Case Study from Mode Analytics: "Yammer Analysis: Drop in User Engagement"

All data from: https://community.modeanalytics.com/sql/tutorial/a-drop-in-user-engagement/

The problem

You show up to work Tuesday morning, September 2, 2014. The head of the Product team walks over to your desk and asks you what you think about the latest activity on the user engagement dashboards. You fire them up, and something immediately jumps out.
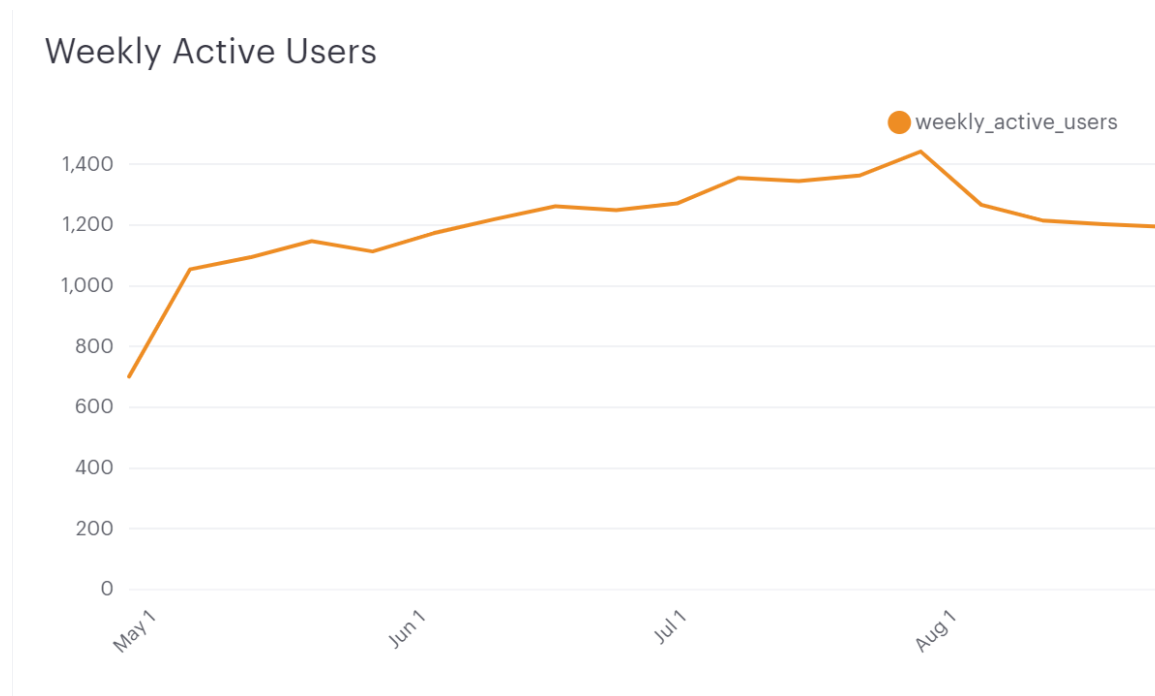
The above chart shows the number of engaged users each week. Yammer defines engagement as having made some type of server call by interacting with the product (shown in the data as events of type "engagement"). Any point in this chart can be interpreted as "the number of users who logged at least one engagement event during the week starting on that date."

You are responsible for determining what caused the dip at the end of the chart shown above and, if appropriate, recommending solutions for the problem.

Initial Hypothesis

Possible causes include:

Holidays: There is a 16% user drop-off the first week of August. Given the time of year, it could be that there are overall fewer users on the system than normal. We can look at total user count by week to understand the relative % vs the absolute numbers.

Systems Issue: There might be an error with the user interface, back-end system, etc. preventing users from using the system as normal. If there is data relative to error codes or similar, we can look to leverage and analyze.

Traffic differences: understanding if there might have been a change in customer usage (e.g. major client stopped using Yammer). Analyze total usage trends and traffic volume.

