



TEXAS
Health and Human
Services

Texas Department of State
Health Services

Utilization Of Oracle SQL & Tableau To Identify & Monitor Data Quality

Texas Department of State Health Services
Immunization Section

Do You Know Where Your Data Is Right Now?



Texas Department of State
Health Services

Agenda

1. Introduction
2. Background
3. Tools Used
4. Approach
5. Results
6. Summary



Introduction

- RunMatch Software



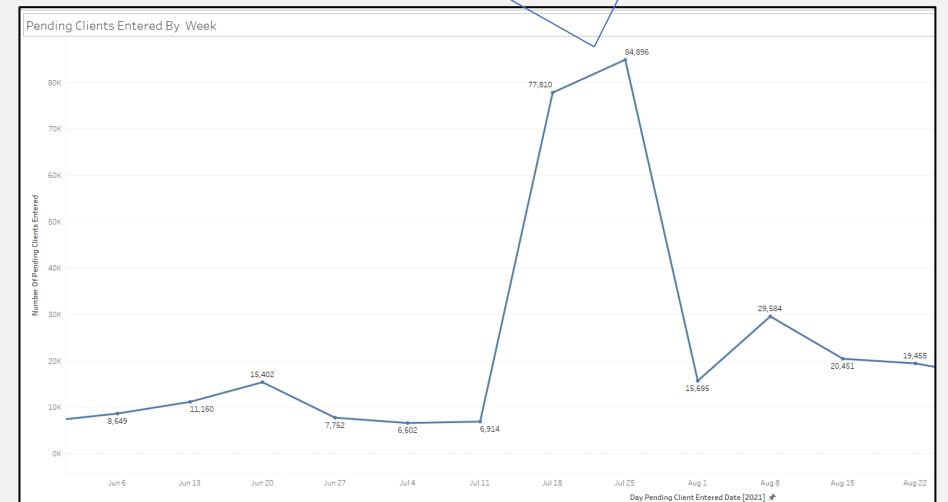
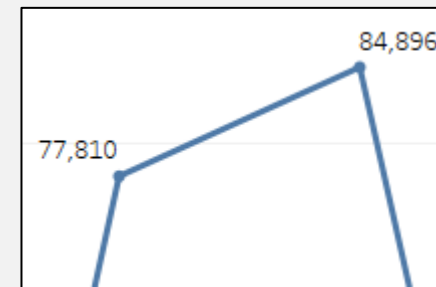
- Pending Client



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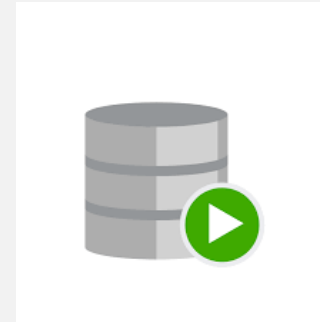
Background

- On 21 July 2021 the Texas Immunization Registry observed an increase in the number of pending clients added in one day.
- This spike resulted in:
 - RunMatch software failing to function
 - Increase in the pending client list
 - Immunizations not visible to the providers



Tools Used

- Oracle SQL Developer
- Tableau
- ImmTrac2 Application
- TrueClient
- Excel



Approach

The registry team addressed this issue with a three-step process.

- **Step 1:** Identify the reason for RunMatch failure.
- **Step 2:** Perform outreach to Organizations and EHR Vendors.
- **Step 3:** Conduct data cleanup.



Approach Step 1: Identify the reason for RunMatch failure.

