correct Webhook URL appears.	

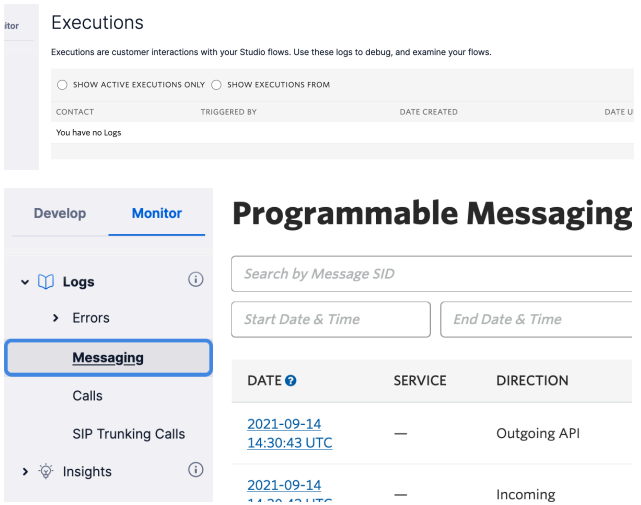
To send a Studio Flow via SMS:

The message text does not need to be pre-approved.

1	**Configure your Twilio phone number for a Studio Flow via SMS** ● Navigate to Develop > Phone Numbers → Active Numbers → Click on the number you want to use.	
2	**Link to the designated Studio Flow** ● Scroll down to Messaging. Under "A Message Comes In," select Studio Flow from the first option in the drop-down menu, and the specific Flow you'd like to use in the second drop-down menu option.	

5.2. Test surveys via an incoming message

1	Confirm that your Twilio phone number is configured to send a Studio Flow via WhatsApp or SMS (see here). *Note: when using a trial account, phone numbers that will receive messages from Twilio need to be verified (see here). This restriction is removed when the account is upgraded. If you are testing using a Twilio phone number with a country code that is different than the recipient's country code and number, Twilio may send this survey through a "shortcode." The recipient cannot reply directly to this code. Instead, the recipient will need to add the Twilio phone number to their contacts list and respond directly to this number.*	
2	Trigger a Studio Flow via an incoming message *Note: there may be fees affiliated with sending inbound or outbound messages when testing SMS messages. Please check your phone company's policy before testing so that you are aware of any possible fees.* • Set the trigger to "Incoming Message" (i.e. connect it to the first widget in your flow in Studio). The Incoming Message trigger is invoked when your Twilio phone number (or other message-based channel) receives a new message and sends it to your Studio Flow Webhook URL. • Test the flow by sending a text message to the configured Twilio phone number. For testing purposes, the exact content of this first message does not matter, as any inbound message will trigger the Studio Flow. Sending an SMS to the Twilio phone number will start the Studio Flow	

	through an SMS conversation. Sending a message to the Twilio phone number within WhatsApp will start the Studio through a WhatsApp conversation. ● In both cases, the first widget of the Studio Flow (for example, the q0 widget per the screenshot here) should happen immediately after the inbound message. ● The message conversation should proceed through the survey as designed in the Studio Flow. This is a helpful way to test that the logic set up with "Split Based On" widgets is designed appropriately.	
3	Look through Studio Flow logs to see how the conversation data is stored in Studio. ● Navigate to Monitor —> Logs —> Messaging in the Studio toolbar. ● By clicking on the hyperlinked Execution ID under the Contact column (starts with the letters FN), you can then see the entire conversation exchange, including the widgets that were sent, the branches that were taken after splits, and inbound messages. ● You can also export the SMS and WhatsApp message log in a csv file through Programmable Messaging > Monitor > Logs (see here for more information).	

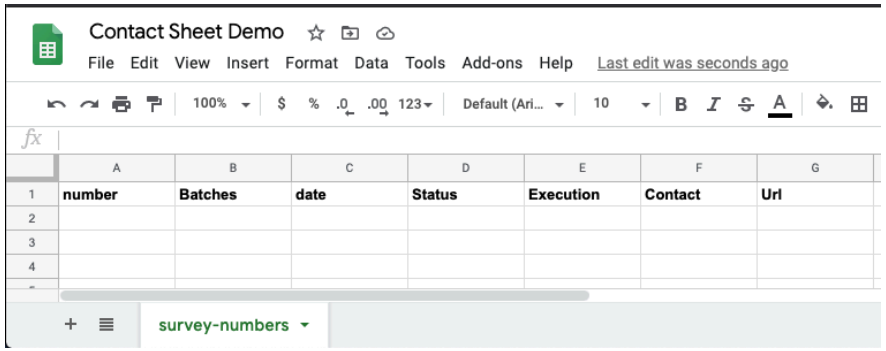
5.3. Decide how you want to initiate your survey

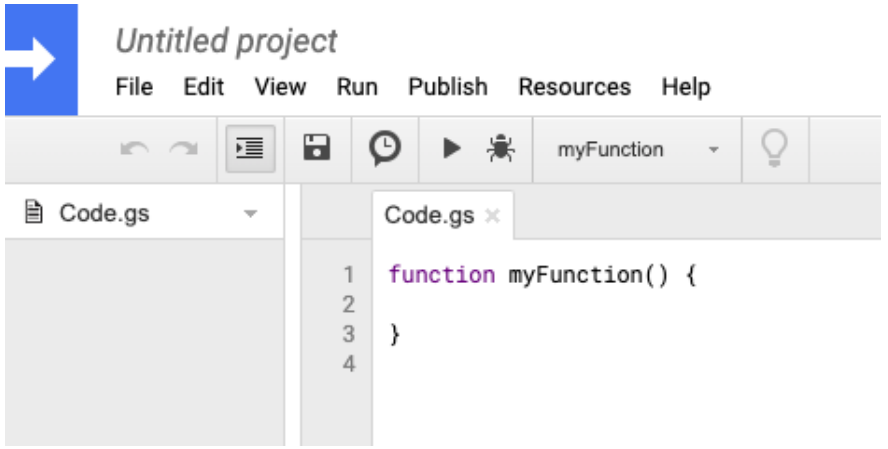
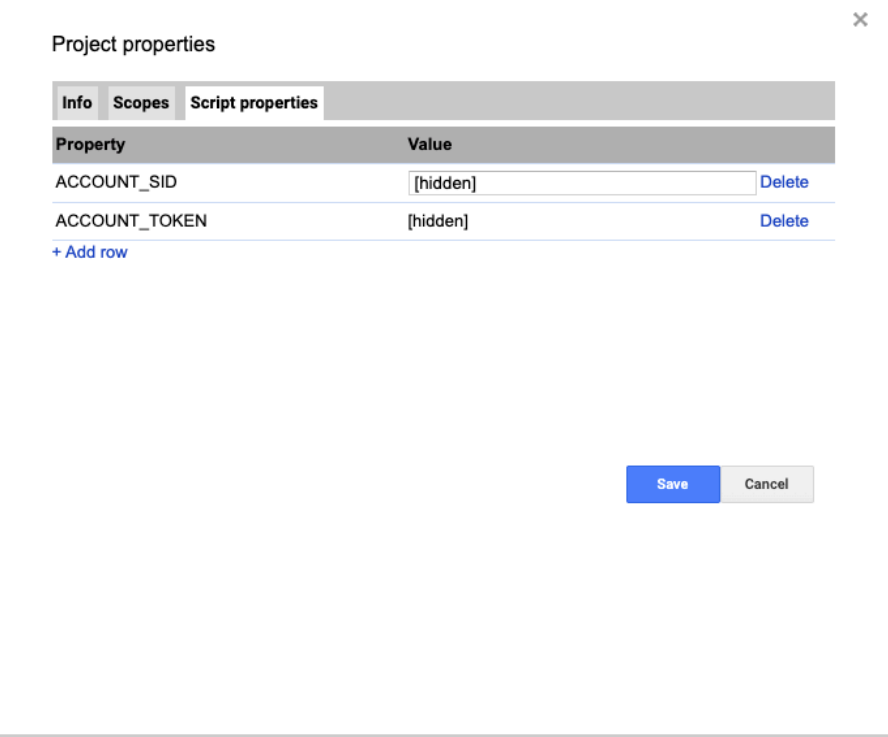
There are two ways you can initiate the start of your survey. The first one uses Google Sheets as a contact sheet for survey participants and enables the user to start the survey from within that document (see section 5.4). If you prefer to store the

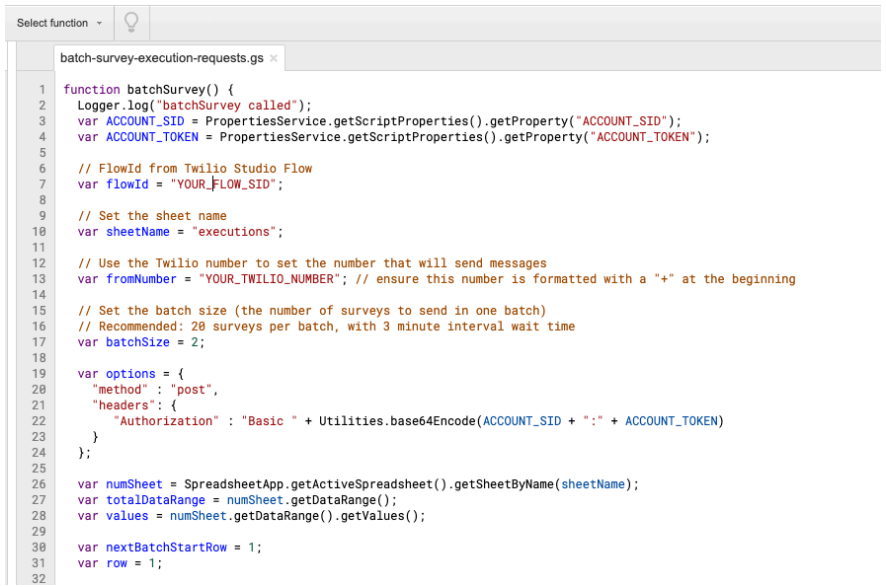
contact sheet information directly on your computer and start the survey directly, rather than on Google Sheets, skip to section 5.7.

5.4. Set up a contact list in Google Sheets

To learn more about the contact sheet, watch the Contact Sheet & Sending Surveys Tutorial.

