# GIS SOLUTIONS

## CITY OF HOUSTON
# SOLD WASTE MANAGEMENT

### TEXAS GIS FORUM
### OCTOBER 2024

PRESENTED

Michael Vetter & Jane Chen

**01**

**02**

**03**

**04**

CHALLENGES &
GIS  SOLUTIONS

311 CRIS &
FIELD MAPS
INTERGRATION

GIS FOR DISASTER
ASSESMENT &
DEBRIS REMOVAL

Q&A

# CHALLENGES AND GIS SOLUTIONS
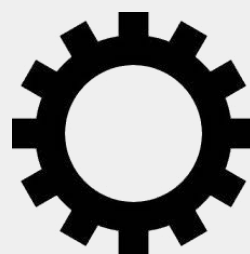
# SOLD WASTE MANAGEMENT

**SERVICES**
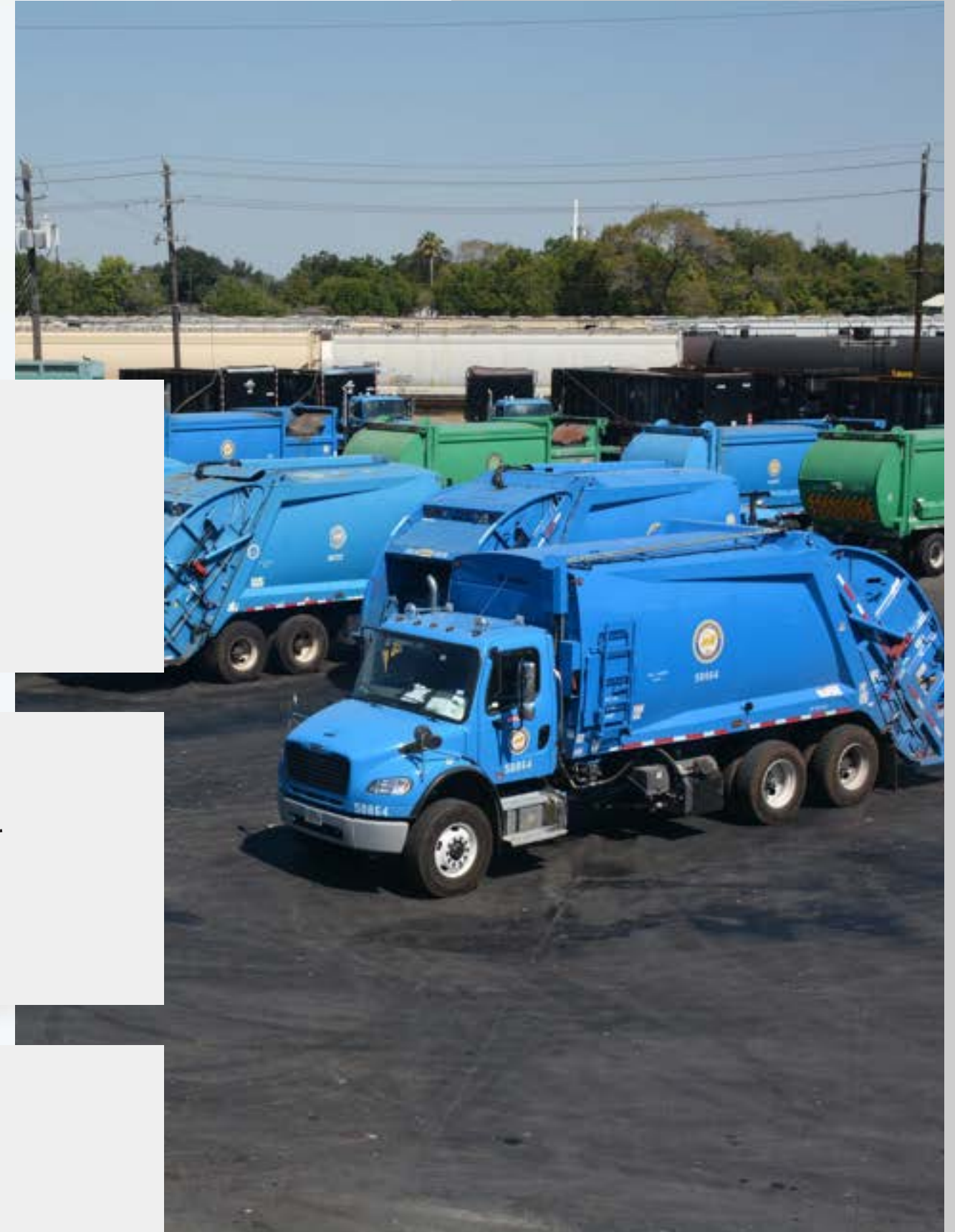Collection services for garbage, recycling, yard waste and tree/bulk waste

**CODE ENFORCEMENT**
Provide permitting and code enforcement for dumpsters, tires, illegal dumping, etc.

**DEPARTMENT CHALLENGES**
Underfunded and understaffed

# OUR JOURNEY

We evaluated our needs and identified areas for improvement, focusing on efficiency. Based on that, we chose software and technology solutions to meet those needs effectively.

## GIS TECHNONOGIES IN USE

- Survey 123 & Field Maps
- Web-maps
- Dashboards
- Python

## SWM GIS CASES

- Disaster response and recovery
- Field Inspections
- 311 requests
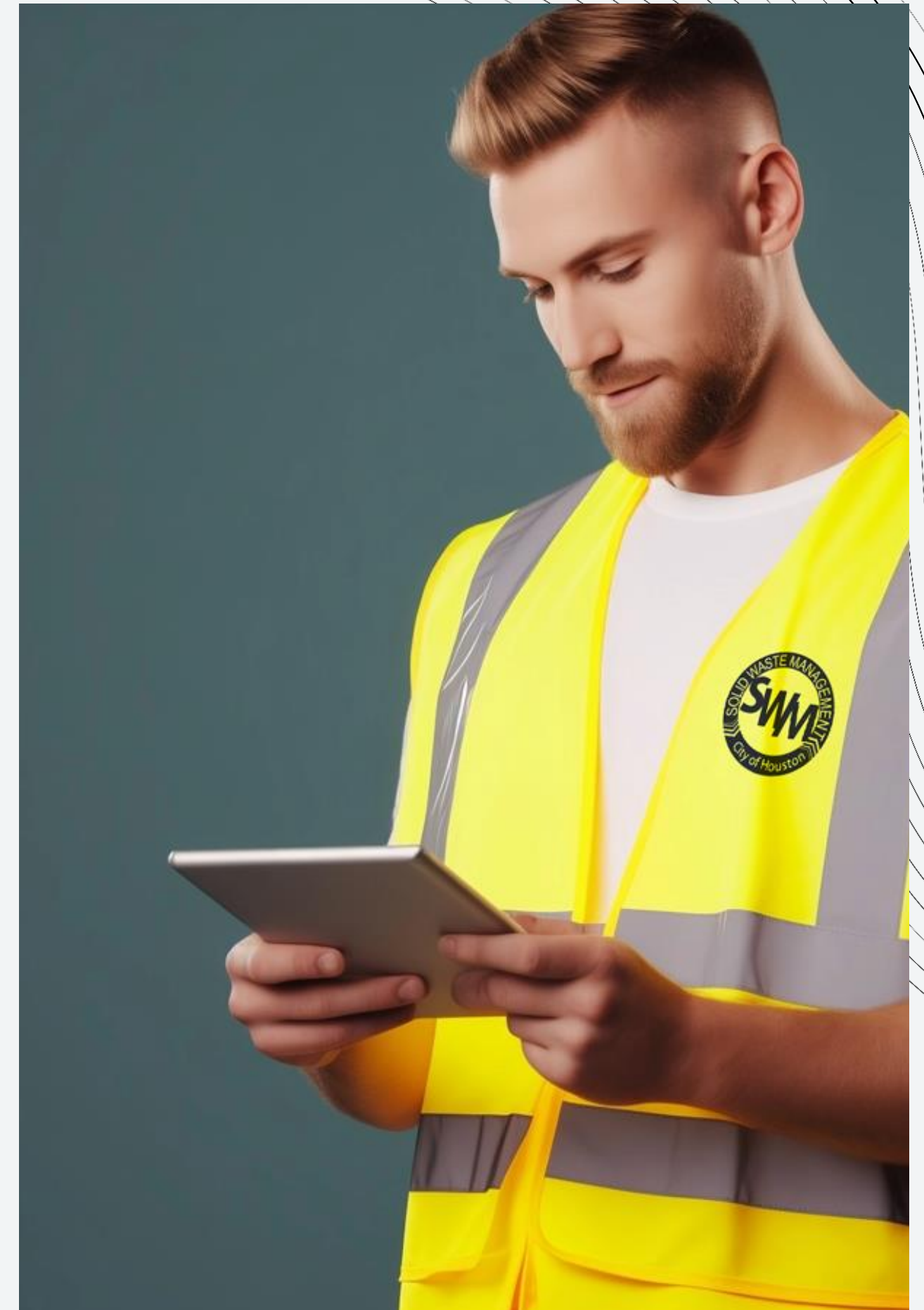- Tracking asset movements
  -vehicles, roll-off boxes, containers...