- **Step 1** : Identify the reason for RunMatch failure.
 - Research

```
1  --Pending Clients Added To DB By Org
2  SELECT COUNT (DISTINCT PC.CLIENT_ID), PO.SHORT_NAME
3  FROM WIR_PROD_APP.PENDING_CLIENT PC --Clients added to pending client list
4  JOIN WIR_PROD_APP.PROVIDER_ORGANIZATION PO
5  ON PO.PROVIDER_ORGANIZATION_ID = PC.CREATE_ORG_ID
6  WHERE TRUNC(PC.DATE_ENTERED) = '21-JUL-21' --Date RunMatch Faild
7  GROUP BY PO.SHORT_NAME --To Get Org Code That Added Pending Client
8  ORDER BY COUNT (DISTINCT PC.CLIENT_ID) DESC;
9
10 --Job ID's For Pending Clients By Date/Job ID
11 SELECT COUNT (DISTINCT PC.CLIENT_ID), JS.JOB_ID
12 FROM WIR_PROD_APP.PENDING_CLIENT PC --Clients added to pending client list
13 JOIN WIR_PROD_APP.TDGLITE_PENDING_TXN PT ON PC.PENDING_TXN_ID = PT.PENDING_TXN_ID
14 JOIN WIR_PROD_APP.TDGLITE_PENDING_TXN_MATCH PTM ON PT.PENDING_TXN_ID = PTM.PENDING_TXN_ID
15 JOIN WIR_PROD_APP.TDGLITE_JOB_STATUS JS ON PT.JOB_ID = JS.JOB_ID
16 JOIN WIR_PROD_APP.PROVIDER_ORGANIZATION PO ON PO.PROVIDER_ORGANIZATION_ID = PC.CREATE_ORG_ID
17 WHERE TRUNC(PC.DATE_ENTERED) = '21-DEC-21'
18 GROUP BY JS.JOB_ID
19 ORDER BY COUNT (DISTINCT PC.CLIENT_ID) DESC;
```



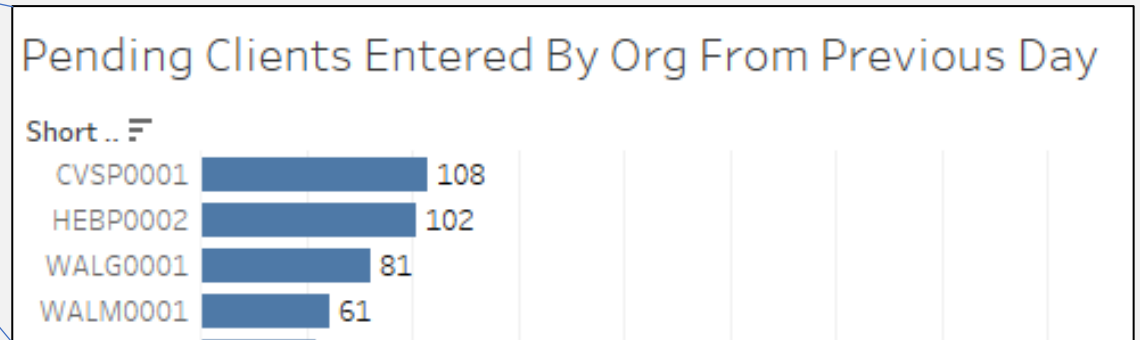
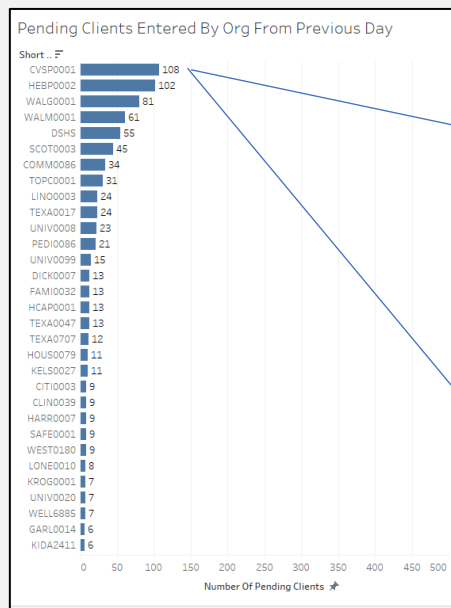
Approach Step 2: Perform outreach to Organizations and EHR Vendors

- **Step 2: Perform outreach to Organizations and EHR Vendors.**

- Monitor

Total Pending Clients	Entered By Day	Entered By Week	Entered Previous Day	Entered By Org Sunday-Saturday
Entered By Org Total	Totals Entered By Org/Date	Pending Client Spike	Entered By Org/Date	

- ID, Research, Prioritize, and Reach Out



Approach Step 3: Conduct data cleanup.