1	Confirm that your Twilio phone number is configured to send a Studio Flow via WhatsApp or SMS (see here).	
2	Copy an example project or create a new Google Sheet. If you will be sending surveys in multiple languages, copy Twilio Executions With Language Support. Otherwise, choose the standard Twilio Execution project to copy. Name the Google Sheet document however you'd like (i.e. "Contact Sheet Demo"). Replicate the headers in the top row and sheet names in the bottom tab if creating a new sheet. *Note: there will be account details saved in this GoogleSheet that will enable access to data in your Twilio account. Restrict access to the Google Sheet via passwords or other access limitations.*	

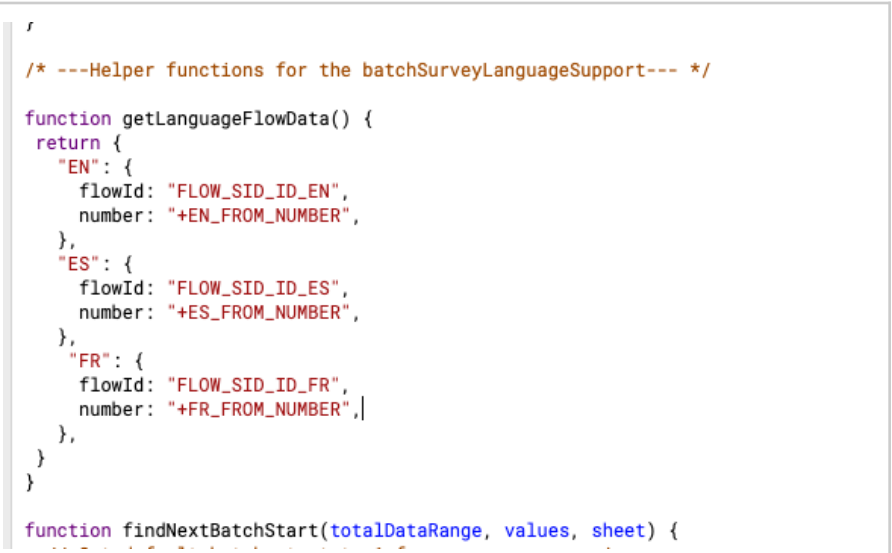
3	Go to Tools → Script editor. If working with a copy of the template from the links above, you will see the script that will be run to create new survey executions. If the user interface looks different from these photos, look to the upper right-hand corner and select "Use legacy editor" (if the option to do so is available) so the interface looks the same as our screenshots. To learn more about how this code will be run, review the video posted at the start of this section. The code for these scripts is also stored in the Github repository's Google Scripts folder for additional access.	
5	Add project properties. • Go to File → Project Properties → Script Properties. Click "+ Add row." • Enter your Twilio Account SID and Twilio Account Authentication Token. In order for the code to be able to use these to access your Twilio account, you must type out the Property names exactly as written in the screenshot (all caps, no spaces). By saving your Account SID and Authentication Token in project properties, the template code can reference these variables without replacing them directly. It is a best practice to save these in project properties, rather than directly in the code, for data privacy. *Note: at this point, anyone who accesses this Google Sheet can access your Twilio profile, so ensure that the Google Sheet is protected appropriately.*	

6	Update the template code to reference your specific Twilio phone number and Studio Flow. Without altering any other lines of code, change the following sections only: • Line 7: replace YOUR_FLOW_SID with the Studio Flow SID of the specific survey; this is found in the Studio Dashboard, inside the quotation marks. • Line 13: Replace YOUR_TWILIO_NUMBER with your Twilio phone number, starting with a plus sign and then adding only numbers (no spaces or other dashes) inside the quotation marks. Note: if sending messages via WhatsApp, the number must be formatted for WhatsApp (whatsapp:+xxxxxxxxxxx). • Save the code.	

Select function

batch-survey-execution-requests.gs

```
1  function batchSurvey() {
2    Logger.log("batchSurvey called");
3    var ACCOUNT_SID = PropertiesService.getScriptProperties().getProperty("ACCOUNT_SID");
4    var ACCOUNT_TOKEN = PropertiesService.getScriptProperties().getProperty("ACCOUNT_TOKEN");
5
6    // FlowId from Twilio Studio Flow
7    var flowId = "YOUR_FLOW_SID";
8
9    // Set the sheet name
10   var sheetName = "executions";
11
12   // Use the Twilio number to set the number that will send messages
13   var fromNumber = "YOUR_TWILIO_NUMBER"; // ensure this number is formatted with a "+" at the beginning
14
15   // Set the batch size (the number of surveys to send in one batch)
16   // Recommended: 20 surveys per batch, with 3 minute interval wait time
17   var batchSize = 2;
18
19   var options = {
20     "method" : "post",
21     "headers": {
22        "Authorization" : "Basic " + Utilities.base64Encode(ACCOUNT_SID + ":" + ACCOUNT_TOKEN)
23     }
24   };
25
26   var numSheet = SpreadsheetApp.getActiveSpreadsheet().getSheetByName(sheetName);
27   var totalDataRange = numSheet.getDataRange();
28   var values = numSheet.getDataRange().getValues();
29
30   var nextBatchStartRow = 1;
31   var row = 1;
32
```

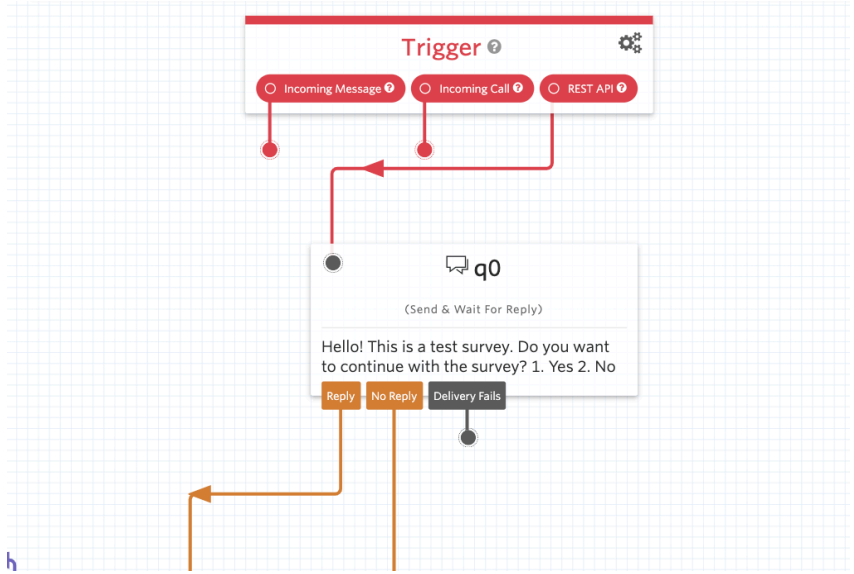
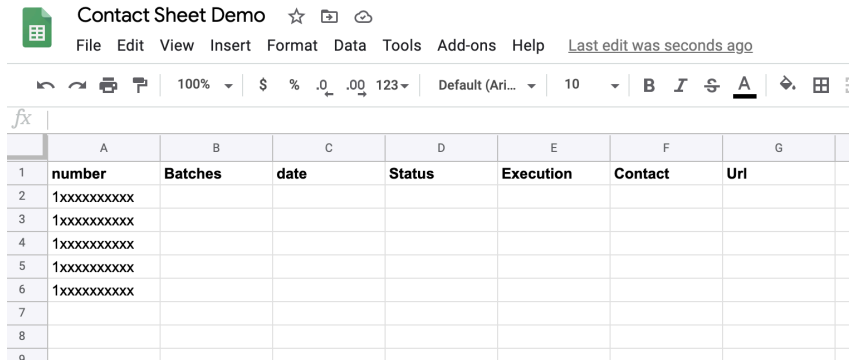
7	If you are using the template that supports multiple languages, update the flowId and their respective numbers in the helper function on line 76–91.	

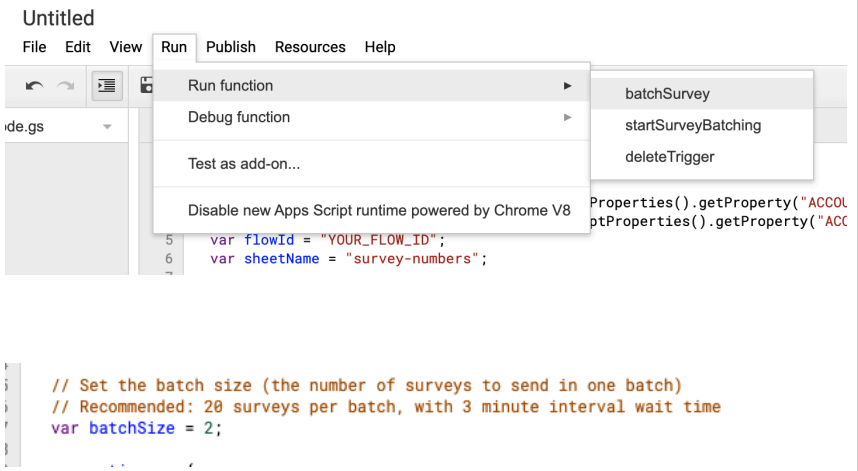
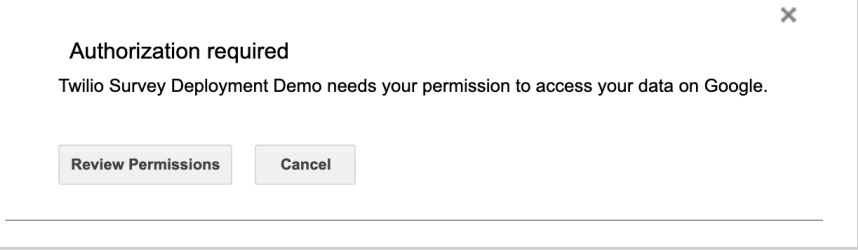
```
/* ---Helper functions for the batchSurveyLanguageSupport--- */

function getLanguageFlowData() {
 return {
   "EN": {
     flowId: "FLOW_SID_ID_EN",
     number: "+EN_FROM_NUMBER",
   },
   "ES": {
     flowId: "FLOW_SID_ID_ES",
     number: "+ES_FROM_NUMBER",
   },
    "FR": {
     flowId: "FLOW_SID_ID_FR",
     number: "+FR_FROM_NUMBER",
   },
 }
}

function findNextBatchStart(totalDataRange, values, sheet) {
```

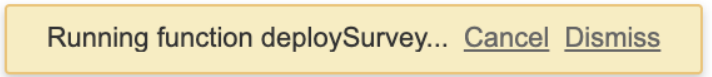
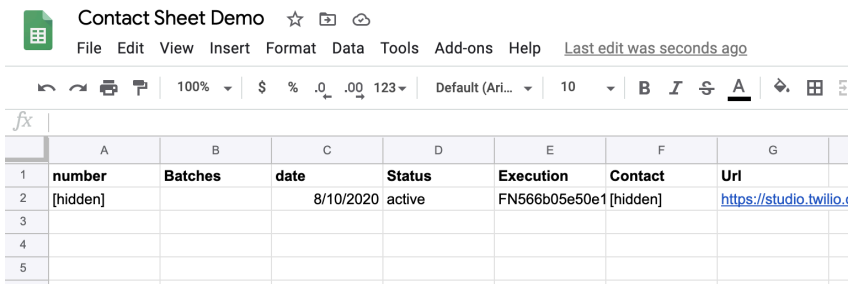
5.5. Send surveys using the contact list

To learn more about sending surveys, watch the Initiate Twilio Survey Script Tutorial.

1	Confirm that your Twilio phone number is configured to send a Studio Flow via WhatsApp or SMS (see here).	

2	In Twilio Studio, connect the first widget to the REST API trigger. This means that an external request will trigger sending the first outbound message. Remember: to start a conversation with an outbound message via the REST API in WhatsApp, the first message must be approved as a notification template. (Read about the approval process here.)	
3	Return to the Google Sheet and list the phone numbers that you want to receive the survey in the first column. The phone number must include the country code, without any spaces or non-numeric characters (i.e. for a US number: +1xxxxxxxxxx). If you are sending the survey via WhatsApp, the numbers must be formatted for WhatsApp (whatsapp:+1xxxxxxxxxxx).	

4	Return to the Script Editor tab. Go to Run → Run Function → batchSurvey. Select this only once to prevent starting the survey multiple times. The "batchSurvey" command will send the survey to the numbers in column A. The number of surveys sent will be dependent on the batchSize variable set in the script. • Behind the scenes, Google Sheets is sending a request to the Twilio REST API to start a new survey execution. It includes the Account SID and Authentication Token in the request, which Twilio can use to verify the account before fulfilling the request. When fulfilling the request, Twilio uses the recipient's number and the sender's number, also provided in the request from Google Sheets, to deliver messages.	
5	The first time you run the deploySurvey function, Google will display a pop-up message requesting permission to connect to external accounts. Click Review Permissions.	