# OUR JOURNEY

# BUSINESS IMPACTS

## GIS SOLUTIONS

- Eliminate duplicate efforts

- Automate repetitive tasks

- Reduce paper, cost, & response time

- Improve operational efficiency & reporting

CASE STUDY ONE:

# 311 CRIS & FIELD MAP INTEGRATION

# FIELD MAP INTERGRATION

CITY ADMINISTRATIVE POLICY 2-23:
- Requires SWM to close 311 service requests on time 90% of the time.

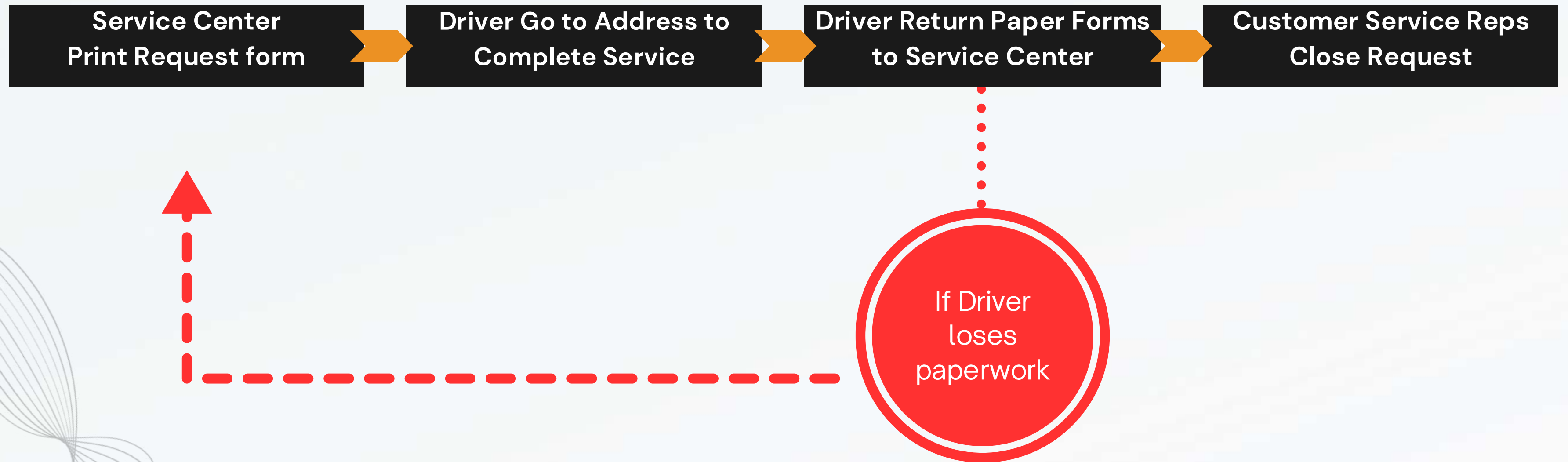SWM ON-TIME PERCENTAGE
    2020 - 64%
    2021 - 72%

INTERGRATE ESRI FIELD MAPS WITH 311 CRIS SYSTEM

1. Move away from printing requests
2. Close requests from the field
3. Add pictures when closing requests

# HISTORIC SERVICE REQUEST

Service Center Print Request form → Driver Go to Address to Complete Service → Driver Return Paper Forms to Service Center → Customer Service Reps Close Request

If Driver loses paperwork

# BACKGROUND PROCESSES

Produce service request in GIS format:

- IT group has created an ArcGIS Online feature layer
- Feature layer only keeps data for a week
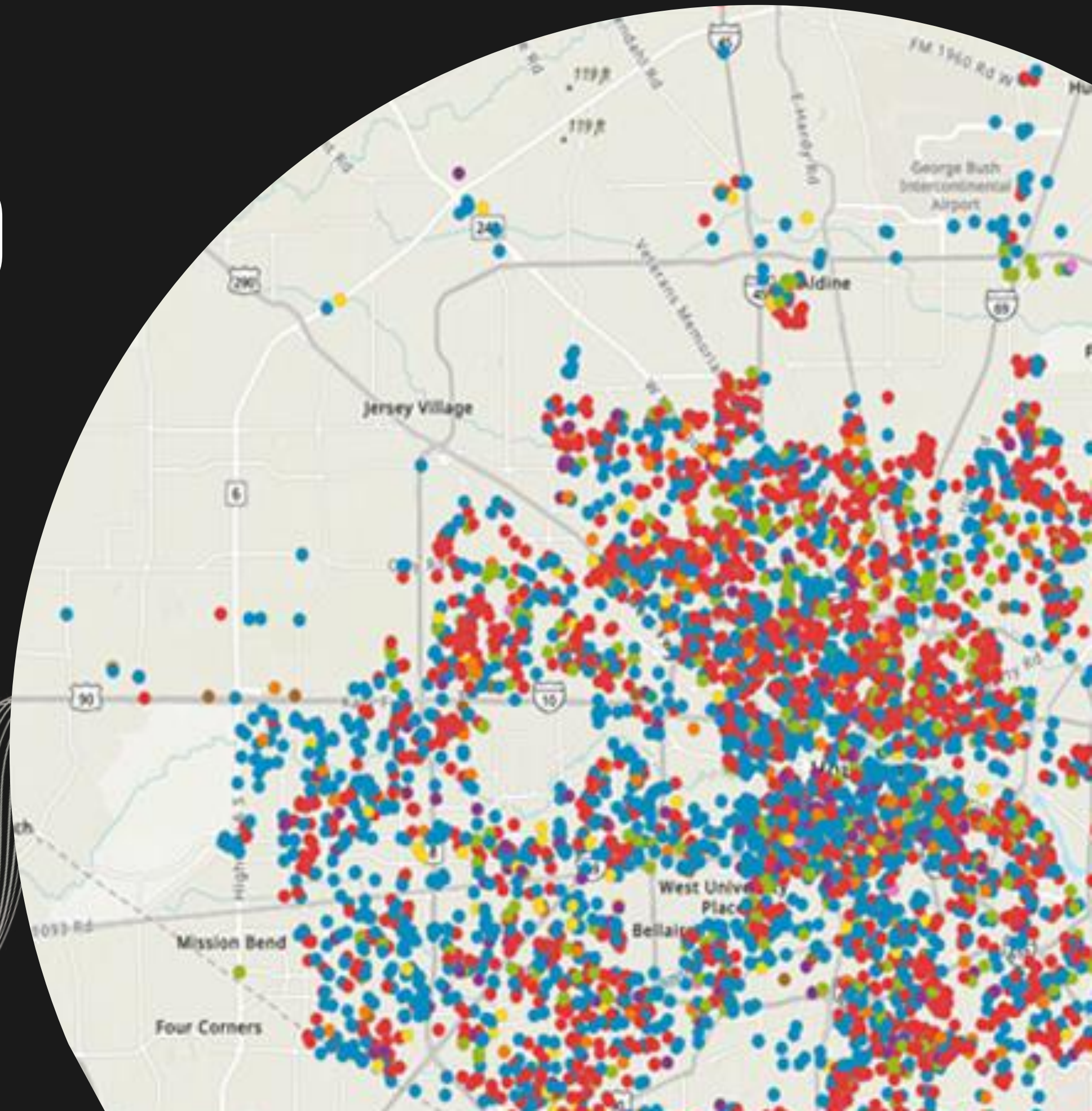
# BACKGROUND PROCESSES