- **Step 3: Conduct data cleanup.**
 - Staff Manual Merge

- Merge List:

```
1  --Pending client merge list for specific org
2  SELECT DISTINCT PTM.CLIENT_ID "MASTER CLIENT ID", C.CLIENT_TYPE "CLIENT TYPE (MASTER)",
3  PC.CLIENT_ID "PENDING CLIENT ID", PC.CLIENT_TYPE "CLIENT TYPE (PENDING)"
4  FROM WIR_PROD_APP.PENDING_CLIENT PC
5  JOIN WIR_PROD_APP.TDGLITE_PENDING_TXN PT ON PC.PENDING_TXN_ID = PT.PENDING_TXN_ID
6  JOIN WIR_PROD_APP.TDGLITE_PENDING_TXN_MATCH PTM ON PT.PENDING_TXN_ID = PTM.PENDING_TXN_ID
7  JOIN WIR_PROD_APP.CLIENT C ON PTM.CLIENT_ID = C.CLIENT_ID
8  WHERE PC.CLIENT_ID IN
9         (SELECT PI.CLIENT_ID
10        FROM WIR_PROD_APP.PENDING_IMMUNIZATION PI)
11 ORDER BY PTM.CLIENT_ID;
```

- Merge:

Select Clients to Merge...

View by Client ID...

* Client ID 1	* Client ID 2	Client ID 3	View
Master Client	Pending Client 1	Pending Client 2	Cancel



Approach Step 3: Conduct data cleanup (cont).

- Step 3: Conduct data cleanup.
 - API (Staff Monitored)

```

1  --API
2  SELECT DISTINCT MASTER_ID1, MASTER_ID_CLIENT_TYPE1,
3  PENDING_CLIENT1, PENDING_CLIENT_TYPE1,
4  PENDING_CLIENT2, PENDING_CLIENT_TYPE2
5  FROM
6  (
7  SELECT DISTINCT PTM.CLIENT_ID AS MASTER_ID1, C.CLIENT_TYPE AS MASTER_ID_CLIENT_TYPE1,
8  PC.CLIENT_ID AS PENDING_CLIENT1, PC.CLIENT_TYPE AS PENDING_CLIENT_TYPE1
9  FROM WIR_PROD_APP.PENDING_CLIENT PC
10 JOIN WIR_PROD_APP.TDGLITE_PENDING_TXN PT ON PC.PENDING_TXN_ID = PT.PENDING_TXN_ID
11 JOIN WIR_PROD_APP.TDGLITE_PENDING_TXN_MATCH PTM ON PT.PENDING_TXN_ID = PTM.PENDING_TXN_ID
12 JOIN WIR_PROD_APP.CLIENT C ON PTM.CLIENT_ID = C.CLIENT_ID
13 JOIN WIR_PROD_APP.ADDRESS PTMA ON C.ADDRESS_ID = PTMA.ADDRESS_ID
14 JOIN WIR_PROD_APP.ADDRESS PCA ON PC.ADDRESS_ID = PCA.ADDRESS_ID
15 JOIN WIR_PROD_APP.PHONE_NUMBER PN ON PC.PHONE_NUMBER_ID = C.PHONE_NUMBER_ID
16 JOIN WIR_PROD_APP.PHONE_NUMBER PPN ON PPN.PHONE_NUMBER_ID = PC.PHONE_NUMBER_ID
17 WHERE PC.CLIENT_ID NOT IN
18 (
19 SELECT PI.CLIENT_ID
20 FROM WIR_PROD_APP.PENDING_IMMUNIZATION PI
21 )
22 AND C.FIRST_NAME = PC.FIRST_NAME
23 AND C.LAST_NAME = PC.LAST_NAME
24 AND (C.MIDDLE_NAME = PC.MIDDLE_NAME OR PC.MIDDLE_NAME IS NULL)
25 AND C.BIRTH_DATE = PC.BIRTH_DATE
26 AND C.SEX_CODE = PC.SEX_CODE
27 AND (PTMA.STREET_ADDRESS_LINE = PCA.STREET_ADDRESS_LINE OR PCA.STREET_ADDRESS_LINE IS NULL)
28 AND (PTMA.CITY_NAME = PCA.CITY_NAME OR PCA.CITY_NAME IS NULL)
29 AND (PTMA.ZIP_CODE = PCA.ZIP_CODE OR PCA.ZIP_CODE IS NULL)
30 AND (TO_CHAR(PN.CREATE_DATE, 'MM-DD-YYYY') > TO_CHAR(PPN.CREATE_DATE, 'MM-DD-YYYY') OR
31 PN.PHONE_NUMBER = PPN.PHONE_NUMBER OR PPN.PHONE_NUMBER IS NULL)
32 AND (TO_CHAR(PN.CREATE_DATE, 'MM-DD-YYYY') > TO_CHAR(PPN.CREATE_DATE, 'MM-DD-YYYY') OR
33 PN.AREA_CODE = PPN.AREA_CODE OR PPN.AREA_CODE IS NULL)
34 AND (C.CLIENT_TYPE = PC.CLIENT_TYPE OR PC.CLIENT_TYPE = 'QM' OR C.CLIENT_TYPE = 'IA' OR
35 (C.CLIENT_TYPE = 'IC' AND (PC.CLIENT_TYPE = 'DU' OR PC.CLIENT_TYPE = 'DC'))) OR
36 (C.CLIENT_TYPE = 'PA' AND (PC.CLIENT_TYPE = 'DU' OR PC.CLIENT_TYPE = 'DC')) OR
37 (C.CLIENT_TYPE = 'DC' AND PC.CLIENT_TYPE = 'DU'))
38 AND (C.SSN = PC.SSN OR PC.SSN IS NULL)
39 AND PC.DIR_ATTRIBUTE IS NULL
40 AND (C.MULTIPLE_BIRTH_ORDER = PC.MULTIPLE_BIRTH_ORDER OR PC.MULTIPLE_BIRTH_ORDER IS NULL)
41 )
42 J1
43 JOIN