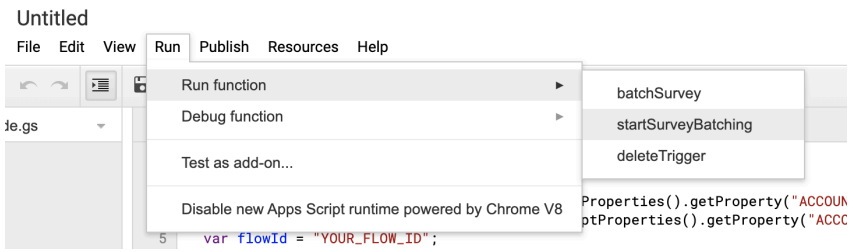
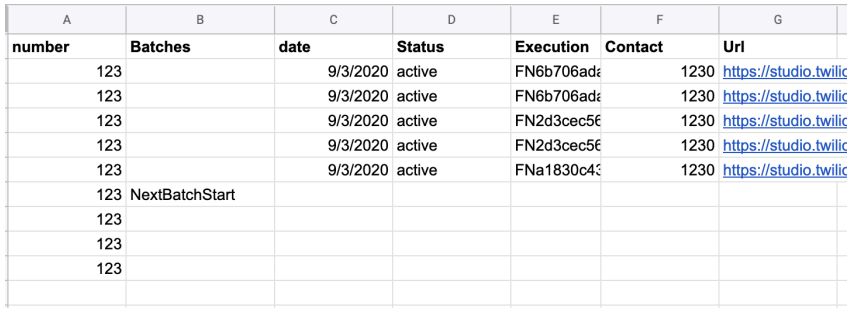
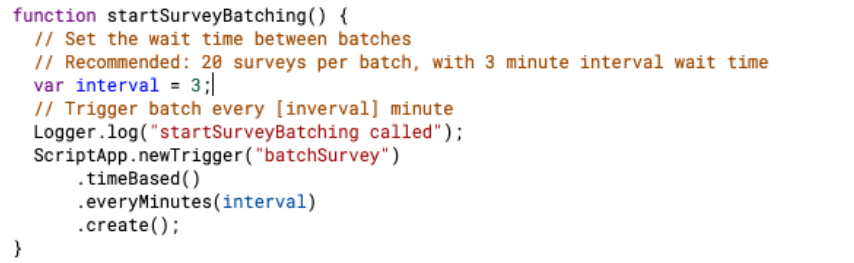
6	Google will then ask which Google account it should use to continue to the Google Sheet. Select the Google account you are using for the Google Sheet. This permission allows the Script Editor to read the details in the Google Sheet, as well as connect to an external service (in this case, that is Twilio). Click “allow.”	
7	At the very top of the Script Editor, you’ll see the following message.	
8	When the above message goes away, return to the Google Sheet. Additional columns will automatically have been filled in. ● **Batches** will be blank. ● **Date** is the day/time when the survey was sent. ● **Status** indicates whether the Google Sheet successfully accessed your Twilio account. This column should indicate “active” for each number. This is a first-level check to confirm that the Script Editor successfully talked to Twilio and sent the request to initiate your survey flow. (This is not a final confirmation that the survey was successfully delivered; you also must check the logs in Twilio to ensure that there were no subsequent errors from Twilio.) ● **Execution** lists the Twilio Execution ID that is unique to each number on the contact sheet.	

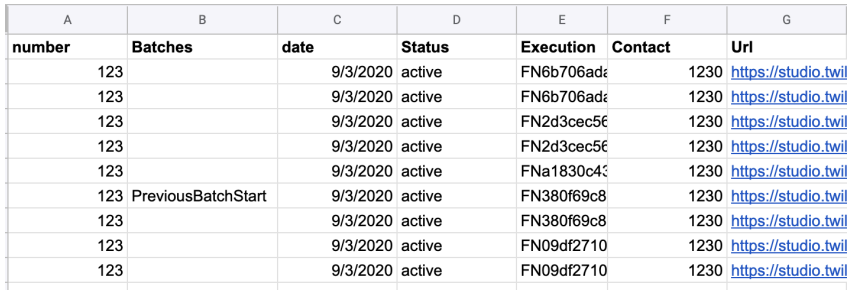
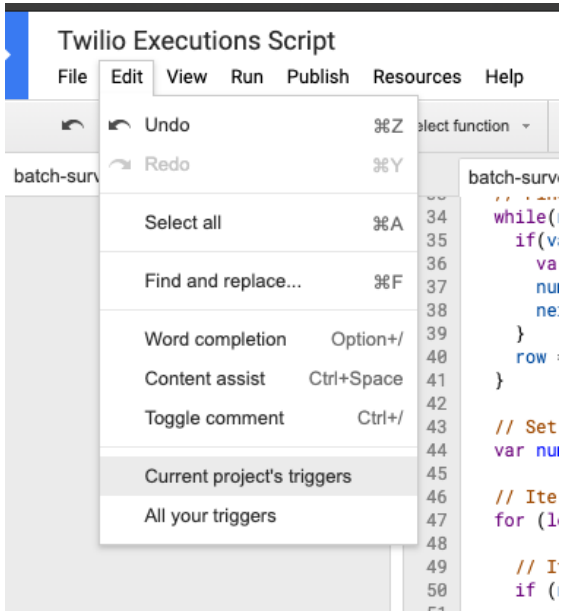
	• **Contact** confirms the phone number. • **URL** auto-populates a URL that links to the raw, unformatted conversation flow per each number. If you are asked to log in, the username is your Twilio Account SID and the password is your Twilio Authentication Token.	

5.6. Send a large-scale survey in batches

When sending a survey to a large group of numbers (>50), it is important to send out the survey in multiple batches to accommodate technical limitations. Google functions will run for one minute before timing out. To ensure that the contact sheet does not approach the time out limit for sending surveys to a large contact list, the function can be edited to incrementally send the survey to batches of numbers at a given interval of time.

1	FIll in the complete list of numbers you'd like to send the survey to in Column A.	
2	Return to the Script Editor tab. Update the template code in two places. Without altering any other lines of code, change the following sections only: • Line 9: replace "40" with size of each each group/batch (we recommend a max of 50 to prevent throttling). • Line 76: replace "5" with the number of minutes to wait between sending surveys to each group/batch.	8 // Set the batch size (the number of surveys to trigger together) 9 var batchSize = 40; 75 function startSurveyBatching() { 76 var interval = 5; 77 // Trigger batch every [inverval] minute 78 Logger.log("startSurveyBatching called"); 79 ScriptApp.newTrigger("batchSurvey") 80 .timeBased() 81 .everyMinutes(interval) 82 .create();

3	Go to Run → Run Function → startSurveyBatching. Select this only once. • Behind the scenes, the "startSurveyBatching" command will take approximately one minute to identify the first group of numbers (equal to the batchSize defined in Line 9). After identifying the first group, it will send the survey to this group.	
4	After the survey is sent out to the first group, the additional columns will be filled in for that group and the indicator "NextBatchStart" will appear in the Batches column. This indicates the break between the first and second groups. • Behind the scenes, the "startSurveyBatching" command is waiting the number of minutes defined as interval, and then will identify the next group of numbers. After waiting the requisite number of minutes, the survey will be sent to the next group. • When the "NextBatchStart" indicator appears in Column B, it means that there are additional groups yet to send. *Note: this example was sent to fake phone numbers.*	 

5	When the next group of numbers is sent out, the indicator in Column B will change to “PreviousBatchStart” to indicate where the groups split.	
6	The iterative process of waiting a designated time interval and then sending the survey out to the next group will continue through the entire list until there are no additional numbers in Column A. At that point, the project trigger, which invokes the function every *n* minutes, will be deleted. ● Behind the scenes: When the function no longer finds NextBatchStart in the table, or the batchSize is greater than the numbers left in the table, a function will run that finds all triggers in the script project and deletes them. Triggers can also be deleted manually by going to Current Project Triggers and selecting the trigger to delete. This can be useful if you need to stop the script from initiating surveys. ● If the trigger is deleted before all surveys are sent, simply start the process again by running startSurveyBatching when you are ready to begin again. The script will pick up at the "nextBatchStart" number.	

	A	B	C	D	E	F	G
	number	Batches	date	Status	Execution	Contact	Url
	123		9/3/2020	active	FN6b706ada	1230	https://studio.twil
	123		9/3/2020	active	FN6b706ada	1230	https://studio.twil
	123		9/3/2020	active	FN2d3cec56	1230	https://studio.twil
	123		9/3/2020	active	FN2d3cec56	1230	https://studio.twil
	123		9/3/2020	active	FNa1830c43	1230	https://studio.twil
	123	PreviousBatchStart	9/3/2020	active	FN380f69c8	1230	https://studio.twil
	123		9/3/2020	active	FN380f69c8	1230	https://studio.twil
	123		9/3/2020	active	FN09df2710	1230	https://studio.twil
	123		9/3/2020	active	FN09df2710	1230	https://studio.twil

5.7. Send surveys directly from your computer

Note: this an alternative approach to starting surveys using sections 5.5 and 5.6.

To save a contact sheet and trigger the survey directly from your computer, follow the instructions in this Github Repository. This requires installing python and git, but no coding in python is required. The code to start the surveys is called "twilio_launcher.py". Remember that additional variables can be sent to Twilio in the last argument of the code.

5.8. Troubleshooting

There could be many reasons why your surveys are not sending correctly. In addition to checking the Debugger for real-time error diagnostics, also check the following:

In Twilio:

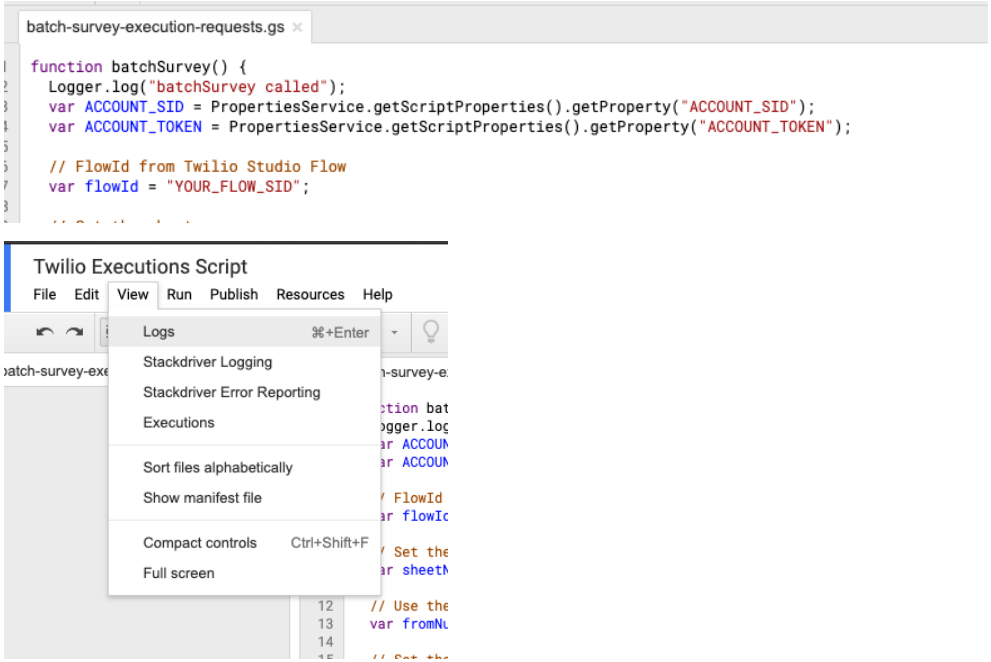
- Webhook URL is configured for your WhatsApp sender number (verify that the right Webhook URL is populated)
- The first WhatsApp message sent via REST API is an approved template
- The REST API branch connects to the first message widget
- The message content assessed by each split is typed in correctly (we recommend using the auto-fill feature from the drop down menu that appears when you begin typing to ensure the exact right format is used)

On the contact sheet:

- The Flow ID and Sheet ID are correct in the contact sheet code
- Your Twilio Number in the contact sheet code is formatted for the messaging platform (WhatsApp/SMS)
- Respondents' numbers are formatted correctly (+1xxxxxxxxxx OR whatsapp:+1xxxxxxxxxx)

