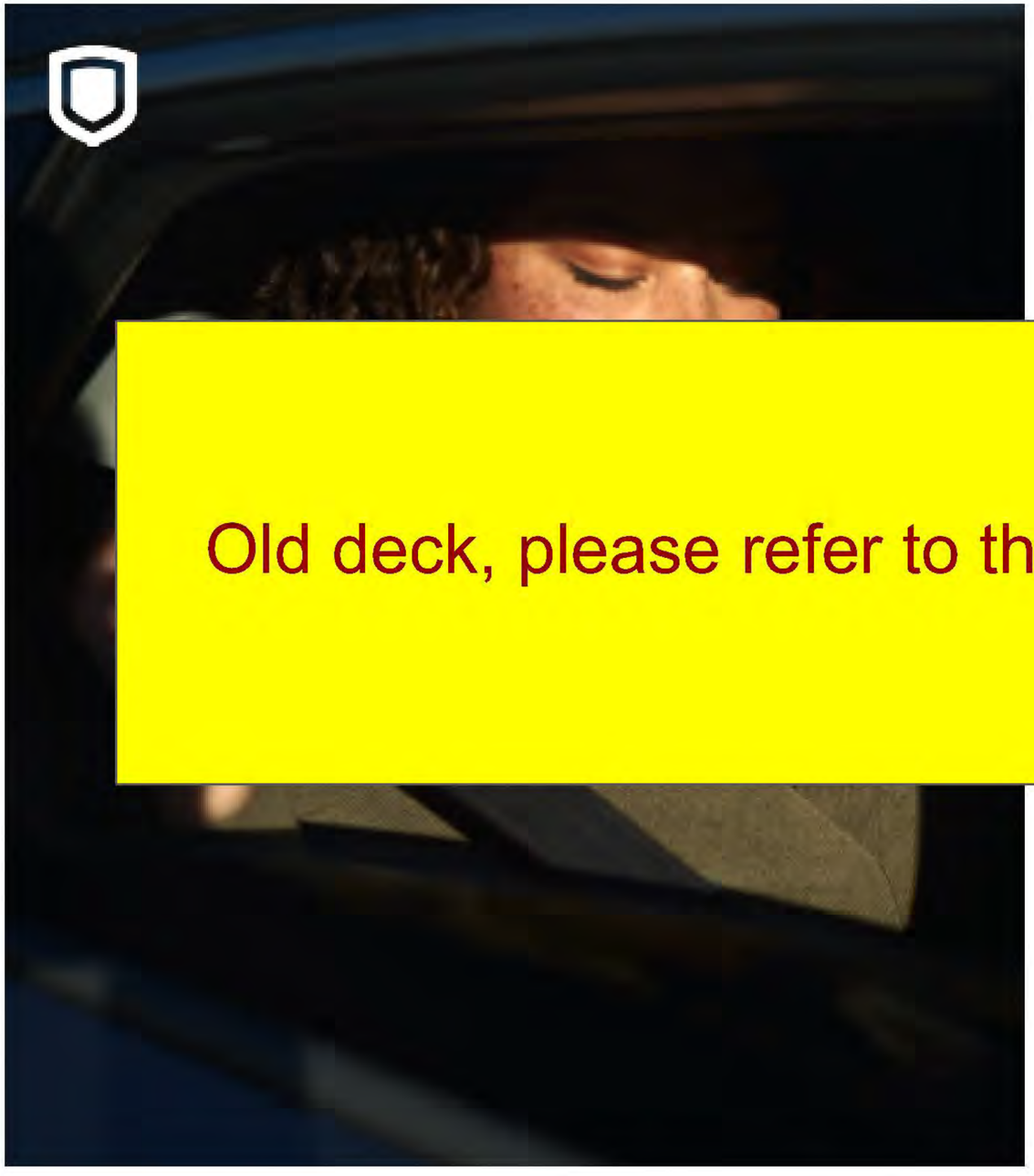


S-RAD

NGRV NIGH GOLDENBERG RASO & VAUGHN

Old deck, please refer to the new deck for latest updates

Leadership Update

Uber

Trial Exhibit No.
P-01366

March 6

CONFIDENTIAL

Agenda

01 S-RAD Product type issue & recommended next steps

02 Status update on S-RAD MEA expansion (pre-read)

03 H1 Roadmap + SDM Updates (pre-read)

Goal for today: Inform / Align

Inform Gus on S-RAD progress and recent developments

Suggestion: Move to quarterly cadence

CONFIDENTIAL UBER_JCCP_MDL_003274195

P-01366.00003

01 S-RAD Product type issu

[redacted]

ATTORNEY-CLIENT PRIVILE

CONFIDENTIAL

Executive Summary

Issue | S-RAD was found to be active beyond UberX trips, impacting other Mobility products (e.g. Moto, Mid-Tier, Black, UberXL, Flash) in all active markets (with 20% holdout). This issue has existed since 2020 (since S-RAD 1st XP). S-RAD has been turned off for those non-UberX products on Jan 10th.

Safety & Marketplace Impact | The analysis indicates there was meaningful safety benefit with minimal marketplace impact for non-X Mobility products.

- Incident Rate Reduction is 11.8%; more specifically, 10.9% for UberX and 14.8% for Non-X products.
- Marketplace impact varies across regions, with most results being within the bounds of previously accepted marketplace impact (less than a 3% increase in ETAs and less than 1% decrease in C/R).

Safety Tech Recommendation | Current version of S-RAD has the potential to cover all Mobility products using the existing models and intervention. We recommend re-launching S-RAD to non-X products:

- Brazil, United States, and ANZ : without changes (including Moto).
- Rest of Latam and IN: Separate score threshold.

Looking Forward | Decision to not invest in a Moto-specific version of S-RAD now, but rather re-launch and then train a new Global Model that addresses all product types (including Moto) while adding new features possibly including guest rides, account sharing, and driver rating.

ATTORNEY-CLIENT PRIVILEGED

S-RAD was found to be active beyond UberX trips in all active markets since the 1st XP in 2020

Why this happened?

- S-RAD client code made an assumption - Only UberX traffic would be sent to it.



- S-RAD data model also filtered out the data for all other product types so request data was limited to global_product_name = UberX.
- No real time metrics/alerts with product type data.

How to avoid this in the future?

- Real time metrics and alerts with product type data
- Creating a union of all S-RAD active regions and products in the data model alongside any

S-RAD XP & Launches Timeline

Context	Region	Date
Experimentation Phase 1 (<10% trips compared to 2023) [Product Type Issue is introduced]	Brazil, US	January 2020
Switchback Experiments (<50% trip volume in Brazil) (<5% trip volume in US)	Brazil,US	July 2021
First Rollout	Brazil, US	July 2022
S-RAD LATAM Rollout	LATAM (excluding Brazil)	February 2023
S-RAD ANZ/IND Rollout	ANZ,IND	July 2023
S-RAD MEA/CA Rollout	MEA,CA	December 2023
Product Issue Identified	All Regions	December 23, 2023
Product Issue Fixed	All Regions	January 10, 2024

EY-CLIENT PRIVILEGED

Slide 6 Notes

- Hardcoded global_product_name to UberX.
- The request was sent uScorer always with UberX as global_product_type.

S-RAD was effective at preventing Serious SA/SM in UberX and non-X while producing minimal marketplace impact.

- Incident Rate Reduction was larger for non-X trips despite relatively lower flagging rate and intervention efficiency when compared to UberX.

	Baseline (IR Holdout)	Serious SA/SM Incident Rate Reduction	Downranking Efficiency	Flagging Rate
non-X	6.40	14.8%	71.7%	0.93%
UberX	5.87	10.9%	78.4%	1.04%
Overall	5.98	11.8%	77.0%	1.01%

- Marketplace impact is comparatively larger than UberX but within the pre-agreed ranges of previous SRAD XPs

Metric*	Brazil		United States		LatAm (excl. BR)		India		ANZ		Success Criteria
	Baseline	Rel. Effect (%)	Baseline	Rel. Effect (%)	Baseline	Rel. Effect (%)	Baseline	Rel. Effect (%)	Baseline	Rel. Effect (%)	
P95 Post dispatch ETA	599.75	0.50%	731.62	-	707.75	0.49%	517.93	0.91%	619.69	1.65%	< +3.0%
P99 Post dispatch ETA	688.64	0.50%	809.71	-	894.37	0.65%	589.53	1.18%	729.9	1.23%	< +3.0%

Within pre-agreed ranges
-: No stat-sig impact
* No stat-sig impact on C/R and Avg Post dispatch ETA

ATTORNEY-CLIENT PRIVILEGED

Slide 7 Notes

Scope: all active markets, excluding MEA and CA due to recent launch
Safety analysis period: Oct 2023 to Jan 2024
Marketplace analysis period: Oct 2023 to Nov 2023

S-RAD is effective at preventing Serious SA/SM in Moto while producing minimal marketplace impact.

- Incident Rate Reduction was larger for Moto trips despite relatively lower intervention efficiency when compared to UberX.

	Baseline (IR Holdout)	Serious SA/SM Incident Rate Reduction	Downranking Efficiency	Flagging Rate
Moto	15.11	12.6%	69.0%	1.41%
UberX	5.87	10.9%	78.4%	1.04%

- Marketplace impact is comparatively larger than UberX but within the pre-agreed ranges of previous SRAD XPs.

Metric	Brazil		LatAm (excl. BR)		India		Success Criteria
	Baseline	Rel. Effect (%)	Baseline	Rel. Effect (%)	Baseline	Rel. Effect (%)	
P95 Post dispatch ETA	685.77	-	776.5	1.23%	434.87	1.23%	< +3.0%
P99 Post dispatch ETA	786.86	-	885.41	1.10%	548.56	-	< +3.0%

Within pre-agreed ranges
-: No stat-sig impact
* No stat-sig impact on C/R and Avg Post dispatch ETA

ATTORNEY-CLIENT PRIVILEGED

Slide 8 Notes

Scope: all active markets, excluding MEA and CA due to recent launch
Safety analysis period: Oct 2023 to Jan 2024
Marketplace analysis period: Oct 2023 to Nov 2023

Serious SA/SM Incident Rate Reduction by market

UberX vs non-X comparison:

Metric	Brazil		United States		India	
	Baseline (IR)	Rel. Effect (%)	Baseline (IR)	Rel. Effect (%)	Baseline (IR)	Rel. Effect (%)
Incident Rate Reduction non-X	11.24	-12.7%	7.14	-33.2%	3.19	-6.7%
Incident Rate Reduction UberX	4.38	-10.2%	8.56	-10.4%	2.78	*

*Low Serious SA/SM sample size in ANZ, LatAm (exc. BR) and India (UberX) in the analyzed period

Metric	Brazil		India	
	Baseline (IR)	Rel. Effect (%)	Baseline (IR)	Rel. Effect (%)
Incident Rate Reduction Moto	20.4	-15.0%	10.5	-11.6%
Incident Rate Reduction UberX	4.38	-10.2%	2.78	*

ATTORNEY-CLIENT PRIVILEGED

Slide 9 Notes

Scope: all active markets, excluding MEA and CA due to recent launch
Safety analysis period: Oct 2023 to Jan 2024
Marketplace analysis period: Oct 2023 to Nov 2023

Recommendation #1: Based on safety performance and marketplace impact results, we recommend rolling out S-RAD to non-X products in existing S-RAD markets.

Launch set-up

- **Brazil, US, and ANZ :** re-launch S-RAD to non-X products without changes (including Moto).
- **Rest of LatAm + IND:** launch S-RAD to non-X products using a separate score threshold for better flagging rate management.

Launch ETA: TBD (pending Ops approvals)

Monitoring plan:

- Using the existing holdout infrastructure, analyze marketplace metrics when the re-launch reaches 4 weeks to see if levels remain within expected range;
- If there are no unexpected results, keep monitoring every 4 weeks as we normally do for UberX;
- If unexpected results are observed, conduct a deep dive analysis and inform regional stakeholders of diagnostic and recommendations.

ATTORNEY-CLIENT PRIVILEGED

Recommendation #2: Repurpose resources from planned Moto-focused work to broader model performance improvement efforts

Scope of effort would include:

1. Retrain Model with Fresher Data	2. Explore New Features
The model was originally trained with primarily UberX and has shown to perform quite well on non-UberX. With fresher data that has a more representative mix of product types, we would expect better model performance.	The current production model has not had new features added since initial launch. Our plan is to explore new features guided by ticket reading with a focus on driver to rider SA risk signals such as guest rides, driver ratings, and account sharing.

ATTORNEY-CLIENT PRIVILEGED

2024 OKRs and goals were defined assuming that S-RAD was active for UberX-only

OKR	Jan 2024		2024 H1 goal
	Baseline*: UberX-only	Actual: UberX + Moto	
Global Estimated Prevented Incidents (UberX+Moto) (3mmw)	**3.3%**	**4.3%**	5.5%
Moto Global Incident Coverage (1mmw)	**0%**	**98.4%**	41.0%

* Projection

If S-RAD is fully rolled out to UberX and Moto (based on Jan data):

- **On track:** Moto Global Incident coverage goal
- **At risk:** Estimated Prevented Incidents goal - 1.2p.p. below target;
  - UberX expansion to MEA and Canada might have additional impact
  - **Dependency**: The enhancement of the global model (recommendation #2).

ATTORNEY-CLIENT PRIVILEGED

02 Status update on S-RAD MEA expansion

@Margalit

[redacted]

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Feb ‘24 Progress in UberX Incident Coverage

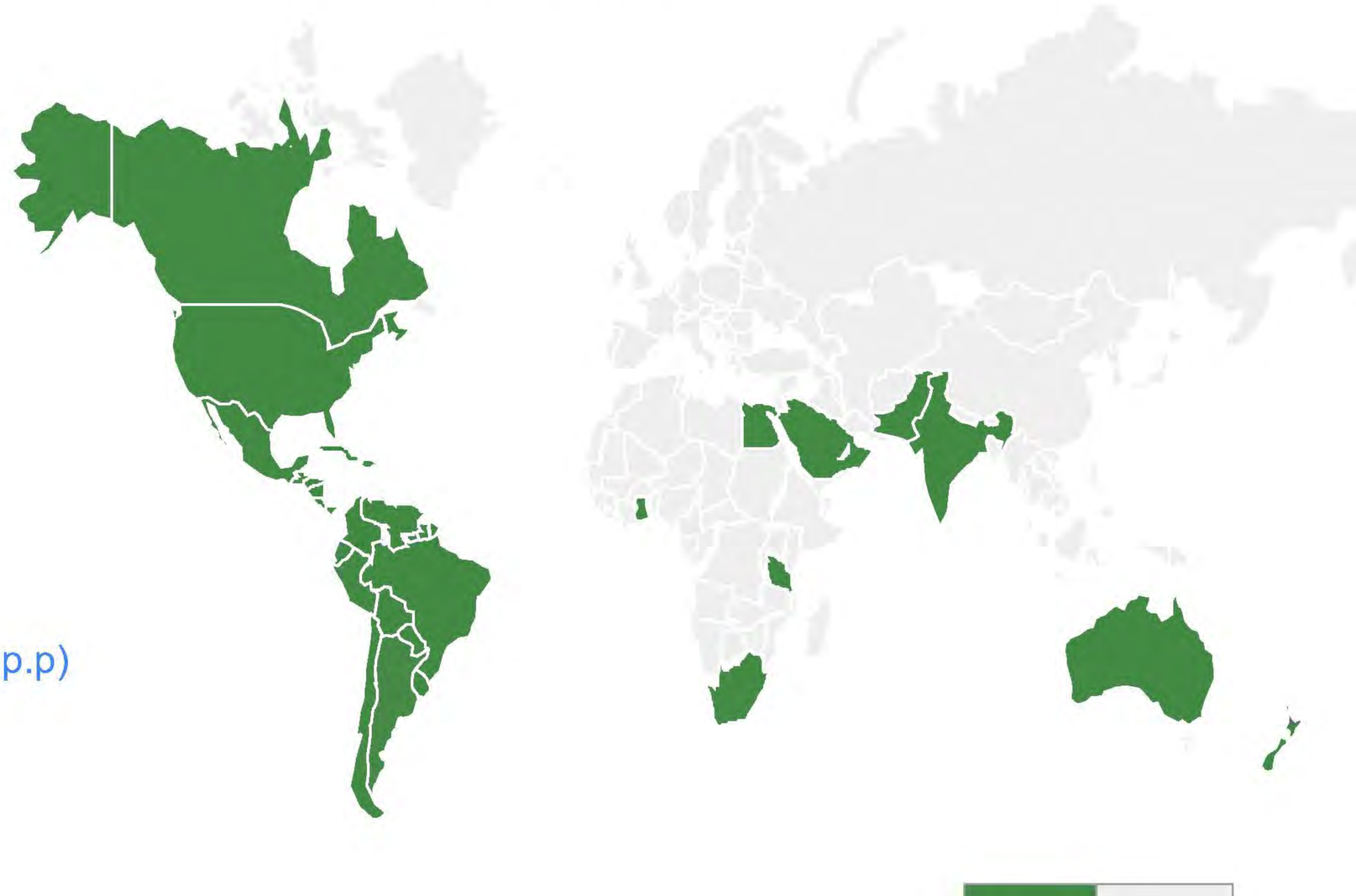
88.0%

Serious SA/SM Incident Coverage
(Jul ‘23: 79.5%)

Expansions use S-RAD Global model

Dec‘23 - CA Launch (+2.5 p.p)

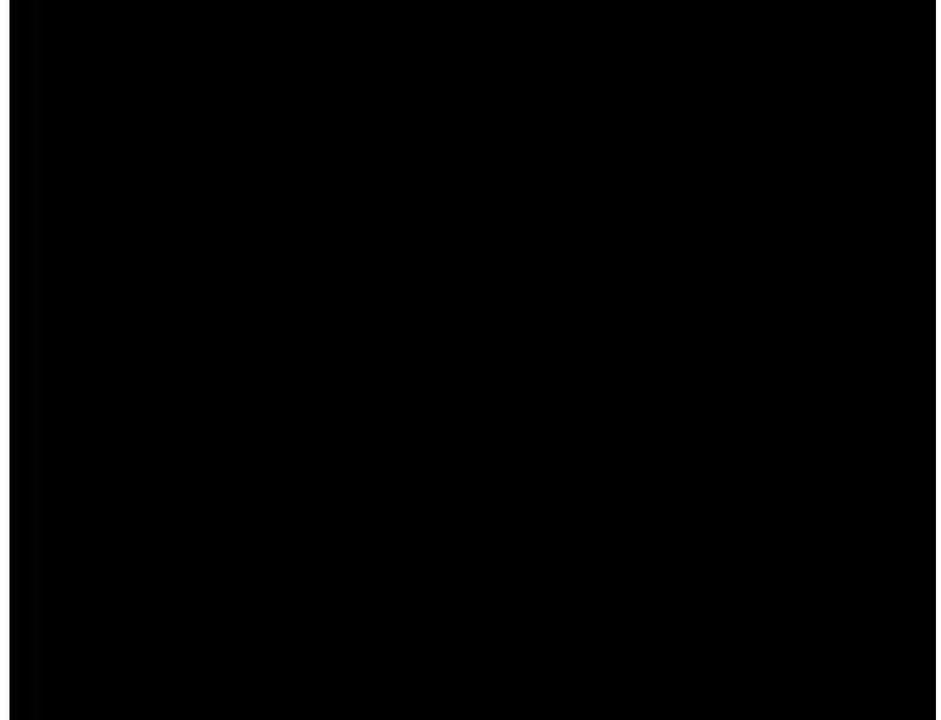
Dec‘23 - Jan'24 - MEA Launch (+4.5 p.p)