```

```

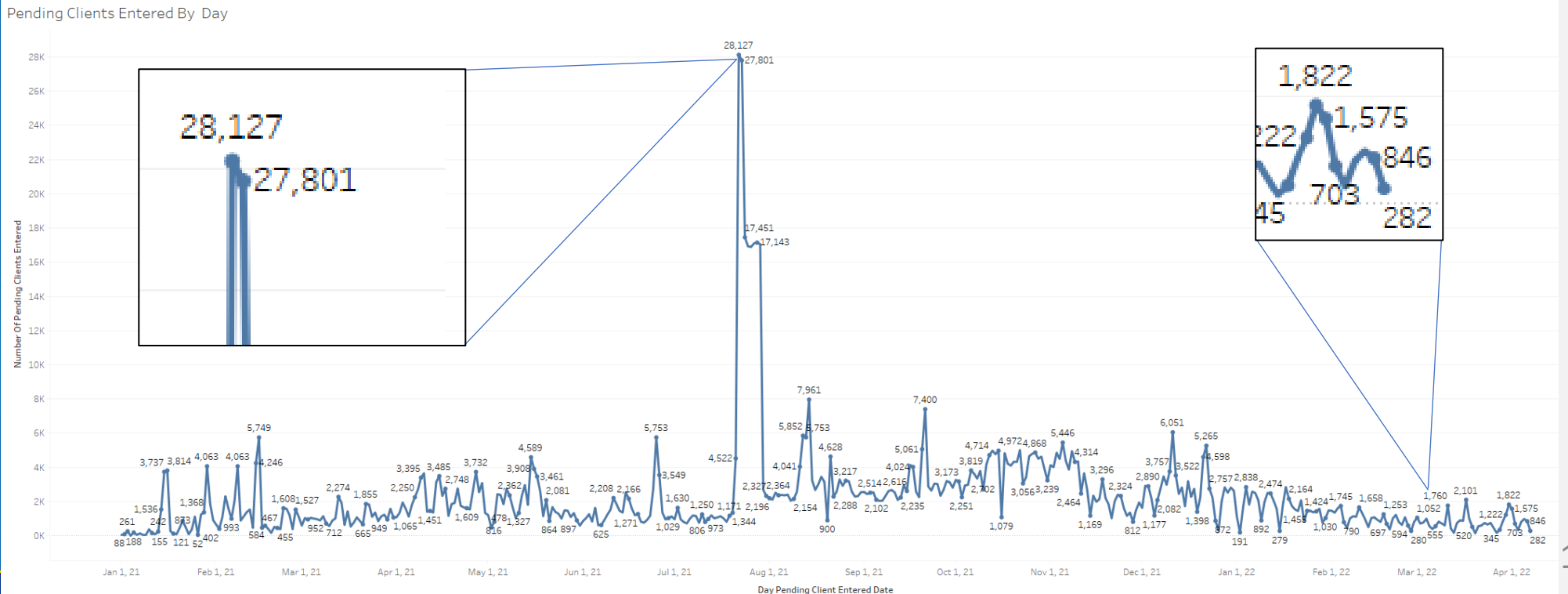
42 J1
43 JOIN
44 (
45 SELECT DISTINCT PTM2.CLIENT_ID AS MASTER_ID2, C2.CLIENT_TYPE AS MASTER_ID_CLIENT_TYPE2,
46 PC2.CLIENT_ID AS PENDING_CLIENT2, PC2.CLIENT_TYPE AS PENDING_CLIENT_TYPE2
47 FROM WIR_PROD_APP.PENDING_CLIENT PC2
48 JOIN WIR_PROD_APP.TDGLITE_PENDING_TXN PT2 ON PC2.PENDING_TXN_ID = PT2.PENDING_TXN_ID
49 JOIN WIR_PROD_APP.TDGLITE_PENDING_TXN_MATCH PTM2 ON PT2.PENDING_TXN_ID = PTM2.PENDING_TXN_ID
50 JOIN WIR_PROD_APP.CLIENT C2 ON PTM2.CLIENT_ID = C2.CLIENT_ID
51 JOIN WIR_PROD_APP.ADDRESS PTMA2 ON C2.ADDRESS_ID = PTMA2.ADDRESS_ID
52 JOIN WIR_PROD_APP.ADDRESS PCA2 ON PC2.ADDRESS_ID = PCA2.ADDRESS_ID
53 JOIN WIR_PROD_APP.PHONE_NUMBER PN2 ON PC2.PHONE_NUMBER_ID = C2.PHONE_NUMBER_ID
54 JOIN WIR_PROD_APP.PHONE_NUMBER PPN2 ON PPN2.PHONE_NUMBER_ID = PC2.PHONE_NUMBER_ID
55 WHERE PC2.CLIENT_ID NOT IN
56 (
57 SELECT PI2.CLIENT_ID
58 FROM WIR_PROD_APP.PENDING_IMMUNIZATION PI2
59 )
60 AND C2.FIRST_NAME = PC2.FIRST_NAME
61 AND C2.LAST_NAME = PC2.LAST_NAME
62 AND (C2.MIDDLE_NAME = PC2.MIDDLE_NAME OR PC2.MIDDLE_NAME IS NULL)
63 AND C2.BIRTH_DATE = PC2.BIRTH_DATE
64 AND C2.SEX_CODE = PC2.SEX_CODE
