

DATA MINING

With

Playbook

Recordings from

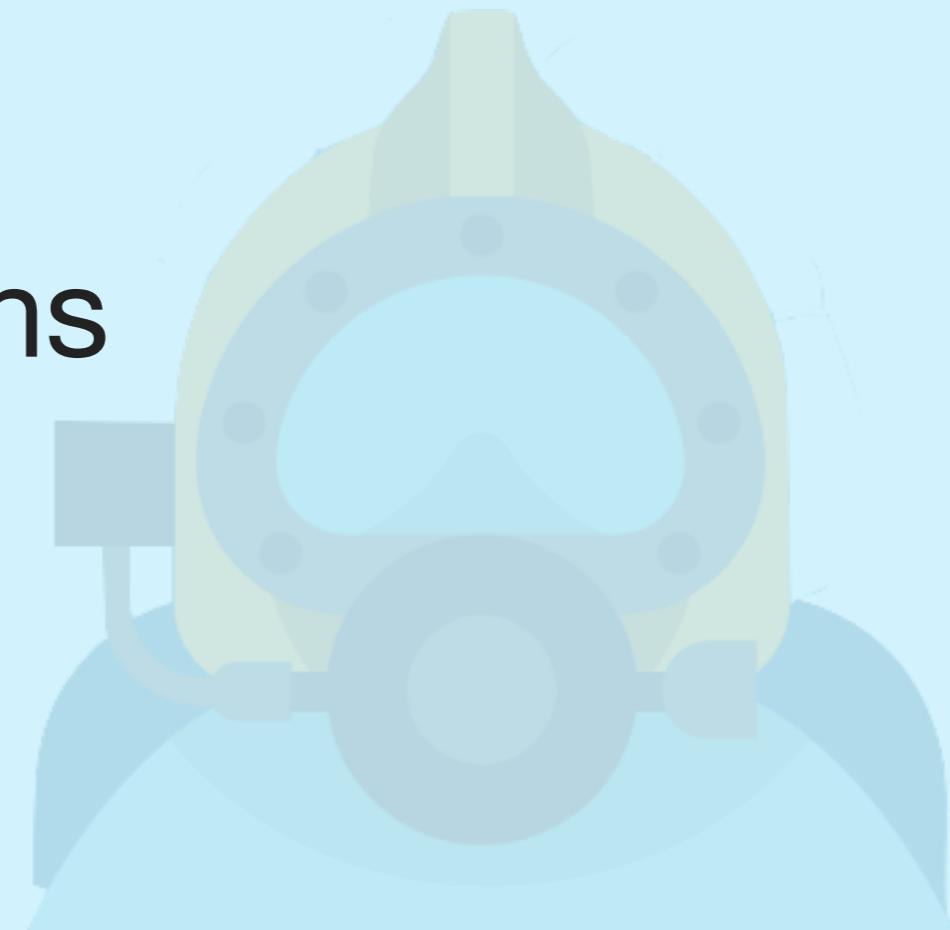
NEEMO 20

Katy Linn
General Assembly Data Science
January 21, 2015



AGENDA

- Background on Playbook and NEEMO
- Project Focus
- Exploration & Analysis
- Questions and Suggestions
- Conclusions



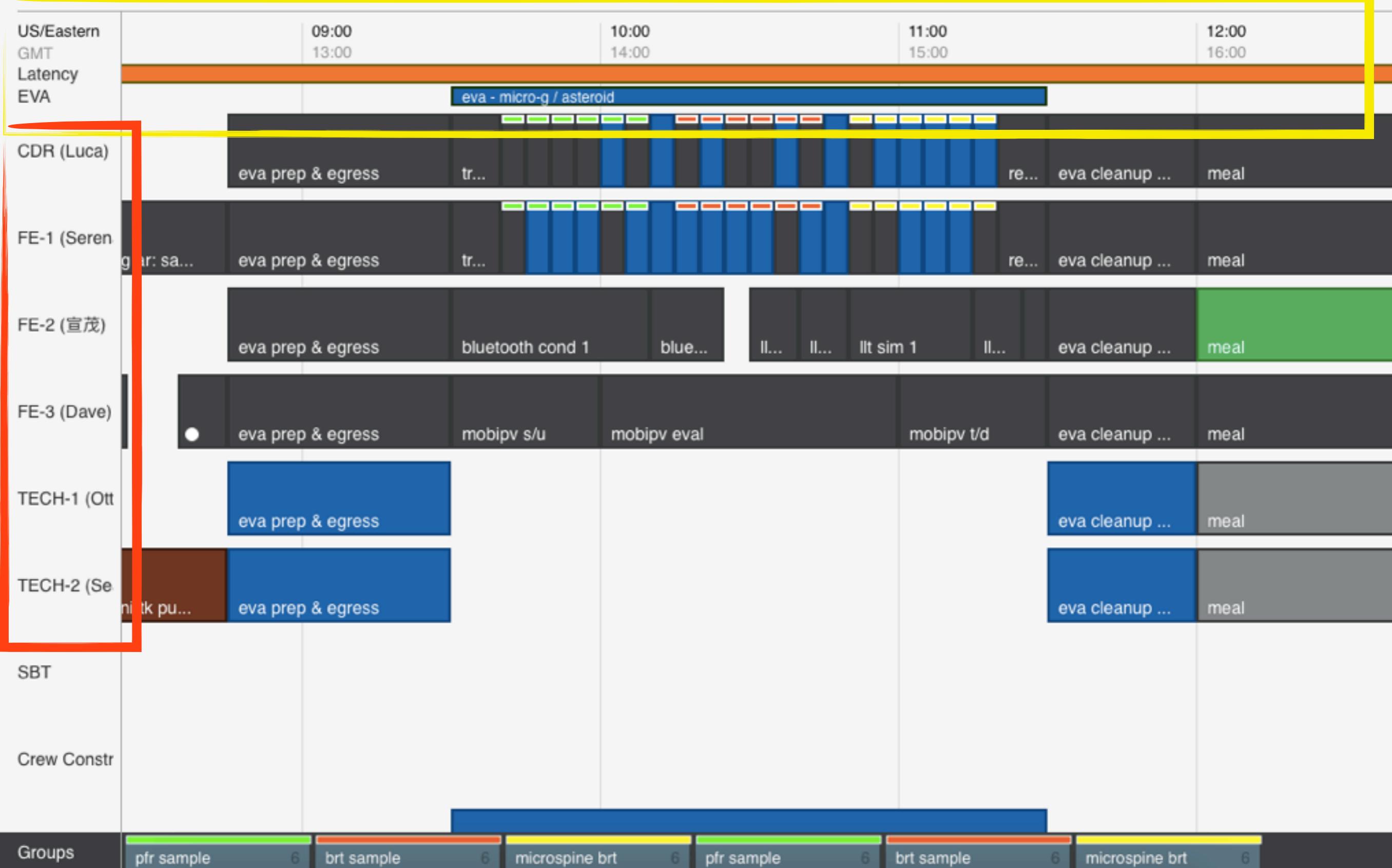
BACKGROUND

What is Playbook?