ATTORNEY-CLIENT PRIVILEGED

03 H1 Roadmap + SDM Updates

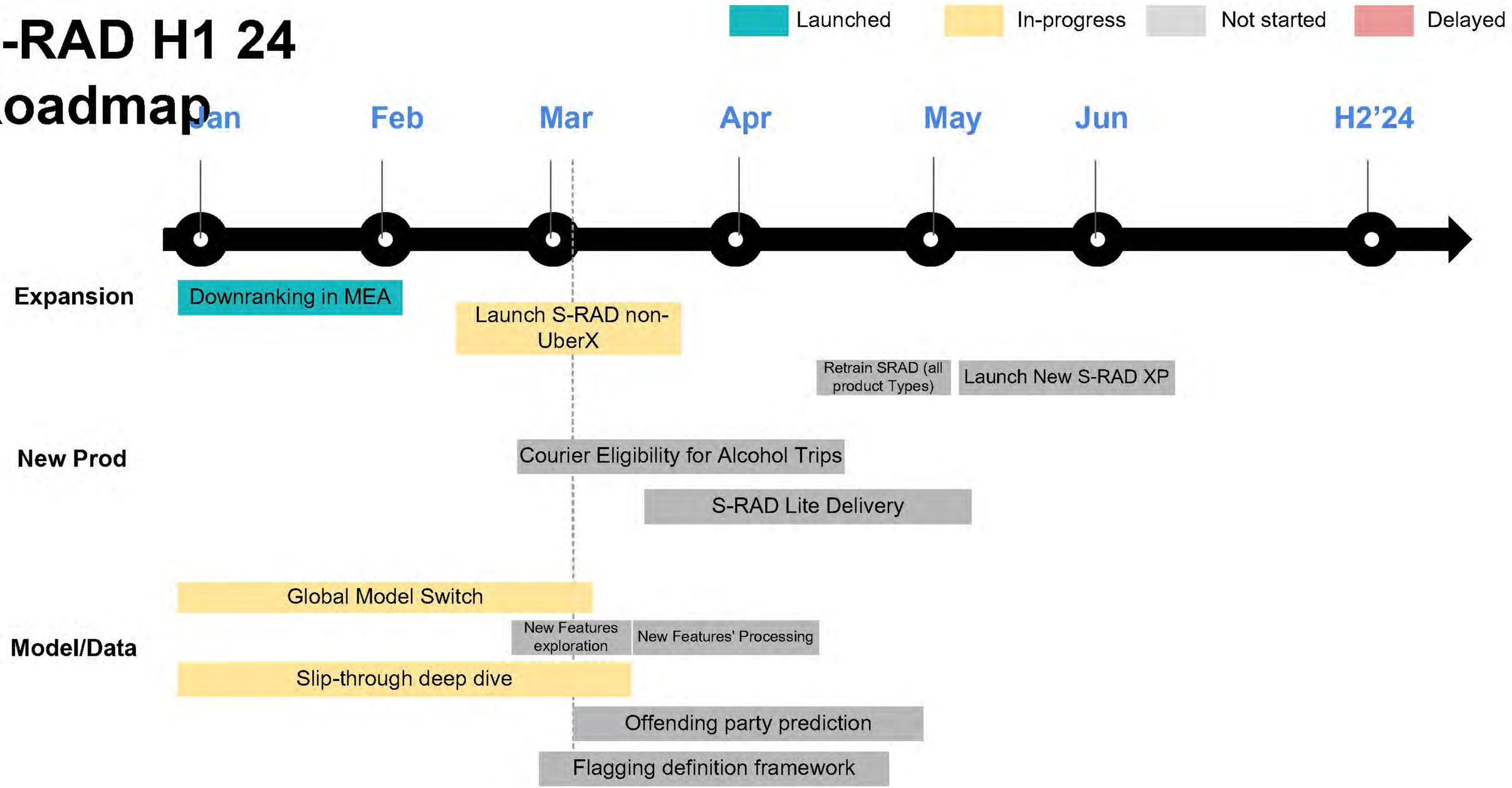
@Mariana



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

S-RAD H1 24 Roadmap

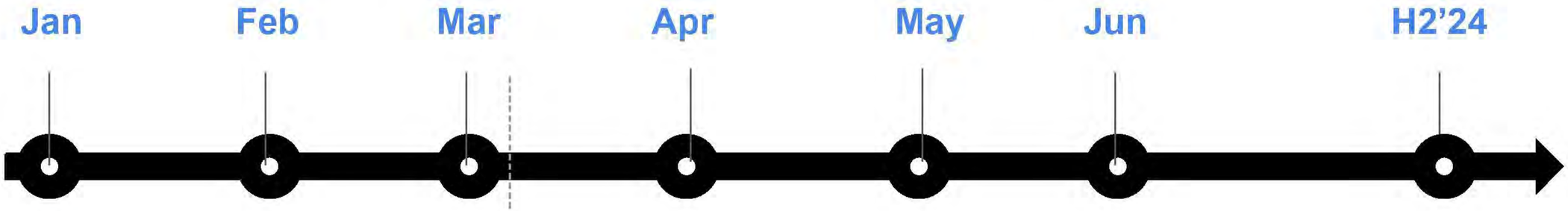


Uber

ATTORNEY-CLIENT PRIVILEGED

SDM H1 24 Roadmap

Launched | In-progress | Not started | Delayed



Expansion

BR & MX non-cash launch (already in the sprint) V4

SDM Everywhere XP

New Prod

Delivery SDM Model

Courier Protection Intervention

SDM v5

Delivery SDM XP & Production

Model/Data

New features exploration - Dormant accounts ,multi-destination, connected payments and devices

IPC type prediction

Session level flagging

Science Ex: SLA metrics

Science Ex: New model evaluation plots

Uber

ATTORNEY-CLIENT PRIVILEGED

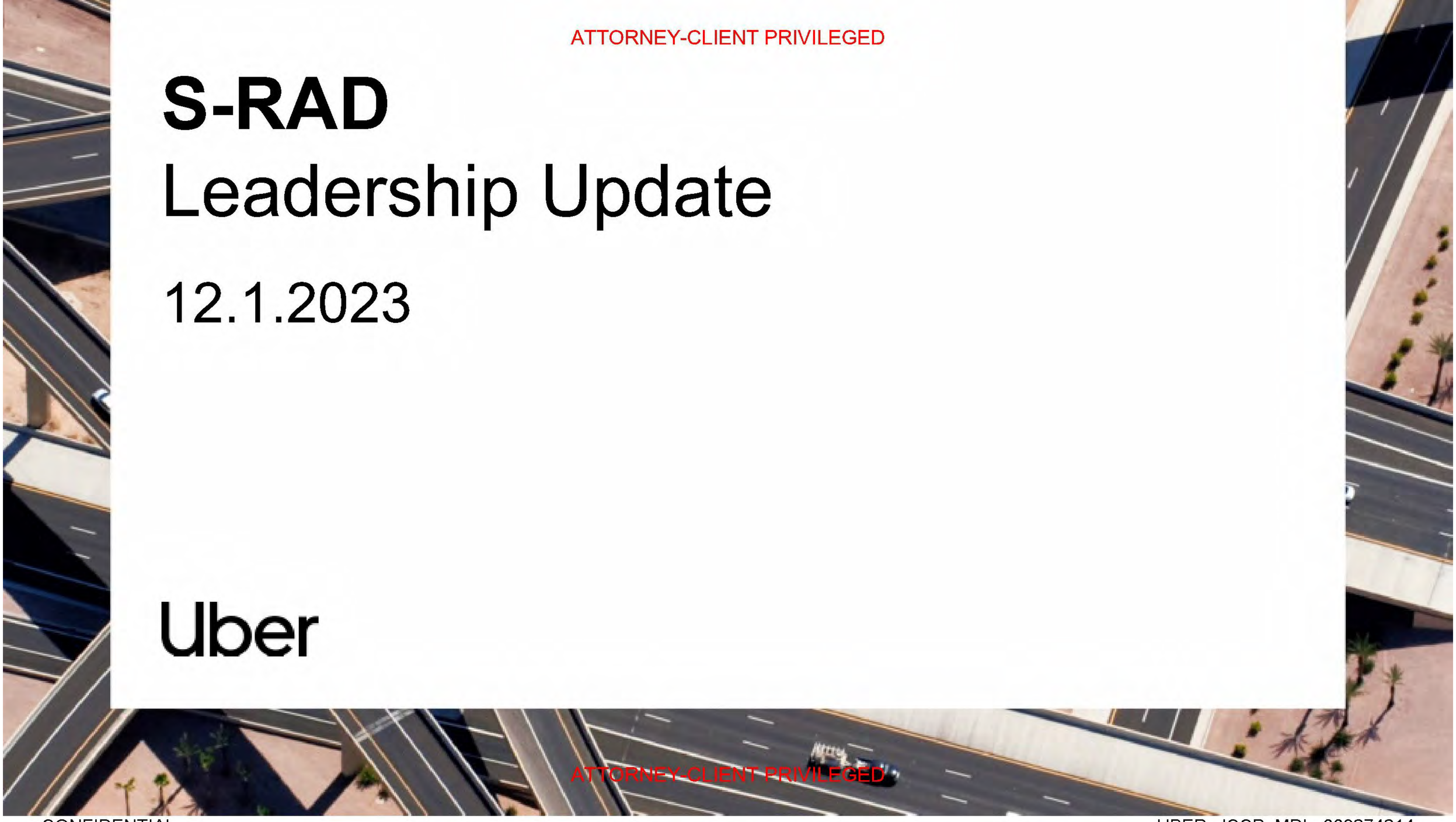
ATTORNEY-CLIENT PRIVILEGED

S-RAD

Leadership Update

12.1.2023

Uber



ATTORNEY-CLIENT PRIVILEGED

01 S-RAD H2 ‘23 Progress

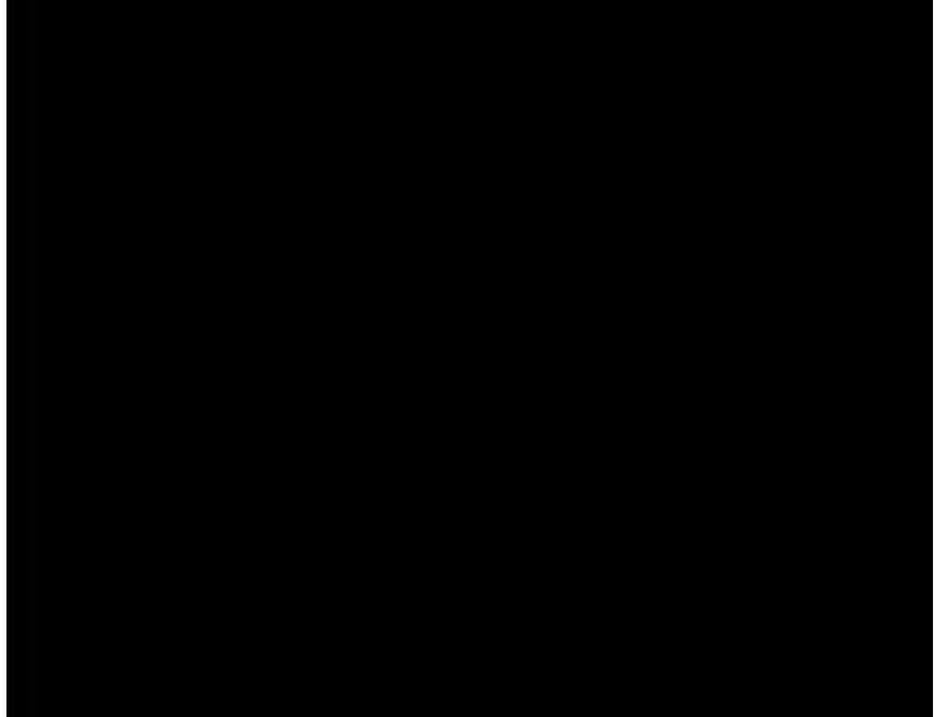
02 H1 ‘24 Big Rock - S-RAD Moto

03 H1 ‘24 Big Rock - New Model Features(pre-read)

04 H1 ‘24 Big Rock - S-RAD Lite for Delivery

01 S-RAD H2 ‘23 Progress

@zoe



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274216

H2 ‘23 Progress in UberX Incident Coverage

83.9%

Serious SA/SM Incident Coverage
(Jan ‘23: 51%, H2 Goal at 81%)

Expansions outside of LATAM use S-RAD Global model

Mar ‘23 - SSL LATAM Launch (+18 p.p)

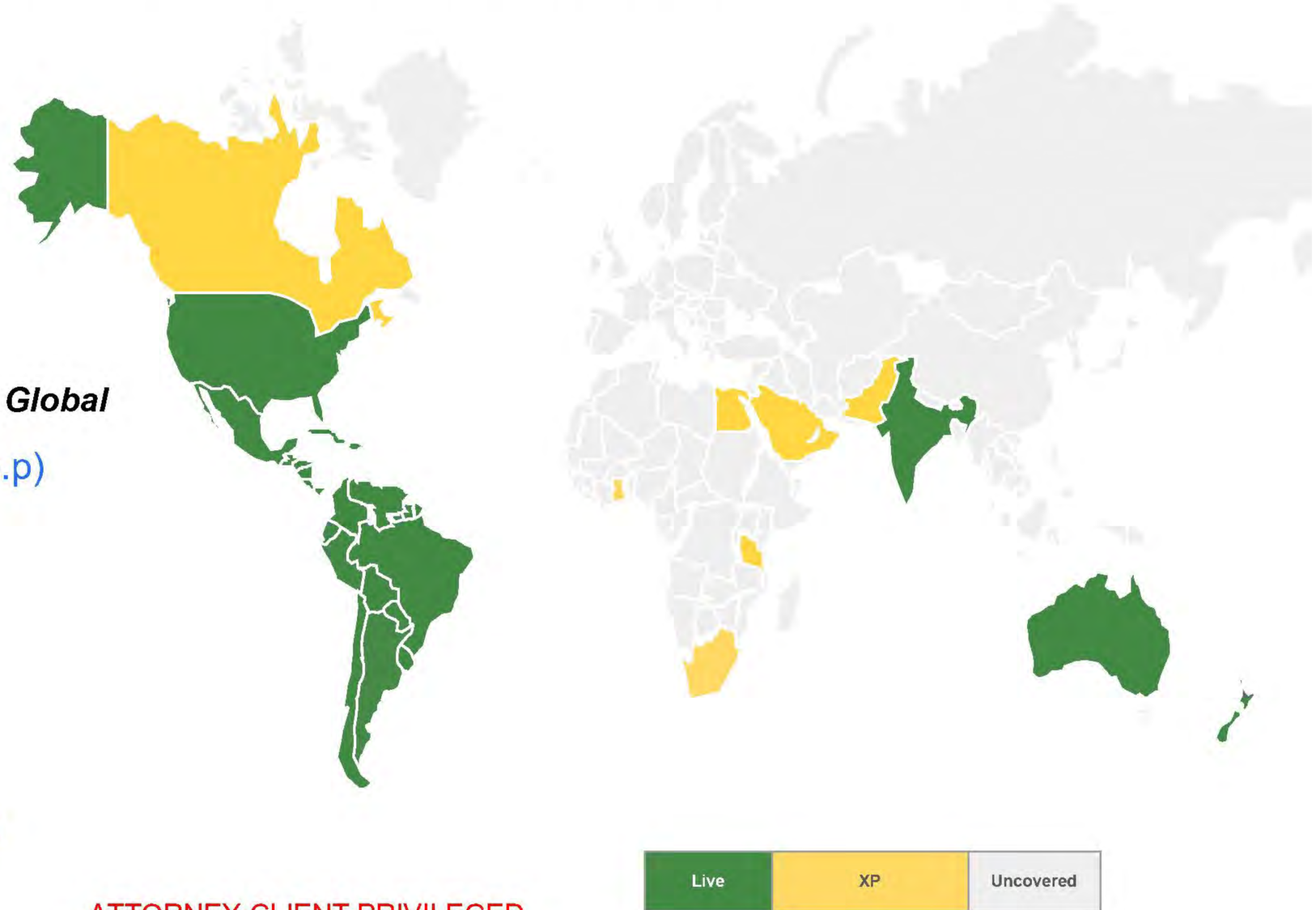
July ‘23 - ANZ Launch (+4.4 p.p)

July ‘23 - IND Launch (+2 p.p)

Dec‘23 - CA Launch (Est. +2.5 p.p)

Dec‘23 - MEA Launch (Est. +4.5 p.p)

* based on Oct ‘23 OKR



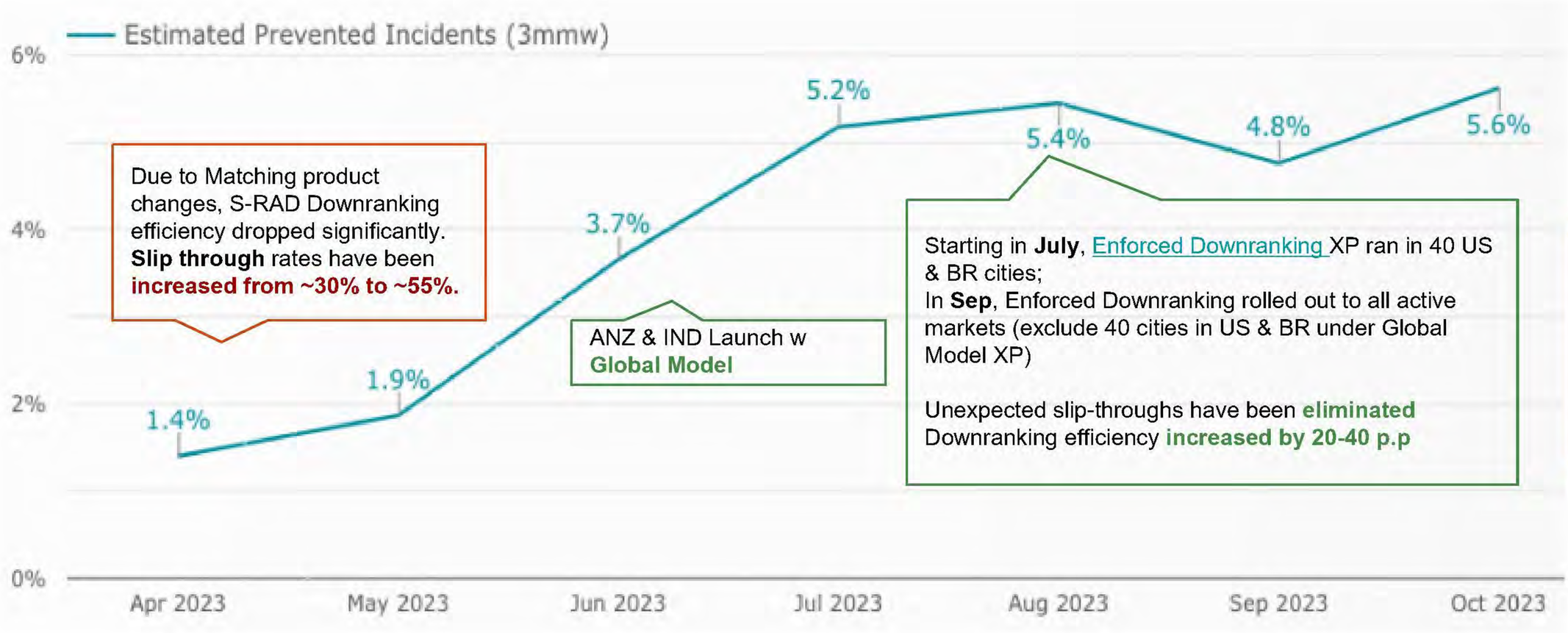
ATTORNEY-CLIENT PRIVILEGED

H2 '23 Progress in Safety

5.6%

% Prevented Incidents(Global)*
measured by 20% holdout

[Global view Dashboard]