Create new ArcGIS Online
feature layer
- Use ArcGIS API for Python
  - Add data from IT layer to
    SWM layer
  - Ability to schedule script



```python
from arcgis.gis import GIS
import pandas as pd
gis = GIS("home")

# Get the SWM feature layer
dest = gis.content.get("41b0ba334229498190caadae71a7beb2")
dlayer = dest.layers[0]

# Get the HITS GIS feature layer to pull data from
orgin = gis.content.get("261c3caa36ea4d53847787e228661bd4")
olayer = orgin.layers[0]

# Query the layers
allDOnlineLayer = dlayer.query(
    out_fields=['*']
).sdf

oOnlineLayer = olayer.query(
    where="Department = 'Solid Waste Management'",
    out_fields=['*']
).sdf

# Change the field type of all CaseNumbers
allDOnlineLayer["CaseNumber"]=allDOnlineLayer["CaseNumber"].astype("int64")
oOnlineLayer["CaseNumber"] = oOnlineLayer["CaseNumber"].astype("int64")

# Create an outer join to get the records that are only in the HITS layer
outerJoin = oOnlineLayer.merge(allDOnlineLayer, how="outer", on="CaseNumber", indicator=True).query("_merge == 'left_only'")

# Remove the unneeded fields and rename the fields
newRecords = outerJoin.drop(["CaseNumber365_y","CaseType_y","ClosedDate_y","CouncilDistrict_y","CreatedDate_y","Department_y"
newRecords.rename(columns={"SHAPE_x":"SHAPE","ObjectID_x":"ObjectID","CaseNumber365_x":"CaseNumber365","CaseType_x":"CaseType"

if (len(newRecords) > 0):
    dlayer.edit_features(adds=newRecords.spatial.to_featureset())
else:
    print('No new records to add')
```

Query for all features

Join the features and get new features from IT layer

Add any new records

# SOLUTION: FIELD MAPS

- Chose ArcGIS Field Maps
  - Mapping capability
  - Webhook
- Used container related requests for pilot
- Multiple phase implementation

# WEBHOOKS

Webhooks are a way for applications to communicate with each other in real time by sending data automatically when specific events occur.

- Real-time communication: Webhooks send data right away, so you don't have to keep checking for it.
- Saves resources: Webhooks help save server power and money by reducing the need to constantly check for new data.
- Automates tasks: Webhooks can be used to automate workflows and improve productivity.

Michael Vetter
e170806_MyCity
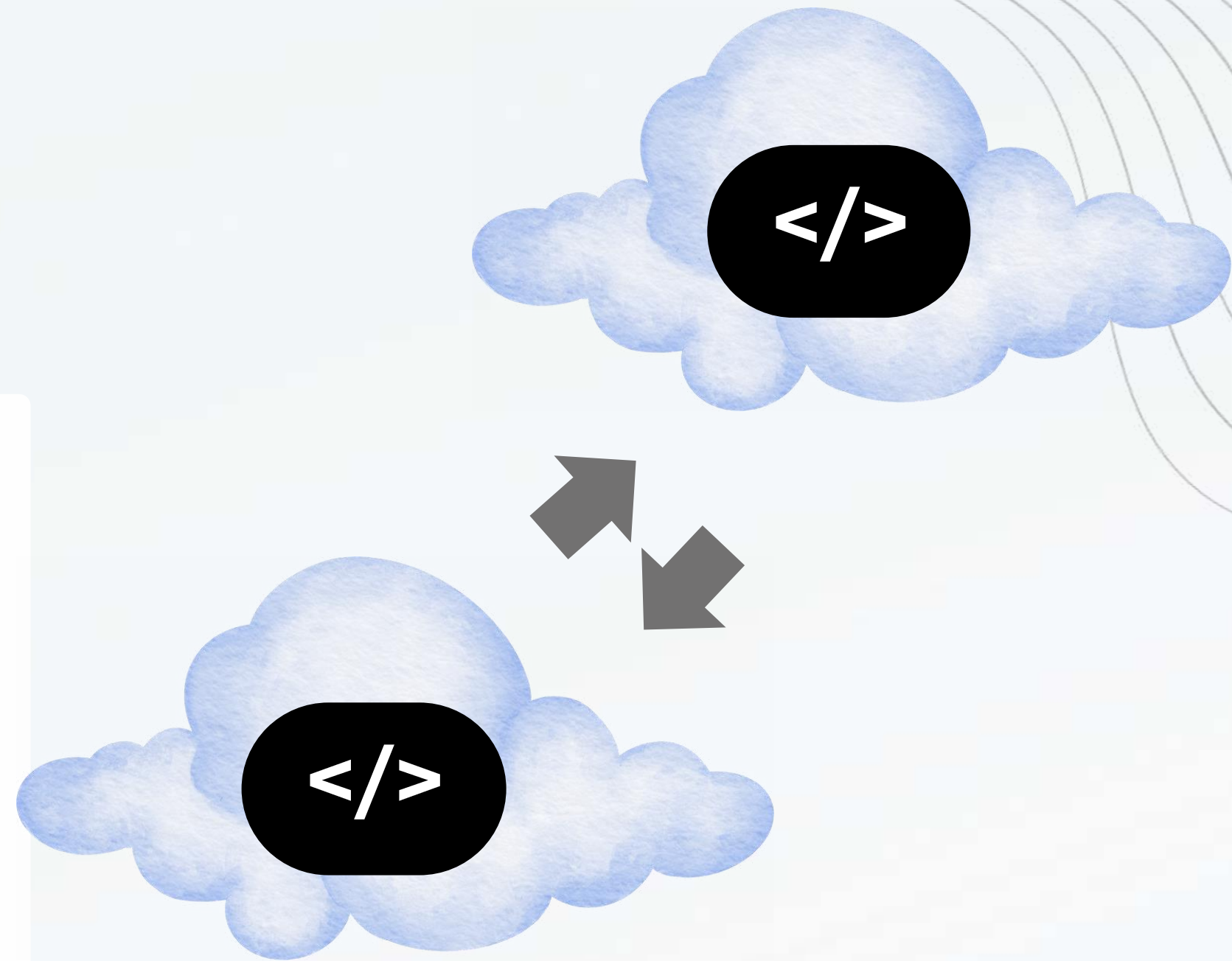
SE Can Related SRs_ArcadeTesting ✎