65 AND (PTMA2.STREET_ADDRESS_LINE = PCA2.STREET_ADDRESS_LINE OR PCA2.STREET_ADDRESS_LINE IS NULL)
66 AND (PTMA2.CITY_NAME = PCA2.CITY_NAME OR PCA2.CITY_NAME IS NULL)
67 AND (PTMA2.ZIP_CODE = PCA2.ZIP_CODE OR PCA2.ZIP_CODE IS NULL)
68 AND (TO_CHAR(PN2.CREATE_DATE, 'MM-DD-YYYY') > TO_CHAR(PPN2.CREATE_DATE, 'MM-DD-YYYY') OR
69 PN2.PHONE_NUMBER = PPN2.PHONE_NUMBER OR PPN2.PHONE_NUMBER IS NULL)
70 AND (TO_CHAR(PN2.CREATE_DATE, 'MM-DD-YYYY') > TO_CHAR(PPN2.CREATE_DATE, 'MM-DD-YYYY') OR
71 PN2.AREA_CODE = PPN2.AREA_CODE OR PPN2.AREA_CODE IS NULL)
72 AND (C2.CLIENT_TYPE = PC2.CLIENT_TYPE OR PC2.CLIENT_TYPE = 'QM' OR C2.CLIENT_TYPE = 'IA' OR
73 (C2.CLIENT_TYPE = 'IC' AND (PC2.CLIENT_TYPE = 'DU' OR PC2.CLIENT_TYPE = 'DC'))) OR
74 (C2.CLIENT_TYPE = 'PA' AND (PC2.CLIENT_TYPE = 'DU' OR PC2.CLIENT_TYPE = 'DC')) OR
75 (C2.CLIENT_TYPE = 'DC' AND PC2.CLIENT_TYPE = 'DU'))
76 AND (C2.SSN = PC2.SSN OR PC2.SSN IS NULL)
77 AND PC2.DIR_ATTRIBUTE IS NULL
78 AND (C2.MULTIPLE_BIRTH_ORDER = PC2.MULTIPLE_BIRTH_ORDER OR PC2.MULTIPLE_BIRTH_ORDER IS NULL)
79 )
80 J2 ON J1.MASTER_ID1 = J2.MASTER_ID2
81 WHERE J1.PENDING_CLIENT1 <> J2.PENDING_CLIENT2;