Dec '23: Switch to Global model in the US and BR
Potential model performance improvements to further **increase Safety benefits**

* based on Oct '23 OKR, using 3 months window

ATTORNEY-CLIENT PRIVILEGED

Dec'23: CA and MEA Expansion - XP Design

- XP is structured as a **standard 2-week switchbacks** with 96-min switches
  - 11 cities selected in CA, XP ran from 10/23 to 11/6;
  - 15 cities selected in MEA, XP ran from 10/9 to 10/23
- XP is using **Global S-RAD model**
- XP is using **Enforced Downranking** as the intervention

Offline Model Performance

Region	Trigger rate	Global model recall
Canada	1.25%	**19.8%**
EMEA - MEA	1.25%	**17.0%**
US Baseline	1.25%	19.2%

† Recall = # serious SASM incidents flagged / # total serious SASM incidents
Recall computed using all non S-RAD actioned, UberX trips with valid driver_uuid; MEA uses data from 2022-11-01 to 2023-01-31; CA uses data from 2022-11-01 to 2023-02-28

ATTORNEY-CLIENT PRIVILEGED

Dec'23: CA and MEA Expansion - Readout

- Marketplace impact is negligible in both regions and meets success criteria
  - Both Day and Night impacts are within expected range
- Fairness testing data is not available for these 2 regions
- Lower downranking efficiency observed in MEA, driven by higher % of "N-Least Risky" slip throughs.
  We still **recommend to launch S-RAD** for any fraction of Safety benefits. Meanwhile, the team will re-evaluate "N-Least Risky" setting and flagging allocation in H1 '24

Metric	Success Criteria	Canada	MEA
Marketplace Metrics			
C/R	< -1.0%	-0.005%	**-0.268%**
Average Post dispatch ETA	< +2.0%	-0.16%	**+0.739%**
P95 Post dispatch ETA	< +3.0%	+0.46%	**+1.198%**
P99 Post dispatch ETA	< +3.0%	+0.67%	+0.711%
Intervention			
Downranking Efficiency	> 60%	79.9%	56.7%

Stat Significant
Positive or within expected range
Not within expected range

ATTORNEY-CLIENT PRIVILEGED

Global Model Switch in US and BR

- Wave 1 XP shows negligible marketplace impact, when pairing with soft-filtering. However, the Downranking efficiency is very low (~20-30%)
- Wave 2 XP has been rolled out with Enforced Downranking so S-RAD can function at its best. The team will re-do Marketplace analysis and Fairness tests
- Target to roll out Global model in **all US and BR cities in Dec '23**

ATTORNEY-CLIENT PRIVILEGED

Dec'23: Global Model Switch in US and LATAM

Public Policy update: we can evolve our research and external engagement strategy to account for global model in US.

As the model changes, we intend to take the following steps to mitigate any impact to the credibility of external partner research:

- **Updating fairness impact assessment with ORCAA** [originally completed in 2020, update underway]
- **Update safety and fairness data used for replication / public-facing research** [not completed, underway. To consider whether we should delay until model switch?]
- **Ensure our narrative acknowledges how responsible AI and model development evolves**, and explain Uber's principles in this area [ongoing]

ATTORNEY-CLIENT PRIVILEGED

02 H1 ‘24 Big Rock: Moto S-RAD

@jake

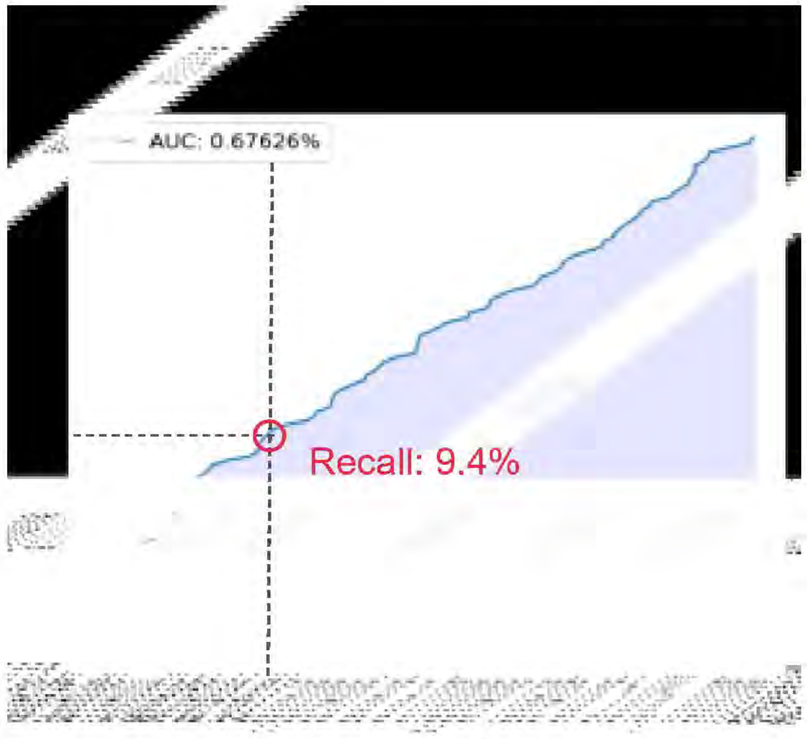
[redacted]

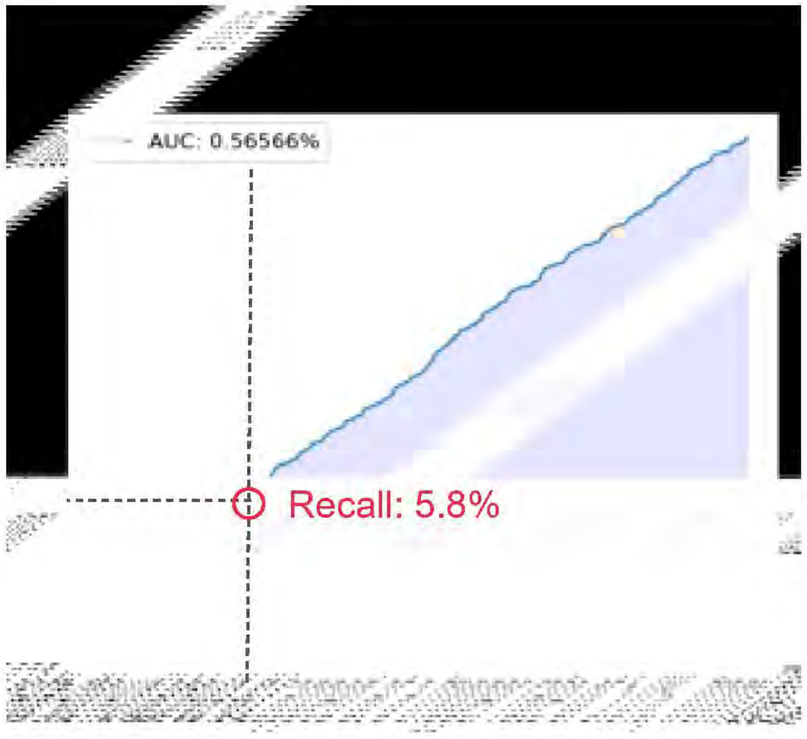
ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Establishing A Baseline for S-RAD Moto Performance

In 1Q24, we aim to launch a version of S-RAD for Moto trips in Brazil and India. As a preliminary step, we have applied the S-RAD Global Model to Moto data to establish a lower bound for the performance of our future S-RAD Moto model.





Next Steps: (1) Train a refreshed global model to increase # of Moto training records, **(2)** Vary the Moto sample fraction in the training data, **(3)** Launch winning candidate in H1

Data computed using Moto trips from 2023-06-01 - 2023-11-01, source code ATTORNEY-CLIENT PRIVILEGED
Recall = # serious SASM incidents flagged / # total serious SASM incidents

Slide 28 Notes

Plots are described as “y vs x” eg “recall vs flag rate” has recall on y axis and flag rate on x axis

4-Wheeler Performance Exceeds 2-Wheeler Baseline

To derive a lower bound for S-RAD performance on Moto trips, we applied the global model to Moto dispatches which provides a **promising starting point for model improvement**

2

Region	Time of Day	Approx. Flag Rate	Moto		UberX	
			Recall†	Precision*	Recall†	Precision*
India	Day	0.8%	7.4%	0.59 bps	5.8%	0.17 bps
	Night	3.5%	14.5%	0.77 bps	21.5%	0.93 bps
	Overall	1.25%	**9.4%**	**0.49 bps**	**11.3%**	**0.21 bps**
Brazil	Day	0.5%	4.2%	1.03 bps	5.6%	0.32 bps
	Night	7.0%	11.5%	0.55 bps	15.5%	0.40 bps
	Overall	1.1%	**5.8%**	**0.67 bps**	**9.8%**	**0.33 bps**

Data computed using all non S-RAD actioned trips with valid driver_uuid from 2023-06-01 – 2023-11-01; source code

ATTORNEY CLIENT PRIVILEGED

†Recall = # serious SASM incidents flagged / # total serious SASM incidents

*Precision = # serious SASM incidents flagged / # trips flagged

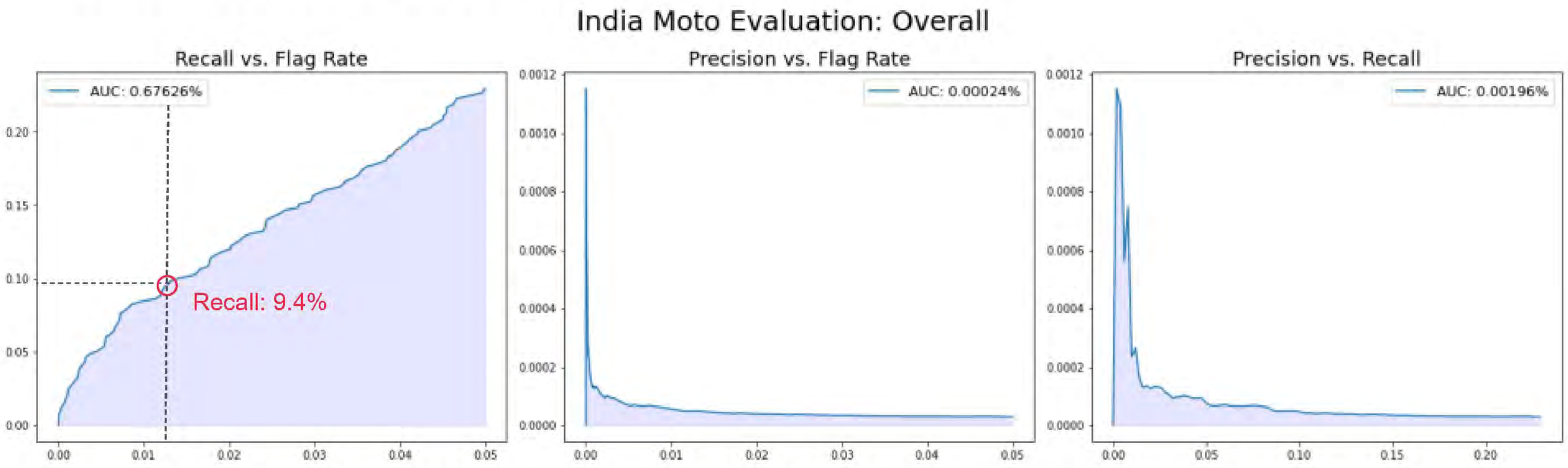
Slide 29 Comments

1 Can we use bps instead of permyriad signs?
Gus Fuldner, 12/1/2023 05:05 PM

2 @jakeatlas@uber.com @arda@uber.com
Sunny Wong, 12/1/2023 05:05 PM

India Baseline: Global Model Applied to Moto Dispatch

To derive a lower bound for S-RAD performance on Moto trips, we applied the global model to Moto dispatches



The data shown above is capped at a trigger rate of 5.0%, from 2023-06-01 - 2023-11-01

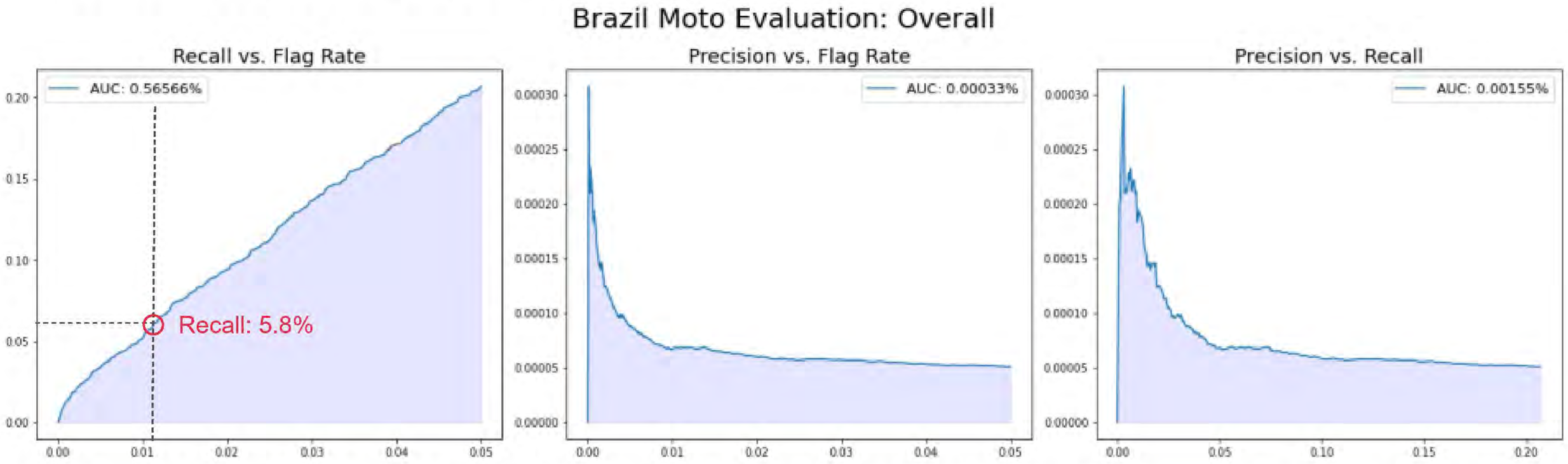
ATTORNEY-CLIENT PRIVILEGED

Slide 30 Notes

Plots are described as “y vs x” eg “recall vs flag rate” has recall on y axis and flag rate on x axis

Brazil Baseline: Global Model Applied to Moto Dispatch

To derive a lower bound for S-RAD performance on Moto trips, we applied the global model to Moto dispatches

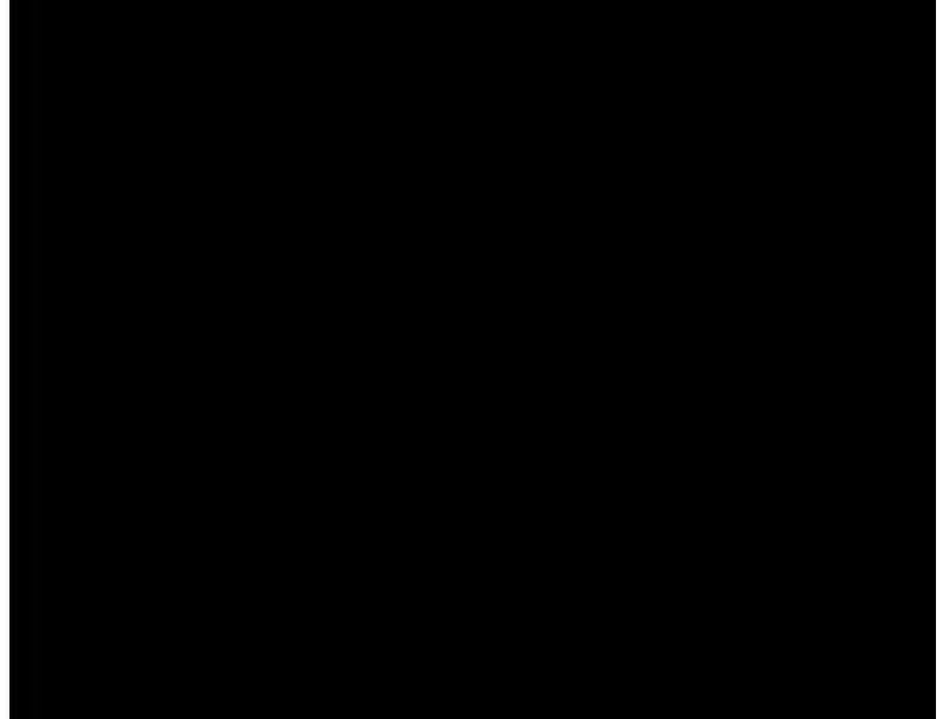


ATTORNEY-CLIENT PRIVILEGED

Pre-read

03 H1 ‘24 Big Rock: New Model Features

@jake



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

New Features to Improve S-RAD Model Performance

In H1.2024, we will explore 3 new feature areas designed to improve the recall and precision of future iterations of S-RAD models:

Guest Rides

From SA/SM ticket reading, guest rides continue to be a risk signal. We will explore use of features already in progress for SDM:

1) Distance between request device & pickup location
2) Distance between request device & destination
3) Distance between pickup and destination

Safety Content Flagger

Leverage Safety Content Flagger data to observe whether there has been historical communication from any given user that is potentially concerning.