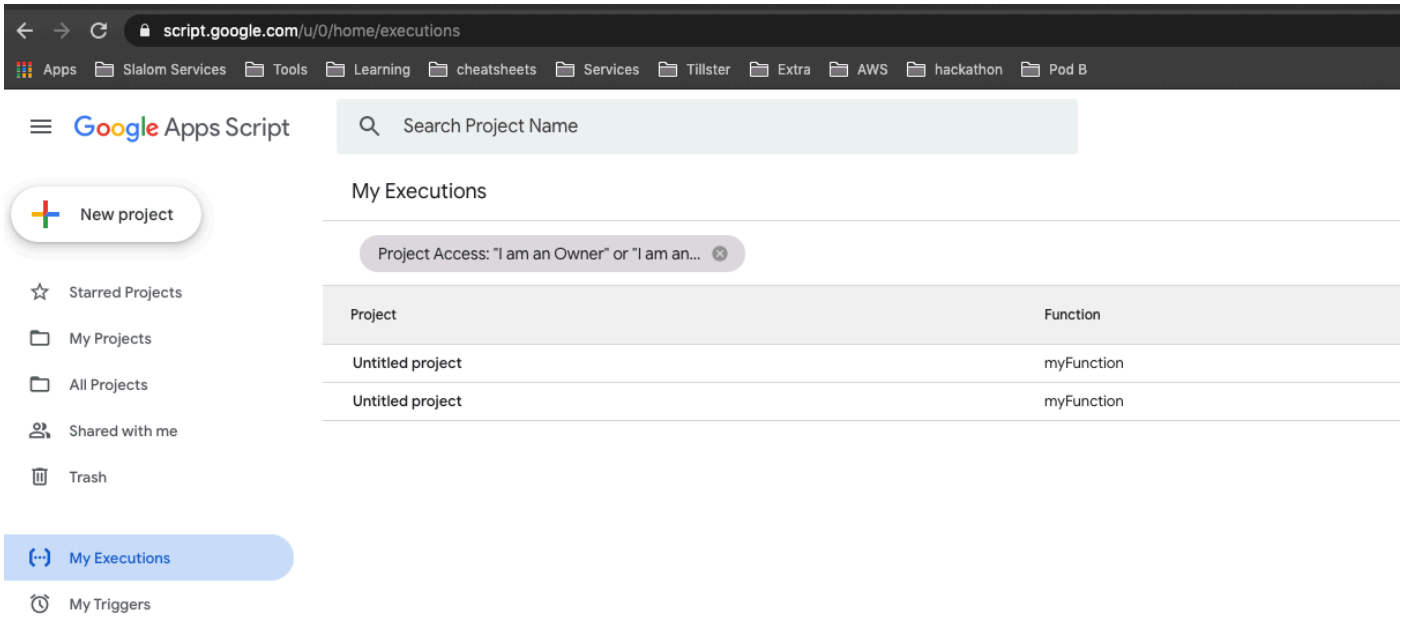
In Google Scripts:

- Add log lines and view logs to make sure variables are getting set as expected:



- Send a small batch size of 1 to reduce the number of requests being sent.

- View the project executions and triggers in the Google Script console to confirm that functions are firing:

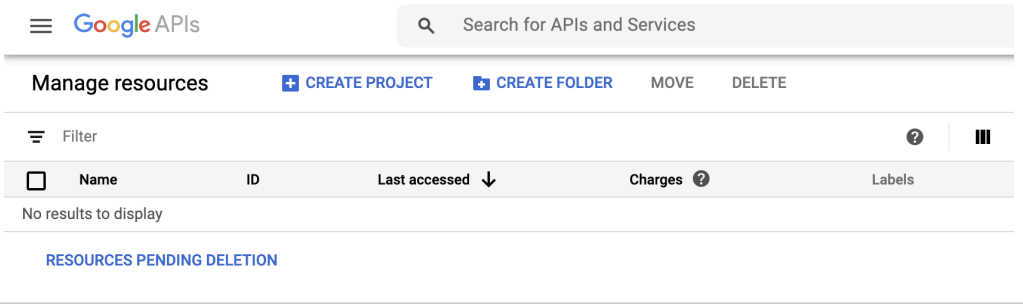
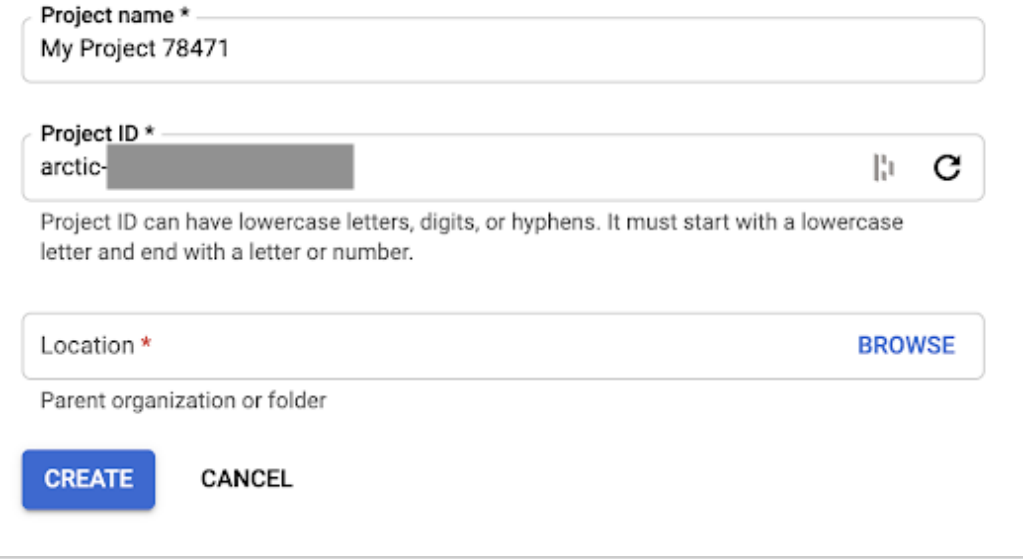


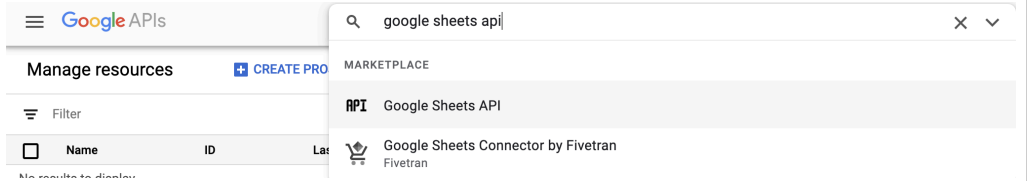
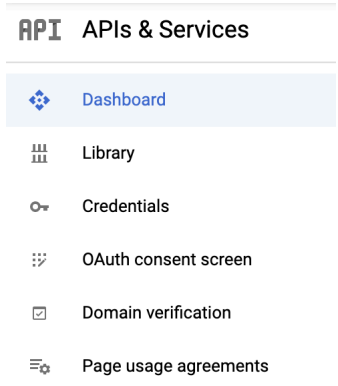
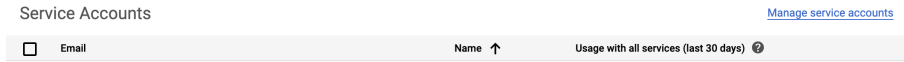
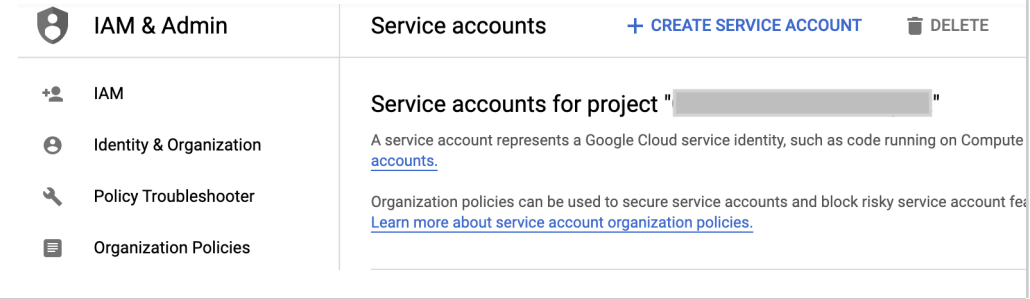
6. Collecting and Exporting Survey Responses

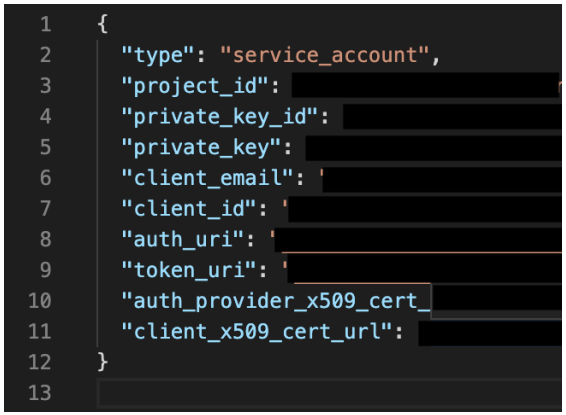
You will use Twilio & Google to

- Set up a data export structure to collect survey responses
- Track usage statistics and request quota increases for the Google Sheet API
- Design a data export infrastructure that sends messages from Twilio to a Google Sheet response database
- Collect and store survey results

6.1. Create a new project in the Google API Console

1	Follow this link to create a project in the Google API Console. Note: you will need a Google account that has permissions to use the Google API Console.	
2	Sign in and click "Create Project" from the upper right-hand corner.	
3	Create a new project and fill out the needed information. It can be helpful to rename Project ID to an identifiable title.	

4	Within that specific project, search for and enable the Google Sheets API. The data export structure relies on this API to connect Twilio and Google Sheets.	
5	Click "Credentials" on the left-hand menu.	
6	In the "Service Account" section, click "Manage Service Accounts."	
7	Click on “+ Create New Service Account.” Enter in a name for the account, like "Twilio data collection," and a description, and click create.	

8	Once the account is created, click on the account. When you are on the account page, click "Add Key", choose "New Key" and select the JSON option. Create the Key and download the JSON file. You will need the information included in this JSON file to set up the data export infrastructure in Twilio.	

6.2. Request quota increase for Google Sheets API

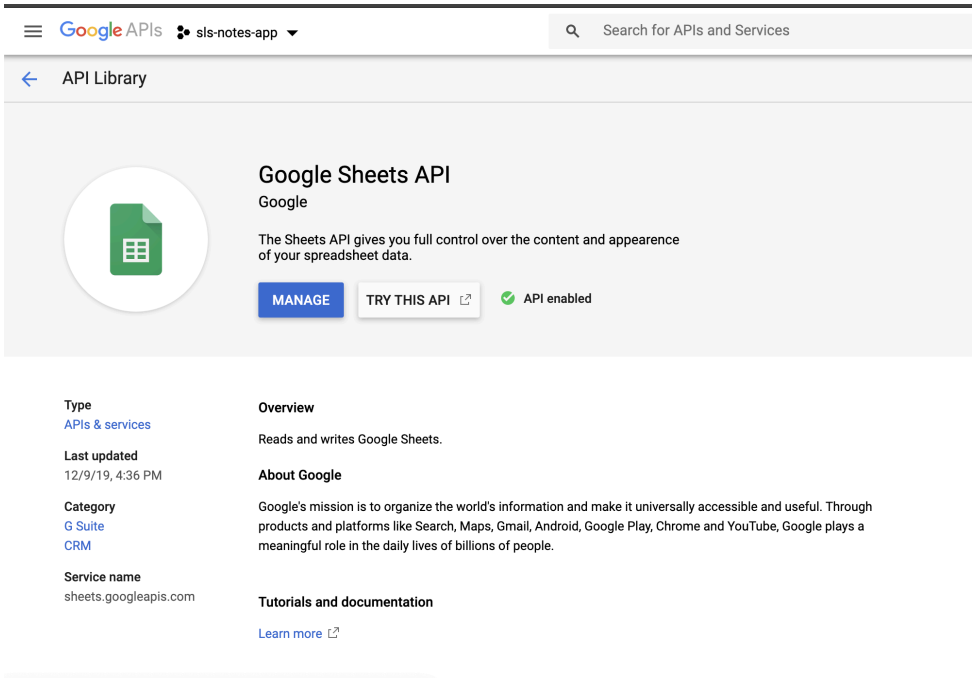
The data export infrastructure relies on the Google Sheets API so that Twilio can post messages to the designated Google Sheet. The Twilio function described in the following section (see here) reads in all headers in the Google Sheet, and then writes to the document; it uses one read and one write request per user for each conversation that is posted to the Google Sheet.

