Investigating a Drop in User Engagement

Yammer

Yammer is a social network for communicating with coworkers. Individuals share documents, updates, and ideas by posting them in groups. Yammer is free to use indefinitely, but companies must pay license fees if they want access to administrative controls, including integration with user management systems like ActiveDirectory.

Yammer's Analysts are responsible for triaging product and business problems as they come up. In many cases, these problems surface through key metric dashboards that execs and managers check daily.

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 chart below 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.

Weekly Active Users
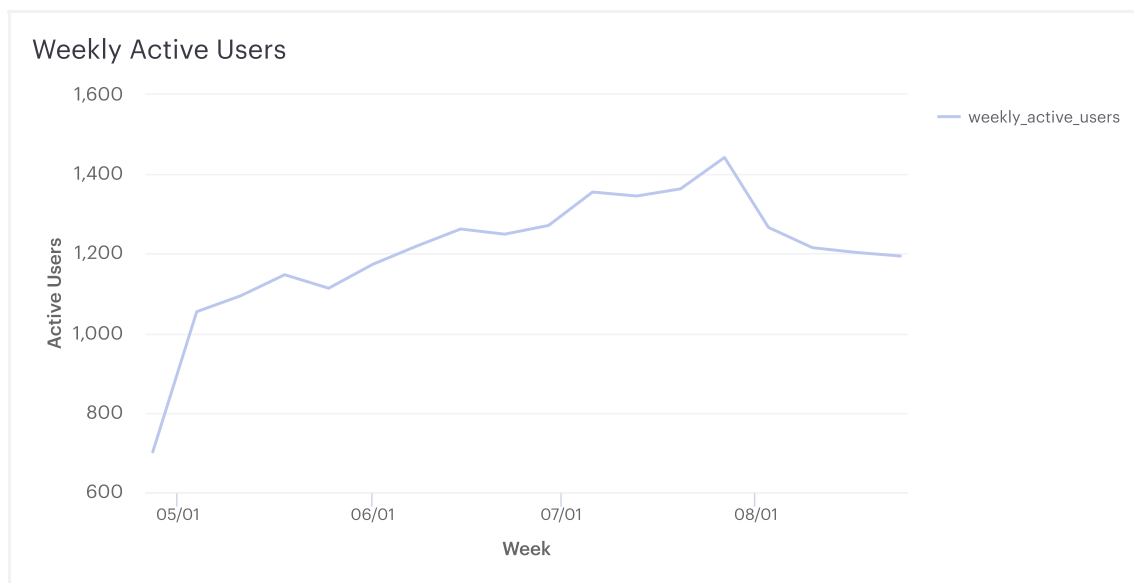
Getting oriented

Before you even touch the data, come up with a list of possible causes for the dip in retention shown in the chart above. Make a list and determine the order in which you will check them. Make sure to note how you will test each hypothesis. Think carefully about the criteria you use to order them and write down the criteria as well.

Hypotheses

1. **Technical Issues with App.** Are there technical issues with the app (broken product feature, app was "down" or inoperable, technical error, etc.)? There may also be technical issues with logging user activity. Users MAY be engaging, but traffic is not being logged properly.
2. **Holiday.** Has the drop in traffic occurred because of a holiday? Users were not engaged or offline due to being involved in holiday activities.
3. **External Event.** Was the user activity influenced by an external event (social event, marketing event, industry event, news/media event).

Investigating Each Hypothesis

1. **Technical issues.** Look for anomalies in all of the Events, over the time period in question. Compare them in relation to one another and look for a specific Event that doesn't follow the same relationship or pattern. Conduct the same analysis for the Email Events.
2. **Holiday.** Compare drops in Weekly Engagement Events engagement with known U.S. holidays.
3. **External Event.** Look for sharp peaks in registrations associated with events, followed by a subsequent drop in engagement, as users acquired through marketing events typically have low retention. Compare Engagement event type to Signup Flow event types.

## Findings

**Hypothesis 1 - Technical Issues with App**
I started by examining Weekly User Engagement by Device. There appears to be a slight drop in user engagement by phone device users, from 7/28 – 8/18.

