**Problem Statement**

We found out that a few months ago, the number of weekly pageviews has dramatically decreased while the number of active users and active customer company kept following the same trend. It never came back to its original order of magnitude since then.

**Clarifying Questions**

Since the content information and the data history are both limited, I would love to get more context by pulling out longer internal historical data, third party data and asking the team about the following questions:

* Time-related data questions:
  + How did the number of weekly pageviews trend looks like in the past 3 years?
  + What is the exact pattern of this drop? Is it a drop after a spike or not?
* Industry-related question
  + How does the number of weekly pageviews trend looks like in the industry / competitors?
* Major Events:
  + Any big one-off events happened between April and May 2019?

**Datasets Information**

In this case study, the only available datasets are:

* Application pageview information -- **fact\_app\_pageview**
* pageview\_id string
* pageview\_timestamp timestamp
* datadog\_user\_id string
* company\_id string
* geo\_country string
* page\_url string
* page\_id string
* source string
* Application page information -- **dim\_app\_page**
* id string
* category string
* subcategory string
* Customer Company information -- **dim\_customer\_company**
* id string
* name string
* signup\_timestamp timestamp
* billing\_plan string
* User information -- **dim\_user**
* id *string*
* name *string*
* role *string*
* created\_timestamp *timestamp*

**Problem Visualizations:**

* Graphs
  + A picture containing chart

    Description automatically generated
  + Chart

    Description automatically generated with low confidence
  + Chart

    Description automatically generated with medium confidence
* Summary
  + The above 3 graphs show that the sudden drop of the number of weekly pageviews happened around 2019-05-09.
  + The drop percentage is approximately 63%.
  + The number of active users and active customer company kept the same trend over the time.

**Hypotheses**

Potential Cause 1: decrease due to regional outages or locale-based feature testing – break down by geo\_country

Chart

Description automatically generated with medium confidence

* Datadog is used by multiple regions, it would be best to analyze the top 10 regions based on the number of daily pageviews.
* From the line chart, the United States has the most significant drop in # daily pageviews.
* The trends of # pageviews in time series in different countries perform differently. For example, the # of pageviews in countries like Vietnam and Portugal is consistent over time, while the United States, Argentina and India dramatically decreased after 2019-05-09.
* It would be useful to quickly check with other teams if there were any new releases or product upgrades localized to only those countries with a sudden drop.

Potential Cause 2: decrease is in one or multiple categories of application page – break down by category

Text

Description automatically generated with medium confidence

* The categories of Datadog application page include the following
  + Dashboard
  + Monitors
  + Infrastructure
* From the graph above, the dramatical decrease of daily pageviews are caused by Dashboards while the other 2 categories' number of pageviews perform steady over time.
* I decided to investigate only **Dashboards** in the following analysis.

Potential Cause 3: decrease is certain types of billing plan – break down by billing\_plan

Text

Description automatically generated

* Top 3 billing plans in # daily pageviews are Pro, Enterprise, and Free respectively. Especially Pro is the largest contributor to the sudden drop of # daily pageviews.
* Dogfooding is an interesting category that is worthy looking into because it is a way for an organization to test its own products for quality control.

Potential Cause 4: Decrease is due to a new feature release – investigate dogfood

Shape, square

Description automatically generated

* It looks abnormal that a spike with more than 150 pageviews happened in 2019-04-23, which is 2-3 weeks before 2019-05-09.
* It might be an indicator of an Internal Beta testing for releasing a feature that would change customers page refreshing behavior and was planned to roll out on 2019-05-09.

Potential Cause 5: A few companies contribute most to the decrease in # daily pageviews – look into company level

* Look into Enterprise
  + Chart, histogram

    Description automatically generated
  + The daily # pageviews on Dashboards of top 10 companies who purchased Enterprise billing plan suddenly dropped at 2019-05-09 as well.
* Look into Pro
  + A picture containing histogram

    Description automatically generated
  + The daily # pageviews in companies such as '7ecd298' and '292956' kept consistent over the time.
  + However, the performance of 2 companies '31d6e' and '9c62f' are abnormal -- a sudden spike and drop in daily # pageview happened before 2019-05-09.
    - The average daily # pageviews from 2019-04-16 to 2019-05-01 for the company '9c62f' is 715.
    - The average daily # pageviews from 2019-04-26 to 2019-05-08 for the company '31d6e' is 1000.
  + I decide to look into the following companies at user level: '7ecd298', '292956', '31d6e', '9c62f'

Potential Cause 6: A few users in each company contribute most to the sudden drop in # daily pageview

* For company '7ecd298' & '292956'
  + Chart, line chart

    Description automatically generated
  + Line chart

    Description automatically generated with medium confidence
  + Companies like '7ecd298' and '292956' whose daily # pageviews keeping the same trend at high volume over the time usually has only one user to use Datadog application. It is possible that these kind of users displays dashboards on big TVs.
* For company '31d6e' and '9c62fc'
  + A picture containing text

    Description automatically generated
  + A picture containing square

    Description automatically generated
  + Companies like '31d6e' and '9c62fc' share the same pattern that the high volume of the usage is both contributed by one user, which means they might be TV dashboards and they were used temporarily.
    - In Company '31d6e', the user '1464d31' contributing the highest volume is in the United States.
    - In company '9c62fc', the user '34b3e9' contributing the highest volume is in Argentina.

**Conclusion**

In conclusion, the drop only happens to dashboards. It happens first to the dogfood channel then to all channels and there’s no difference between different billing plans. The root cause is possibly a new feature release that changes dashboard users’ page refreshing behaviors released to all users across all channels. For instance, it might be changing page updates from pull-only (only load data when the dashboard web page is refreshed) to push (automatically pushing data updates to users’ dashboards). We can tell TV dashboard users from normal end user by checking page refresh numbers by day. If the number is relatively high and steady over time then it’s highly likely a TV, otherwise it’s an end user. TV dashboard continues to automatically refresh dashboard webpages due to the original refresh settings, possibly set by some browser plugins, while end users would discover the new data fetching behavior and stop refreshing webpages so often. The dogfood channel page view spike and drop are good indicators that there was a new feature release related to this behavior change.

(Ask the teacher whether to add conclusion at user-level)

**Recommendation**

1. We’ll need to discuss with dashboard engineering team to verify our assumption
2. For future feature releases that change user behaviors, we should broadcast the update before the release to relative teams so that it won’t surprise people