Feedback Tags

Formulate features with lookback windows for relevant feedback tags, e.g. “wrong driver”

ATTORNEY-CLIENT PRIVILEGED

Slide 33 Notes

Safety Content Flagger

- safety content flagger can "look" at many places to find safety content. It can come from 4 sources: tickets, the rider feedback text box, the eats help text box, and chatbot text boxes
- there are also various "tools" that SCF uses to identify safety content. In earlier stages it was keywords only, but that has evolved to using models which are trained on urgent safety tickets and have a much higher precision than keywords

Guides Rides: Distances are spherical (not related to routing) and in KM.

04 H1 ‘24 Big Rock: Delivery SRAD-lite

@mariane

[redacted]

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

2024: Expand S-RAD for Serious SA/SM in Delivery

Proposal: Launch rule-based risk assessment with downranking as intervention to Delivery (Eats, Grocery, Direct, Connect/Flash)

SA/SM context in Delivery:

- After expansion to Moto, **S-RAD will cover ~90% Mobility Incidents**. Delivery is still not covered.
- Main opportunities:
  - Highest IR segments: Grocery (**2.9x overall delivery IR**) and Flash/Connect (**1.4x overall delivery IR**)
  - Orders with alcoholic items -> higher IR (**6.9x overall delivery IR**)
  - High IRs in Europe (1.8x overall delivery IR)
  - High incident volume in the United States (38% of incidents globally)

SRAD-lite is a rule-based version of S-RAD:

- Shorter time-to-market
- Higher interpretability compared to ML model could lower Legal risk in EU
- Holdout would allow for follow-up ML development

ATTORNEY-CLIENT PRIVILEGED

Source: Delivery Opportunity Sizing analysis

CONFIDENTIAL

UBER_JCCP_MDL_003274235

P-01366.00043

SRAD-lite: UK Mobility Exploration Demonstrates Promising Results with Rules-Based Approach

SRAD-lite UK results: Through our analysis, we were able to derive rule configurations that **performed close to ML-based* S-RAD**, with an overall lift of 10.5x at similar trigger rates.

Metrics	Rule-based (SRAD-lite)	ML-based (*SRAD US model)
Flagging Rate	**1.15%**	1.19%
Recall	**12.1%**	13.8%
Lift	**10.5**	11.6

* ML performance based off of model trained using US data and evaluated on UK

Goal for Delivery SRAD-lite:

- Rule-based to enable the safety benefit of S-RAD in the short-term and ML model in the long-term to maximize risk-assessment accuracy
- Explore a simple set of rules, starting with features defined for SRAD-lite UK Mobility and known risk factors for delivery:
  - Users: incident history, ratings, cancellations, tenure
  - Order context: hour, has alcoholic items

ATTORNEY-CLIENT PRIVILEGED

ATTORNEY-CLIENT PRIVILEGED

S-RAD

Leadership Update

9.1.2023

Uber

ATTORNEY-CLIENT PRIVILEGED

Agenda

01 Executive Summary

02 Enforced Downranking XP Readout

03 Global Model Switch in US and Latam (pre-read)

04 Global Expansion Updates (pre-read)

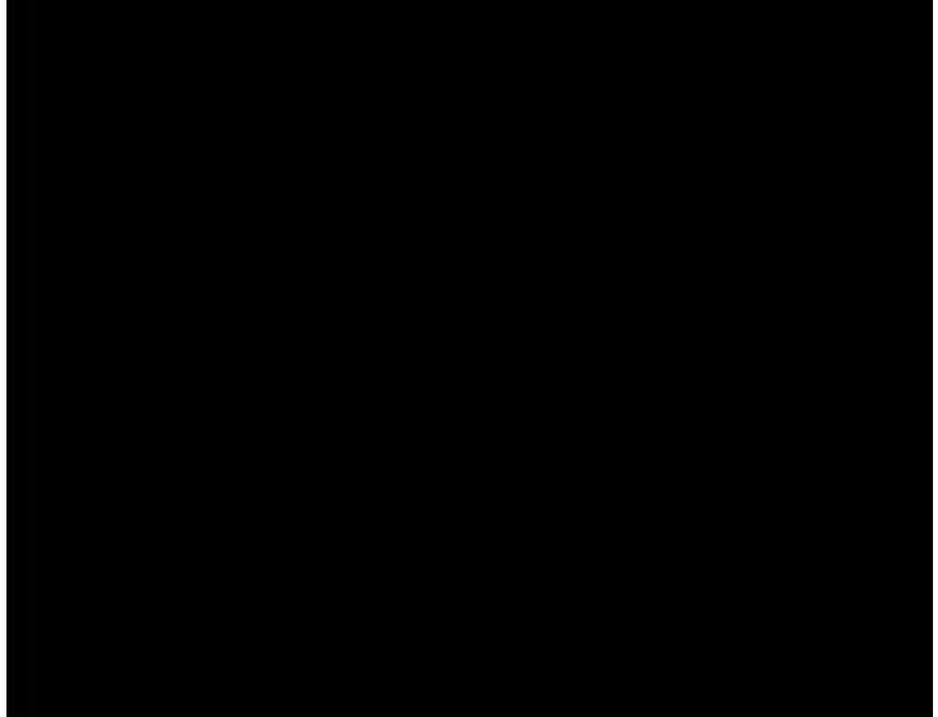
CONFIDENTIAL

UBER_JCCP_MDL_003274238

P-01366.00046

01 Executive Summary

@zoe



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Executive Summary

- **[Focus]Propose to roll out Enforced Downranking for all existing and new markets**
  - [Issue Recap] Due to product changes on the Matching side, soft filtering **efficiency dropped significantly** and more S-RAD flagged plans got dispatched. **Slip through rates** have been **increased from ~30% to ~55%**.
  - [Solution Recap] Switch from soft to **hard filtering** of supply plans directly following plan generation and **all supply plans flagged by S-RAD will not be available during the final solving step of matching** (except in n-least risky situations)
  - [XP Results] The new intervention is proved to **eliminate slip throughs caused by Matching filters**. The downranking efficiency has been **improved by 20-40 p.p.**
    - Observed **negligible marketplace impact** that meets success criteria
    - No block to launch this new intervention from Fairness perspective; will follow up with more research on Brazilian demographics test and with local legal
- (Pre-read) XP of **switching to Global S-RAD model in US and LATAM** will start in week 9/4 and run for 4 weeks. Expecting improved recall performance(+5% to +35% lift in US, Latam) and no change in marketplace impact.
- (Pre-read) ANZ and IND expansions have been completed in July. **MEA and Canada expansions will start in Sep**, applying enforced downranking

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 40 Notes

Global model marketpl xp for US & Latam
Use the holdout group to run marketplace xp for new global model in US/Latam.
80% new model, 20% no SRAD
Will use a couple of

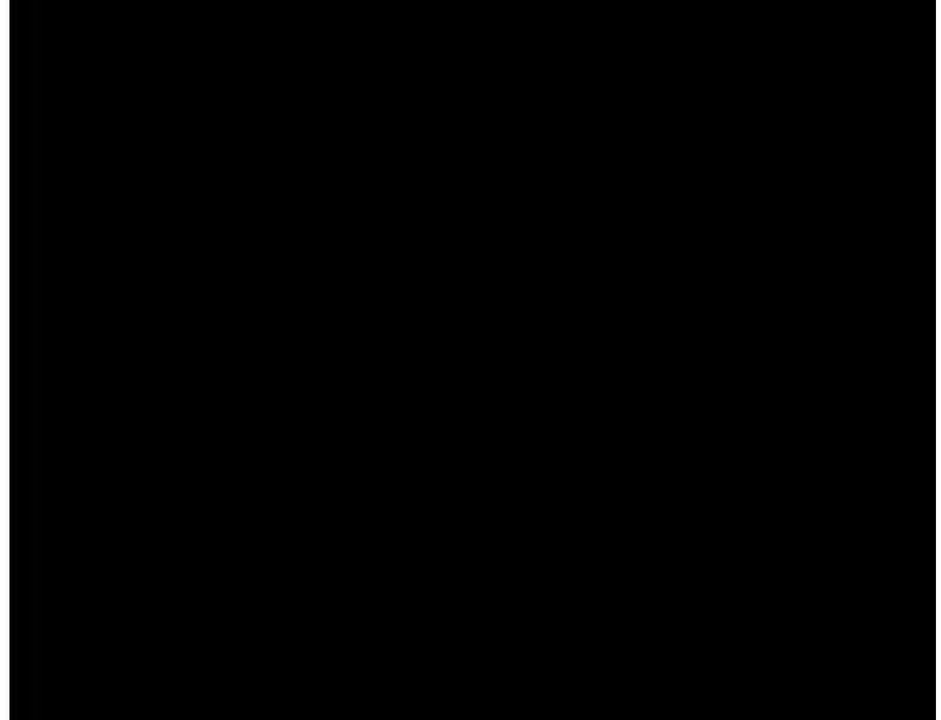
(1) 80% enforced downranking, 20 % no srad
(2) 80% soft filtering new global model, 20% no srad

We can run this in parallel with enforced downranking marketplace xp.

Shadow mode(ANZ&IND): 5/2 -> turn on data model on the countries
Enforced downranking testing: data logging issue -> by 5/8

02 Enforced Downranking XP Readout

@mariane @dan



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274242

Late Issue worsen the slip-through

Risk Assessment → **Flagging** → **S-RAD Actioning** → **Matching Fast&Slow (MFS)** → **Matching**

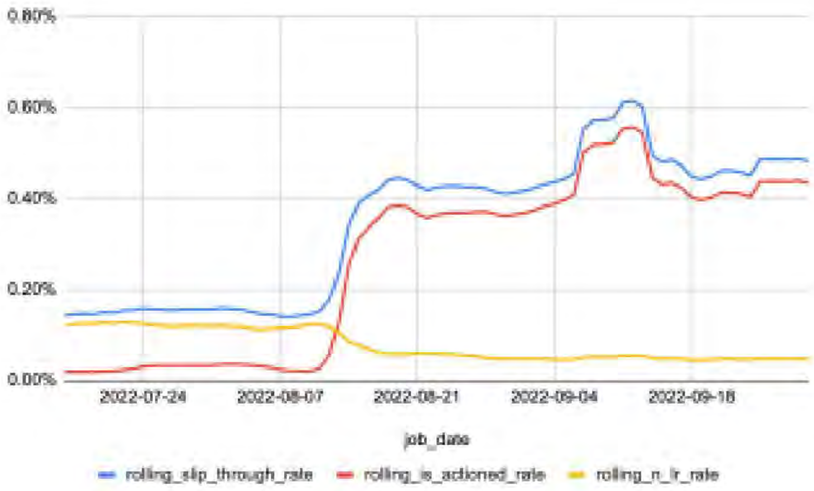
Assess risk of each plan

***Plans** with scores **above threshold** are flagged*

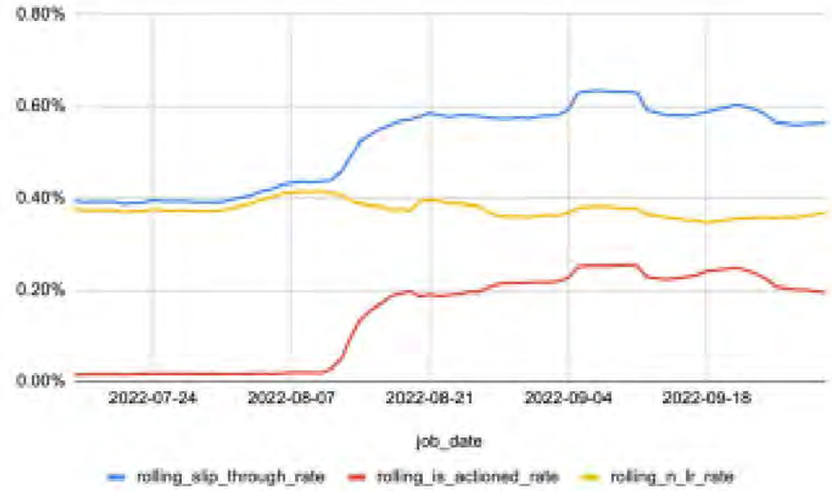
***Soft-filtering:** Objective Function(OF) Cost added to all flagged plans*

***Hard-filtering:** Only consider plans with an ETA < threshold*

Marketplace engine dispatches filtered plans based on OF to optimize overall market



*7 day rolling total slip through rate (blue), Type 1 slip through rate (yellow), Type 2 slip through rate (red) for all active cities in **Brazil***



*7 day rolling total slip through in the **US***

A high score supply plan is part of the global optimum (i.e. MFS), despite there being supply plans that have scores below the S-RAD threshold. In this situation, **'Soft-filtering' is degraded and gives way to other matching algorithms**.
These trips are referred to as **Type 2 Slip through** trips.
More high safety risk plans got dispatched after MFS launch. Some of them can result in serious SA/SM incidents later.

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274243

Slide 42 Notes

Based on historical data, Type 1 slip throughs tend to be stable while Type 2 slip throughs tend to be much less common. Concerningly, since mid Aug 2022, the proportion of Type 2 slip throughs had a sharp spike (red trace in below plots) and remained high, indicating ‘Soft-filtering’ intervention is less effective in ‘downranking’ and preventing the dispatch of high risk plans. This issue has been observed in both Brazil and the US.
a new Matching product favors a subset of supply plans for non-Safety purposes(i.e. Short ETA) without respecting S-RAD scores

Since MFS prunes supply plans, more high risk plans are dispatched after S-RAD flagging. In last 5 months, 273 serious SA/SM incidents in the US and 156 in BR happened after S-RAD flagged plans were dispatched.

	Brazil		United States	
	50/50 Safety XP (09/21 - 04/22)	**80/20 Holdout (07/22 - 12/22)**	**50/50 Safety XP (09/21 - 04/22)**	**80/20 Holdout (07/22 - 12/22)**
Number of requests S-RAD **active**	521M	796M	220M	429M
Number of requests S-RAD **inactive**	520M	204M	221M	109M
Trigger rate S-RAD **inactive**	1.22%	0.98%	1.17%	1.25%
Downranking efficiency	76.0%	52.9%	66.6%	55.4%
# Flagged serious SASM while S-RAD **active**	54	156	84	273

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 43 Notes

How do we measure the incidents we do not observe?

Other hypothesis beyond under-reporting?

By reporter type - findings does not support either situation:

(1) Nudges cause more reporting
(2) Nudges cause more incidents

Inspired Crash detection xp….they reported sooner and more. So we conducted a similar analysis looking at the time elapsed between trip start and incident reported.

Lag - if we saw them reporting sooner, maybe they would report more. But we did not see that.

Comparing to XP stage, S-RAD efficacy on reducing IR(Business Success Metric) dropped significantly as well. This drop is consistent with efficiency drop

Safety Impact		Time of Day		
Country	Observation period	Overall	Day 6 AM - 11 PM	Night 11 PM - 6 AM
Brazil	50/50 Safety XP (09/21 - 04/22)	-8.45%** (-12.2%, -4.74%) 5.13 → 4.71	-6.23%** (-11.0%, -1.43%) 3.41 → 3.21	-11.6%** (-17.5%, -5.76%) 27.5 → 24.4
	80/20 Holdout (07/22 - 12/22)	2.28% (-3.32%, 7.89%) 4.12 → 4.25	1.15% (-5.78%, 8.09%) 2.84 → 2.90	-4.70% (-13.4%, 4.00%) 21.1 → 19.9
United States	50/50 Safety XP (09/21 - 04/22)	-15.3%** (-19.6%, -11.0%) 7.09 → 6.03	-18.2%** (-23.8%, -12.6%) 4.63 → 3.71	-11.8%** (-18.5%, -5.05%) 21.0 → 19.2
	80/20 Holdout (07/22 - 12/22)	-2.61% (-7.60%, 2.38%) 8.39 → 8.16	-3.56% (-10.2%, 3.12%) 5.40 → 5.21	-3.81% (-11.2%, 3.54%) 26.1 → 24.8

**Statistically significant at 80% confidence level

ATTORNEY-CLIENT PRIVILEGED

Slide 44 Notes

How do we measure the incidents we do not observe?

Other hypothesis beyond under-reporting?

By reporter type - findings does not support either situation:

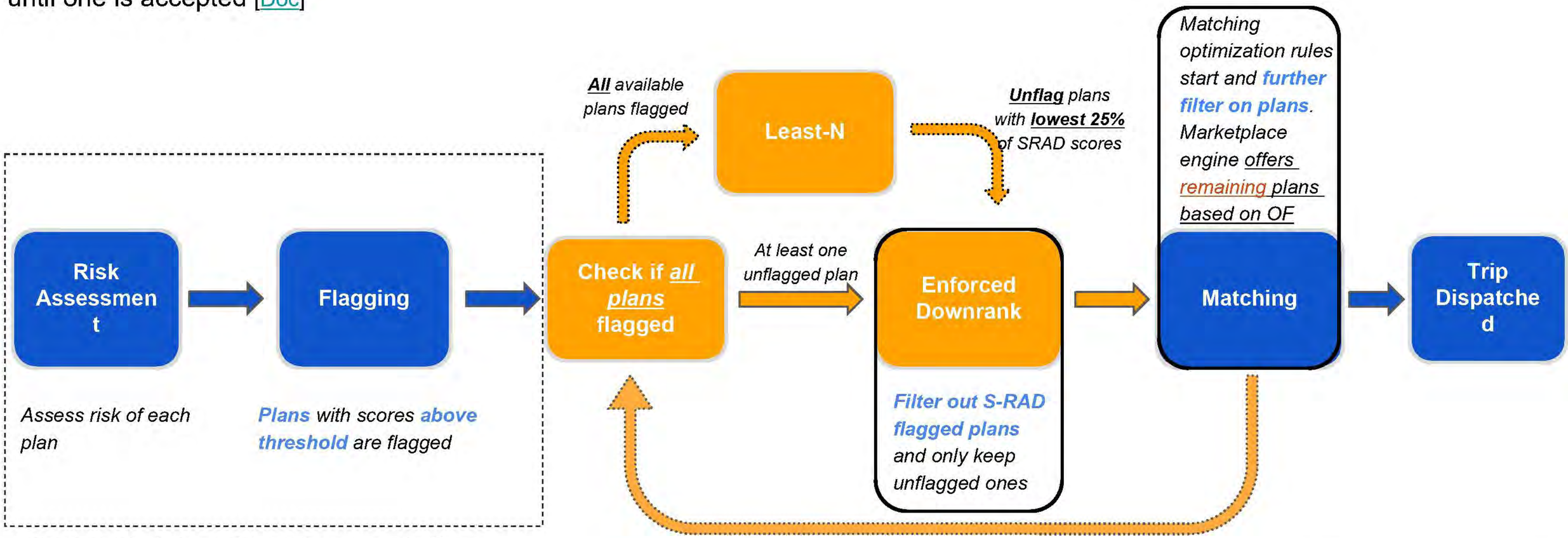
(1) Nudges cause more reporting
(2) Nudges cause more incidents

Inspired Crash detection xp….they reported sooner and more. So we conducted a similar analysis looking at the time elapsed between trip start and incident reported.

Lag - if we saw them reporting sooner, maybe they would report more. But we did not see that.