Weekly User Engagement by Device
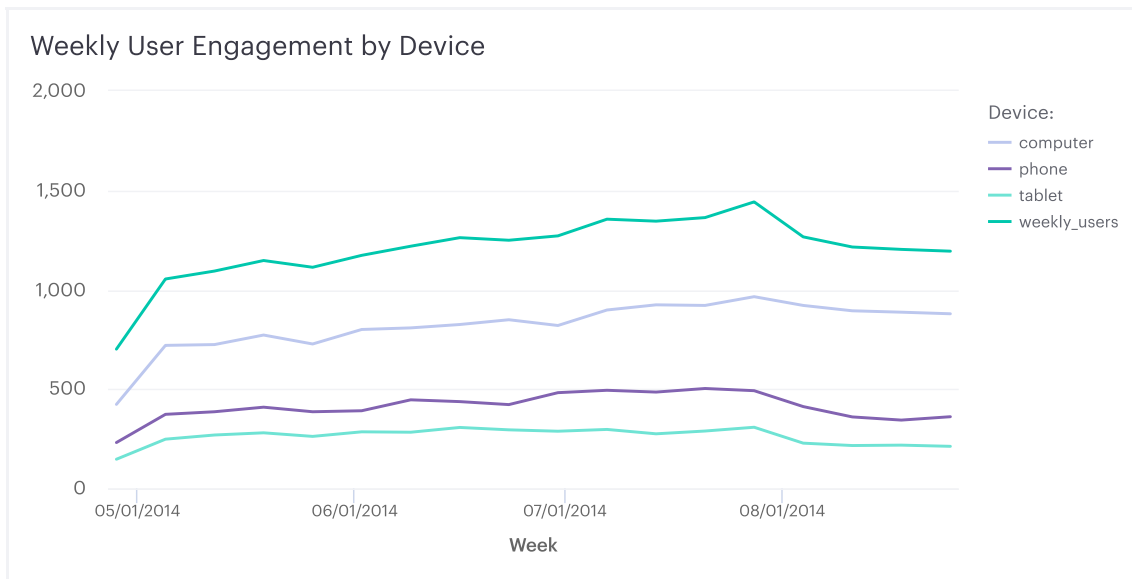
Drilling down into data for mobile device users (phone and tablet), this drop is more pronounced, leading me to believe that there may be an issue with the mobile app. For the time period of 7/28 to 8/11, there was a 7.36% drop in engagement from computers, but a 26.83% drop for phones and a 29.87% drop for tablets. This further supports the idea that the issue could be isolated to the mobile app.

Weekly User Engagement - Mobile Devices
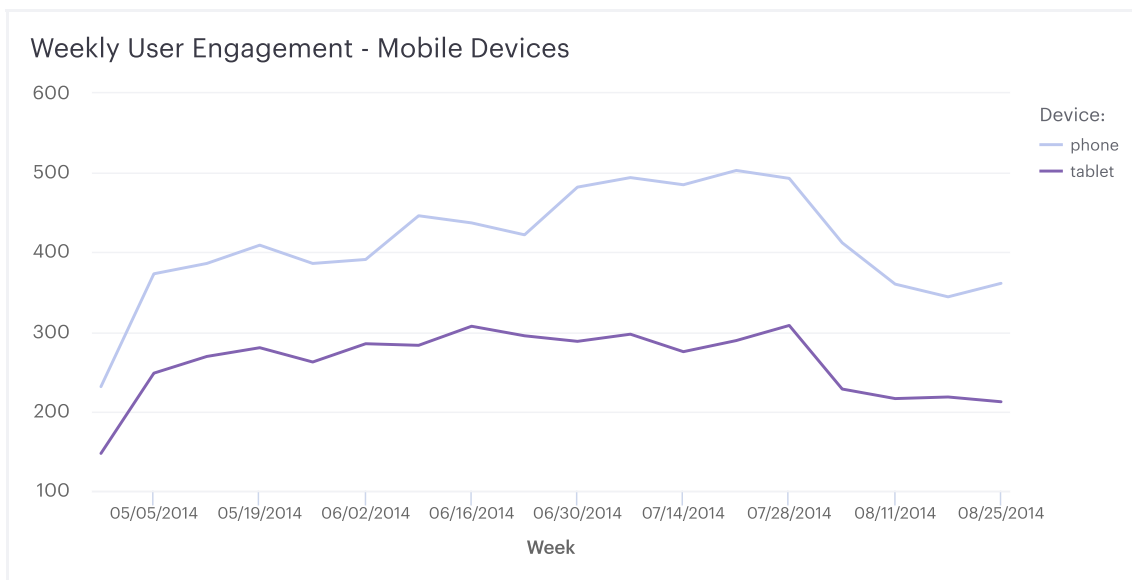
Additionally, looking at the Engagement event types, the metrics are all on a downward trend from 7/28 to 8/18. Drilling down into the Login event type, there is a 19.90% from 7/28 - 8/25. If users cannot (or will not) login, then the other engagement measures will fall as well, as a user cannot engage without logging into the app.