Overview    Usage    Settings

✎ Edit thumbnail

Map displaying the container related SRs for the SE service center to be used in Field Maps    ✎ Edit

🖫 Web Map by e170806_MyCity

Item created: Feb 9, 2024    Item updated: Oct 1, 2024    View count: 176

☆ Add to Favorites

Open in Map Viewer    ⌄

Open in ArcGIS Desktop ⌄

Open in Web Editor

Open in Field Maps Designer

Create Web App ⌄

Share

Metadata    ⌄

## Description    ✎ Edit

Add an in-depth description of the item.

## Layers

⌖ **CanTesting**
Feature layer

⌖ **Active SWM Escalation Cases**
Feature layer

⌖ **Active Container Related SRs**
Feature layer

⌖ **Active New Residential Container (Black)**
Feature layer

⌖ **Active New Recycling Container (Green)**
Feature layer

⌖ **Active Add a Can SRs**
Feature layer

### Item Information    ⓘ Learn more

Low                                    High

💡 Top Improvement:  Add a description

### Details

Size: 205.137 KB
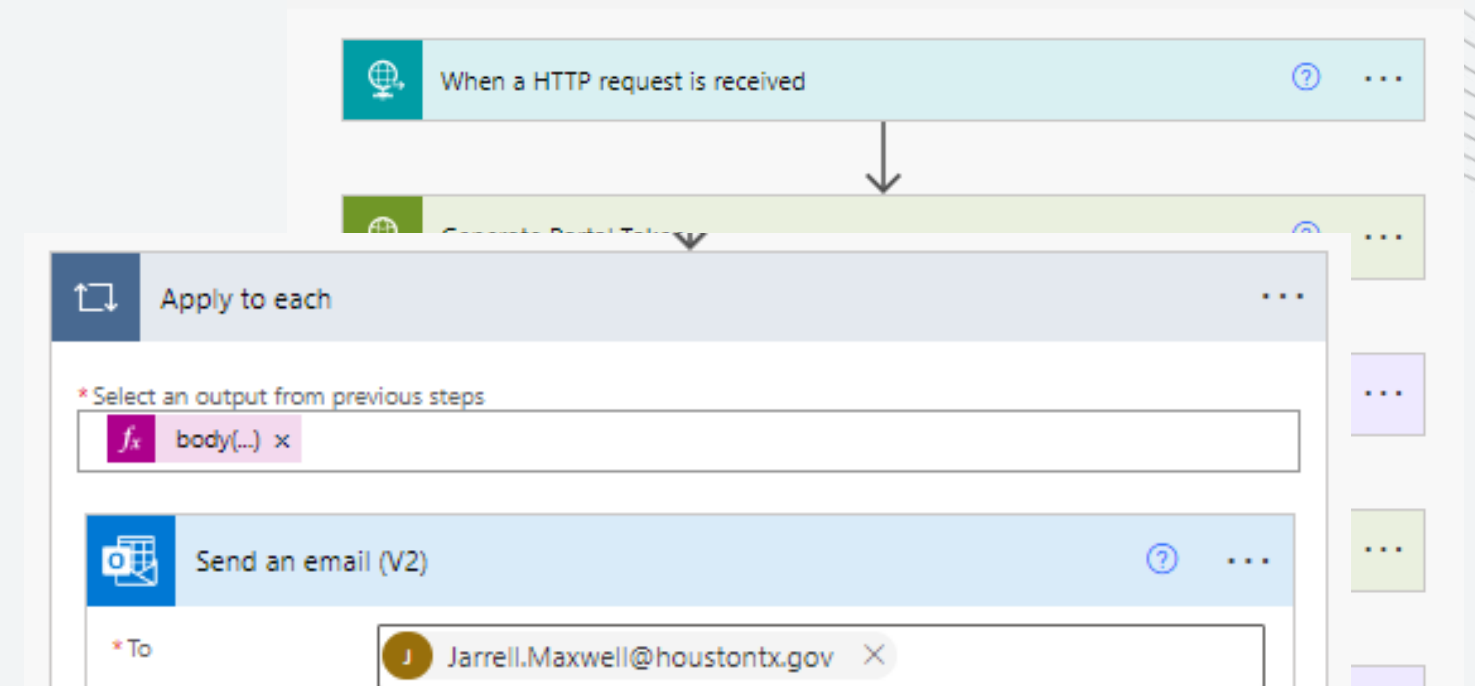ID: 9428432883814dccbe33317788e11147

☆ ☆ ☆ ☆ ☆

[f] [t] [<]