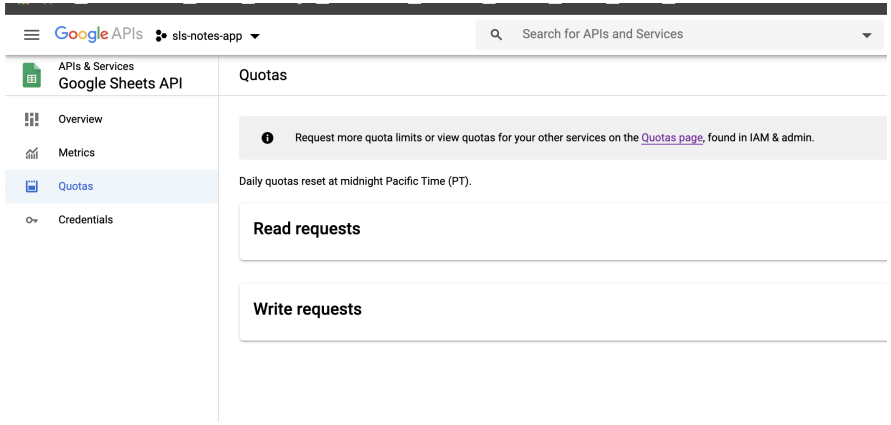
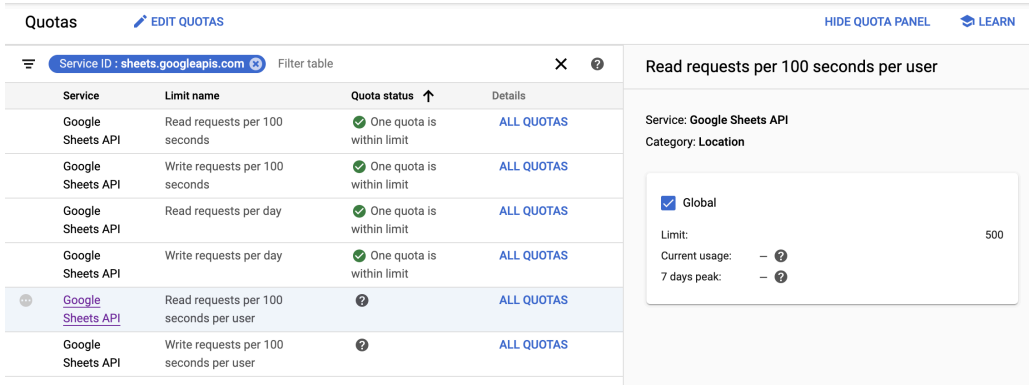
There is a starting limit of 100 read and write requests per user per 100 seconds for the Google Sheets API. If approximately 50 surveys are completed at nearly the same moment, the starting limits may not be enough. If the limit is exceeded, the request will be blocked, you will receive an error message from Google, and messages may not be posted in the transition between Twilio and Google. (Twilio will still save these messages, which can be found in the raw data export approach described here.)

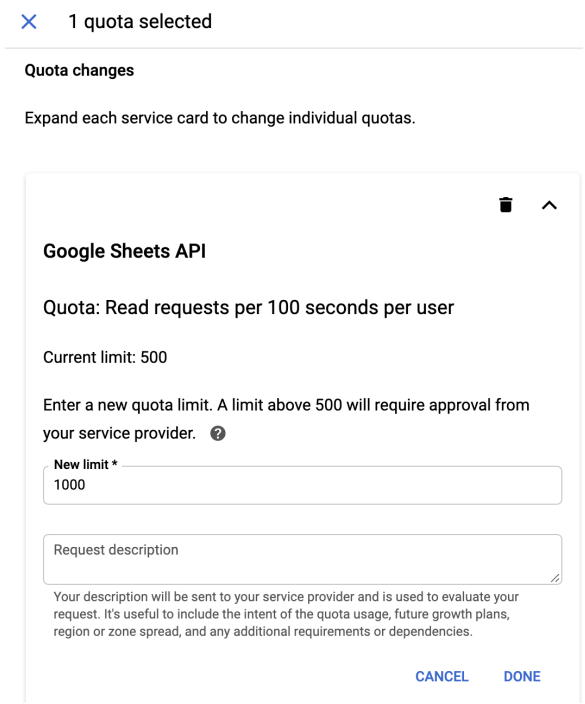
You are able to request a limit increase by following the steps outlined below. Please see here for additional information on quota limits. We recommend increasing “Read request

per 100 sections per user" and "Write requests per 100 seconds per user. The maximum for each is 1,000. Depending on predicted usage, it can be helpful to start with requesting a limit of 500 requests for both categories. It may be necessary to demonstrate usage approaching the quota level before an increase will be approved.

To adjust quota limits, the Service Account must be linked to a billing account on Google Cloud Platform and be upgraded from the free trial account. In the first year, users receive a $300 credit. Charges will only be made to the credit card linked to the billing account after the free trial year or credit run out. Users will be asked at that point to enter the credit card information again.

1	From the project, click to see API options. Then search for Google Sheets API.	
2	Select and click Manage.	

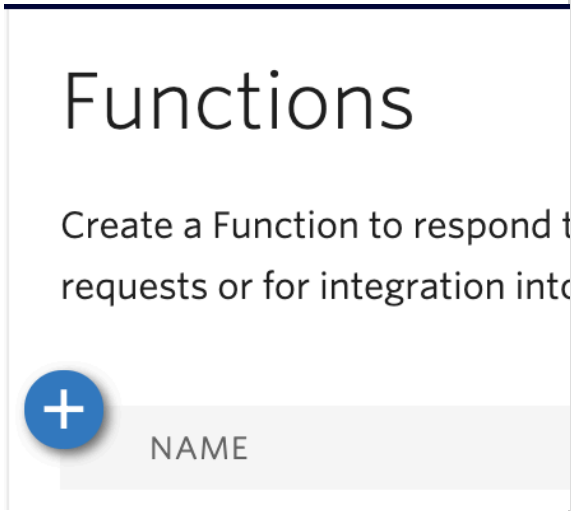
3	Click Quotas from the side menu and select the “Quotas page” link.	
4	To request a quota increase, click on each type of limit you’d like to increase, and select the check box on the right hand side. Then select “Edit Quotas” at the top of the page.	

5	The form will ask for contact information, and then it will request the new quota limit and description. The request is reviewed, and an email indicating the decision is sent to the affiliated Google account.	

6.3. Create a Twilio Function to export to a Google Sheet

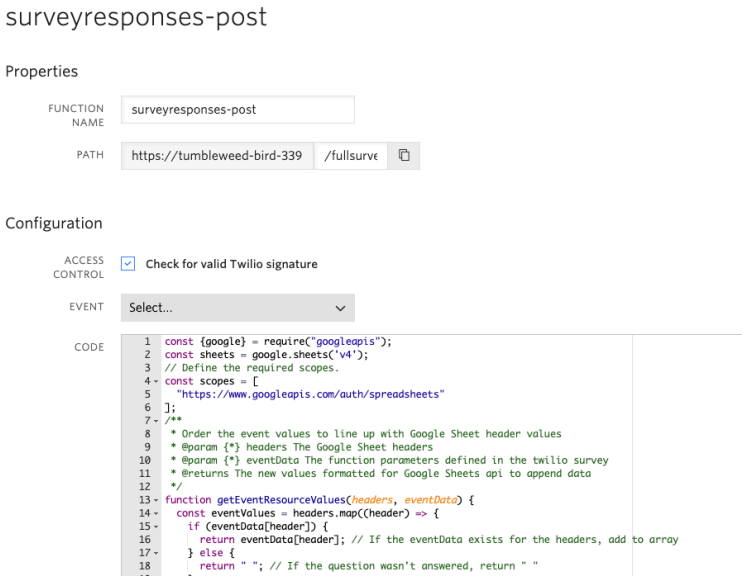
To learn more about Twilio Functions, watch the Twilio Function Part 1 and Twilio Function Part 2 tutorials.

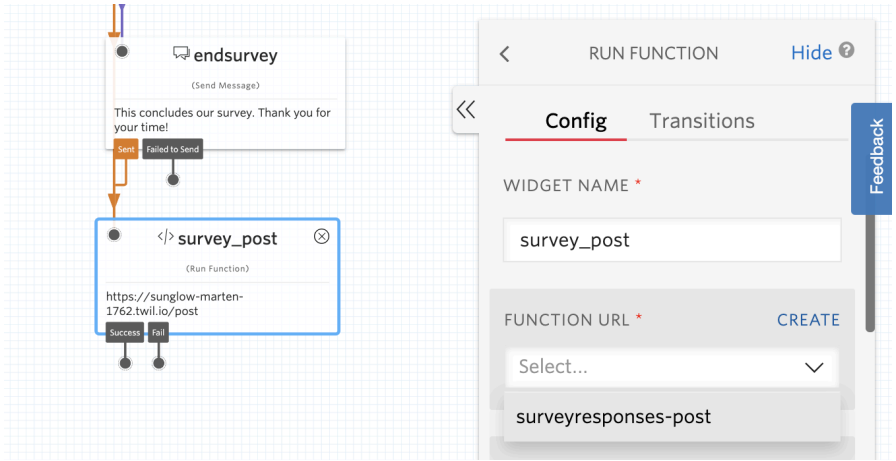
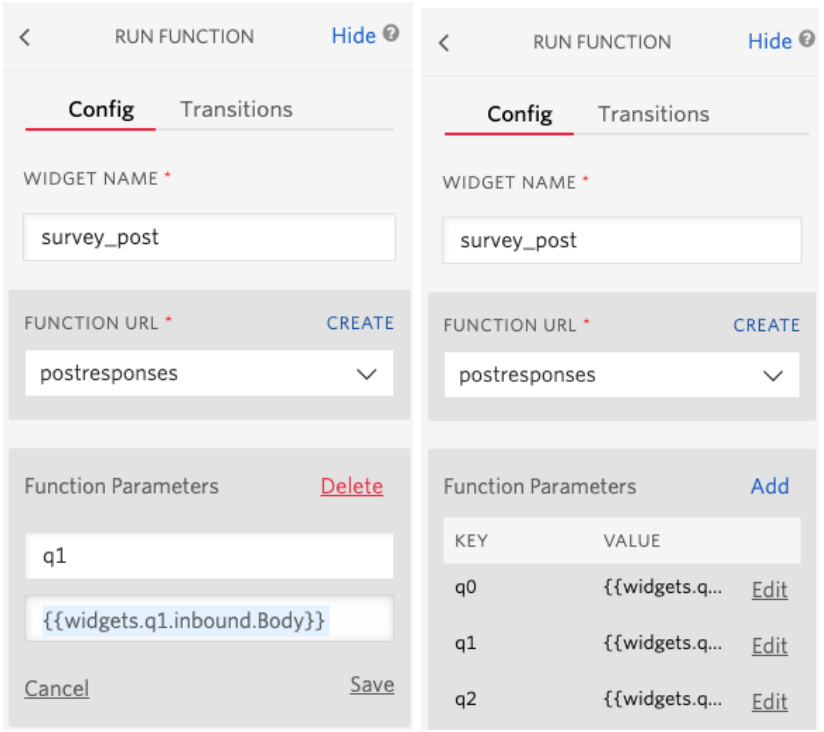
1	Navigate to Develop > Functions > Functions (classic) → List. Click on “Create a Function” blue red (+) mark to create a new blank function. Copy the post-responses function code in the code	*