Weekly Engagement Events


Weekly Engagement Events
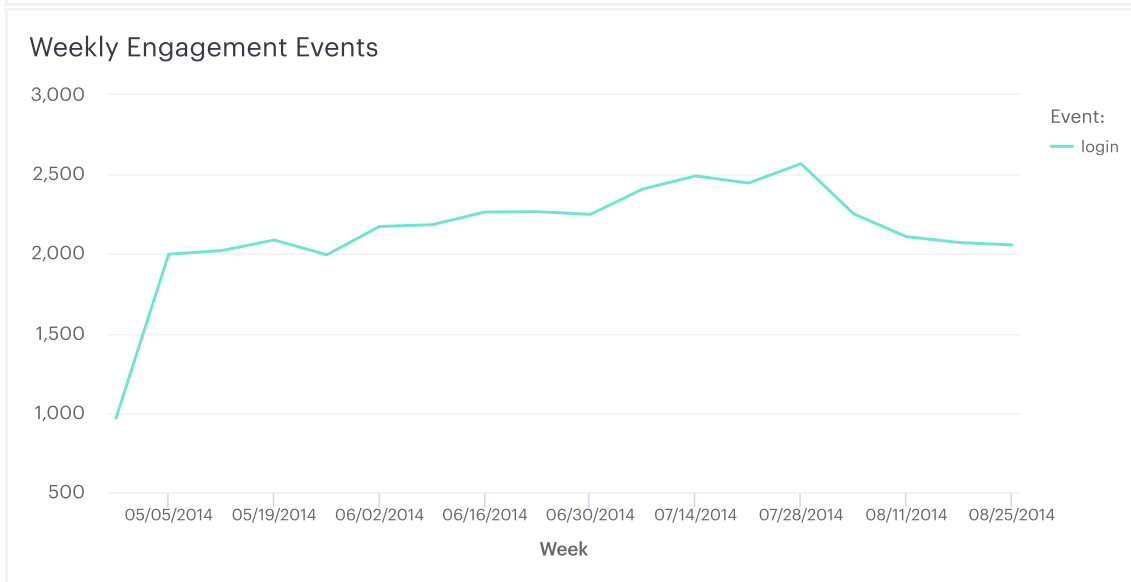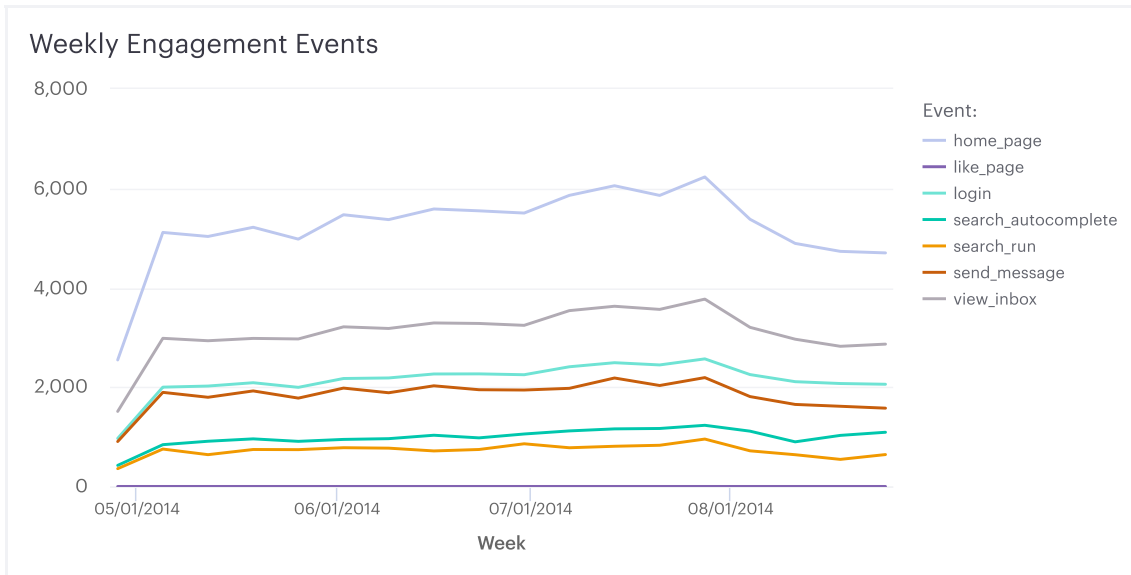
The Weekly Email Event Engagement was also examined. There seems to be another indication of what could be causing the engagement drop. Weekly Digest Emails have been rising steadily over the time period, and email opens have remained steady or increased slightly - yet email clickthroughs has actually dropped. This could indicate user email "fatigue", or even an issue with weekly digest emails to phone users.