### Share    ✎ Edit
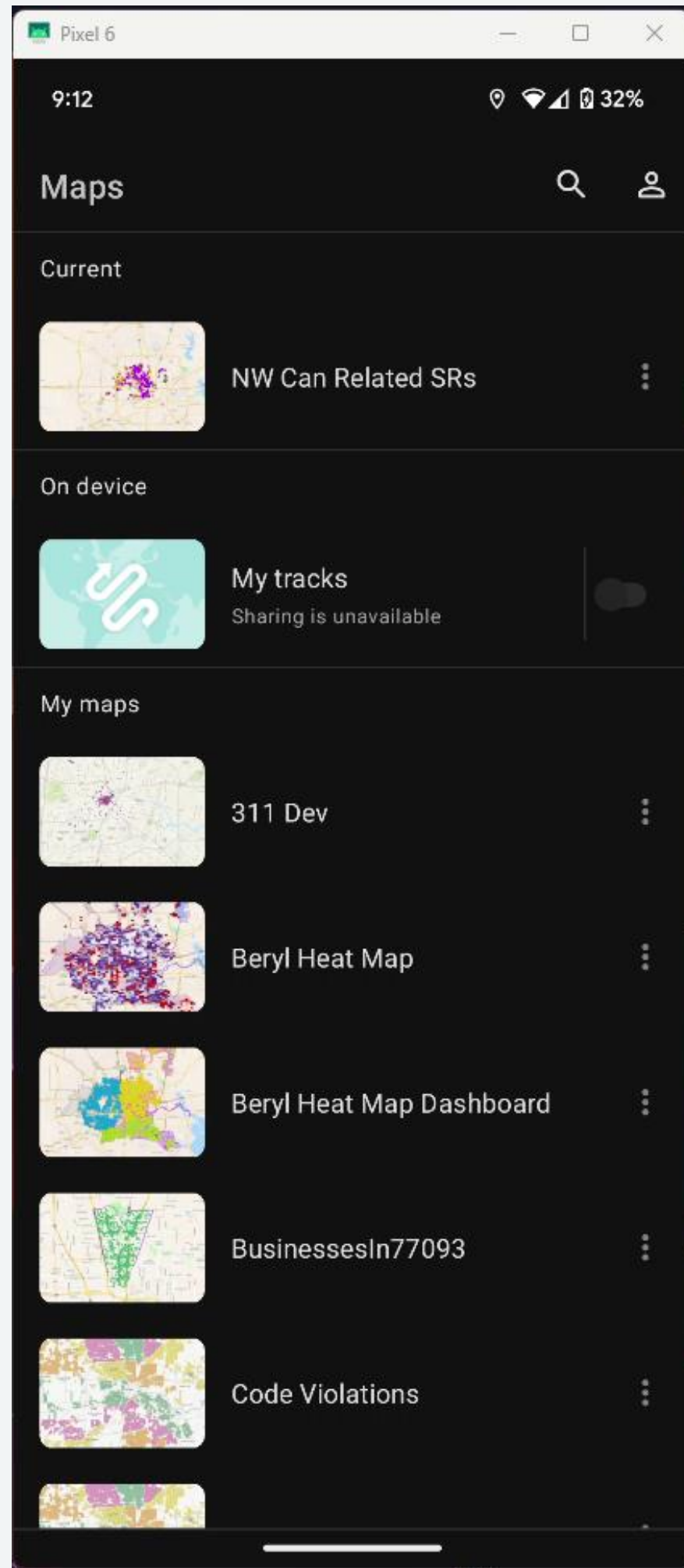
# COMPLETION OF PHASE 1

- Webhook to send email to Customer Service Reps
  -Ability to close request immediately after completion



When a HTTP request is received

Apply to each

*Select an output from previous steps
fx  body(...) ×

Send an email (V2)
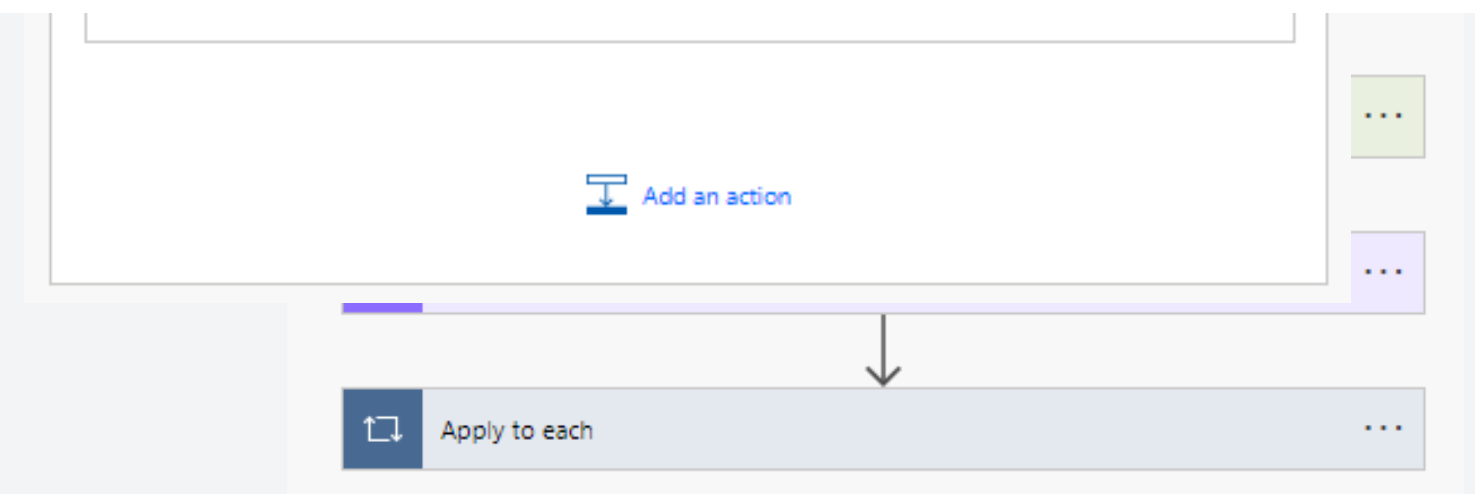
*To  J  Jarrell.Maxwell@houstontx.gov  ×

Can Delivered or Repaired at 3527 SLUMBER LN Houston Texas 77023

A service request has been completed at 3527 SLUMBER LN Houston Texas 77023 (29.70514, -95.31971) by T Bell

SR number is 2200652495

If the SR involved delivering a can, the can number is .

Additional Notes:
1515741 Deliver can

Add an action

Apply to each

# COMPLETION OF PHASE 1

- Implemented end of September 2022
- Advantages
  - Eliminated printing requests
  - Faster close times
  - Field workers can see all requests
- Disadvantages
  - Reliant on "middleman" to close out requests

**Driver**
**See all assigned request**

↓

**Drivers Go to Address**
**Completes Sevice**

↓

**Webhook Email**
**Service Center**
**Immediately**

↓

**Customer Service Rep**
**Close Request**
**Throughout the Day**

# PHASE TWO SOLUTION

- Close requests in 311 system on site
  - Eliminate Customer Service Rep "middleman"
- IT developed API
- Webhook reconfigured to use API instead of sending an email
- New fields added to Field Maps to capture type of request
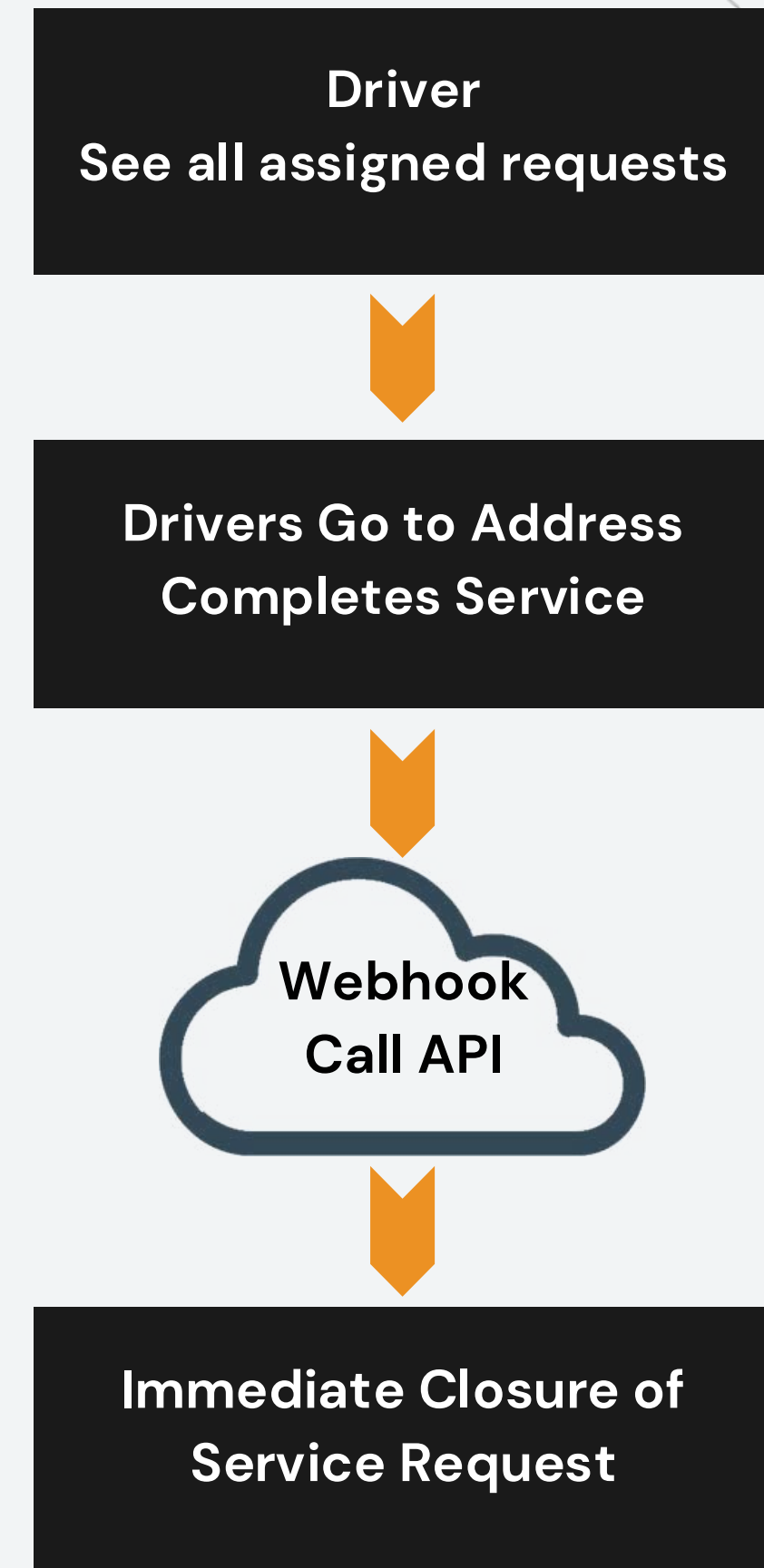- Arcade script to get request number