Enforced Downranking

When a user requests a trip, S-RAD filters out the high-risk plans for safety purposes so that they aren't initially made available for dispatch. Most of the time, one of the unflagged plans is accepted -- a match is made and the trip happens. But sometimes, none of these offers gets accepted or all plans get flagged. When that happens, lowest risk flagged plans will be offered as potential options, until one is accepted [Doc]



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274249

S-RAD Enforced Downranking Experiment Design

Experiment Design	288 min switchback with randomized active/inactive assignments and 80%/20% average balance
Primary Success Metrics	• S-RAD downranking efficiency > 65% • C/R: < 1% relative decrease • Average post dispatch ETA: < 2.0% relative increase (or ~10 second) • p95 ETA post dispatch ETA: < 3% relative increase • p99 ETA post dispatch ETA: < 3% relative increase
Secondary Success Metrics	Driver Fairness (Earnings Per Hour, Ratings to Riders) Rider Fairness (ETAs, Upfront Fare, Ratings to Drivers)
Cities	20 cities in US, 20 cities in Brazil; List
XP start date	BR: July 5, 2023 (4 weeks), BR: July 18, 2023 (4 weeks), XP Plan

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Overall, the experiment showed mostly favorable results.

Increase in Downranking Efficiency, minimal to no impact on marketplace, and some impact on fairness outcomes

Metric	Success Criteria	Observed Brazil	Observed United States
Intervention			
Downranking Efficiency	> 65%	86.2%	64.0%
Marketplace Metrics			
C/R	< -1.0%	-0.18%	-0.07%
Average Post dispatch ETA	< +2.0%	**+0.74%**	+0.03%
P95 Post dispatch ETA	< +3.0%	**+0.51%**	+0.29%
P99 Post dispatch ETA	< +3.0%	+0.11%	+0.05%
Fairness: Cohort disparities			
Overall earnings	No disparities	No disparities	No disparities
ETAs	No disparities	Small disparities	No disparities

Metrics in **bold** are statistically significant at 90% confidence interval; No corrections for multiple comparisons

Positive or within expected range

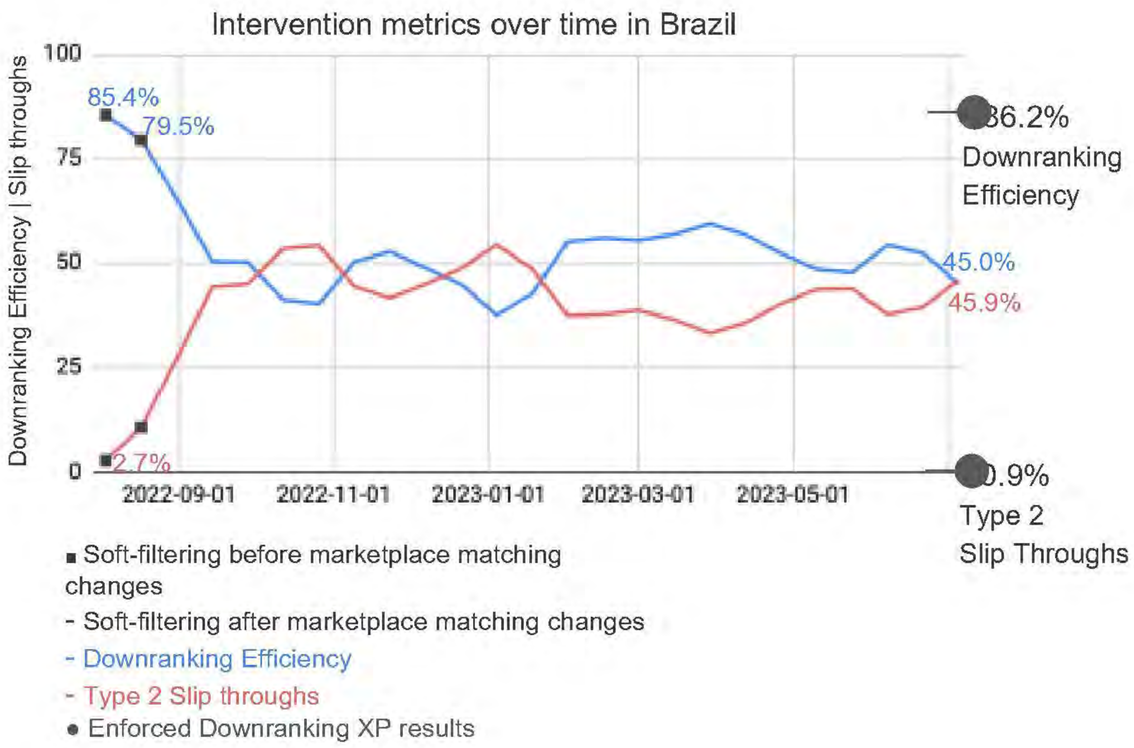
Neutral or near expected range

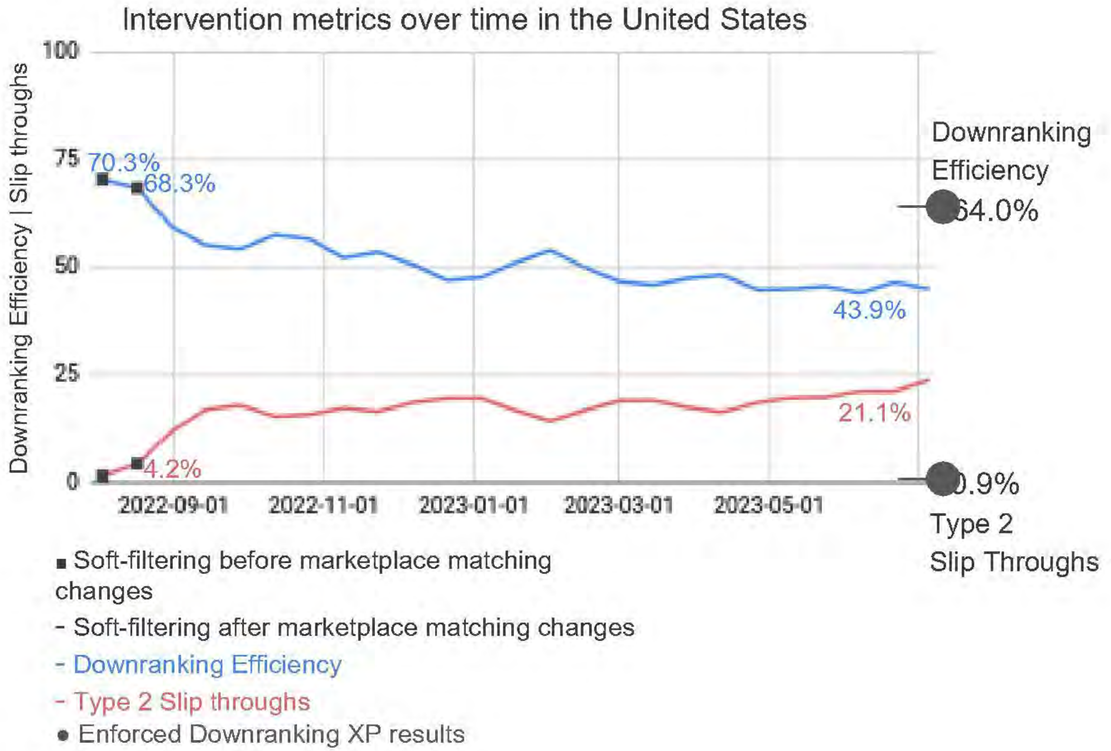
ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Enforced Downranking successfully increased Downranking Efficiency.

It prevents the majority of Type 2 Slip Throughs, i.e., flagged plans from being dispatched when other options are available.





- Type 1 Slip Throughs (i.e., n-least risky cases) are not targeted in this XP. It will always exist since S-RAD does not block dispatch. During XP time, Type 1 Slip Through increased compared to previous months:
  - BR: from ~9% to 13%;
  - US: from ~30% to 35%.

Type 1 Slip Throughs: n-least risky, occur when all available plans are flagged; when this happens, the 25% least risk are released.
Type 2 Slip Throughs: despite the availability of unflagged plans, a flagged plan is dispatched.
Downranking efficiency + Type 1&2 Slip Throughs = 100%

Source: Soft-filter data from S-RAD Global View dashboard

CONFIDENTIAL

UBER_JCCP_MDL_003274252

P-01366.00060

Deep-dive on Marketplace Metrics

Minimal marketplace impact; stat sig increase in Driver Ratings metrics in Brazil and the US.

Metric Group	Metric	Brazil			United States		
		Baseline	Level Effect	Relative Effect	Baseline	Level Effect	Relative Effect
Post dispatch ETA	**Average**	197	**1.5**	**0.74%**	330	-	-
	P95	477	**2.4**	**0.51%**	838	-	-
	P99	579	-	-	1023	-	-
Trip request	Completed/Requests	82.80%	-	-	91.03%	-	-
	Completed trips per hour	5,446	-	-	1,489	-	-
	Requests per hour	6,592	-	-	1,636	-	-
	Average Request to begin	380	-	-	481	-	-
	Unfulfilled rate	4.01%	-	-	0.64%	-	-
Cancellation	**Rider cancellation rate**	11.58%	**0.17%**	**1.44%**	7.00%	-	-
	Driver cancellation rate	17.41%	-	-	7.55%	-	-
Ratings	**Driver Star Ratings**	4.89	**0.001**	**0.01%**	4.92	**0.0011**	**0.02%**
	% Driver Low Rating	2.20%	**-0.02%**	**-0.79%**	1.37%	**-0.02%**	**-1.54%**
	Rider Star Ratings	4.96	-	-	4.96	-	-
	% Rider Low Rating	0.72%	-	-	0.85%	-	-

Metrics in **bold** are statistically significant at 90% confidence interval; No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274253

P-01366.00061

Marketplace metrics in Brazil: time-of-day comparison

Metric Group	Metric	Overall			Day			Night		
		Baseline	Level Effect	Relative Effect	Baseline	Level Effect	Relative Effect%	Baseline	Level Effect	Relative Effect%
Post dispatch ETA	Average	197	**1.5**	**0.74%**	193	-	-	236	**4.48**	**1.90%**
	P95	477	**2.4**	**0.51%**	446	-	-	550	**6.23**	**1.13%**
	P99	579	-	-	566	-	-	610	-	-
Trip request	Completed/Requests	82.77%	-	-	84.13%	-	-	68.58%	-	-
	Completed trips per hour	5,446	-	-	7,220	-	-	1,303	**-10.87**	**-0.83%**
	Requests per hour	6,592	-	-	8,615	-	-	1,881	-	-
	Average Request to begin	380	-	-	374	-	-	439	**3.34**	**0.76%**
	Unfulfilled rate	4.01%	-	-	3.45%	-	-	9.97%	**-0.651%**	**-6.54%**
Cancellation	Rider cancellation rate	11.58%	**0.17%**	**1.44%**	10.84%	**0.11%**	**1.01%**	19.16%	**0.98%**	**5.13%**
	Driver cancellation rate	17.41%	-	-	16.80%	-	-	24.20%	-	-
Ratings	Driver Star Ratings	4.89	**0.001**	**0.01%**	4.89	-	-	4.87	**0.006**	**0.12%**
	% Driver Low Rating	2.20%	**-0.02%**	**-0.79%**	2.16%	-	-	2.79%	**-0.16%**	**-5.62%**
	Rider Star Ratings	4.96	-	-	4.96	-	-	4.96	**0.0014**	**0.03%**
	% Rider Low Rating	0.72%	-	-	0.72%	-	-	0.80%	**-0.041%**	**-5.16%**

Metrics in **bold** are statistically significant at 90% confidence interval; No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Marketplace metrics in US: time-of-day comparison

Metric Group	Metric	Overall			Day			Night		
		Baseline	Level Effect	Relative Effect	Baseline	Level Effect	Relative Effect	Baseline	Level Effect	Relative Effect
Post dispatch ETA	Average	330	-	-	326	-	-	359	**6.95**	**1.94%**
	P95	838	-	-	811	-	-	898	**11.02**	**1.23%**
	P99	1,023	-	-	1,012	-	-	1,048	-	-
Trip request	Completed/Requests	91.03%	-	-	92.00%	-	-	85.33%	-	-
	Completed trips per hour	1,489	-	-	1,824	-	-	707	-	-
	Requests per hour	1,635	-	-	1,981	-	-	818	-	-
	Average Request to begin	481	-	-	474	-	-	522	**6.82**	**1.31%**
	Unfulfilled rate	0.64%	-	-	0.47%	-	-	1.74%	-	-
Cancellation	Rider cancellation rate	7.00%	-	-	6.34%	-	-	10.94%	-	-
	Driver cancellation rate	7.55%	-	-	6.84%	-	-	11.56%	**0.45%**	**3.92%**
Ratings	Driver Star Ratings	4.92	**0.001**	**0.02%**	4.92	**0.001**	**0.02%**	4.90	**0.004**	**0.08%**
	% Driver Low Rating	1.37%	**-0.02%**	**-1.54%**	1.30%	**-0.02%**	**-1.38%**	1.77%	**-0.07%**	**-4.07%**
	Rider Star Ratings	4.96	-	-	4.96	-	-	4.95	-	-
	% Rider Low Rating	0.85%	-	-	0.84%	-	-	0.91%	-	-

Metrics in **bold** are statistically significant at 90% confidence interval; No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Fairness Results

1

No measurable fairness concerns in the US by…

- HUD-qualified census tracts, Race (inferred from census demographics of trip pickup)
- Race (inferred from name), Gender (using safety gender inference table)

Mixed results in Brazil. [Not a launch block]

- Statistically significant, but small (1% point) increases in upfront fares and ETAs (but not Weekend PM ETAs) in predominantly Black census tracts [New and First time testing this demographic]
- Otherwise no significant differences by Race (inferred from census demographics of trip pickup) and Gender (using safety gender inference table)

Recommendations

- Flag findings to local legal team
- Conduct follow-up research into geographic distribution and marketplace metrics for predominantly Black census tracts in Brazil

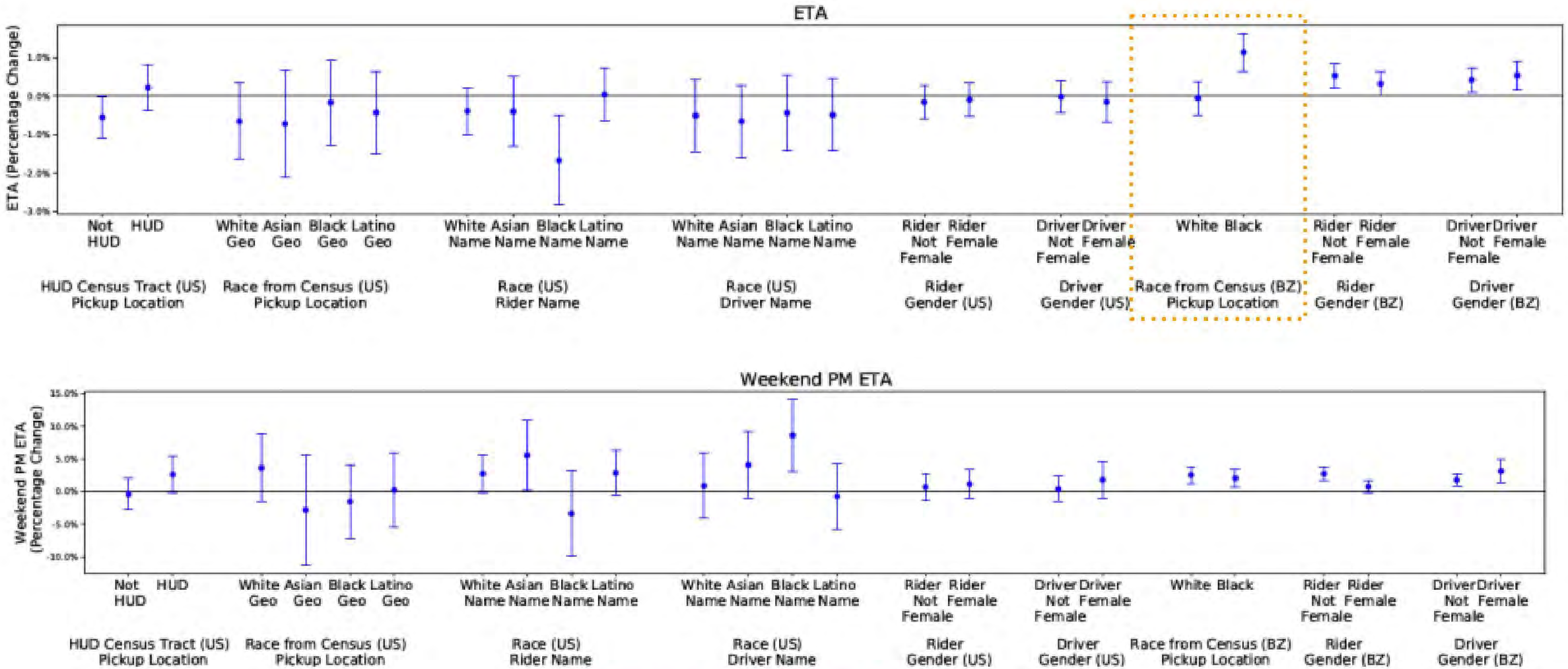
ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 52 Comments

1 @dsvirsky@uber.com added a note (not a launch block)here per feedback. let me know if you have any concern.
Assigned to dsvirsky@uber.com
Zoe Pu, 8/31/2023 09:08 PM