Weekly Email Event Engagement

Email Events:
— email_clickthroughs
— email_opens
— sent_reengagement_emails
— sent_weekly_digest_emails
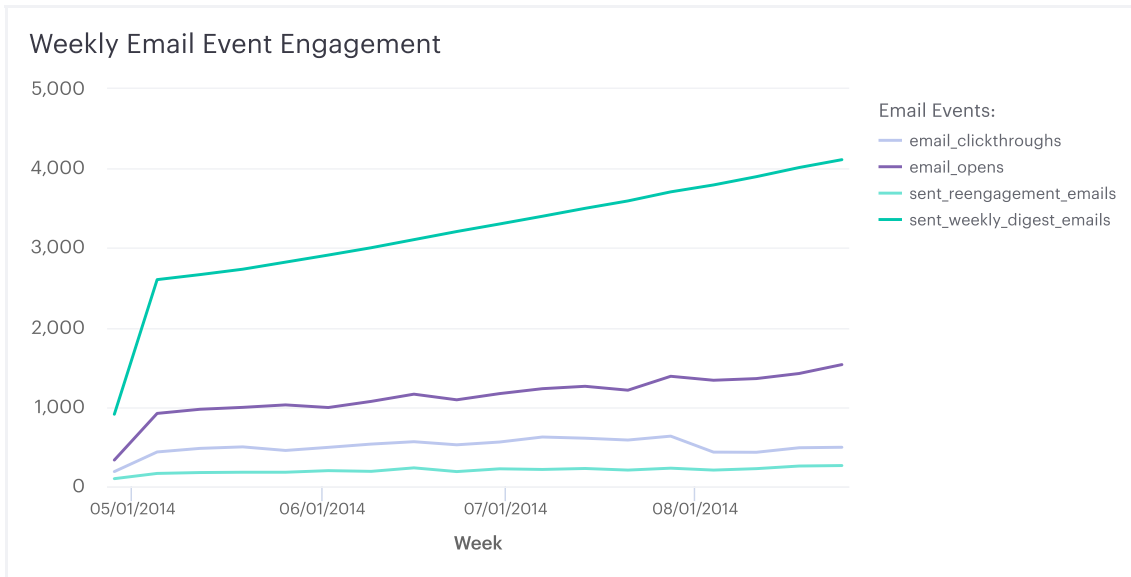
Hypothesis 2 – Drop in Traffic Due to Holiday

Looking at the Weekly Active Users trend and comparing the trend to known U.S. Holidays, there appears to be a slight drop in Active Users around the Memorial Day holiday, but no drop around July 4. Further, there is no holiday that aligns with the drop in engagement starting the week of July 28. Further investigation should be done around users' location information, and compare their home country's holidays to the Weekly Active Users trend.

Weekly Active Users

— weekly_active_users
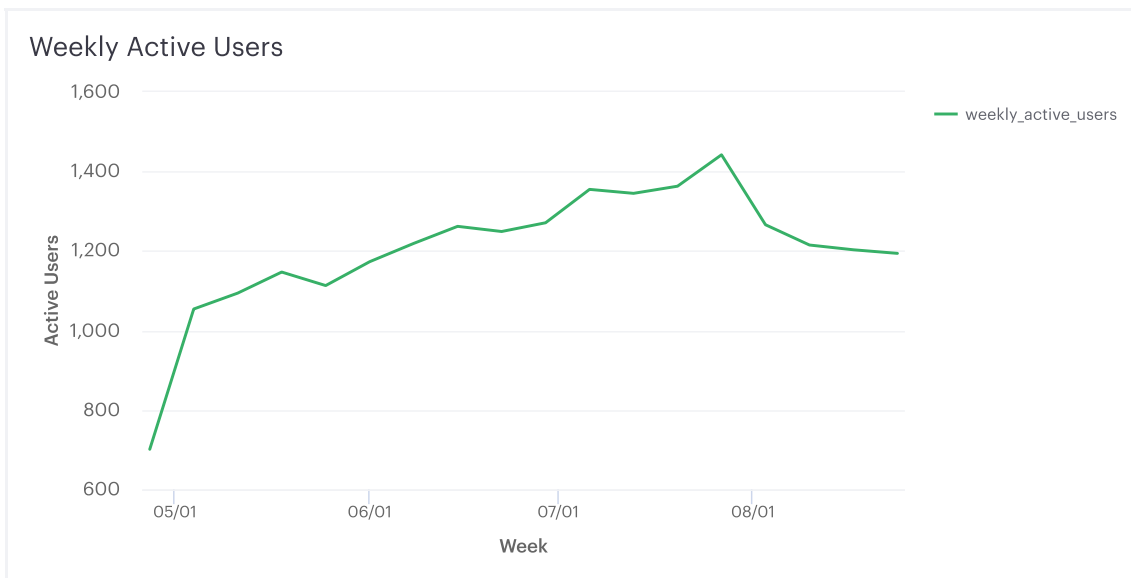
Hypothesis 3 – Drop in Engagement Due to External Event