Tablet Application developed at NASA
that allows astronauts to

- **View Plans and Procedures**
- **Status Activities**
- **Send and Receive Messages**
- **Simulate Communication Delay****

≡ Playbook for NEEMO 20

[Zoom In](#)
[Zoom Out](#)
[MD2 ▾](#)


Playbook for NEEMO 20

Zoom In

Zoom Out

MD2 ▾

TECH-2 (Sean)



		09:00 13:00		10:00 14:00		11:00 15:00	
US/Eastern GMT Latency EVA							
CDR (Luca)				eva - micro-g / asteroid			
FE-1 (Seren... g ar: sa...	eva prep & egress	tr...					
FE-2 (宣茂)	eva prep & egress	tr...					
FE-3 (Dave)	eva prep & egress	bluetooth cond 1	blue...	ll...	ll...	llt sim 1	ll...
TECH-1 (Ott)	eva prep & egress	mobipv s/u	mobipv eval		mobipv t/d		
TECH-2 (Se... ni-tk pu...	eva prep & egress						
SBT							
Crew Constr							
Groups	pfr sample 6	brt sample 6	microspine brt 6	pfr sample 6	brt sample 6	microspine brt 6	

EVA Prep & Egress



08:45 to 09:30 (45 minutes)

Perform "5.401 N20 ALL EVA PROCEDURES"; all steps and appropriate hyperlinks at bottom of page per directions in "5.601 N20 EVA REAL-TIME DATASHEETS"

- 1) Download "5.601 N20 EVA REAL-TIME DATASHEETS" attached.
- 2) Save document with a unique name by appending the mission day, example: "5.601 N20 EVA REAL-TIME DATASHEETS_MD02" to Crew_Data > Datasheets-Completed > EVA
- 3) Open file and if prompted, Enable macros.
- 4) Perform tasks according to timeline on tab for the mission day and EVA; fill in all necessary fields in data sheet during execution of EVA, including start/stop times, ratings, and comments.
- 5) Periodically save document to Crew_Data > Datasheets-Completed > EVA

[5.401 N20 ALL EVA PROCEDURES \(RevI\)](#)

[5.601 N20 EVA REAL-TIME](#)

[DATASHEETS.xlsx](#)

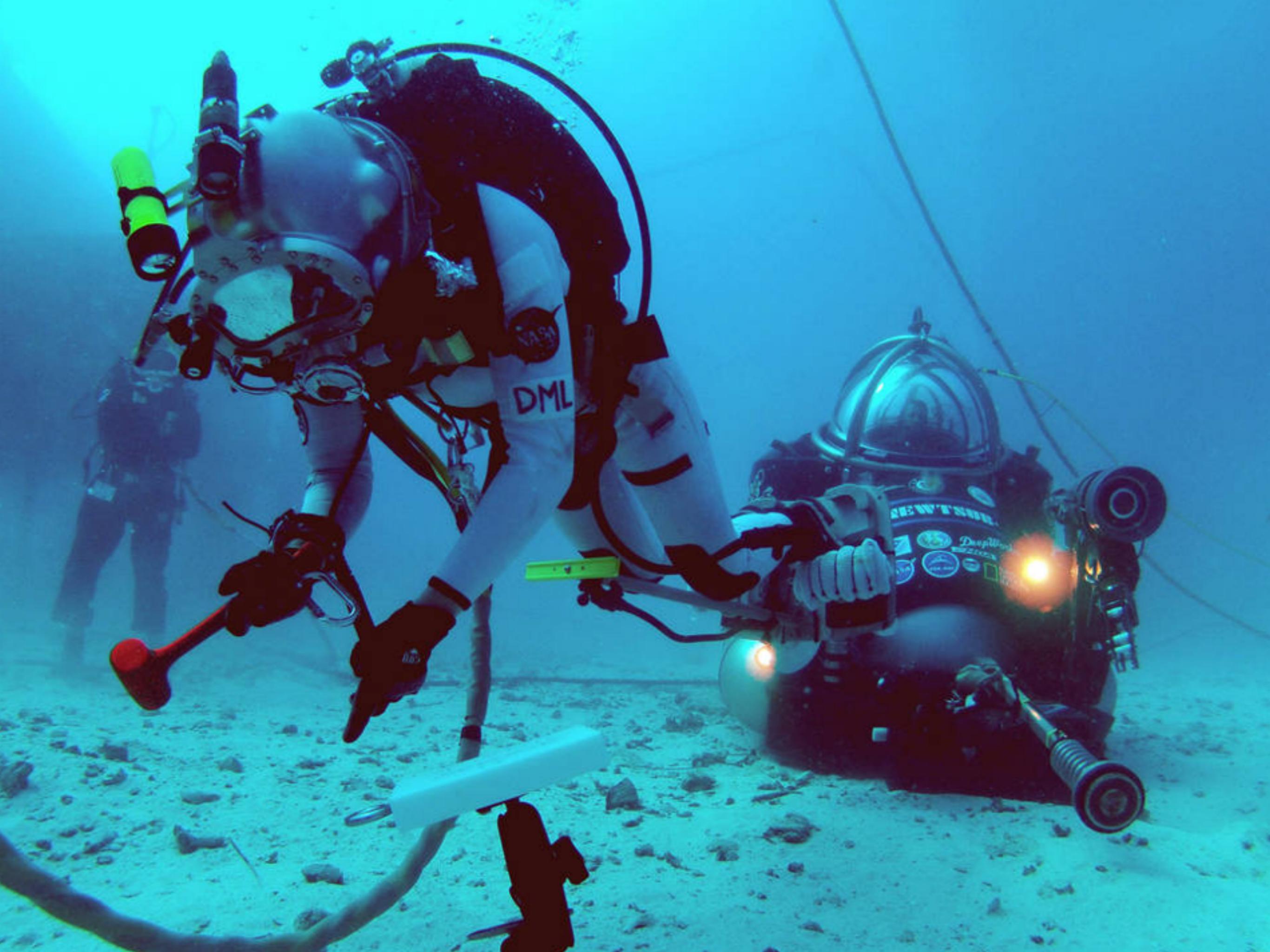
BACKGROUND

What is **NEEMO**?

- **Undersea Analog** NASA uses to test tools and techniques for future spacewalks
- Building a knowledge base on **delayed space communications** (crew to Ground/Mission Control)







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DATA

“Non-Intrusive Recording Logs”

- Generated from custom tool that records **DOM changes** and **user interactions**
- >900 files
- sample log



FOCUS

Examine **usage patterns** from Playbook
and **look for insights** that could inform
design improvements.