```



Results: RunMatch

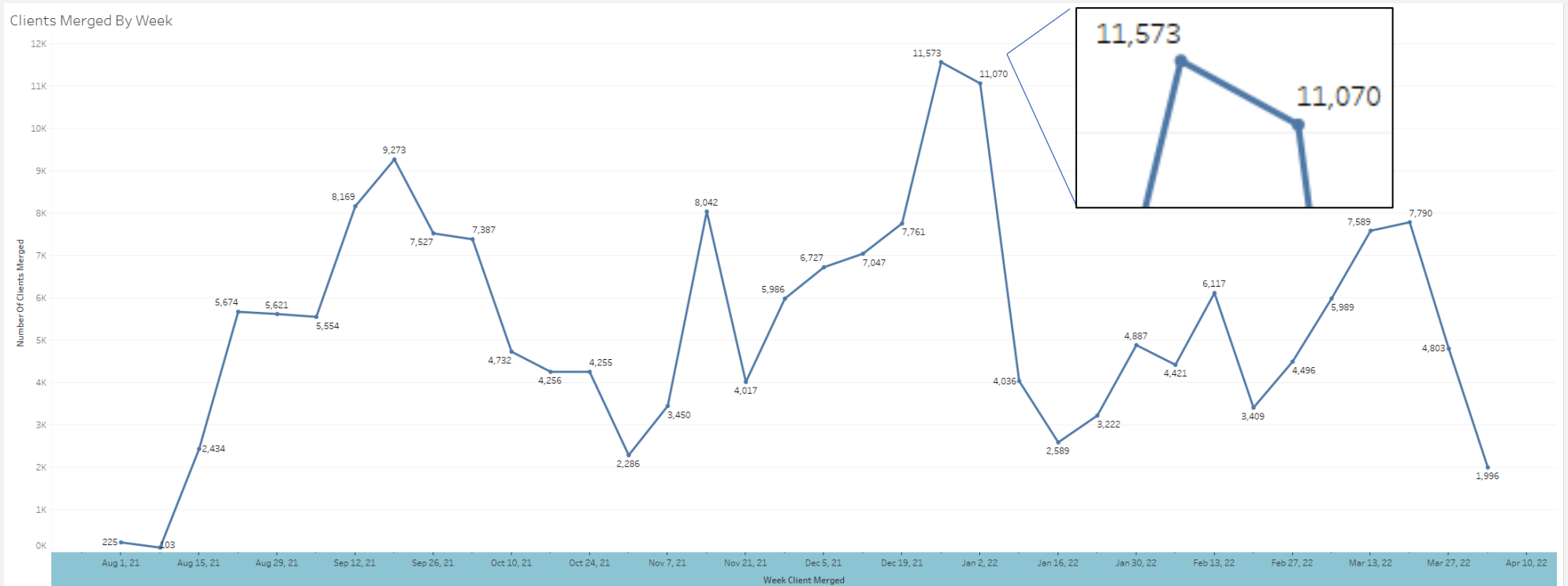
- Pre-Failure: Avg number of pending clients added per day - 1,303
- After: Avg number of pending clients added per day - 3,886 (198% increase)
- Now: Avg number of pending clients added per day – 1,116 (14% decrease)



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Results: Merge (Data Cleanup)

- Manual merges through UI
- Use of an Application Programming Interface (API) monitored by staff
- Successfully conducted 194,688 client merges since July 21, 2021.



Summary

- To ensure data quality we must
 - Monitor
 - Research
 - Interpretation
 - Develop and implement corrective actions





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Thank You!

From the Texas Department of State Health Services