The expected pattern around an external event (marketing, industry event, etc.) would be a sharp spike in new registrations, with a subsequent drop in engagement as these "event" registrants typically disengage. Looking at the weekly Event Types (Engagement and Signup, using a logarithmic scale for comparison purposes), this spike and drop off pattern doesn't seem to be present. However, I did notice a sharp drop in signups from 7/28 - 8/4, concurrent with the drop off in engagement. A drop in both signups and engagement could indicate a technical issue.

Weekly Event Types

Event Type:
— engagement
— signup
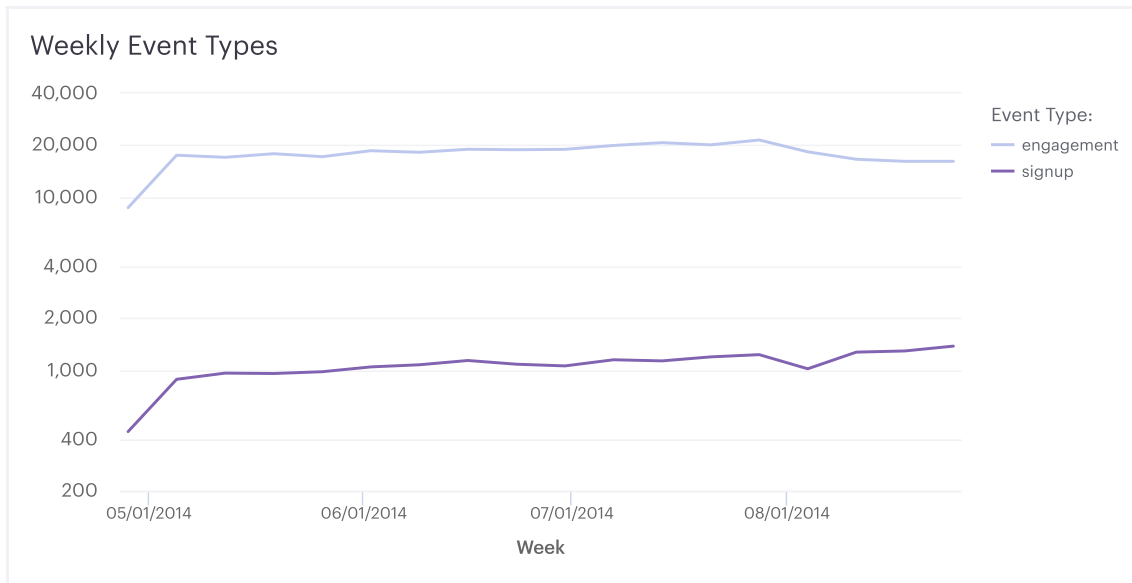
Recommendation

Do the answers to any of your original hypotheses lead you to further questions?
Yes, the findings from testing the hypothesis did not reveal a definitive identification of the issue, but led to more questions. For example, there are clearly issues with the mobile app, as well as with the email clickthroughs. And lastly, the drop in both the engagement event types and the signup event types indicate a technical issue. But these are all indicators of paths of inquiry that require further investigation.

If so, what are they and how will you test them?
To further investigate the new questions or potential issues, I would first look at email digest click-throughs by device type (phone) to see if there is any connection or relationship between the two.
I would also look at signups by device type, to further investigate any relationship between the mobile app and signups, in an effort to isolate the issue to one particular source of engagement drop.

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)?
One area that couldn't be answered by only data would be looking at the content of the weekly digest emails, and if anything has changed that would cause click-throughs to drop off. I would also talk to the Yammer staff responsible for managing these digest emails to inquire about the content, changes, etc.

What seems like the most likely cause of the engagement dip?
Based on the data at hand, I would say that there is some sort of technical issue with the mobile app, although there doesn't appear to be enough information in the data alone to point to a definitive cause.
Further investigation of signups and email click-throughs by device may provide more insight into whether the mobile app is indeed a cause.

What, if anything, should the company do in response?
The company should start investigating more detailed data/information on the mobile app, such as any logging data, etc., for the 7/28/14 – 8/25/14 time period.

The company should also be looking at the weekly digest emails in an effort to identify the cause of the drop off in click-throughs.