Fairness Outcomes: ETA & Weekend PM ETA

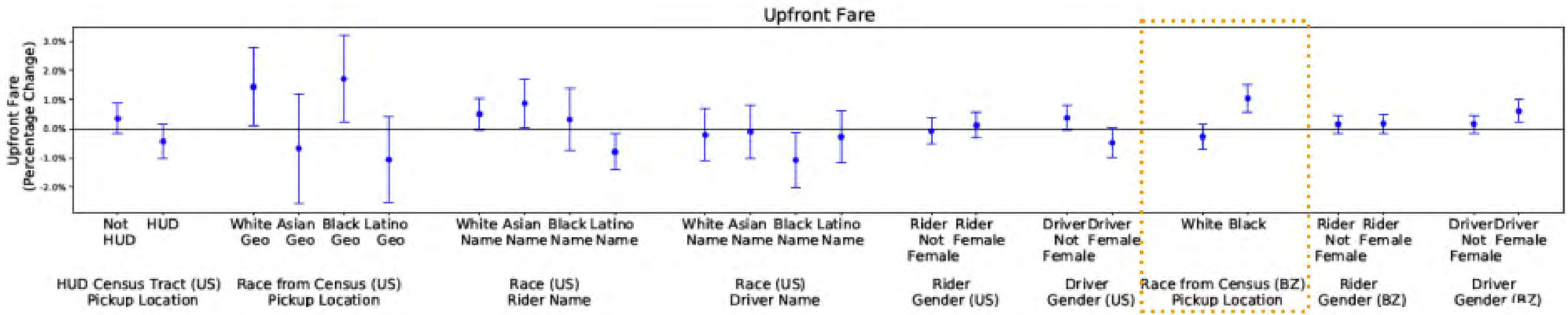


ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274258

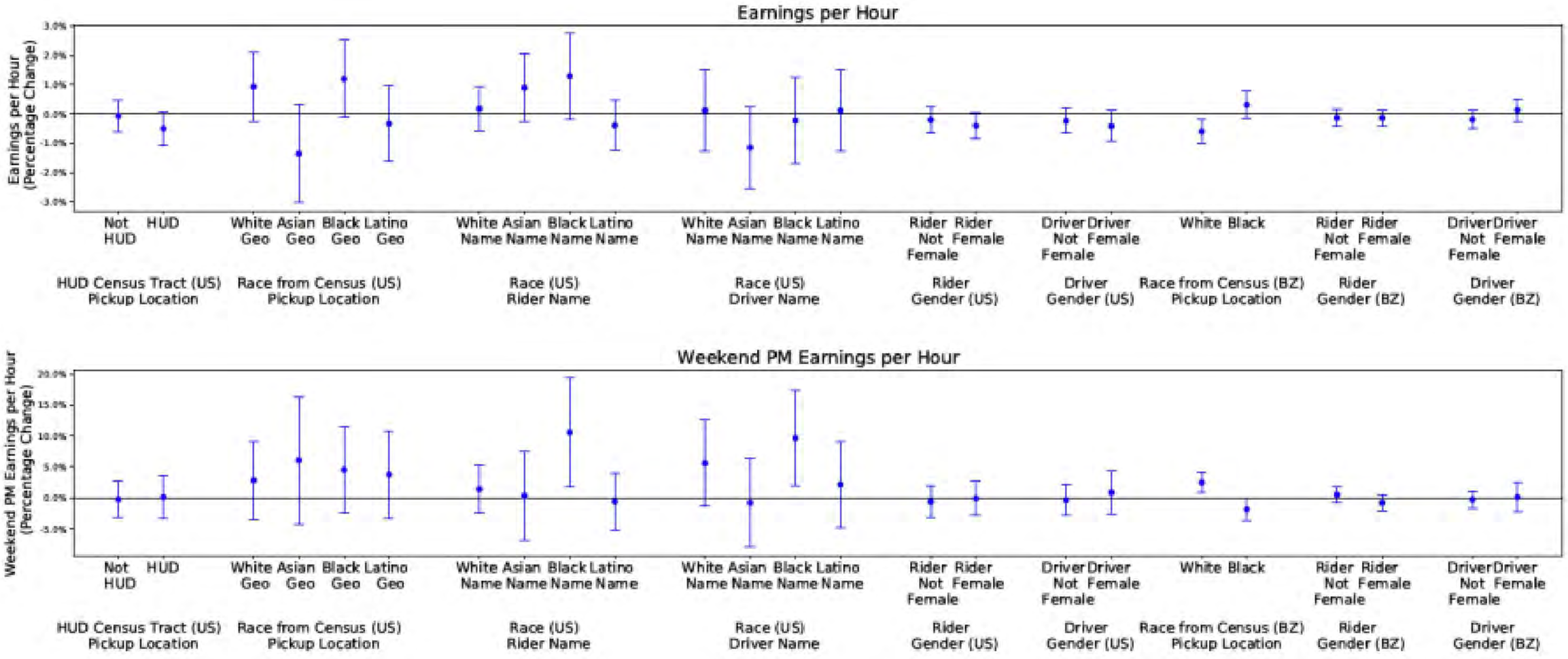
Fairness Outcomes: Upfront Fare



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Fairness Outcomes: Earnings per Hour, Weekend PM Earnings per Hour

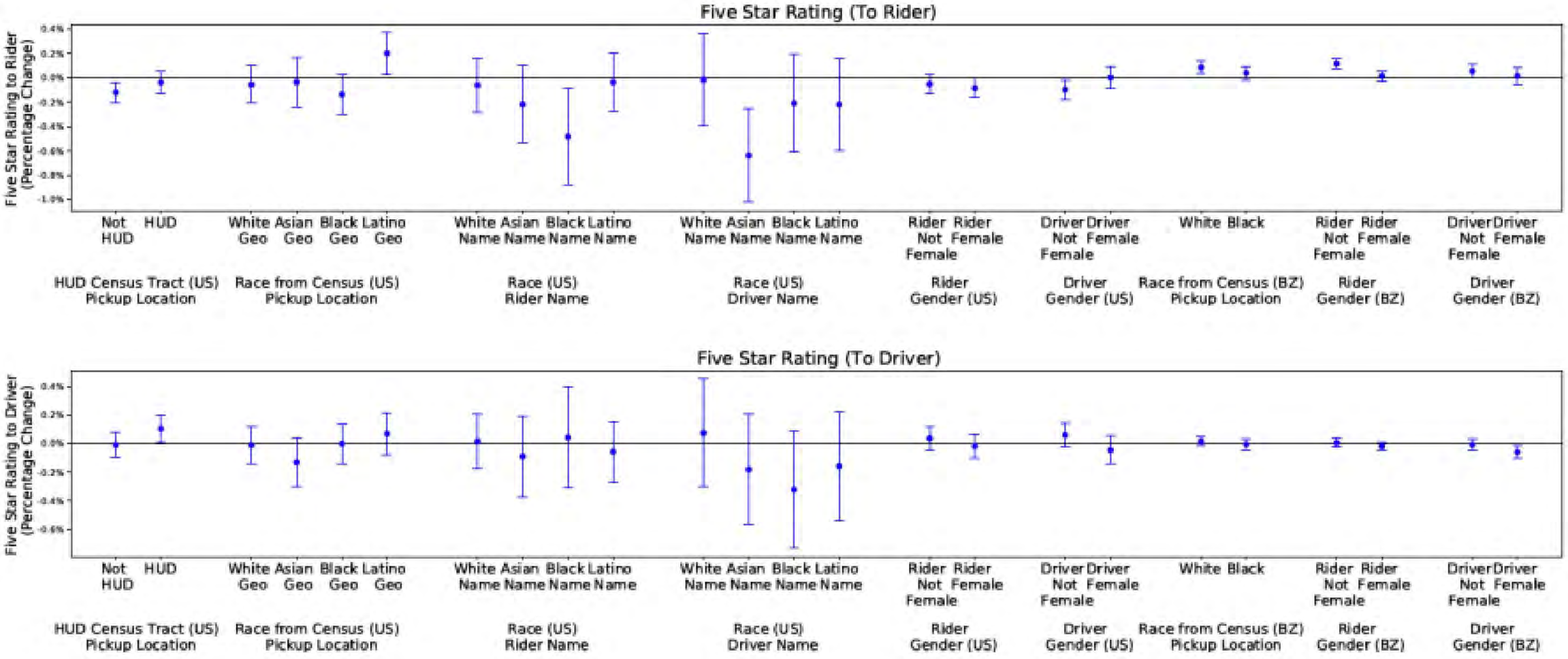


ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274260

Fairness Outcomes: Five-Star Ratings



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274261

Recommendation: Based on marketplace and fairness results, we recommend rolling out Enforced Downranking intervention to all existing and new markets.

Existing cities would be transitioned from soft to hard filtering and monitored using the existing holdout infrastructure. US, LATAM, ANZ and IND will be included in this transition.

Launch ETA: **Mid Sep** (after collecting approvals from Safety Ops and Policy/Legal/Comms); Plan to roll out by regions in 1 week

Monitoring plan:

- Using the existing holdout infrastructure, analyze the marketplace metrics 4 weeks after rollout and compare with XP data to see if levels remain similar;
- If there are no unexpected impacts, keep monitoring every 4 weeks as we normally do for soft filter;
- If unexpected impacts are observed, conduct a deep dive analysis and inform regional stakeholders of diagnostic and recommendations.

Pre-read

03 Global Model Switch in US and Latam

@jake @joao

[redacted]

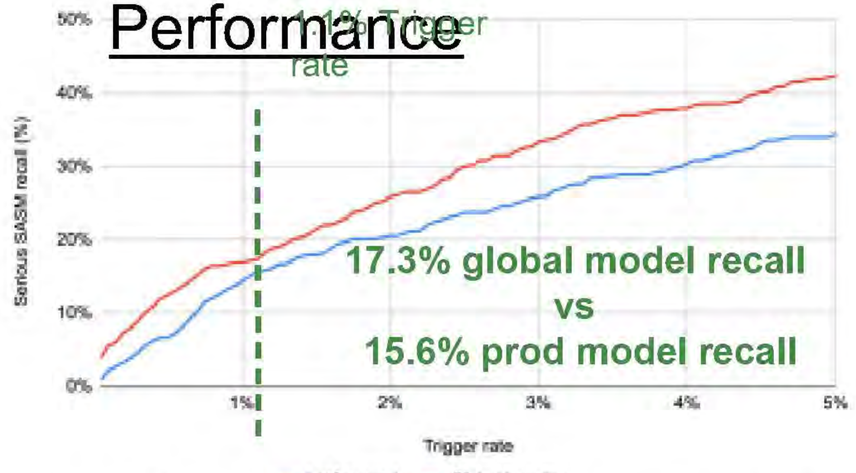
ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

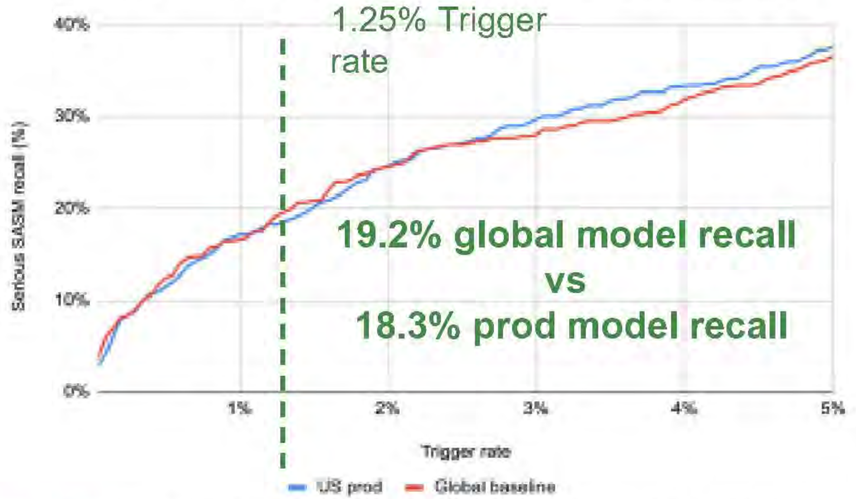
S-RAD Global Model Transition Experiment Overview

Context	The S-RAD global model is live in India and ANZ. We want to continue to standardize by launching the global model in US and LatAm as well, replacing the market-specific models there.
Goal	The primary goal of this experiment is to establish a baseline for the marketplace impact and driver fairness of the S-RAD global model.
Primary Success Metrics	● S-RAD downranking efficiency > 65% ● C/R: < 1% relative decrease ● Average post dispatch ETA: < 2.0% relative increase (or ~10 second) ● p95 ETA post dispatch ETA: < 3% relative increase ● p99 ETA post dispatch ETA: < 3% relative increase
Secondary Success Metrics	Fairness ●Driver Fairness (Earnings Per Hour, Ratings to Riders) ●Rider Fairness (ETAs, Upfront Fare, Ratings to Drivers)
Cities	20 cities in US, 20 cities in Brazil; list
XP start date	**September 5 (4 weeks),** XP Plan

Brazil - Overall Performance



US - Overall Performance



Offline results from UberX S-RAD inactive trips: 2022/11/01 - 2023/01/31

ATTORNEY-CLIENT PRIVILEGED

Avoiding Experiment Conflicts with Marketplace XPs

Context	The S-RAD team uses the holdout architecture to conduct experimentation. This is inspired by switchbacks, but leverages a randomization mechanism to determine whether a city should be "on" or "off" at fixed time points throughout the day.
Problem	To use the holdout architecture, we have agreed with the MX team that we will: 1. Only perform holdout randomization at a set of specific fixed times throughout the day 2. Target XP launches for when primary rides switchbacks are not occurring It has become very difficult to adhere to the second requirement due to the saturation of the MX calendar.
Proposed Solution	1. The MX team will permit S-RAD XPs to launch (and conclude) during the monthly "burn-in period." When possible, S-RAD adjustments will come during the first burn-in period of the month (each month has 2). 2. Where possible, we will roll out at the the mega-region level, particularly if it is not possible to adhere to the guidelines in (1), above. This is particularly relevant in the instance of more urgent major changes. 3. Always communicate with XP owners – we won't always be able to adhere to guidelines. Should we ever reach a breakglass point, for example, we will inform the appropriate people.

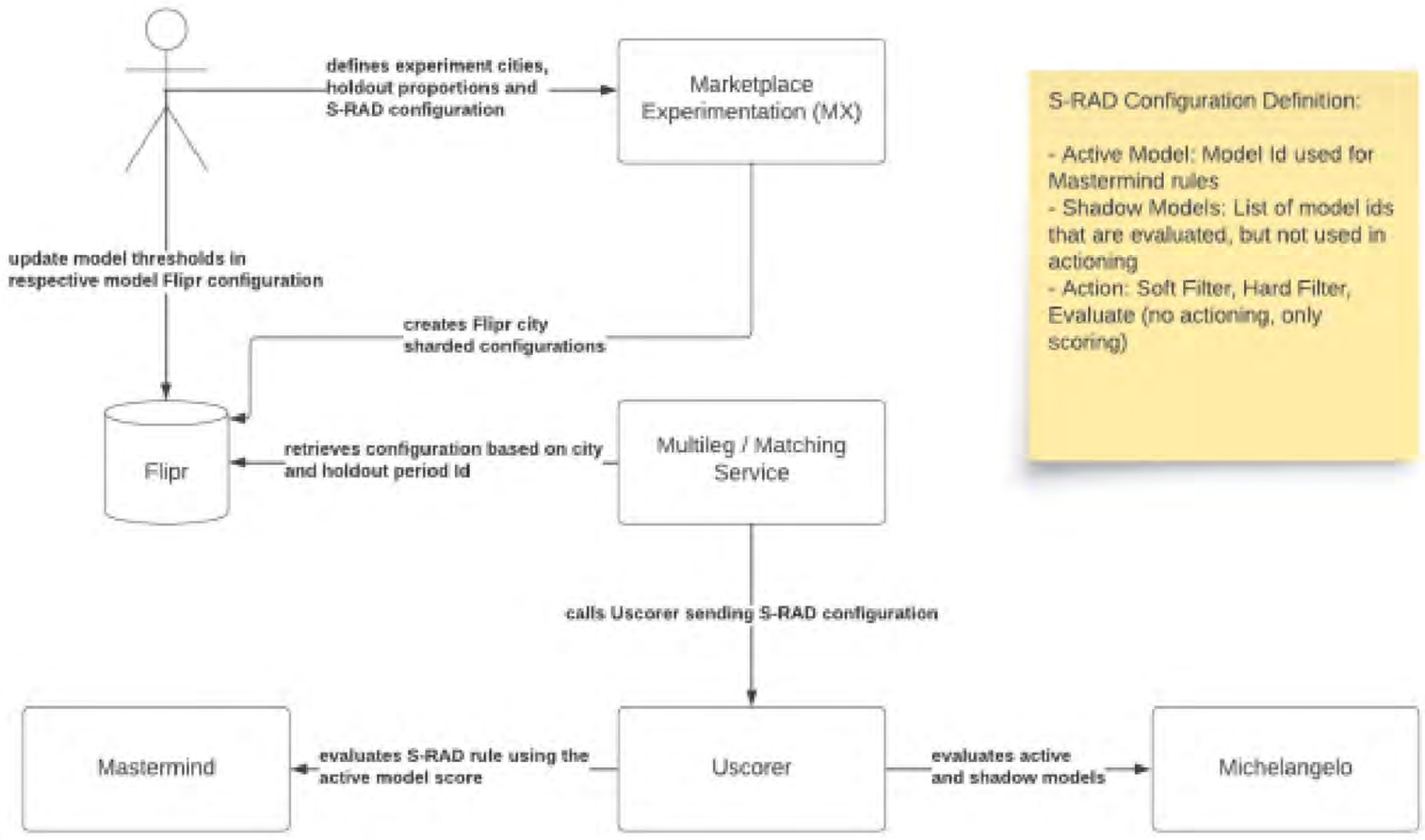
ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274265

P-01366.00073

Updated Engineering design to support multi-model scoring and improve the handling of model switch.



S-RAD Configuration Definition:

- Active Model: Model Id used for Mastermind rules
- Shadow Models: List of model ids that are evaluated, but not used in actioning
- Action: Soft Filter, Hard Filter, Evaluate (no actioning, only scoring)

ATTORNEY-CLIENT PRIVILEGED

Slide 61 Notes

How do we measure the incidents we do not observe?

Other hypothesis beyond under-reporting?

By reporter type - findings does not support either situation:

(1) Nudges cause more reporting
(2) Nudges cause more incidents

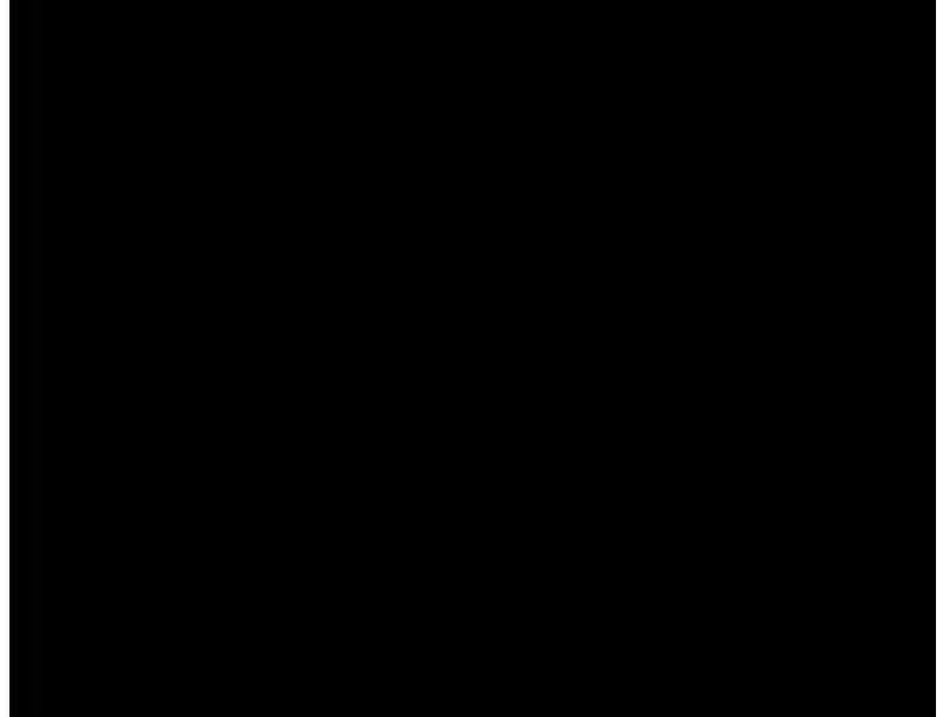
Inspired Crash detection xp….they reported sooner and more. So we conducted a similar analysis looking at the time elapsed between trip start and incident reported.