Analysis

We will first look at the engagement events counts by week. SQL Code:

```
-- Engagement event counts by week
SELECT DATE_TRUNC('week', occurred_at) as week_date, count(event_name)
FROM tutorial.yammer_events events
WHERE event_type = 'engagement'
GROUP BY DATE_TRUNC('week', occurred_at)
ORDER BY DATE_TRUNC('week', occurred_at) asc
```
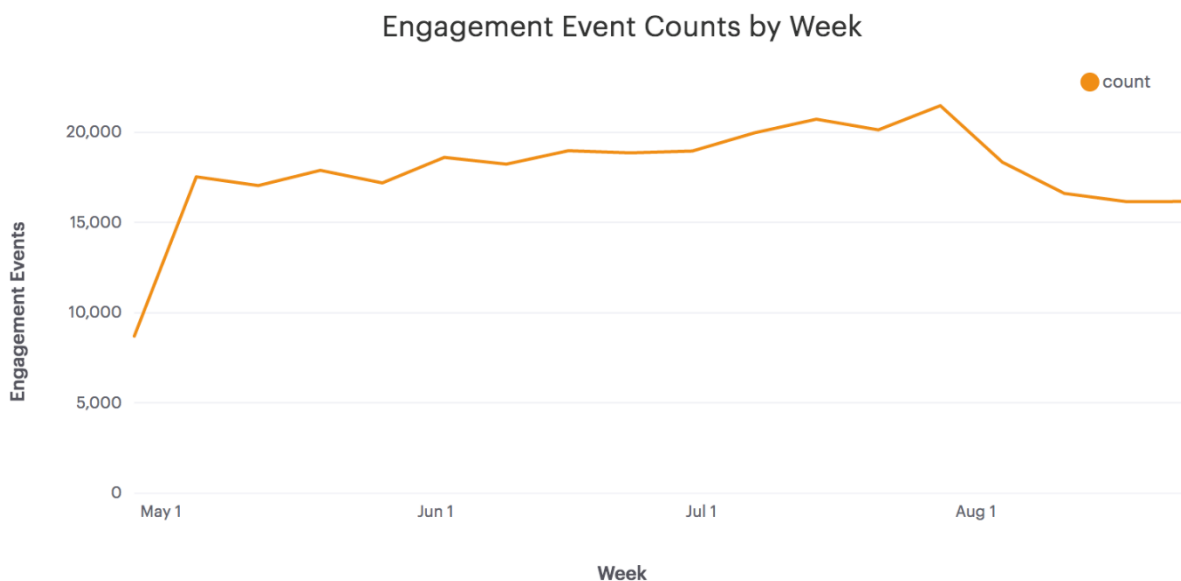

Hypothesis #1: summer holidays and vacation are causing a dip in user engagement.

We will explore the users table and understand how many active vs pending users we have.

```
SQL code:
-- Understanding the total Pending vs Active User Count
SELECT state, count(user_id) as User_Count
FROM tutorial.yammer_users
```

GROUP BY state
ORDER BY count(user_id) desc

## Pending vs Active User Count
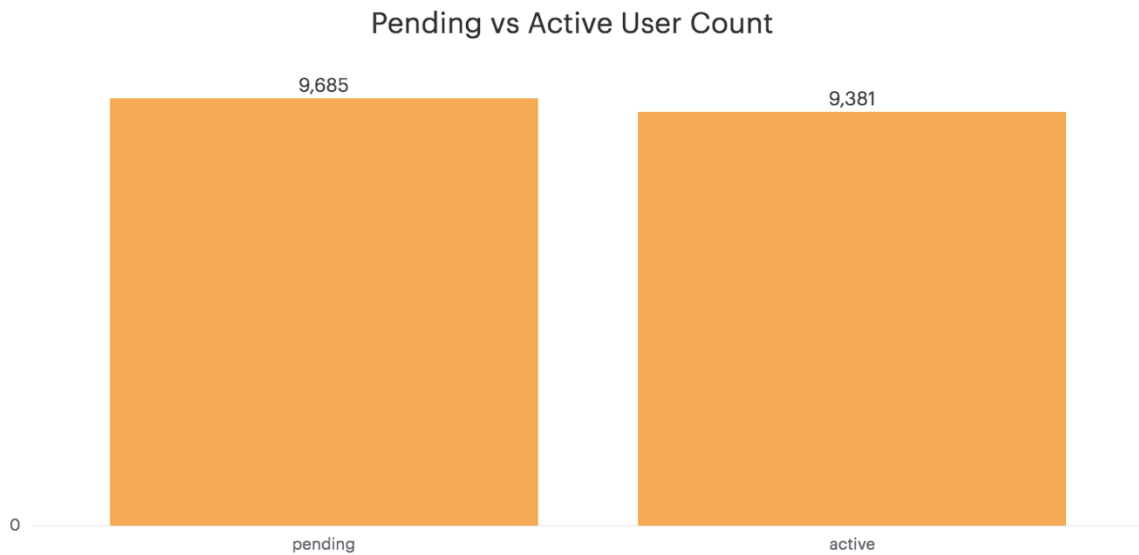
There are 19,066 total users, with 9,381 active users.