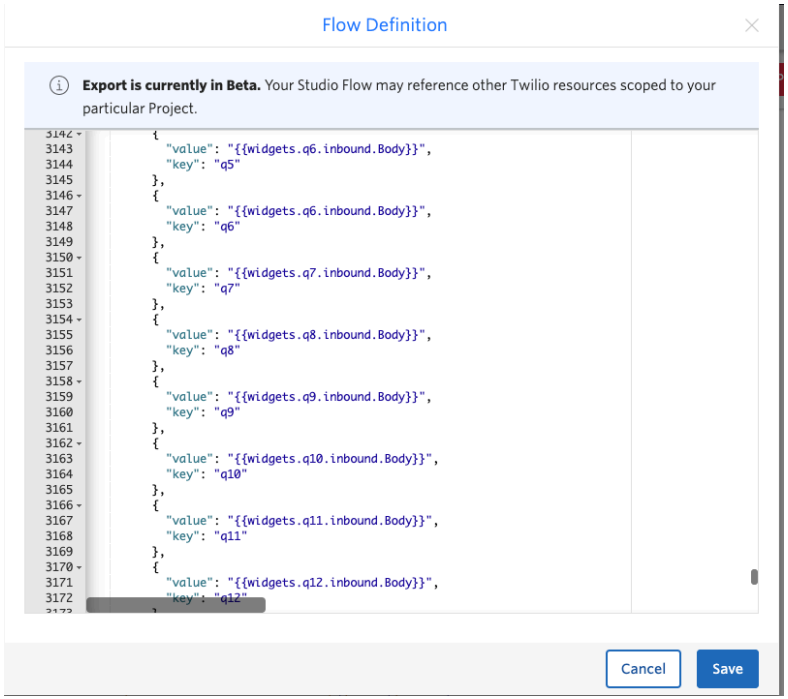


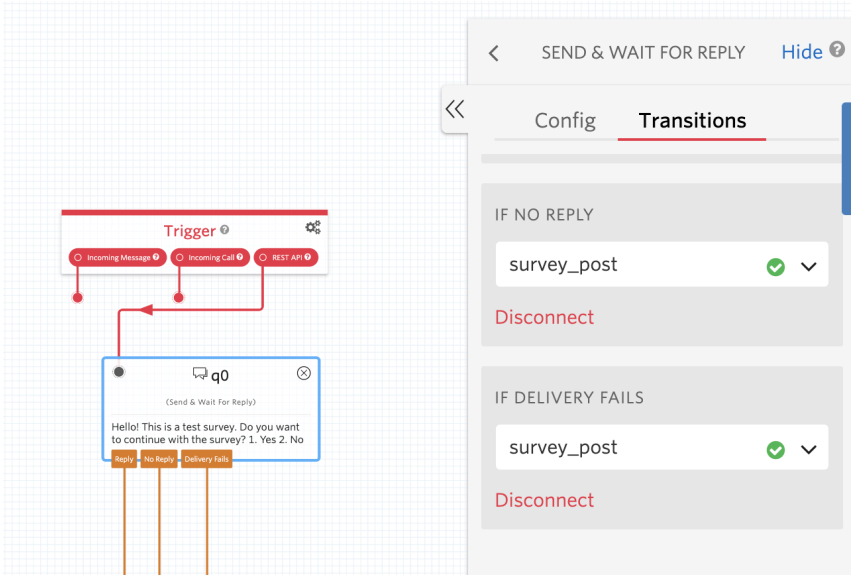
2

Set a title and path for your function. These can be any text that will indicate to you the role of the function. Save the function.

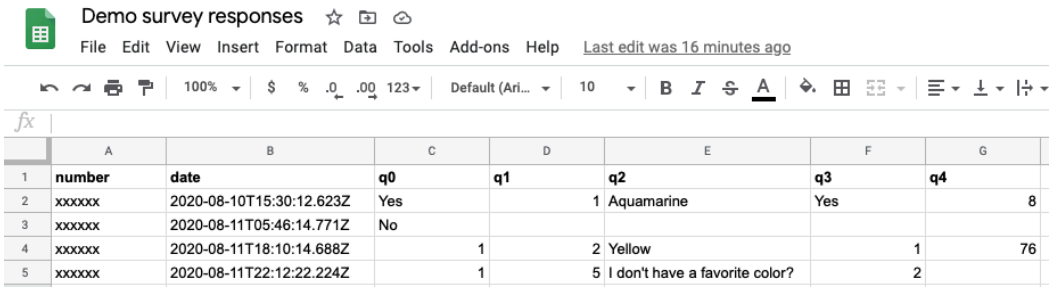


3	Navigate to your Studio Flow and add a function widget at the end of your survey. In the widget, add any widget name and select the function URL that matches the function you set up in the previous step. *Note: this can be placed earlier in the survey, but in order to record all responses, it must be at the end of the flow.*	
4	In order to tell Twilio which messages to export, you need to manually set Function Parameters in the function widget. Each Parameter includes a key/value pair. The key is the name of the variable (which will ultimately be the same header used in the data export Google Sheet), and the value is the liquid variable within the Studio Flow. Make sure to save after entering each key/value pair. For example, to include responses to the first question of the demo survey, we set our Parameter as: Key = q1 (variable name chosen and defined by the user) and Value = {{widgets.q1.inbound.Body}}. *Note: Twilio will pre-populate the values if you start by typing in the double brackets.*	

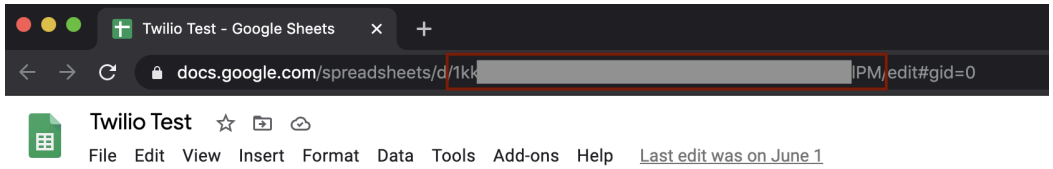
5	Fill in all Key/Value pairs for the entire survey. *Note: To confirm that additional key/value pairs have successfully been added into the function, review the flow JSON file (click on the Trigger box, then on Show Flow JSON). The function portion of the code should be visible at the bottom. You can also add in new key/value pairs manually in the JSON this way. However, the formatting will not be automatically provided by Twilio, so be extra careful about typos and formatting errors, as this will impact your flow execution.*	

6	**Recommended**: connect all “No Reply” and “Delivery Fails” branches throughout the survey to the post-responses function widget. This set up means that non-respondents or partial respondents will also appear in the Google Sheet survey responses database, with blanks for all the questions to which they did not respond. This will enable you to calculate overall response rate directly from the Google Sheet.	

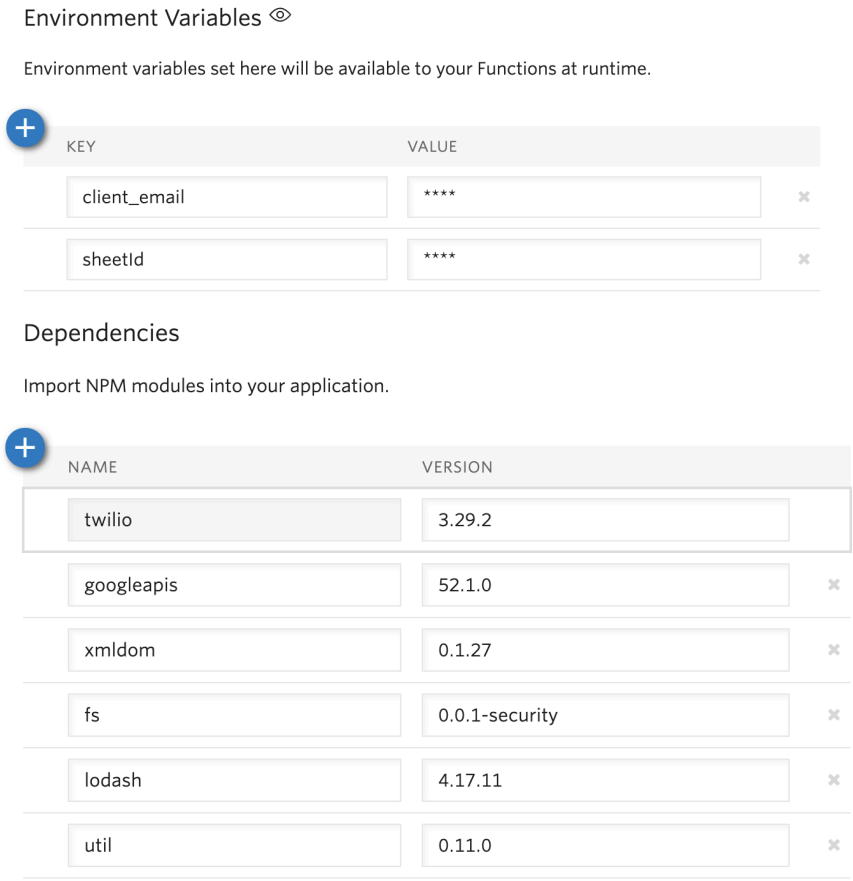
6.4. Create a Google Sheet as the survey responses database

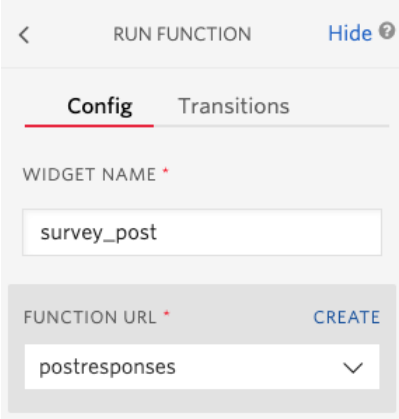
1	Create a new Google Sheet to host exported survey data.	
2	Set up headers in the first row that are the same as the Keys defined in your Twilio export function. These are case-sensitive. The image to the right has been designed to be compatible with the demo survey affiliated with this documentation manual. If you’d like to test the data export approach with the demo survey, mimic the headers seen below. See section 7.2 in Advanced	

	A	B	C	D	E	F	G
1	**number**	**date**	**q0**	**q1**	**q2**	**q3**	**q4**
2	xxxxxx	2020-08-10T15:30:12.623Z	Yes	1	Aquamarine	Yes	8
3	xxxxxx	2020-08-11T05:46:14.771Z	No				
4	xxxxxx	2020-08-11T18:10:14.688Z	1	2	Yellow	1	76
5	xxxxxx	2020-08-11T22:12:22.224Z	1	5	I don't have a favorite color?	2	

	Setup for details on how to use custom Google Sheet table headers.	
3	Note the sheetId for this Google Sheet highlighted to the right (the string of characters between the slashes). You will need to use that as an Environment Variable for the function in Twilio in the next section.	
4	Click on the green “Share” button and share the Google Sheet with the client email downloaded in the JSON file from the Google Developers service account (from this step here). That email address should have permission to edit.	