Lag - if we saw them reporting sooner, maybe they would report more. But we did not see that.

Pre-read

04 Global Expansion Update

@zoe



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

A/C Privileged & Confidential

S-RAD Expansion Update: we are on track of the roadmap

Latam Launch

Mar 2023

CA PLC Assessment

Sep 2023

CA Marketplace XP

Oct -Nov 2023

CA Launch

Nov 2023

Dependency: regional approvals, negligible marketplace impact



ANZ & IND Launch

July 2023

MEA Marketplace XP

Sep -Oct 2023

MEA Launch

Nov 2023

Dependency: regional approvals, negligible marketplace impact

ATTORNEY-CLIENT PRIVILEGED

ATTORNEY-CLIENT PRIVILEGED

S-RAD

Leadership Update

5.5.2023

Uber

ATTORNEY-CLIENT PRIVILEGED

Agenda

01 Executive Summary

02 S-RAD Global Model Candidate

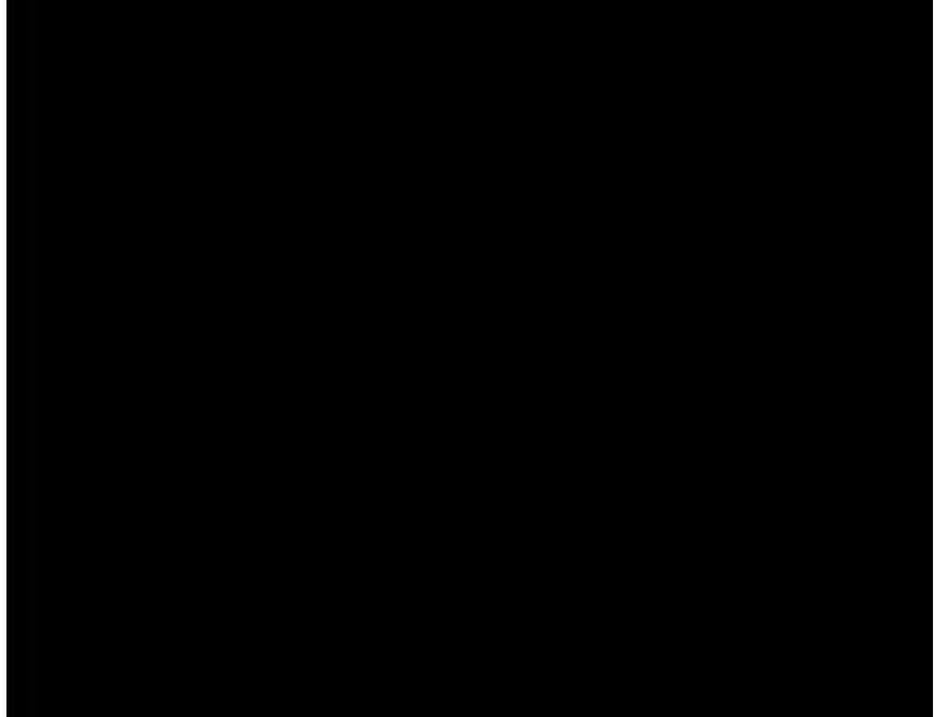
03 Global Model Rollout Plans: ANZ, India, US, Latam

04 Enforced Downranking XP timeline (pre-read)

05 Appendix

01 Executive Summary

@zoe



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Executive Summary

- We have developed a **global S-RAD model candidate with fewer features & comparable and/or better overall serious SASM recall**
  - We **excluded driver star ratings, cancellations** & **gender features**
  - **Maintained/improved performance** in existing markets (+5% to +35% lift in US, Latam) and achieved **robust performance in expansion markets** (~13% to 15% recall in ANZ, India)
- **Two recommendations from the team to this group:**
  - (1) Replace existing prod models with new global model given the performance
  - (2) Deploy this global model candidate in expansion markets (ANZ, India)
- **Review the updated roadmap.** No significant changes given the above recommendations.
- (Pre-Read) **Update on timeline to launch Enforced Downranking XP** in holdout cities. Start date: May 18

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 67 Notes

Global model marketpl xp for US & Latam
Use the holdout group to run marketplace xp for new global model in US/Latam.
80% new model, 20% no SRAD
Will use a couple of

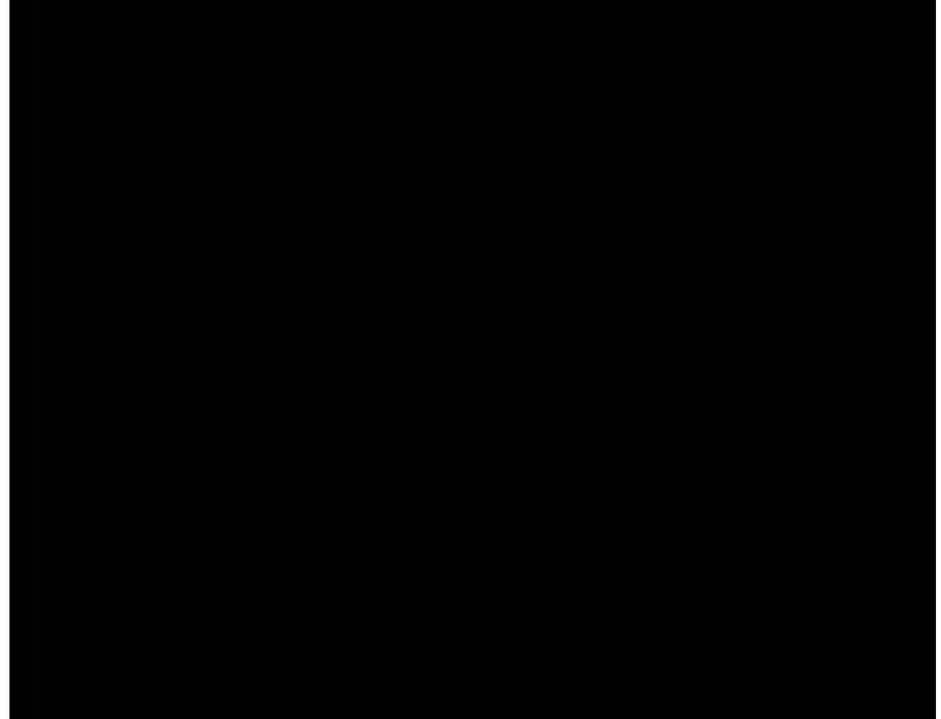
(1) 80% enforced downranking, 20 % no srad
(2) 80% soft filtering new global model, 20% no srad

We can run this in parallel with enforced downranking marketplace xp.

Shadow mode(ANZ&IND): 5/2 -> turn on data model on the countries
Enforced downranking testing: data logging issue -> by 5/8

02 Global Model Performance

@ben



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274275

We removed potentially sensitive features in order to achieve a robust model feature set that satisfies global regulatory requirements

Keep

- **Trip context features**
  - Time of day
  - Day of week
  - City specific incident rates
- **Rider features**
  - Historic trip characteristics (cancel rate, weekend rate, etc.)
  - Star rating feedback
  - Incident rates
- **Driver features**
  - Historic trip characteristics (Trip count, weekend rate, etc.)
  - Incident rates

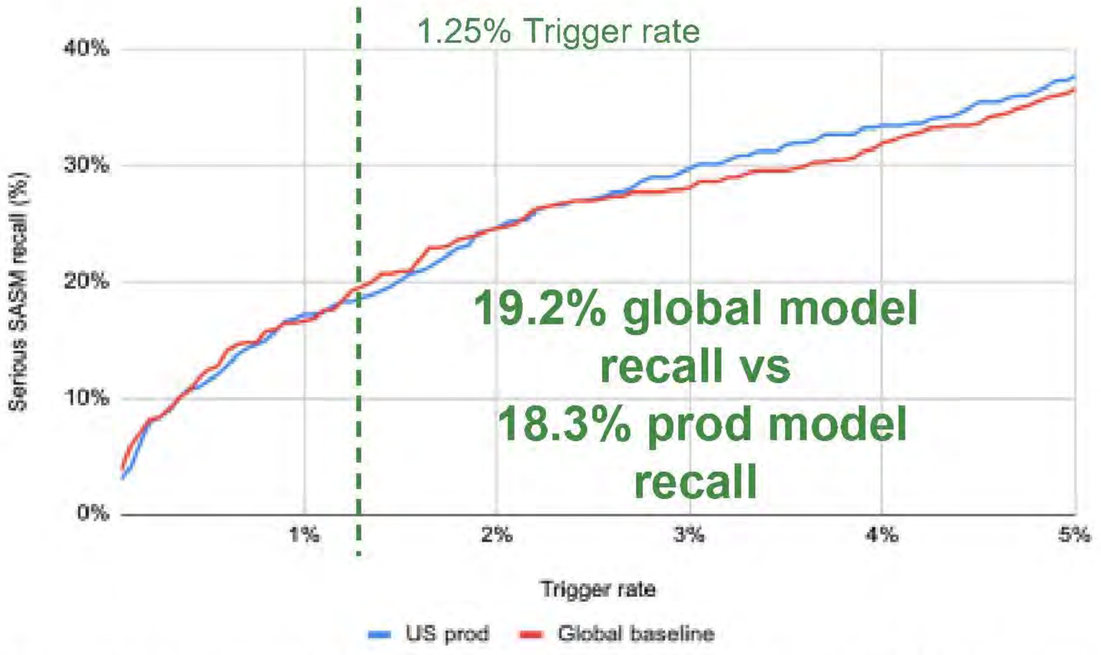
Remove

- **Gender for Rider/Driver**
- **Driver Cancellation history**
  - Cancelled on rate
  - Cancellation rate
- **Driver Ratings**
  - 1/2 star ratings given
  - 1/2 star ratings received

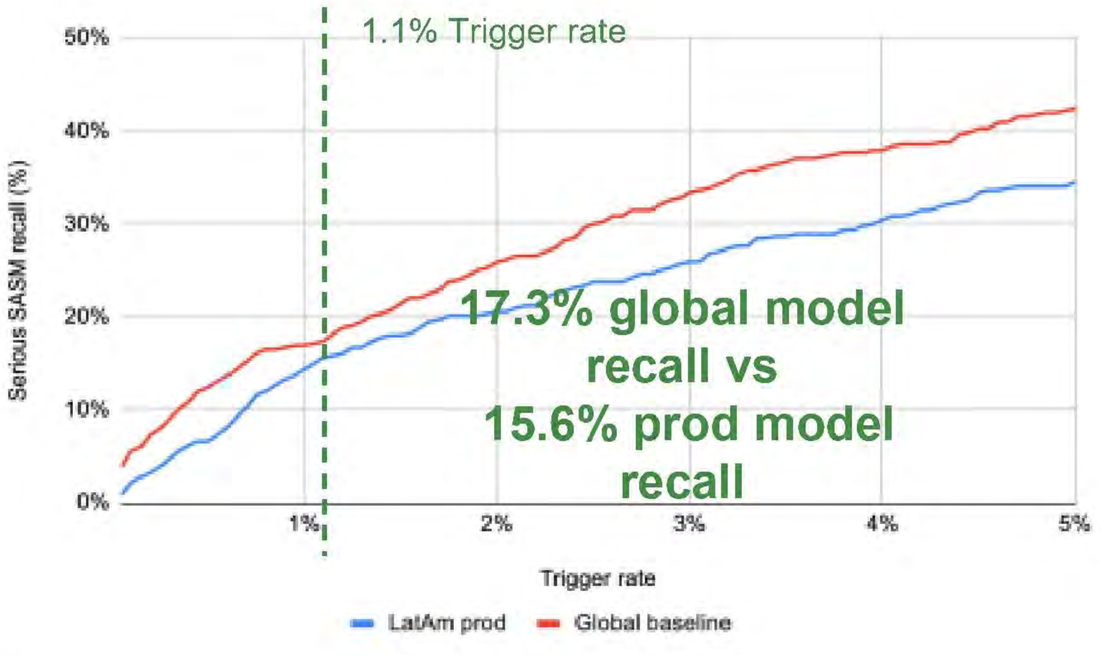
Source

Using the current trigger rates, the global model candidate provides a +5% lift in US as compared to prod model and a +11% lift in Brazil.

US - Overall Performance



Brazil - Overall Performance

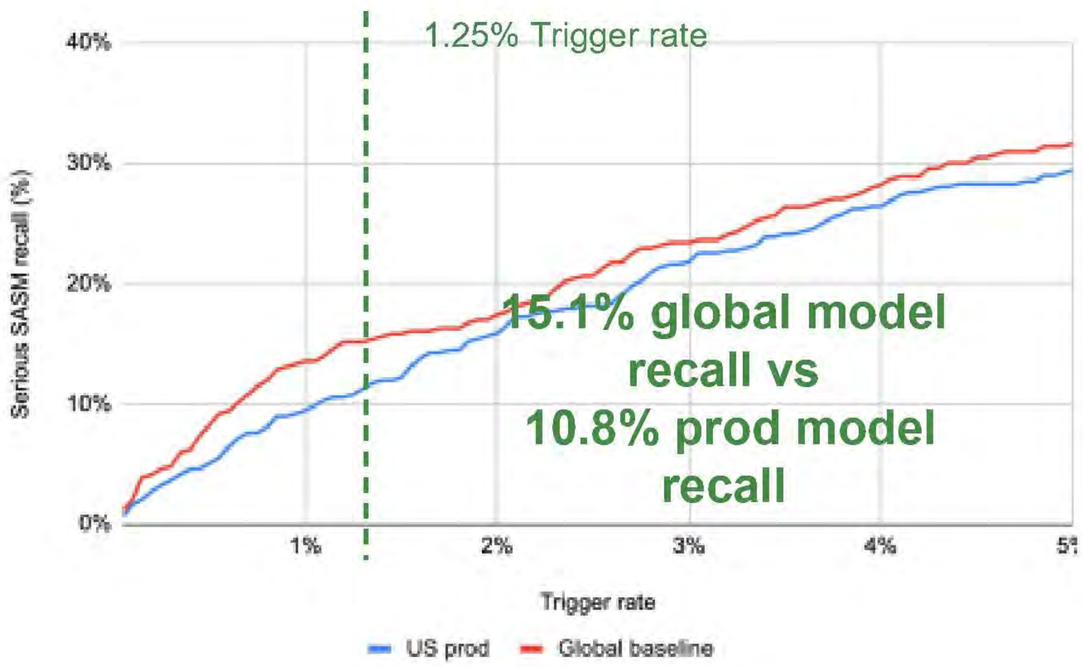


Recall = # serious SASM incidents flagged / # total serious SASM incidents
Recall computed using all non S-RAD actioned, UberX trips with valid driver_uuid from 2022-11-01 to 2023-01-31

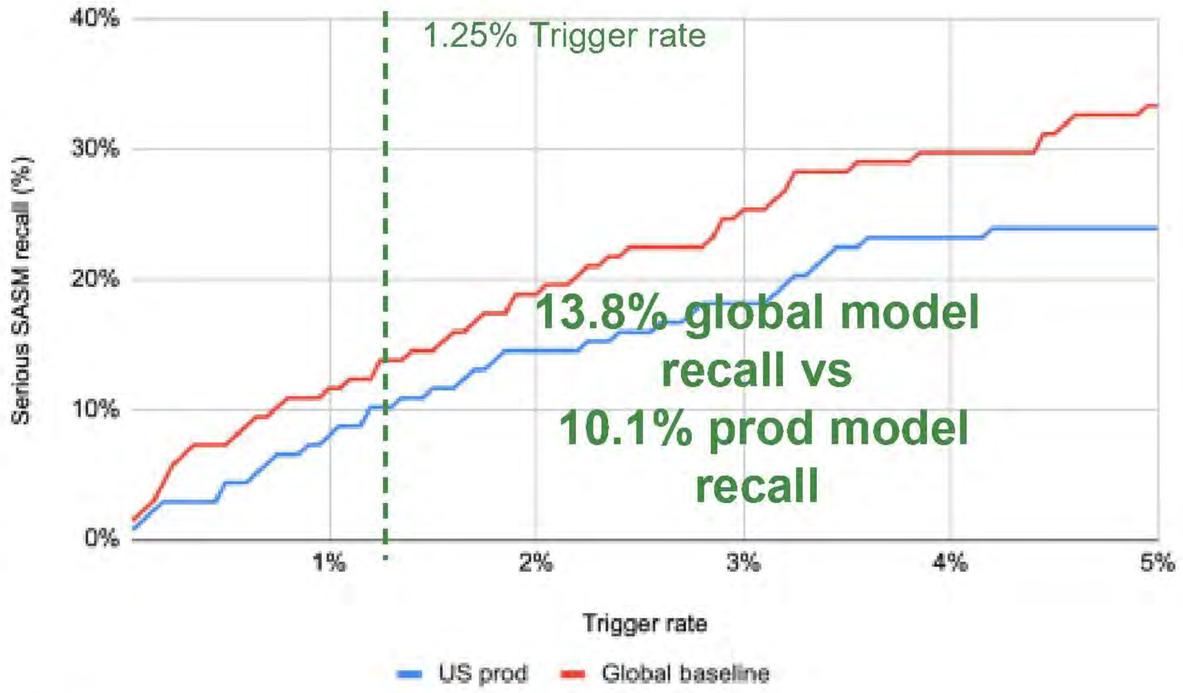
Source

Similarly, in expansion markets, we also observe a lift in recall in global model as compared to prod model: +40% in ANZ and +36% in India

ANZ - Overall Performance



India - Overall Performance



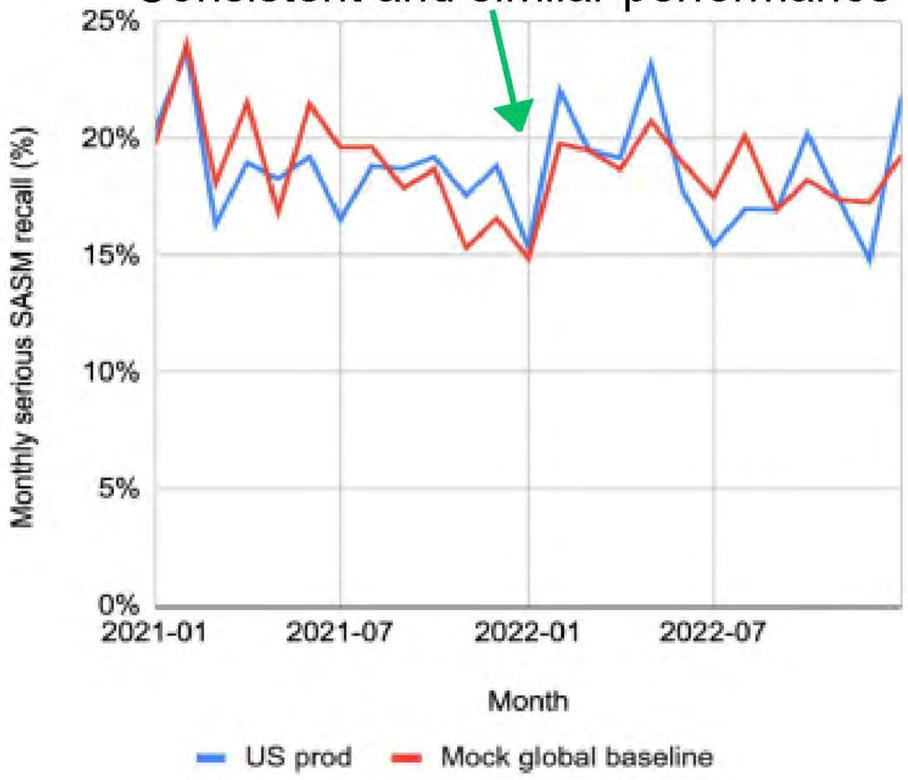
Recall = # serious SASM incidents flagged / # total serious SASM incidents
Recall computed using all non S-RAD actioned, UberX trips with valid driver_uuid from 2022-11-01 to 2023-01-31