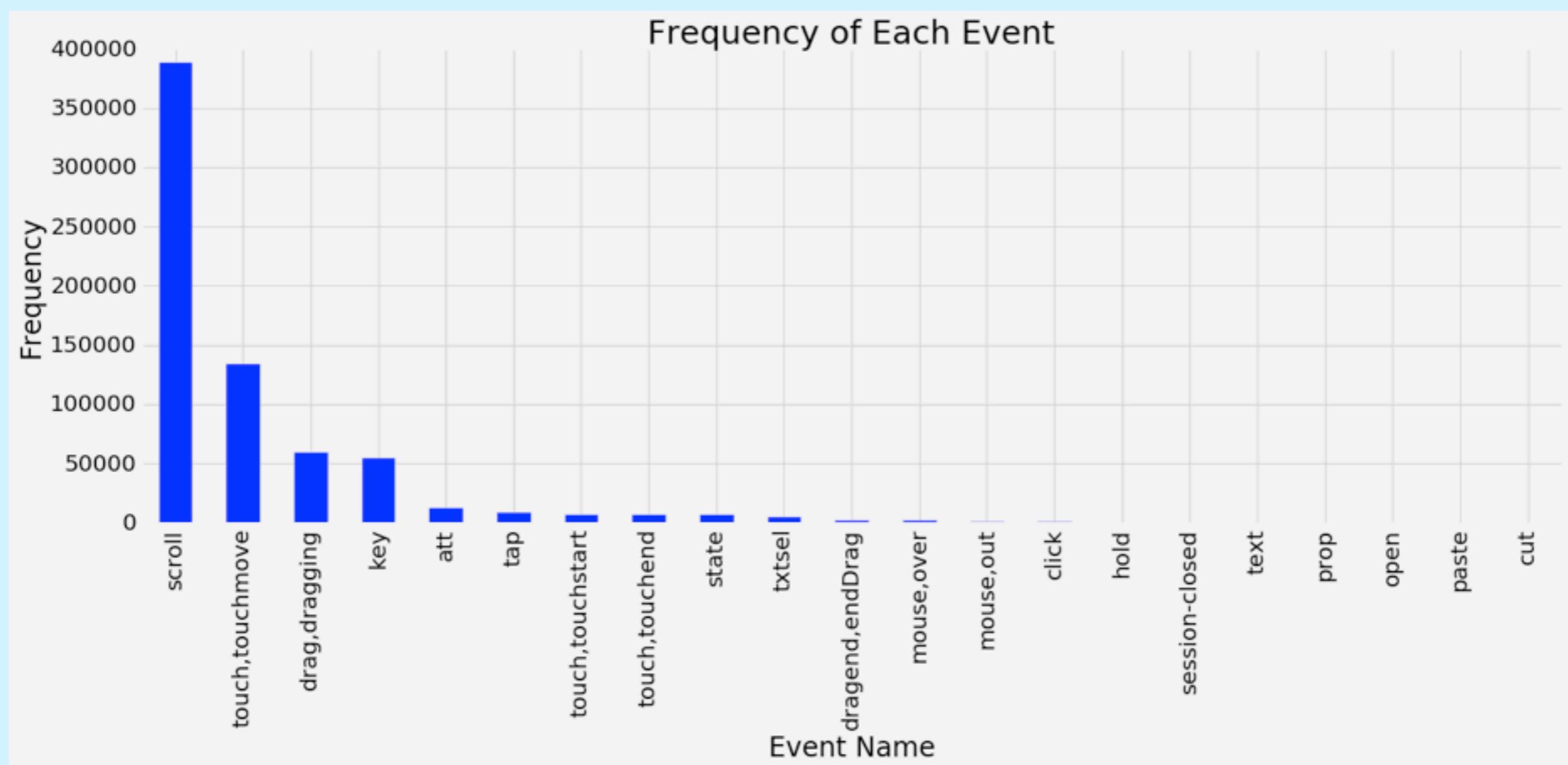


Quick Pause for Questions



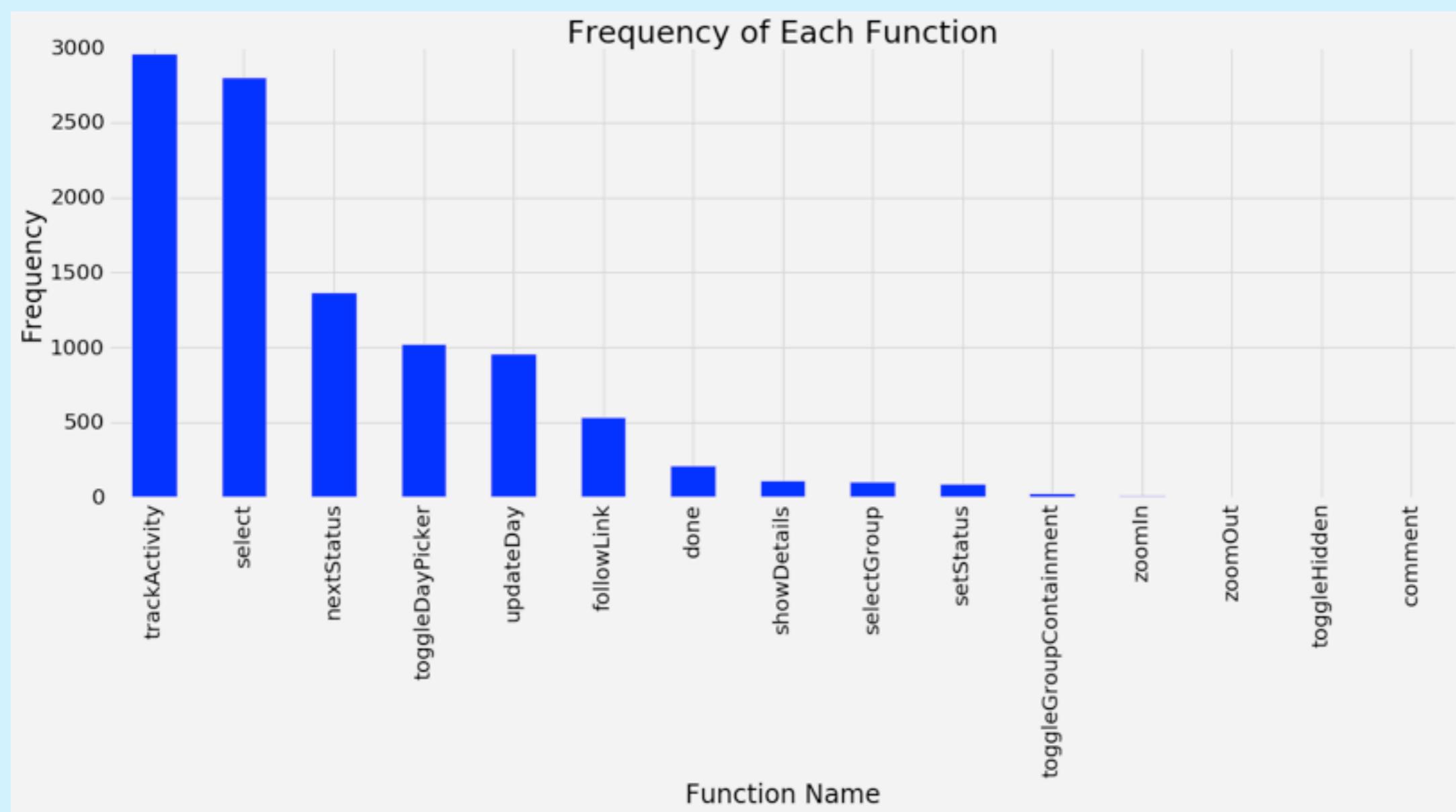
EXPLORATION

What are the most popular events?