6.5. Connect the Twilio Function and Google Sheet to export responses

1	Return to Twilio. Navigate to Develop > Functions > Functions (Classic) → Configure. Add the following details: • Under Dependencies, click the large blue + and add in the NPM module for Name: “googleapis” and Version: “52.1.0.” • Under Environment Variables, click the large red + and add Key: “client_email” (the client_email defined in your Google API key) and Value: [the client email from your Google Project Account], as well as Name: ”sheetId” (case sensitive” and Value: [the Sheet ID for the Google Sheet that will serve as the data export database].	
4	In order to use link the function to the data export Google Sheet, update the following sections in the function code: • Replace private_key with the unique Google Key downloaded in the JSON from the Google Project Account. Copy and paste the Google Key, including the dashes at the beginning and end of the long character string.	

	• In line 51, “range:[“A1:Z1”]” should be modified to reflect the range of column headers in the data export Google Sheet. The number of columns will be affected by the number of questions for which you would like to collect responses on the sheet. For example, to allow for 37 columns, line 51 should be updated to “range:[“A1:AK1”].” *Note: Google will detect empty cells and return a list that is modified to reflect the number of populated cells. For example, if you only have cells A1 and B1 populated in the 1st row but specify the range [“A1:Z1”], you will get a list of two things back corresponding to the two headers.*	
5	Return to Twilio Studio and confirm that the correct URL is linked in the function widget. Be sure to click “Publish” so that all edits are uploaded to surveys initiated in the future for this Flow.	

6.6. Encrypt variables before publishing survey responses to Google Sheets (optional)

There may be instances where it is helpful to include an additional level of data protection when storing survey responses in Google Sheets. This section includes details on encrypting survey responses from Twilio before publishing in Google Sheets. Follow instructions under "encrypting and decrypting collected answers" in this GitHub repository after the initial set up.

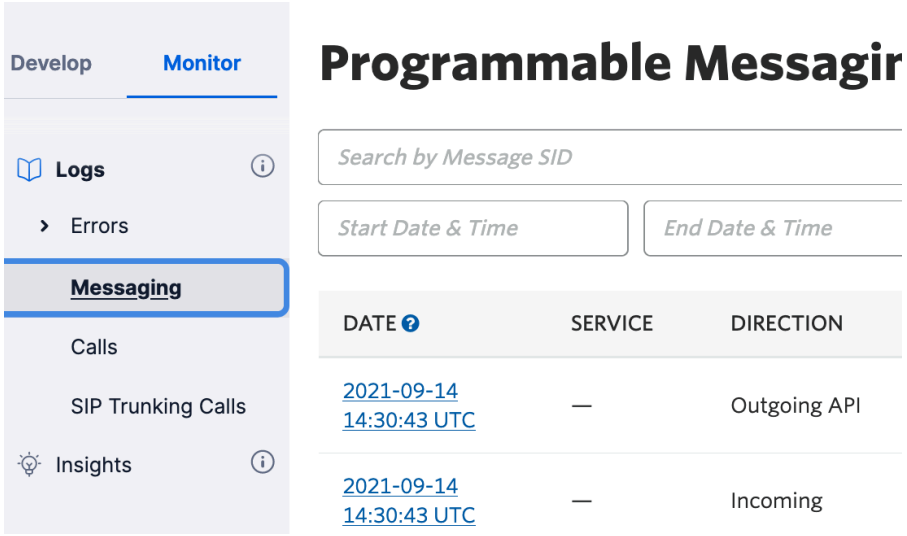
6.7. Collect survey responses in real time

Once the function widget is set up and included in the Studio Flow, you are ready to collect survey responses. Initiate the Studio flow via an incoming message (see here) or using the contact sheet (see here). As respondents advance through the survey, when the Flow reaches the function widget in the survey, Twilio should match the Keys defined in the function with the headers in the Google Sheet. For every Key that is matched with a header, Twilio will post the Value for each conversation in the next empty row in the designated Google Sheet.

6.8. Export raw message data from Twilio

Twilio saves all data from your account on their platform for 30 days. All messages can be downloaded as an unformatted log of all inbound and outbound message data from your account. This can be a helpful supplement to the Google Sheet Data Export system in case you need to look into specific details of any conversation flows, such as message status or error codes.

To download the messages, navigate to Monitor → Logs > Messaging. Click on “Export to CSV” and Twilio will automatically generate a csv file of all messages. You can restrict the date or to/from number by applying filters at the top of the page.



This is an example of what the csv data export looks like. *Note: a primary limitation of this export method is that the timestamps are only recorded to seconds, not milliseconds. This can prove challenging when you are trying to interpret the order of the conversation, as incoming and outgoing messages may occur in the same second.*

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	From	To	Body	Status	SentDate	ApiVersion	NumSegmer	ErrorCode	AccountSid	Sid	Direction	Price	PriceUnit
2	[hidden]	[hidden]	Sent from your Twilio trial account - Hello! This is a test survey. Do you want to continue with the survey? 1. Yes 2. No	delivered	2020-08-28 23:18:13 UTC		1	0	[hidden]	[hidden]	outbound-api		USD
3	[hidden]	[hidden]	Yes	received	2020-08-28 23:18:18 UTC		1	0	[hidden]	[hidden]	inbound		USD
4	[hidden]	[hidden]	Sent from your Twilio trial account - Thank you for agreeing to take the survey! If you want to skip any of the questions, respond with the word "skip" at any time.	delivered	2020-08-28 23:18:18 UTC		2	0	[hidden]	[hidden]	outbound-api		USD
5	[hidden]	[hidden]	Sent from your Twilio trial account - What is your favorite animal? Please respond with the number of your answer. 1. Koala bear 2. Rattlesnake 3. Octopus 4. Cheetah 5. Chipmunk	delivered	2020-08-28 23:18:20 UTC		2	0	[hidden]	[hidden]	outbound-api		USD
6	[hidden]	[hidden]	1	received	2020-08-28 23:19:41 UTC		1	0	[hidden]	[hidden]	inbound		USD

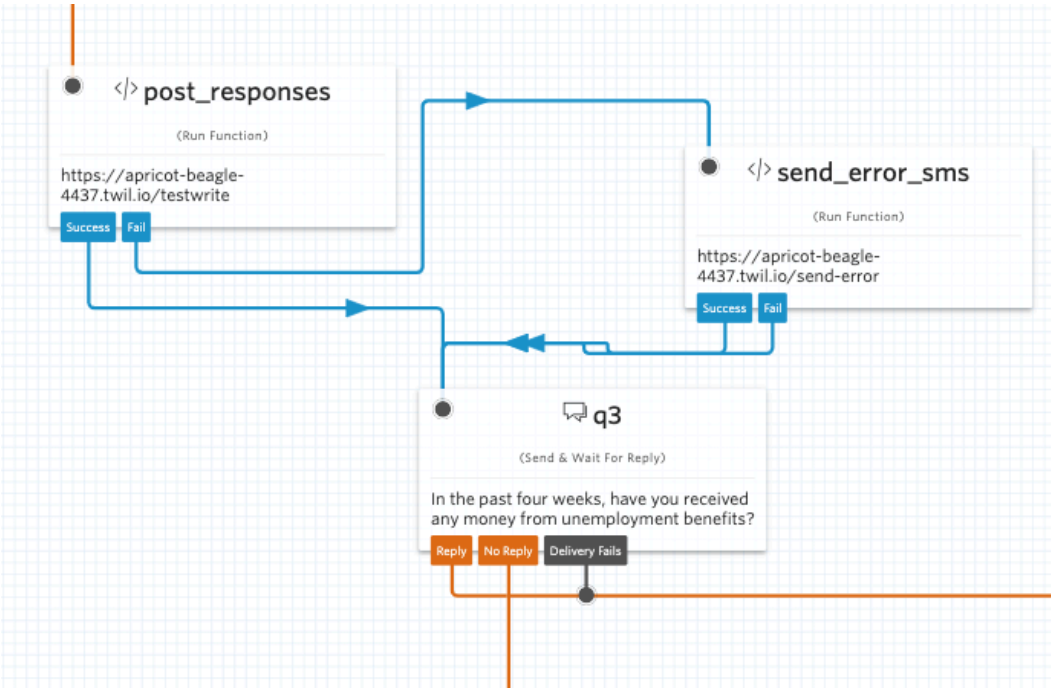
7. Advanced Setup

7.1. Testing / error messaging (fail states)

Occasionally, attempts to process survey data may lead to errors if servers are unavailable or request limitations are exceeded. The Twilio function may fail to execute properly, or the POST request to the google API may fail, resulting in data not stored in the Google Sheet. One way to keep track of posting errors is to set up a “posterror” function as the last step in your survey flow (after the function that posts accepted responses). The “posterror” function sends a text message to a pre-specified phone number from one of your Twilio numbers informing you of the date and phone number of the survey that failed to post to Google Sheets. You can use the raw data export from Twilio to uncover the survey responses if you do receive a posterror alert.

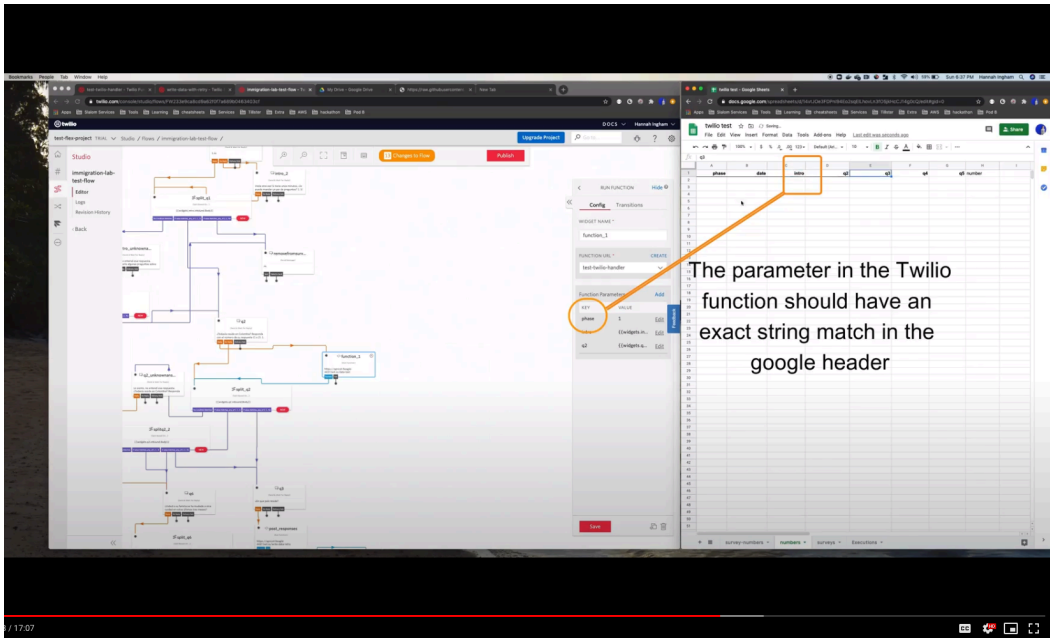
You can find the code for the Twilio error handler function here.