# PHASE TWO SOLUTION

- ESRI developed a connector for Power Automate
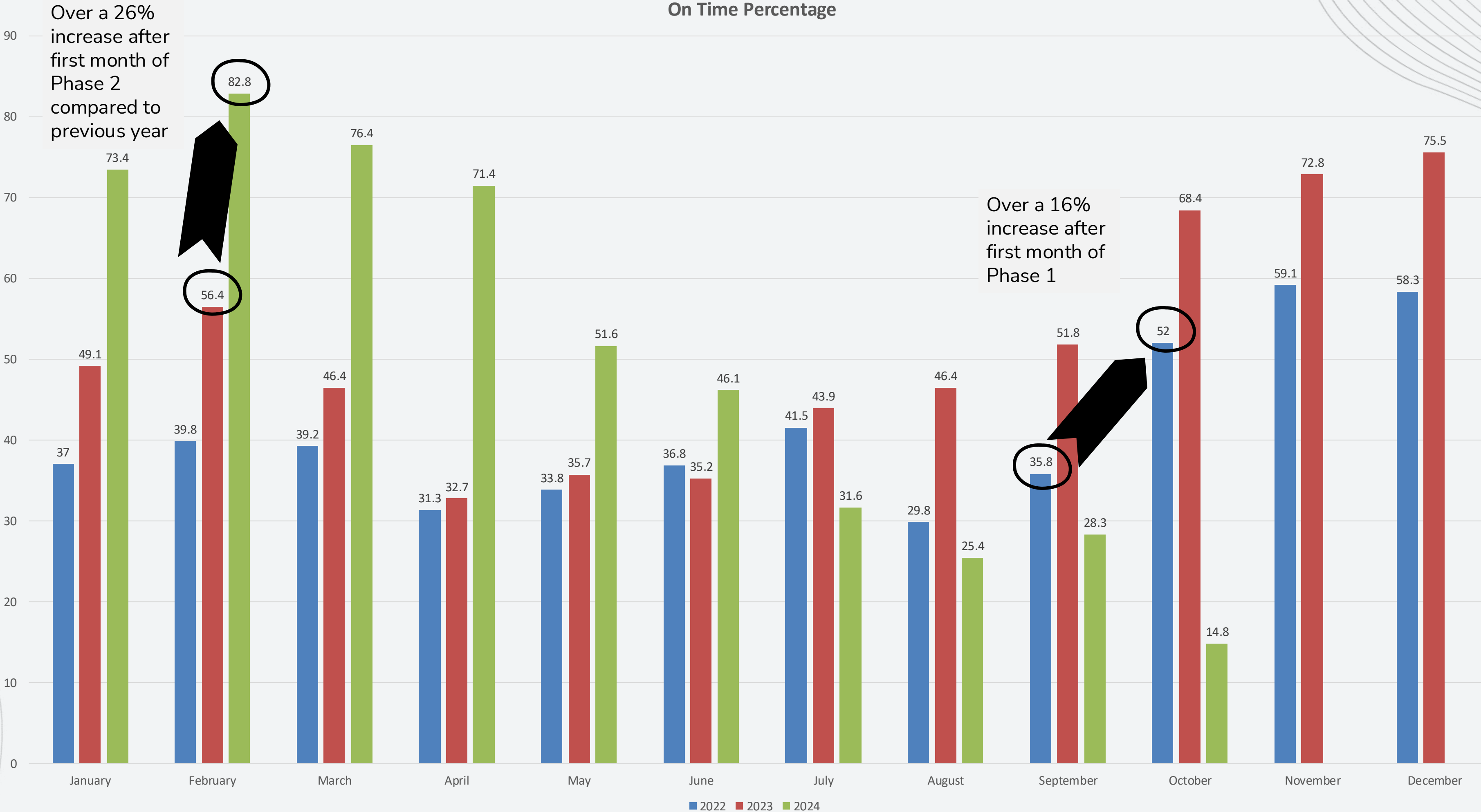    - Easier to configure webhooks
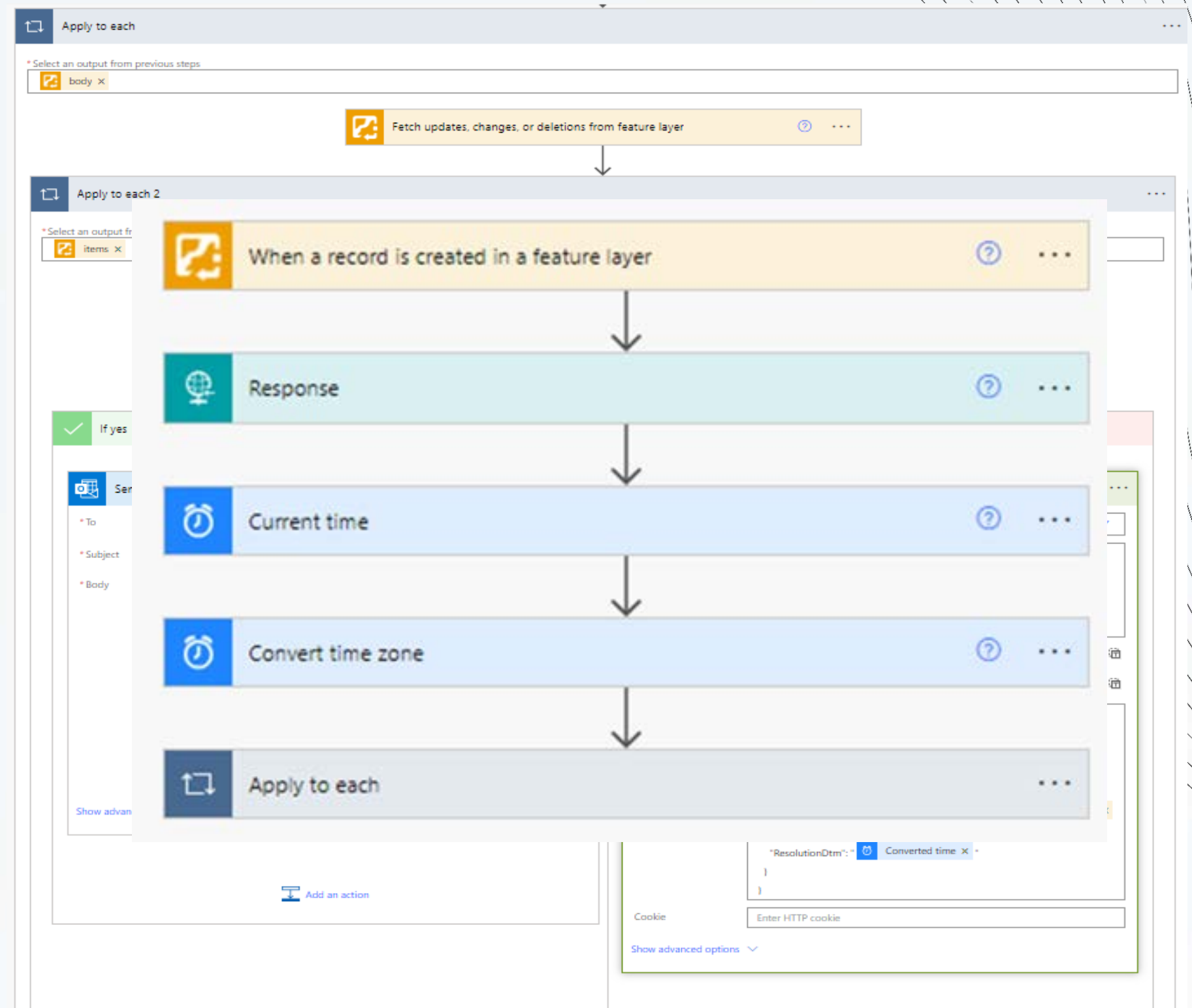
# COMPLETION OF PHASE 2