Next, let's look at where the active users live.

SQL Code:
```
-- Confirming that engagement events only arise from active users
SELECT events.location, count(users.user_id)
FROM tutorial.yammer_events events
JOIN tutorial.yammer_users users
ON events.user_id = users.user_id
WHERE state = 'active' AND event_type = 'engagement'
GROUP BY location
ORDER BY count(users.user_id) desc
LIMIT 10
```

Active Users by Country
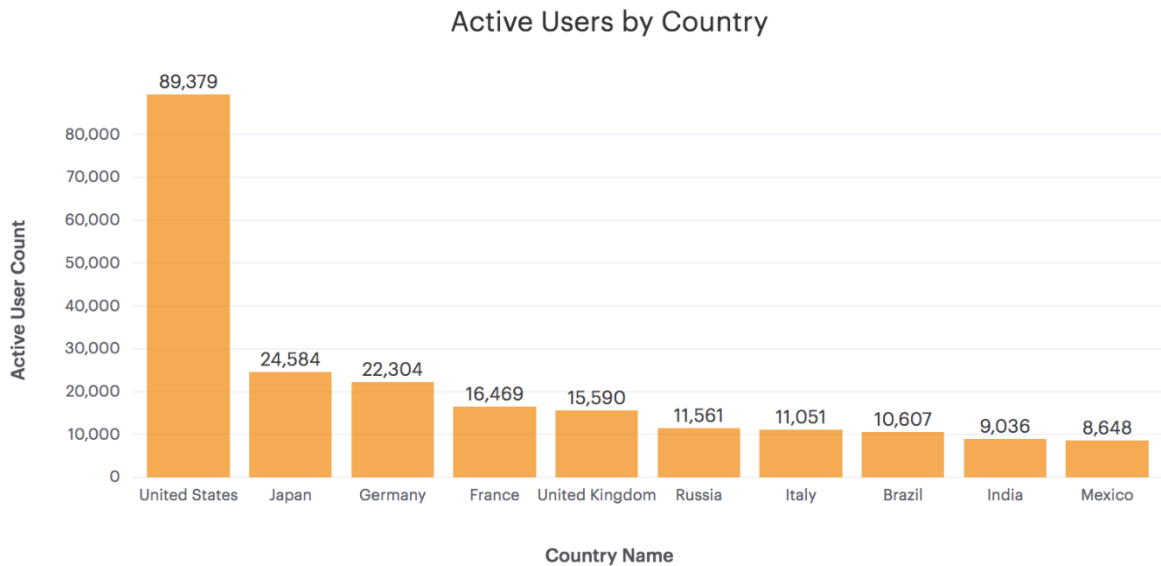
It appears that most of the users live in the United States, meaning that August would be a summer holiday month (vs, say, Australia which would be more likely in Jan/Feb).

Next, let's look at user activity by week. Including email open.

SQL Code:
```
-- Email Open Action count by Week
SELECT DATE_TRUNC('week', occurred_at) as week_date, count(user_id) as user_actions
FROM tutorial.yammer_emails emails
WHERE action = 'email_open'
GROUP BY DATE_TRUNC('week', occurred_at)
ORDER BY DATE_TRUNC('week', occurred_at) asc
```