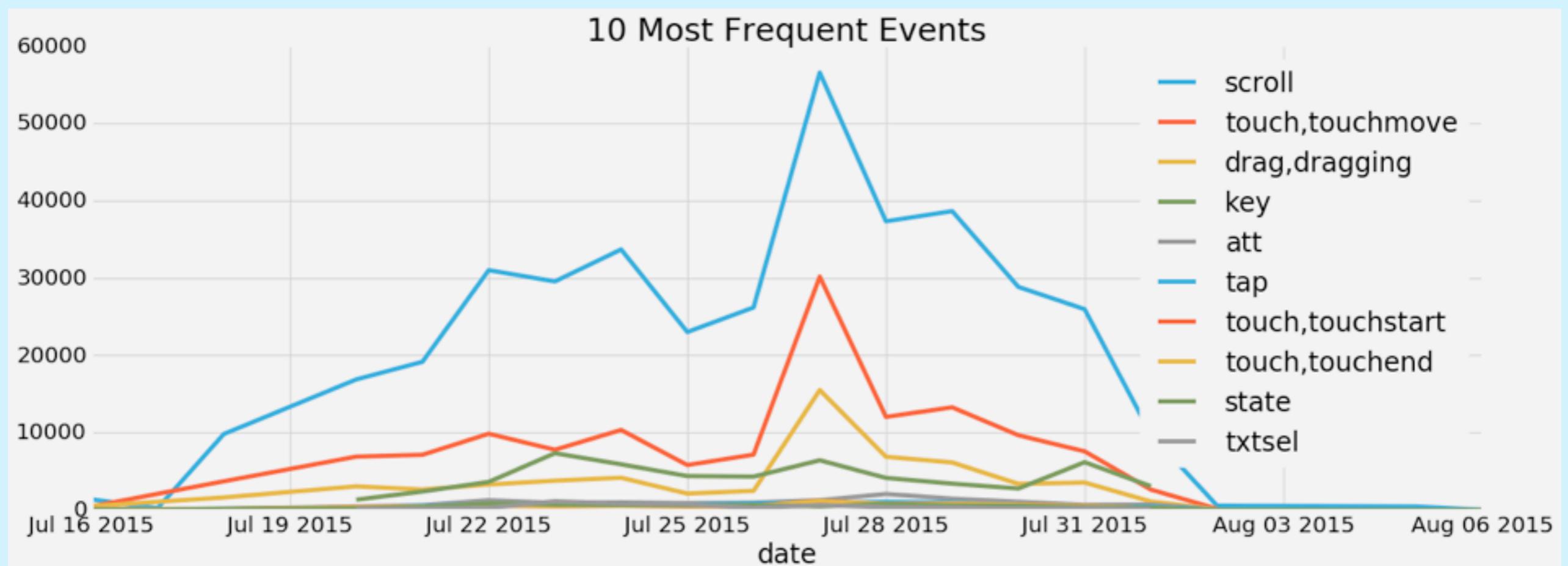
EXPLORATION

What gets clicked on the most?



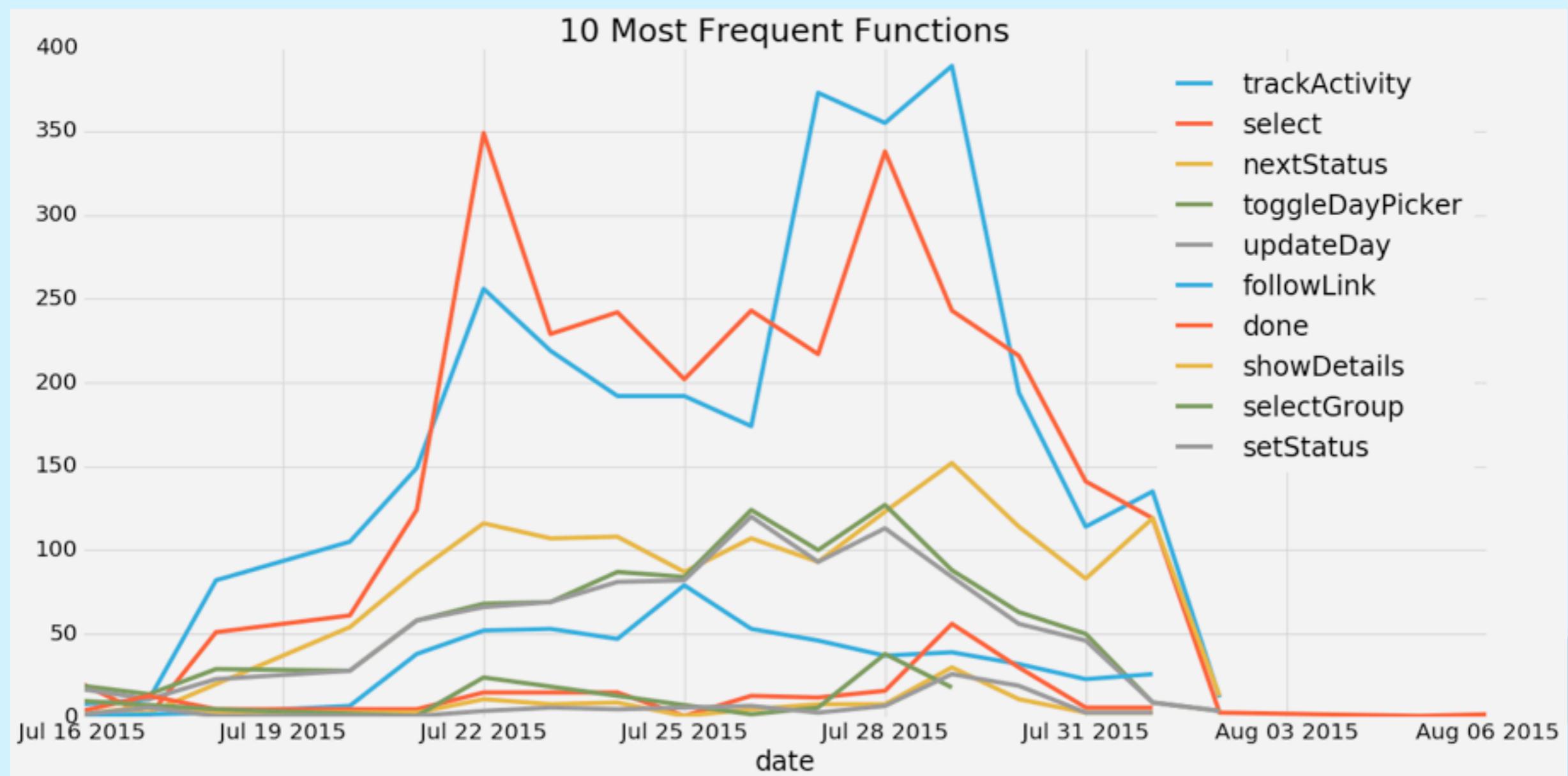
EXPLORATION

What does the data look like over time?