- Implemented beginning of February 2024
- Advantages
    - Immediate closure of requests
    - Reduce 311 license fees ($1000/Person/Year)
    - CSRs able to do other duties
- Disadvantages
    - No ability to attach pictures when closing requests

**Driver**
**See all assigned requests**

**Drivers Go to Address Completes Service**

**Webhook Call API**

**Immediate Closure of Service Request**

CASE STUDY TWO:

# DISASTER RECOVERY & RESPONSE

# 2024 Storm Recovery

## City recovers from three weather events



### Derecho

May 16, 2024
A derecho with winds of up to 100 mph occurred on in Houston, Texas, causing significant damage and at least eight fatalities.



### Kingwood Flood

May 3, 2024
Severe flooding impacted the Kingwood area due to heavy rainfall and the rapid rise of the West Fork of the San Jacinto River.
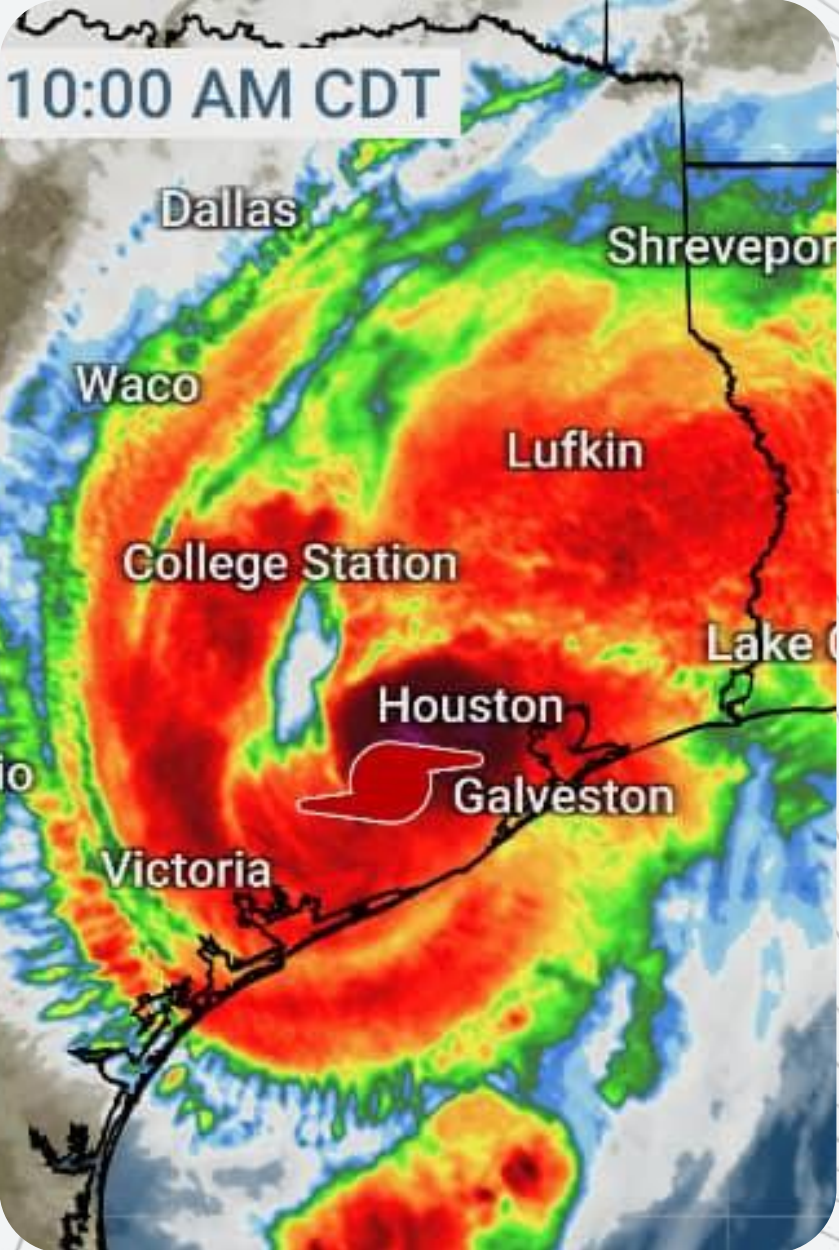