'Email Open' Action Count per Week
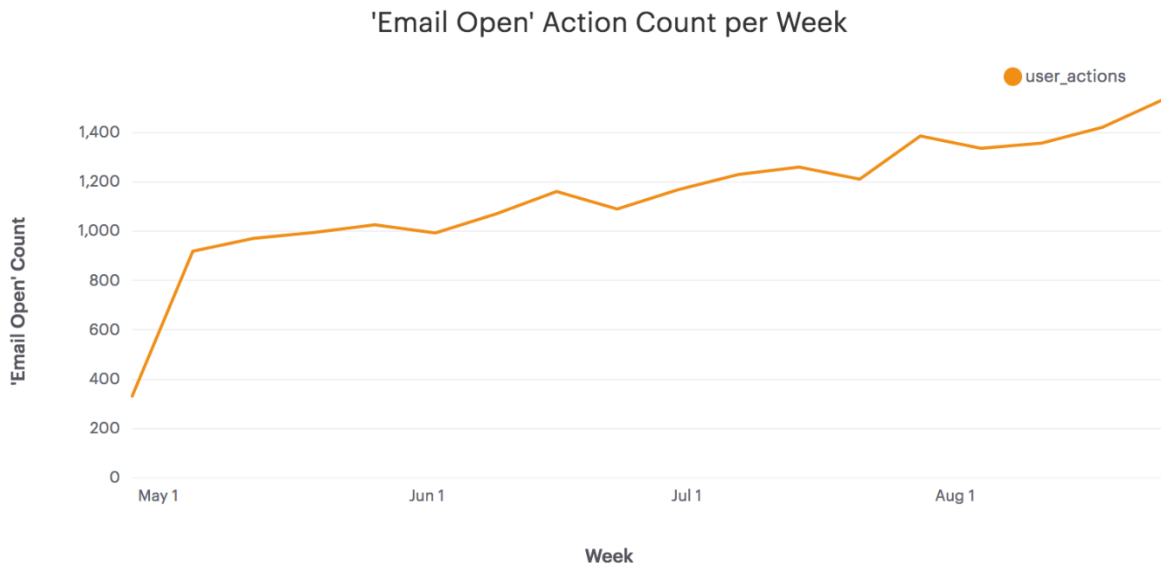
It appears that email open activity is on the rise, this might disprove the hypothesis that a large group of users took vacation in August.

Hypothesis #2: there may have been a systems issue during the early August timeframe.

SQL Code:
```
-- User Action by Week
SELECT DATE_TRUNC('week', occurred_at) as week_date, action, count(user_id) as user_actions
FROM tutorial.yammer_emails emails
GROUP BY DATE_TRUNC('week', occurred_at), action
```
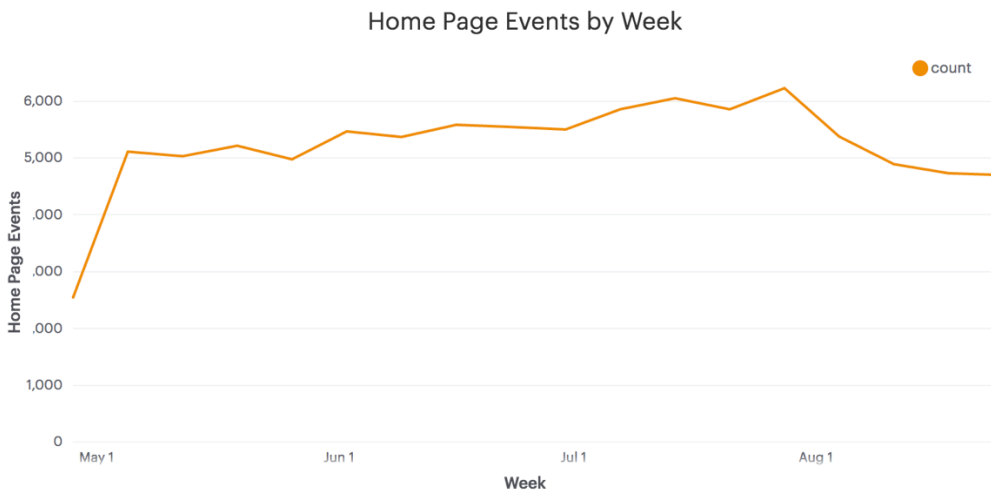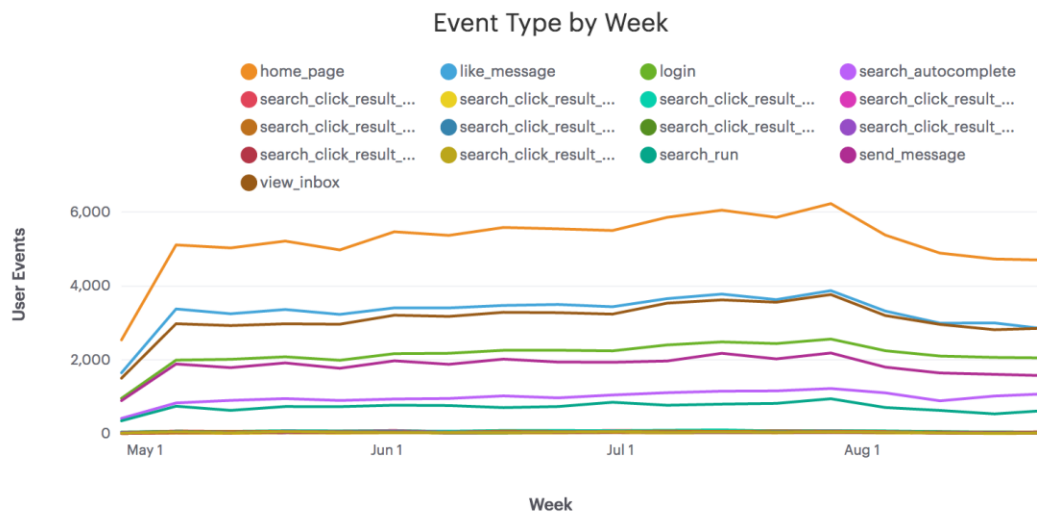
ORDER BY DATE_TRUNC('week', occurred_at) asc