EXPLORATION

What does the data look like over time?



ANALYSIS

PART ONE:

Examining **Usage Patterns** Through **Click Rates**

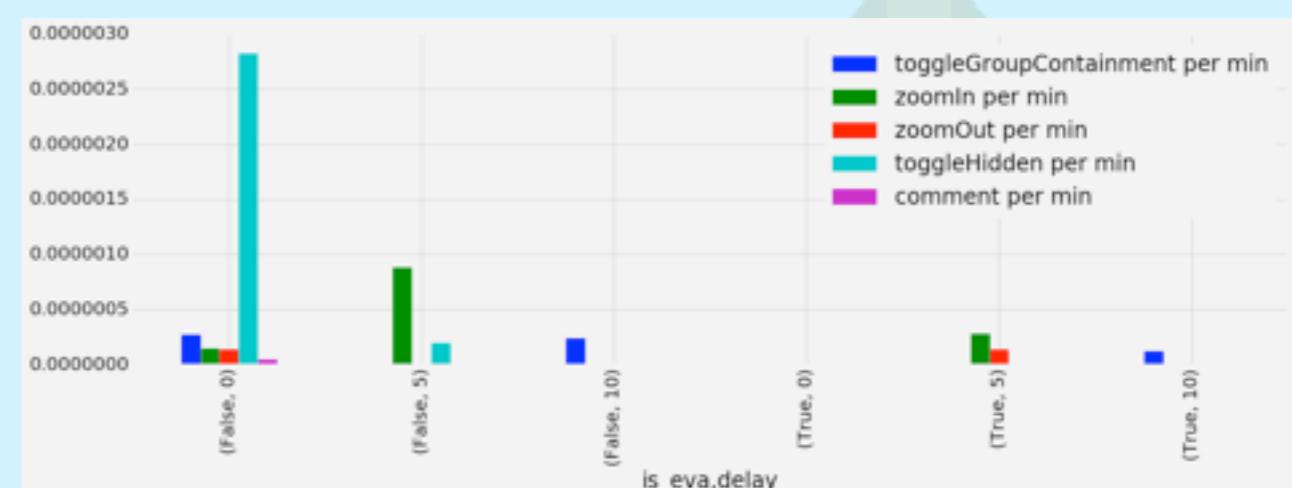
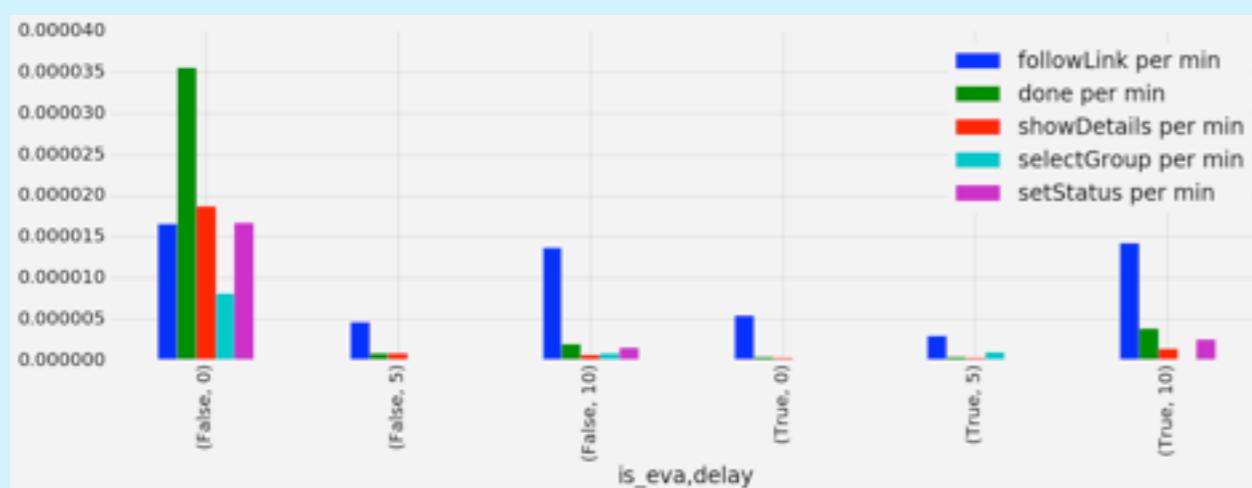
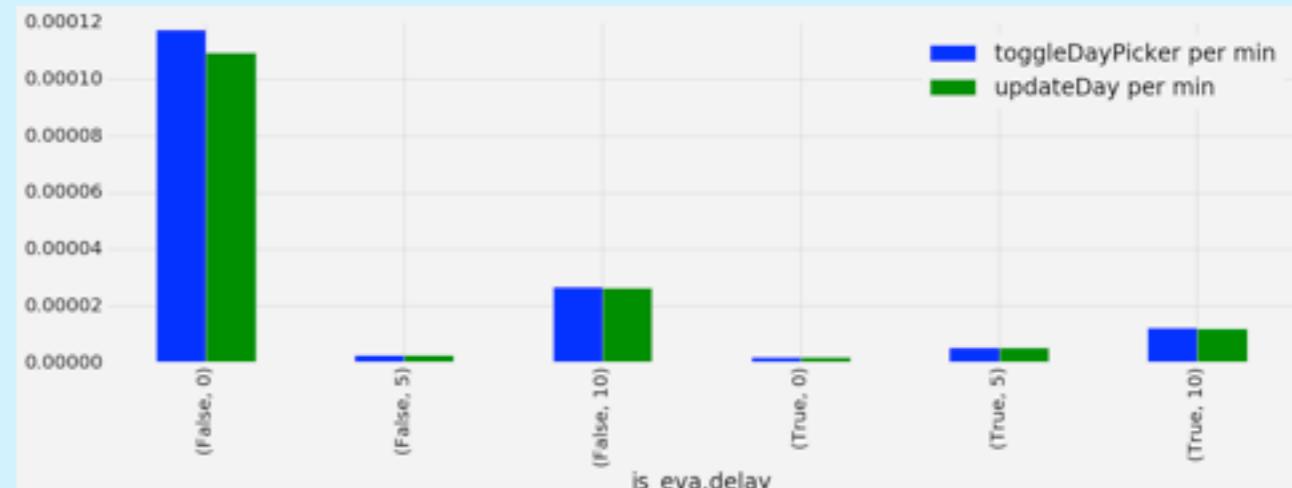
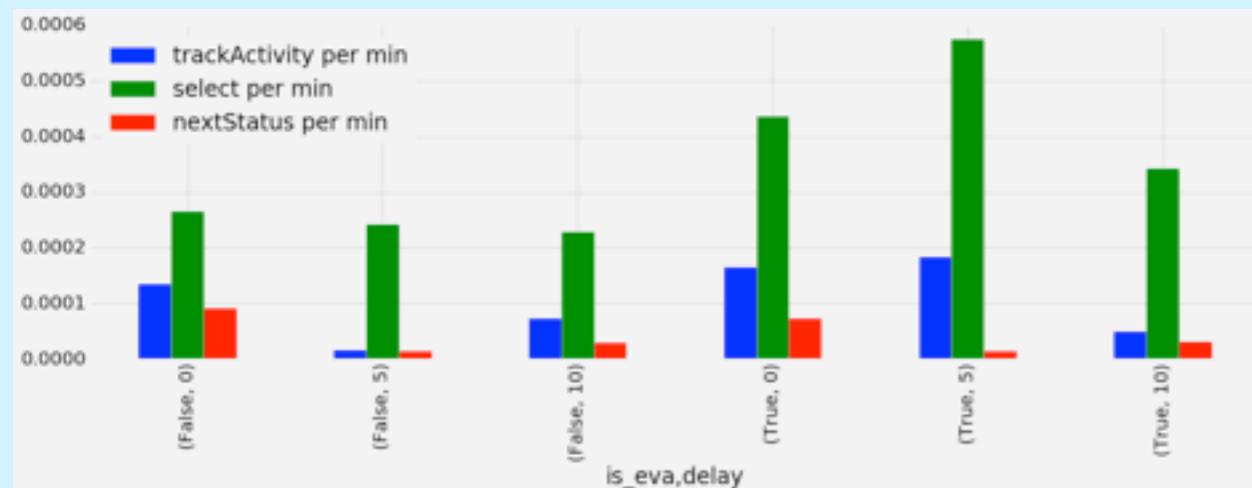
How does usage vary during:

- EVAs
- Time Delays



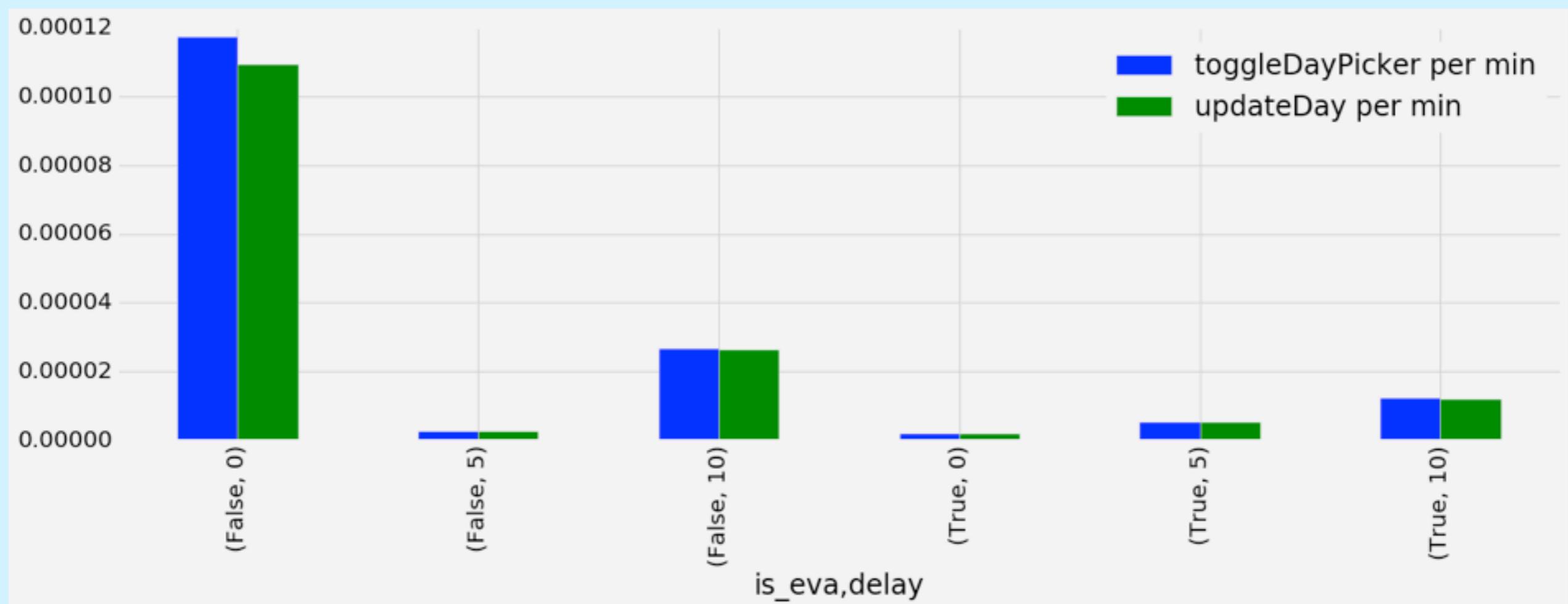
ANALYSIS

Mean click rates as a function of EVA and time delay



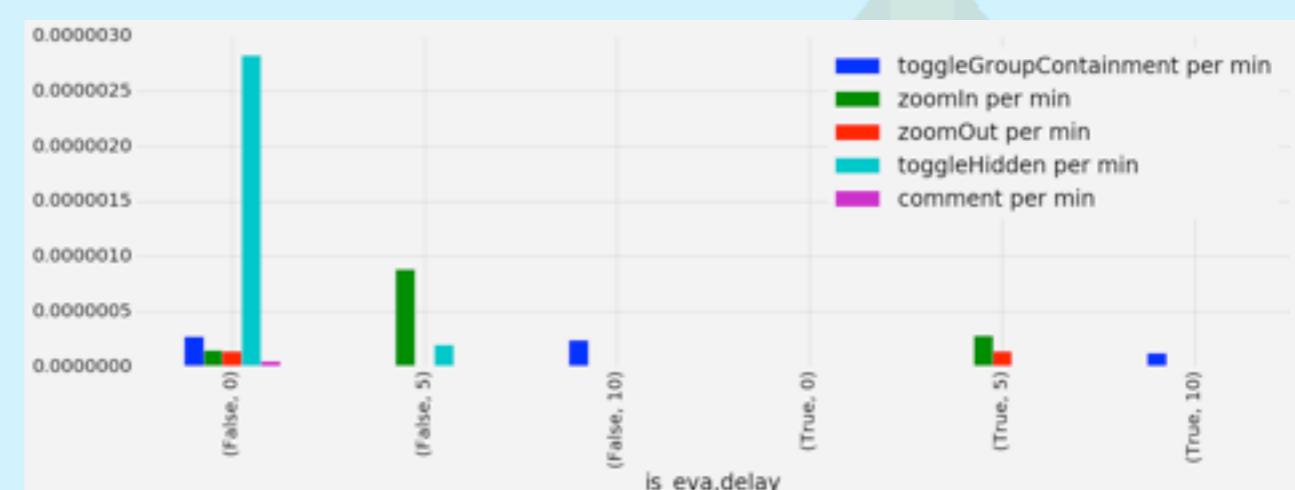