### Beryl

July 8, 2024
Hurricane Beryl hit near Matagorda as a Category 1 on July 8, 2024, causing widespread damage and power outages for millions of Texans.
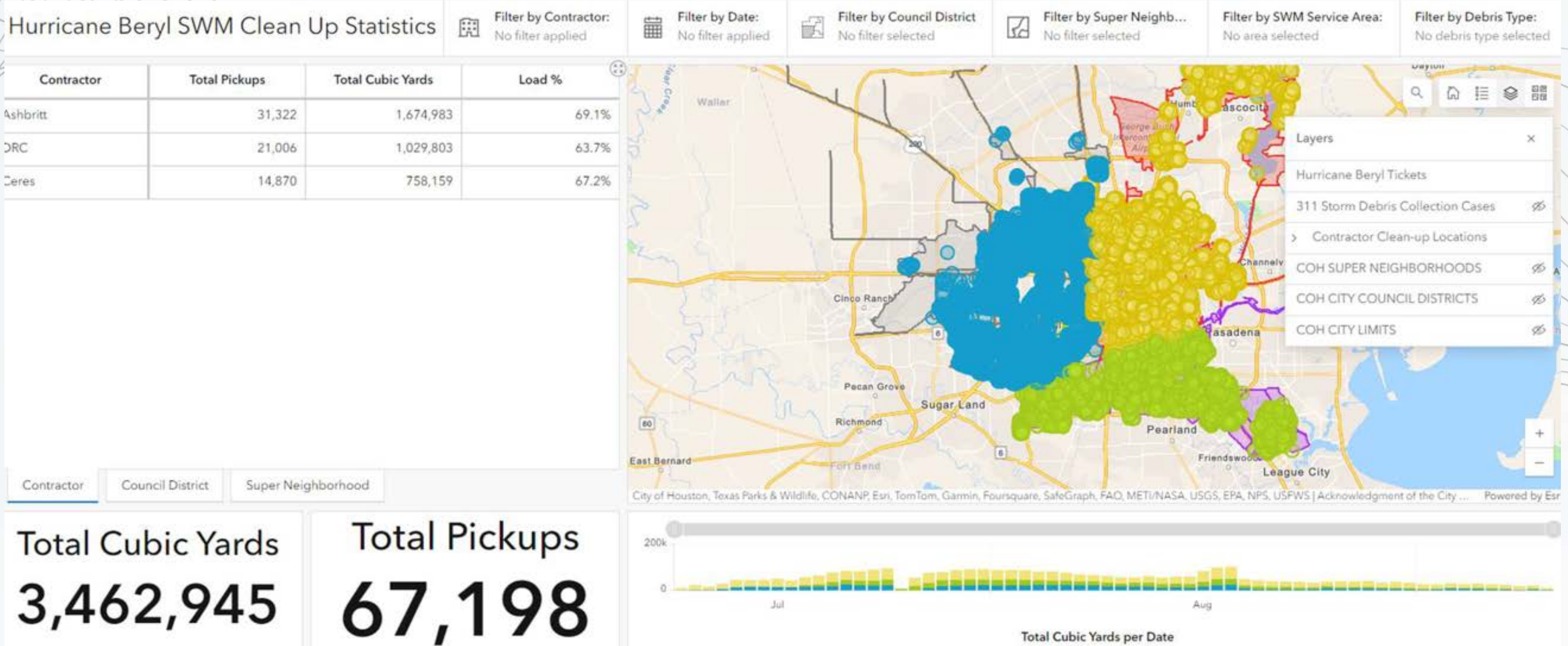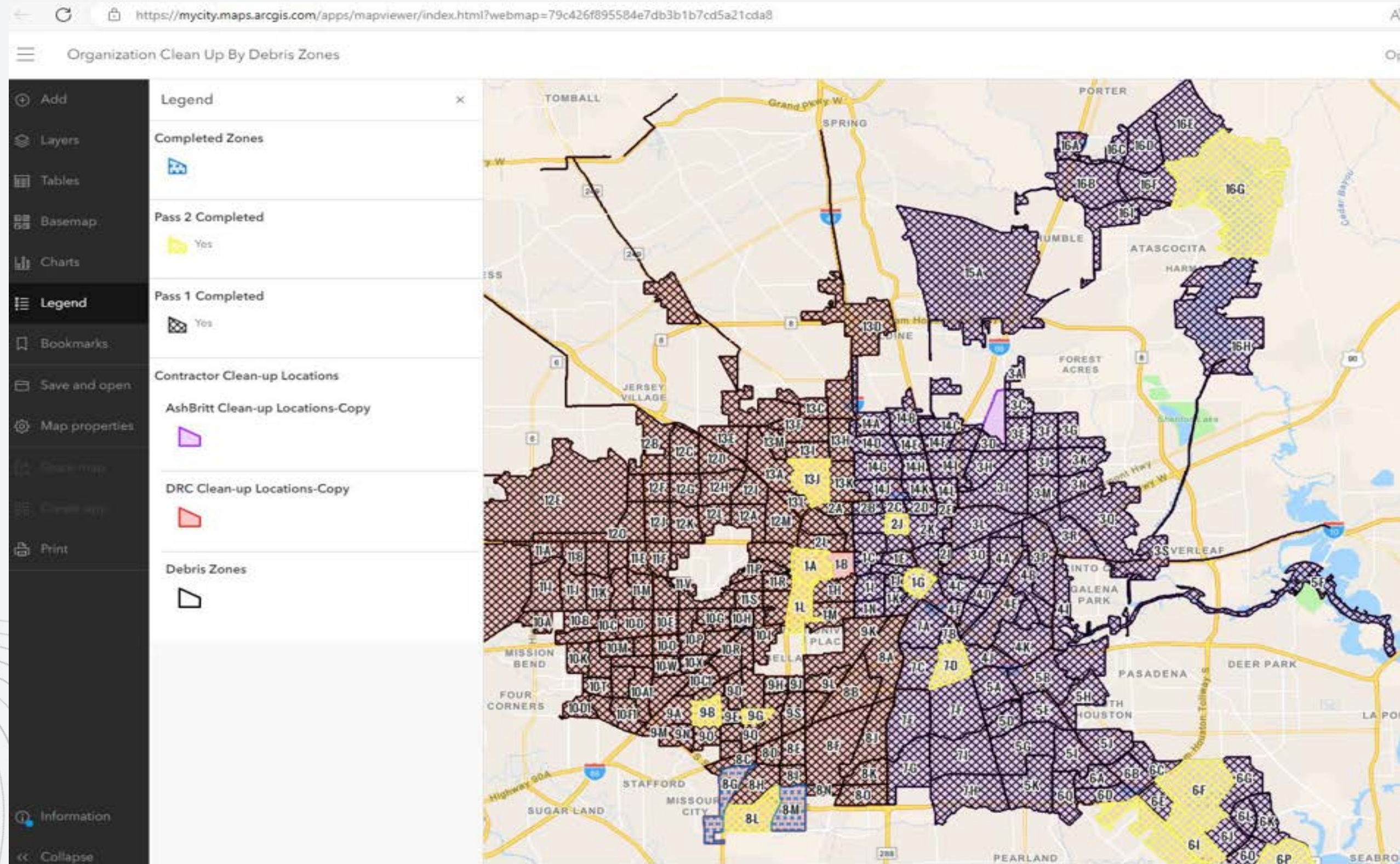
# GIS-DISASTER RESPONSE & RECOVERY

- Field Maps (Integrated with 311 CRIS)
  - Assess damage and verify debris removal
- Dashboards
  - Track damage assessments and debris removal inspections
- Web Maps
  - Display debris removal progress by contractors

# HURRICANE BERYL DASHBOARD

# WEB DEBRIS REMOVAL PROGRESS

WHAT IS
THIS FOR?

GIS TEAM
Solid Waste Management
City of Houston

Jane.chen@houstontx.gov
Michael.Vetter@houstontx.gov

# THANK YOU