User Action by Week

Count of User Clickthrough vs Time
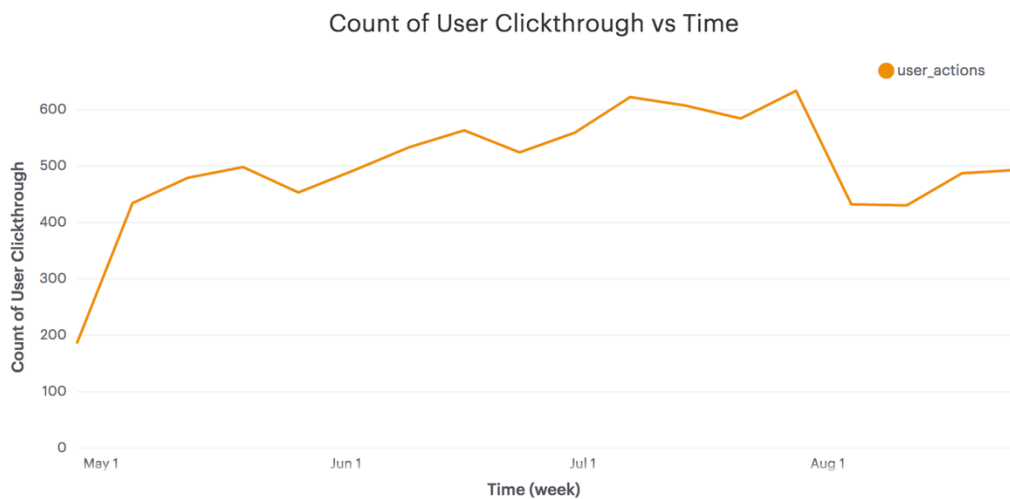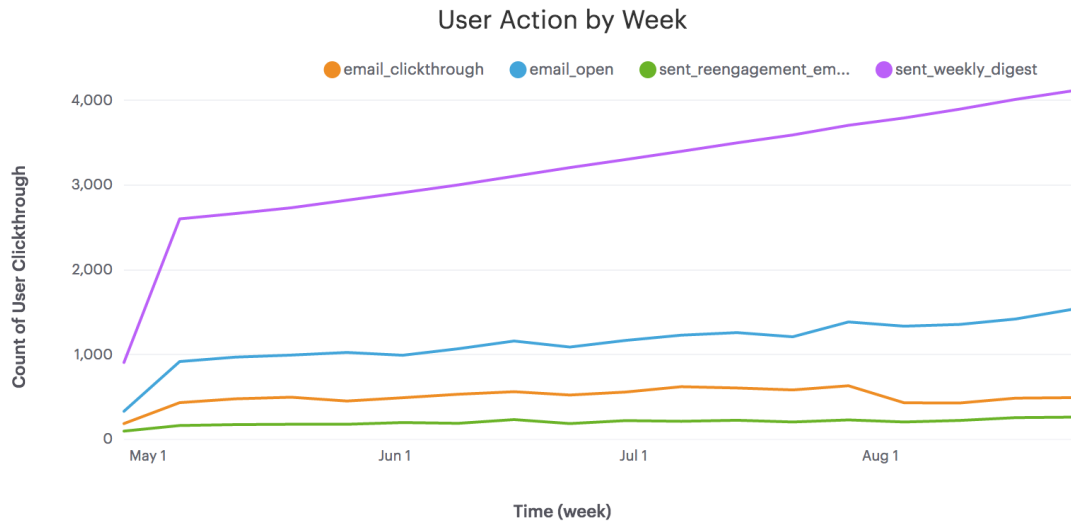
In analyzing the other email events, it appears that while emails sent and opened increased consistently, the "user_clickthrough" event seemed to dip during the same timeframe as the dip in engagement.