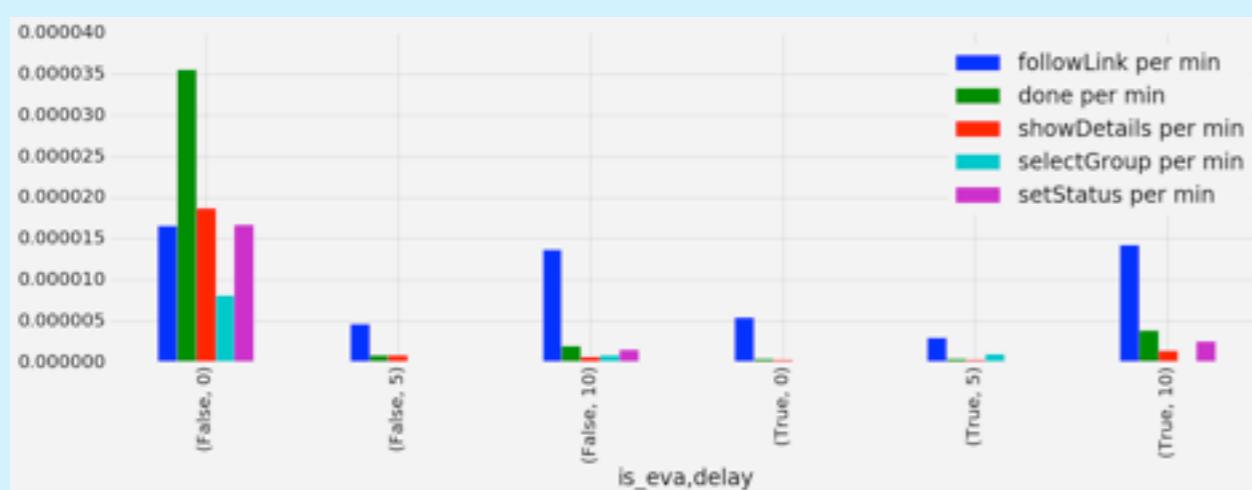
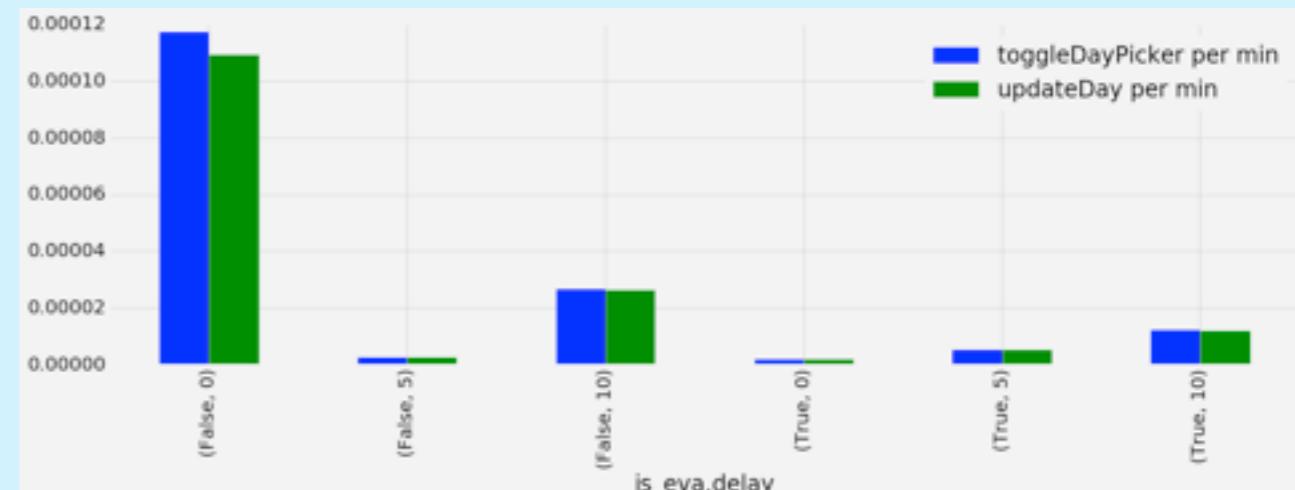
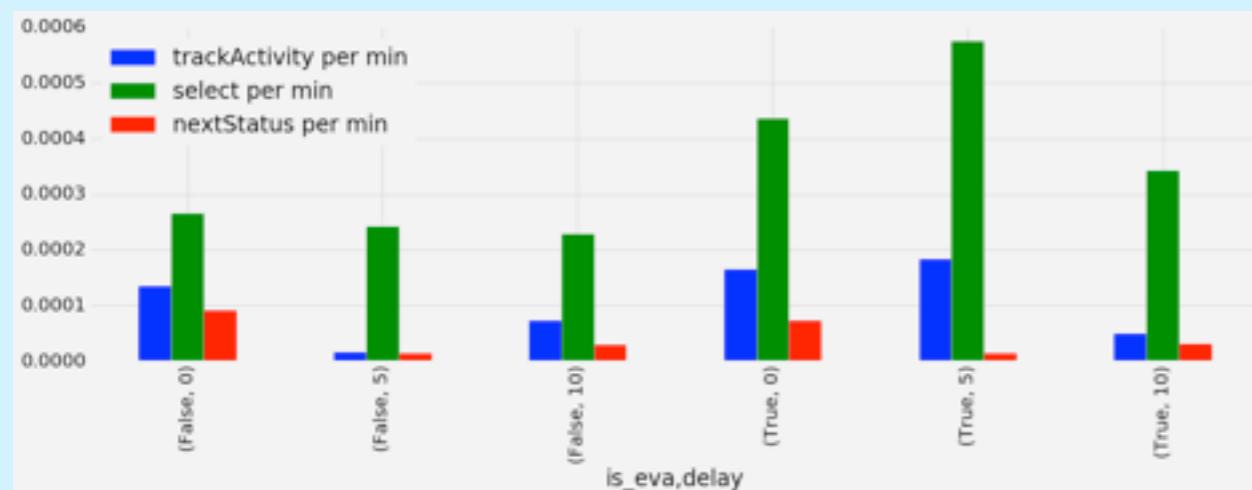
ANALYSIS