Add a run function widget that will fun if the post function returns an error for any reason in your Twilio flow:



7.2. Customize Twilio function parameters

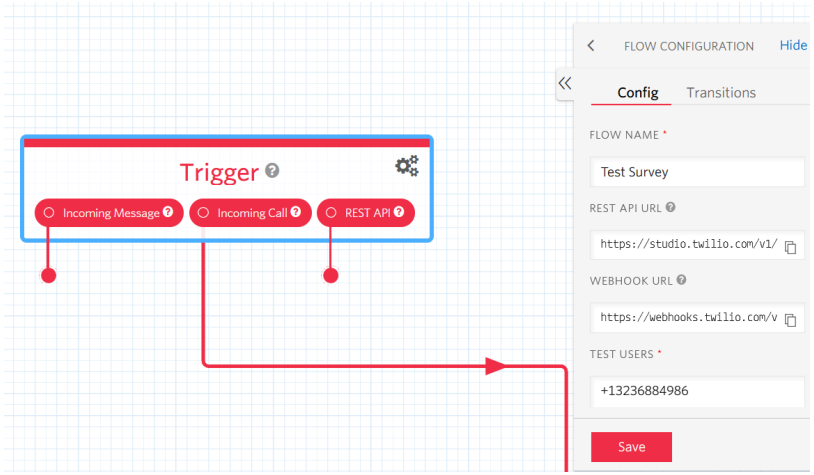
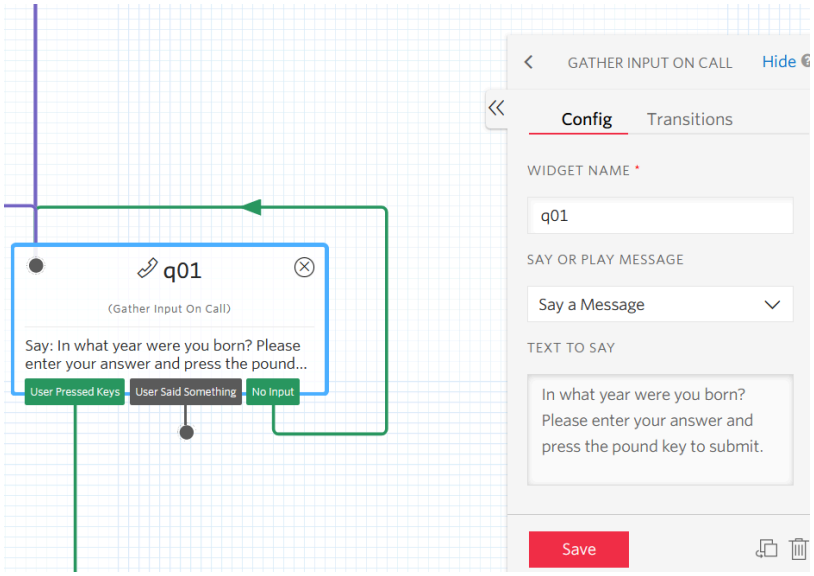
When setting up the Twilio function widget and declaring the input parameters, users may create their own unique key values. When creating unique key names, use dashes or underscores to separate strings, and keep keys short. Note that data will only be mapped and stored on the Google Sheet if the parameter key has a matching header in the Google Sheet. Ensure that there is an exact string match between the parameter key and the header in Google Sheet.

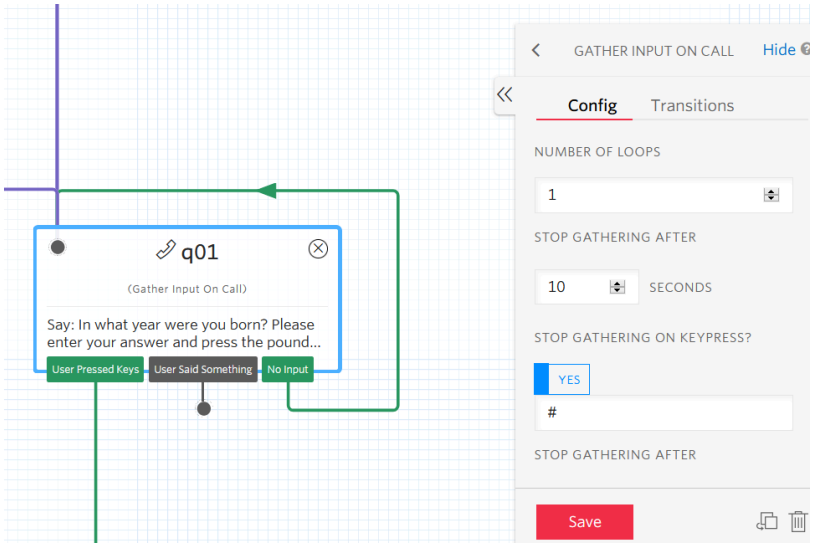


7.3. Administer voice surveys

An added benefit of survey design in Twilio Studio is that a single survey skeleton can be tweaked to administer the same survey through multiple communication formats. Twilio Studio makes it relatively easy to modify a survey administered through Whatsapp to be administered as an Interactive Voice Response (IVR) survey. IVR surveys are beneficial because they are accessible to people who might not enjoy access to a smartphone and/or continuous internet coverage, and for populations with low literacy rates. These surveys are triggered by a potential respondent making a toll-free call to a designated phone number registered with Twilio. Voice calls that are toll-free to respondents are priced starting at $0.0220/minute. See here for a list of prices in different countries.

There are three key alterations that need to be made to a Whatsapp-administered survey for it to be administered as a voice survey:

1	**Change the Trigger** The trigger widget for a voice survey starts with “Incoming Call” (instead of “Incoming Message” as implemented for Whatsapp surveys). This widget triggers the survey flow as soon as the survey respondent calls the Twilio phone number associated with the survey.	
2	**Gather Input on Call** This widget is the voice equivalent of the “Send & Wait for Reply” widget in the Whatsapp implementation. It either plays a recorded message or dictates text in an automated voice to the respondent on call, and then waits for a key press (or a spoken response if that option is enabled) before advancing to the next step in the flow.	

3	**Say/Play** This widget is the voice equivalent of the "Send Message" widget in the Whatsapp implementation. It can be used to either play a recorded message or dictate text in an automated voice to the respondent on call. It does not listen for a response and, upon completion, immediately advances to the next step in the flow.	

For more details on voice widgets available in Twilio Studio, please refer to the Widget Library.

7.4. Translate your survey into multiple languages

To learn more about sending surveys in multiple languages, watch the Multi-language Dictionary Part 1 and Multi-language Dictionary Part 2 tutorials.

You may need to make your survey available in multiple languages. In order to streamline the Flow translation process, use the code provided in this documentation and the steps below to seamlessly generate translated flows. This section describes an overview of how to make a parent Flow, and then create a dictionary template that can be filled with additional translations to use to generate translated flows.

The most up-to-date and specific information about how to use this code is located in the "README.md" file in the Github repository for generating translated survey flows.

First, design and set up a Studio Flow that will serve as the parent survey in the original survey language with all of the widgets, functions, and flow logic already finalized. This flow will be replicated for other languages, so finalizing the set up before translation will minimize the need to edit multiple flows later on. Ensure that you have translated text that corresponds to your original parent survey flow as well. Download the JSON file of your Studio Flow by clicking on the Trigger → Show Flow JSON. Copy the entire code and paste it into a new file in your text editor, then save it. Once this is ready, generate a dictionary template through the **"create-new-dictionary.js"** code. After you generate a dictionary template, fill in the translated text for each widget in the designated spot in the dictionary. For example, an entry in the dictionary for the greeting message would read:

EN: "Hi"
ES: "Hola"
FR: "Bonjour"
SW: "Halo"

Once the translations for all widgets with respondent-facing messages are filled in, generate Twilio flow translations using this dictionary with the "**create-flow-translations.js**" code.

If you update your original parent flow at any time, you can generate an updated dictionary using the updated parent flow and the previously generated and filled out dictionary through the **"create-updated-dictionary.js"** code. Once you generate an updated dictionary, it will already be filled out with the translations that exist in both your previous parent flow and your updated parent flow. If the updated flow has new widgets that did not exist before, those widgets will appear as entries in the dictionary

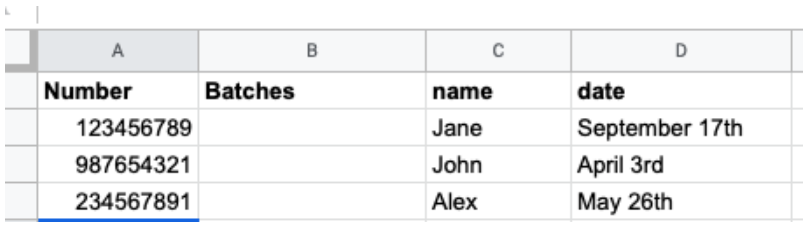
that need to be filled out before using the **“create-flow-translations.js”** code to generate updated translated flows. There is validation logic included to ensure you aren’t missing anything before generating flow translations. Once flows are generated, you can upload the JSON code of each flow into Twilio Studio by creating a new flow and choosing to import via JSON, and then copying and pasting the JSON code into the provided field.

7.5. Piping External Variables into Messages when using Google Sheets to start the survey

It is possible to customize and personalize your survey messages based on the outbound contact number by piping in external data by following the steps below.

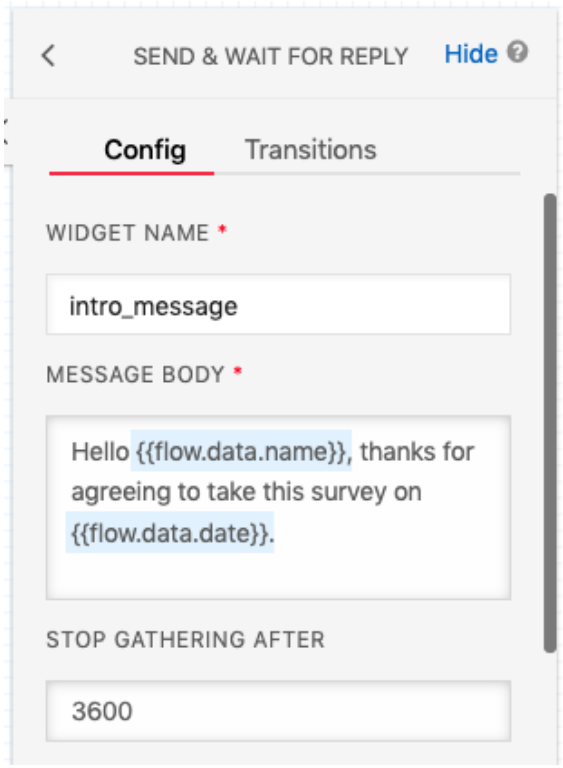
Note: for a full description of setting up a contact sheet, see the prior section: Set up a contact list in Google Sheets. The contact sheets referenced in this section use similar, but different, code to the approach described in that section to allow for message customization.

Note: if you are hosting a contact sheet directly on your computer using Python, the linked Github command offers a way to pipe external variables.

1	Create a copy of one of the Google Sheets below or create a new Google Sheet with headers including number (i.e. WhatsApp number), and then other variables such as name,	

	A	B	C	D
	Number	**Batches**	**name**	**date**
	123456789		Jane	September 17th
	987654321		John	April 3rd
	234567891		Alex	May 26th

	date, etc. that you would like to pipe into a message within the survey. - Piping variables for single language survey - Piping variables for multi-language survey If you created a new Google Sheet, be sure to populate the script of your Google Sheet from the Apps Script in the Google Sheets below and set up two sheets (one titled “contactData” with external data to be piped in and one titled “executionResponse” to record outgoing surveys).	

2	In your survey wherever you would like the piped in data to appear, insert {{flow.data.[variablename]}}. For example, if you would like to pipe in a first name after the greeting in your first message and reference a date that consent for the survey was obtained on, the first message in Studio could look like this. Note that in this example, the Google Sheet with the external data should have the columns with headers “name” and “date” (like the example in step 1) so that the Twilio Flow can read in this flow data based on the outbound number. Note that if you would like to pipe in data to your first message (i.e. template), you must have a WhatsApp-approved template with placeholders	

	such as {{1}} and {{2}} in that message in order to send out the survey.	
3	Once the survey flow is complete and saved in Studio, send out the survey using the “StartSurveyBatching” or “StartSurveyBatchingwithLanguageSupport” functions in the Google Sheet Apps Script.	