SQL Code:
```
-- Event Type by Week
SELECT DATE_TRUNC('week', occurred_at) as week_date, event_name, count(user_id)
FROM tutorial.yammer_events events
WHERE event_type = 'engagement'
GROUP BY DATE_TRUNC('week', occurred_at), event_name
ORDER BY DATE_TRUNC('week', occurred_at) asc
```

Event Type by Week

Legend:
- home_page
- like_message
- login
- search_autocomplete
- search_click_result_...
- search_click_result_...
- search_click_result_...
- search_click_result_...
- search_click_result_...
- search_click_result_...
- search_click_result_...
- search_click_result_...
- search_click_result_...
- search_click_result_...
- search_run
- send_message
- view_inbox

Home Page Events by Week

In analyzing specific events closer, it appears that the home page events follow a similar trend as click through. I wonder if there may be something related to the email link associated with the home page.

SQL Code:
```
-- Events by Device Type by Week
SELECT DATE_TRUNC('week', occurred_at) as week_date, device, count(user_id)
FROM tutorial.yammer_events events
GROUP BY DATE_TRUNC('week', occurred_at), device
```

ORDER BY DATE_TRUNC('week', occurred_at) asc

Events by Device Type by Week
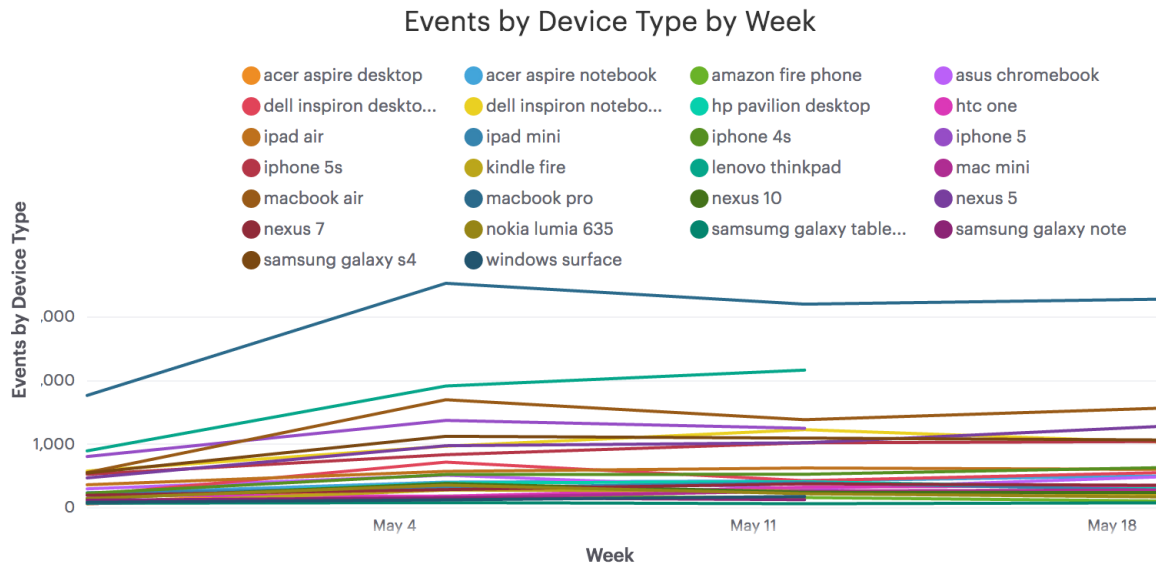
There may also be something associated with device type, as it appears that the mobile devices may be having more of an impact in the recent weeks.

Answers

- Do the answers to any of your original hypotheses lead you to further questions?

  yes, it appears that there may be an issue with the email blasts that are being sent, and possibly how they are read on the mobile app. I would want to know if there have been any product updates in the early August timeframe.

- If so, what are they and how will you test them?

would deal with talking with the product team.

- If they are questions that you can't answer using data alone, how would you go about answering them (hypothetically, assuming you actually worked at this company)?

it appears that the issue lies in the email clickthrough rates and potentially the mobile app. Ask the head of product if there have been any email template changes, or product changes on the mobile app.

- What seems like the most likely cause of the engagement dip?

it appears that the issue lies in the email clickthrough rates and potentially the mobile app.

- What, if anything, should the company do in response?

Investigate the email template and links. Same for the mobile app. I can't say that it is 100% the cause, but likely we will find something that could be improved (e.g. layout, UX) or there may be something recently implemented that needs to be fixed.