Mean click rates as a function of EVA and time delay



ANALYSIS

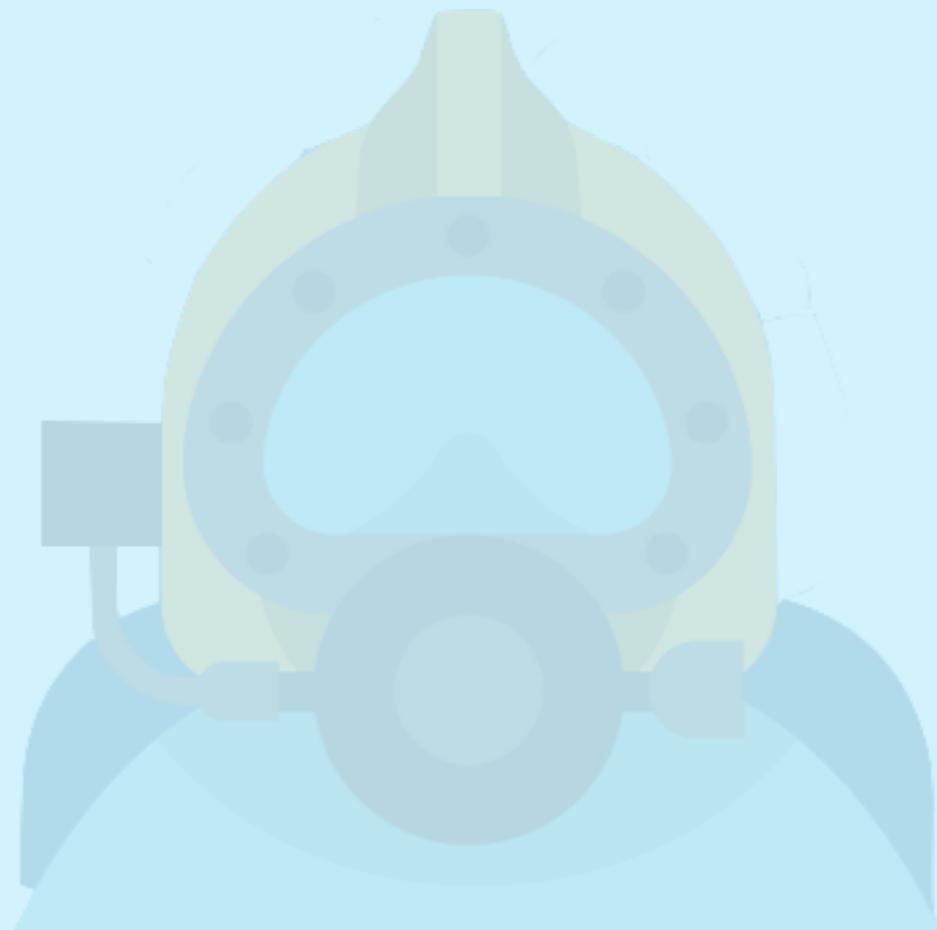
Mean click rates as a function of EVA and time delay



ANALYSIS

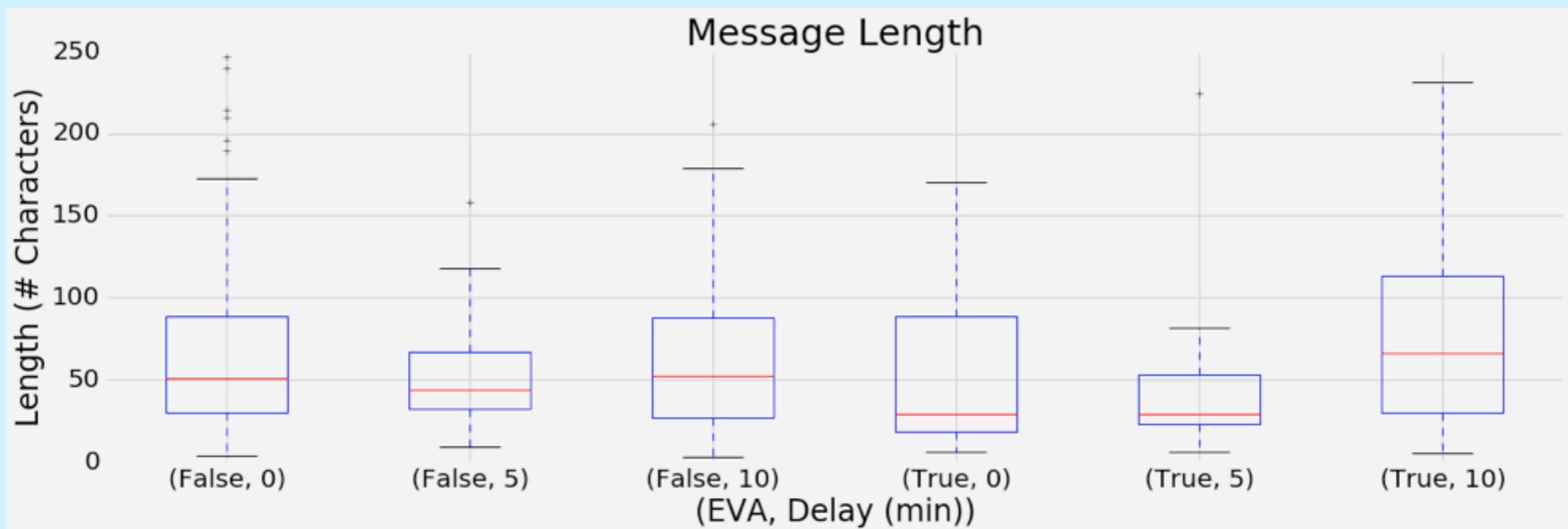
PART TWO:

Examining Patterns in Messages



ANALYSIS

Visualizing Message Length



ANALYSIS

Exploring Word Frequencies



ANALYSIS

Messages with “Copy” or “copy”

```
28483      'Copy MD1 14:37:44. That\'s hattin standby
29674      'Copy MD1 15:32:02. We\'re still getting elec...
32510      'Copy MD1 15:40:12. PC1 has been set up w/Wifi
92474      'Copy MD3 08:09:37. Now R/T channel is running...
118304     'Copy MD3 14:46:44. we\'ll pass the RPE and Di...
137339     'Re EVA: \n1. Copy that today is a dynamic m...
137665     'Copy MD4 07:40:50. \nRe NEEMO 20 NAS: I trie...
144695     'Copy MD4 10:39:00. I\'m so sorry for the conf...
155637     'Copy SBT background notes...I\'ll be sure the...
158009           'Copy MD4 07:55:49. Re: SBT notices
158440           'Copy notes on Boulder in zone 3'
158645           'Copy'
159200           'Copy for Zone 2'
160307           'Copy on acceptability'
161517           'Copy on EVA start time'
161636           'Copy on amendment to Zone 3'
176593           'Copy MD4 16:50:16. \nSure
183305     'Copy MD4 17:41:11. \nRe surface EVAs:\n1. 5....
189914     'Copy MD4 18:20:15. \n\nMD4 pictures;\nHave be...
190944     'Copy MD4 17:59:45. \nRe MD5 EVSs: Will there ...
200868           'Copy MD5 08:19:44. \nVESICULAR!!!'
201331           'Copy MD5 07:38:39. \nRe marine science tools
203578     'Copy MD5 13:58:08. \nFor data sheets: How do...
203687           'Copy MD5 14:28:31. \nYes
203799     'Copy MD5 14:42:04. \nI\'m having trouble with...
```



Questions and Suggestions



CONCLUSIONS

- **Undirected Data Mining is hard.**
- Code for **reproducibility** from the start
- **Tidy data** is a goal itself



THANK YOU

- Fellow Students
- General Assembly
- Jim Byers