Source

Although we need to collect more evidence of sustained offline performance through time, initial analysis looks promising

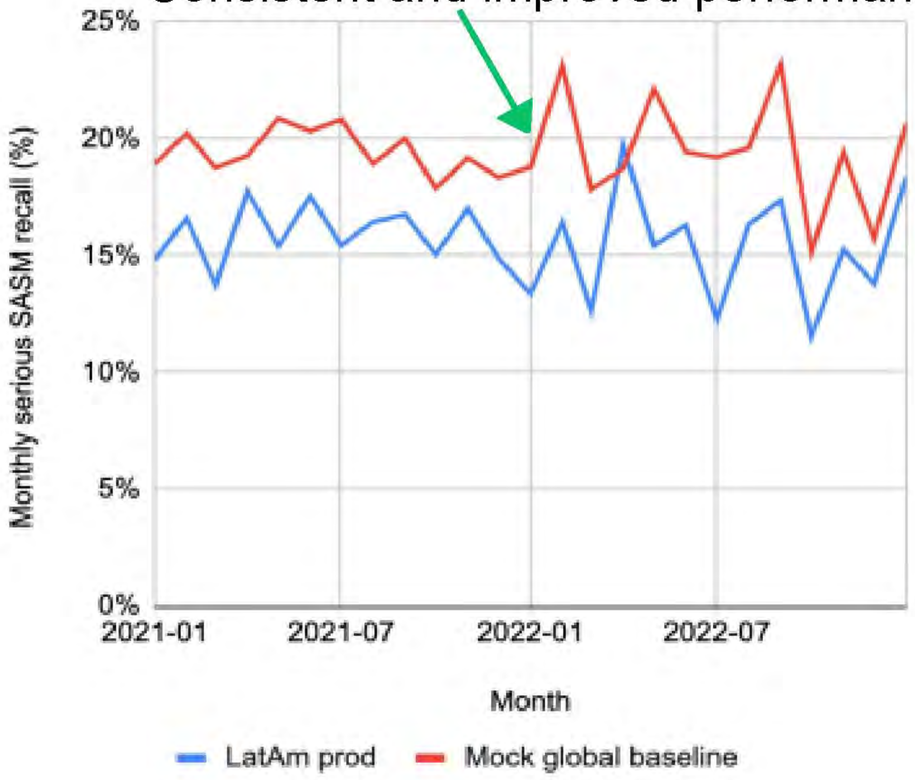
US

Consistent and similar performance



Brazil

Consistent and improved performance



Source

2 Recommendations: (1) Replace existing prod models with new global model; and
(2) Deploy this global model candidate in expansion markets

Consistent performance over time (so far) plus better overall performance meets product performance criteria for rollout. >>>>>>

Region	Trigger rate	Prod. recall†	Global cand. recall§	% difference
United States*	1.25%	18.3%	19.2%	5.1%
Brazil**	1.10%	15.6%	17.3%	11.0%
ANZ	1.25%	10.8%	15.1%	40.1%
India*×	1.25%	10.1%	13.8%	35.7%

§Some variance is expected in these measurements. Reproducing these results is prevented by an ongoing incident on Michelangelo

*US production model used for comparison
**LatAm production model used for comparison
×Includes India, Bangladesh, and Sri Lanka
†Recall = # serious SASM incidents flagged / # total serious SASM incidents
Recall computed using all non S-RAD actioned, UberX trips with valid driver_uuid from 2022-11-01 to 2023-01-31

Fewer available driver features may impact our ability to maximize safety impact in some markets, but overall global model is comparable or outperforms.

Region	Eval trigger rate	Prod recall	Global model recall			
			☆Model Candidate	Driver cancel vars	Driver star rating vars	Driver cancel + star rating vars
United States	1.25%	18.3%	**19.2%**	18.8%	18.5%	18.5%
Brazil	1.10%	15.6%	**17.3%**	17.3%	18.8%	19.5%
ANZ	1.25%	10.8%	**15.1%**	14.7%	16.6%	15.4%
United Kingdom	1.25%	16.5%	**14.7%**	16.8%	18.6%	18.9%
India	1.25%	10.1%	**13.8%**	11.6%	14.5%	13.0%

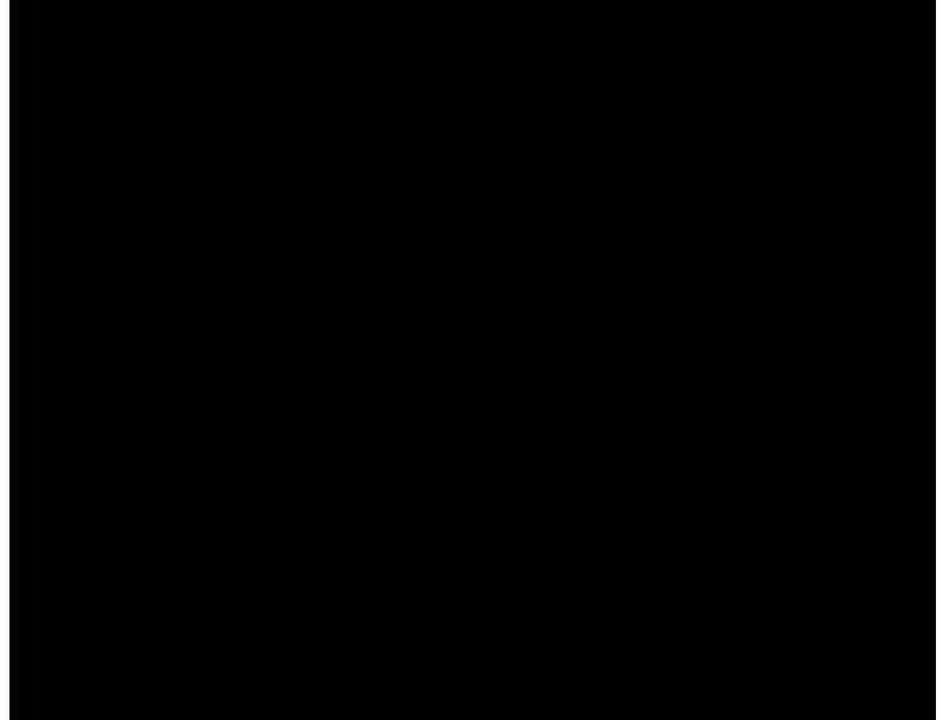
Source

Slide 74 Notes

Add this to skipped slide
We need to take time on tradeoffs
Figure out if we can mask/ unmask features

03 Global Model Rollout Plans

@zoe



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274283

Global model roll out plans for 2023

Started Not started

? *New ruling in the Netherlands on automated decisions makes EU + UK very high risk (RL3-4)*

Global Model Development
Dec-Apr

Marketplace xps
May 11 ANZ
May 16 India
US & Latam tbc

Launch
June 30
ANZ, India, US, Latam

? UK, Poland Rollout
H2 2023
UKL Re...

Shadow Mode Testing
May 3
Shadow mode testing in ANZ & India for ~1 week

Fairness testing
Early June
US & Latam

MEA Rollout
July 1

? EU Rollout
TBD

ATTORNEY-CLIENT PRIVILEGED

Pre-read

04 Enforced Downranking XP (pre-read)

@ben

[redacted]

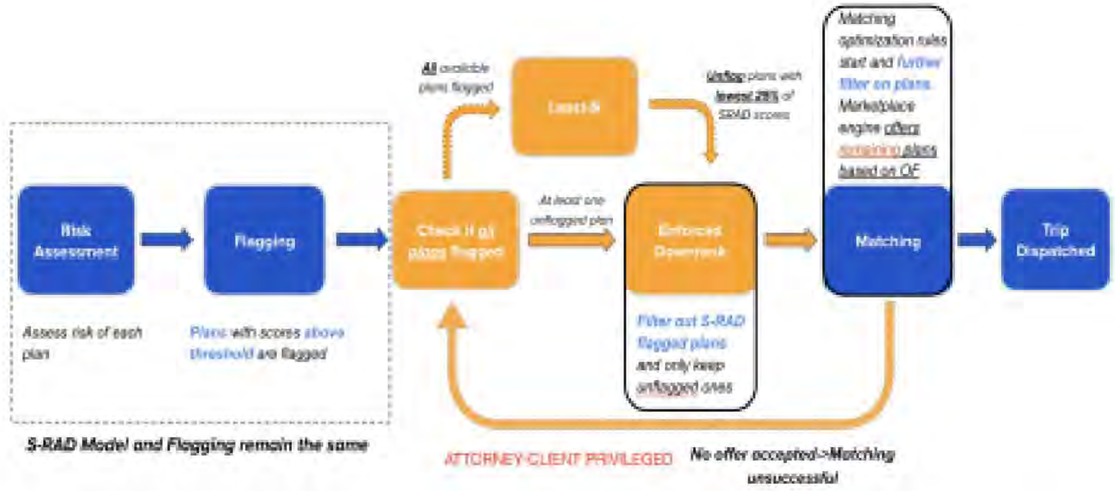
ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274285

S-RAD Enforced Downranking Experiment Overview

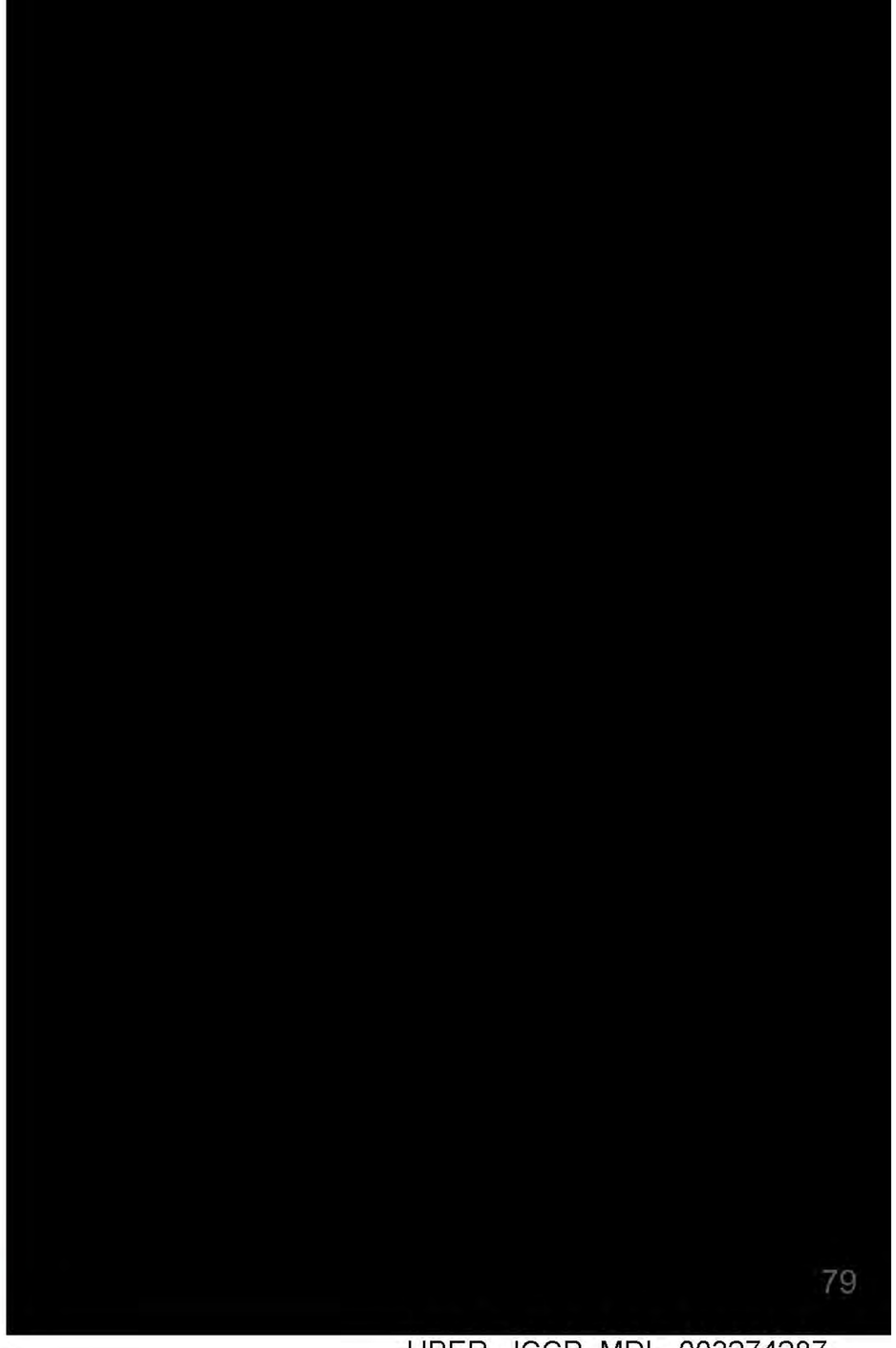
Context	S-RAD Soft-filtering efficiency has been lower than experiment phase (since July/August 2022).
Problem	We identified a new Matching product favors a subset of supply plans (i.e. Short ETA) without respecting S-RAD scores. However, the current 'Soft-filtering' intervention has limited control over this conflict of interests and can not stop slip throughs.
Solution	New S-RAD intervention will switch from soft to hard filtering of supply plans directly following plan generation and all supply plans identified by S-RAD will not be available during the final solving step of matching (except in n-least risky situations)
Primary Success Metrics	●< 1% relative increase in overall C/R ●Overall S-RAD downranking efficiency > 65% ●< ~10 second (or < 2.0% relative) increase in overall average post dispatch ETA ●< 3% relative increase in overall p95 ETA ●< 3% relative increase in overall p99 ETA
Secondary Success Metrics	Driver Fairness (Earnings Per Hour, Ratings to Riders) Rider Fairness (ETAs, Upfront Fare, Ratings to Drivers)
Cities	20 cities in US, 20 cities in Brazil
XP start date	**May 18, 2023 (4 weeks),** XP Plan



PRIVILEGED

CONFIDENTIAL

05 Appendix

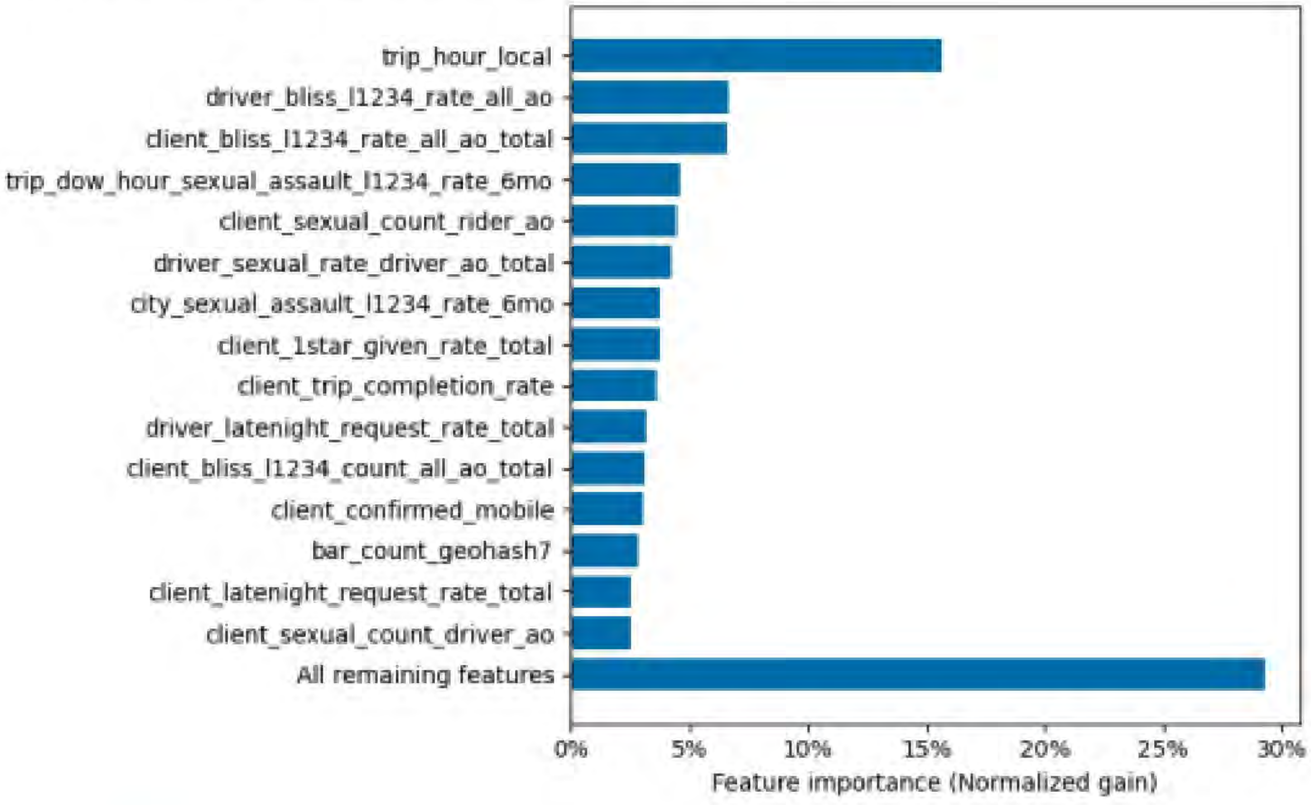


ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

As a result, we see a slight shift in model feature importance towards rider features and safety incident rates compared to current production model

Global Model Features Importance



Source

*Total gain is only one of many methods to measure feature importance
Full list of features and descriptions can be found here.

Observations

- **Trip_hour_local** is the **#1 feature** because it explains **~15%** of a given **S-RAD risk score** (similar to prod model)
- Top **Rider features collectively contribute to ~40% of risk score** (vs ~25/40% in LatAm/US production models)
- **Bliss contact rates** remain important features for both riders/drivers, but **sexual incident rates appear to contribute more** to scores compared to production models.

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

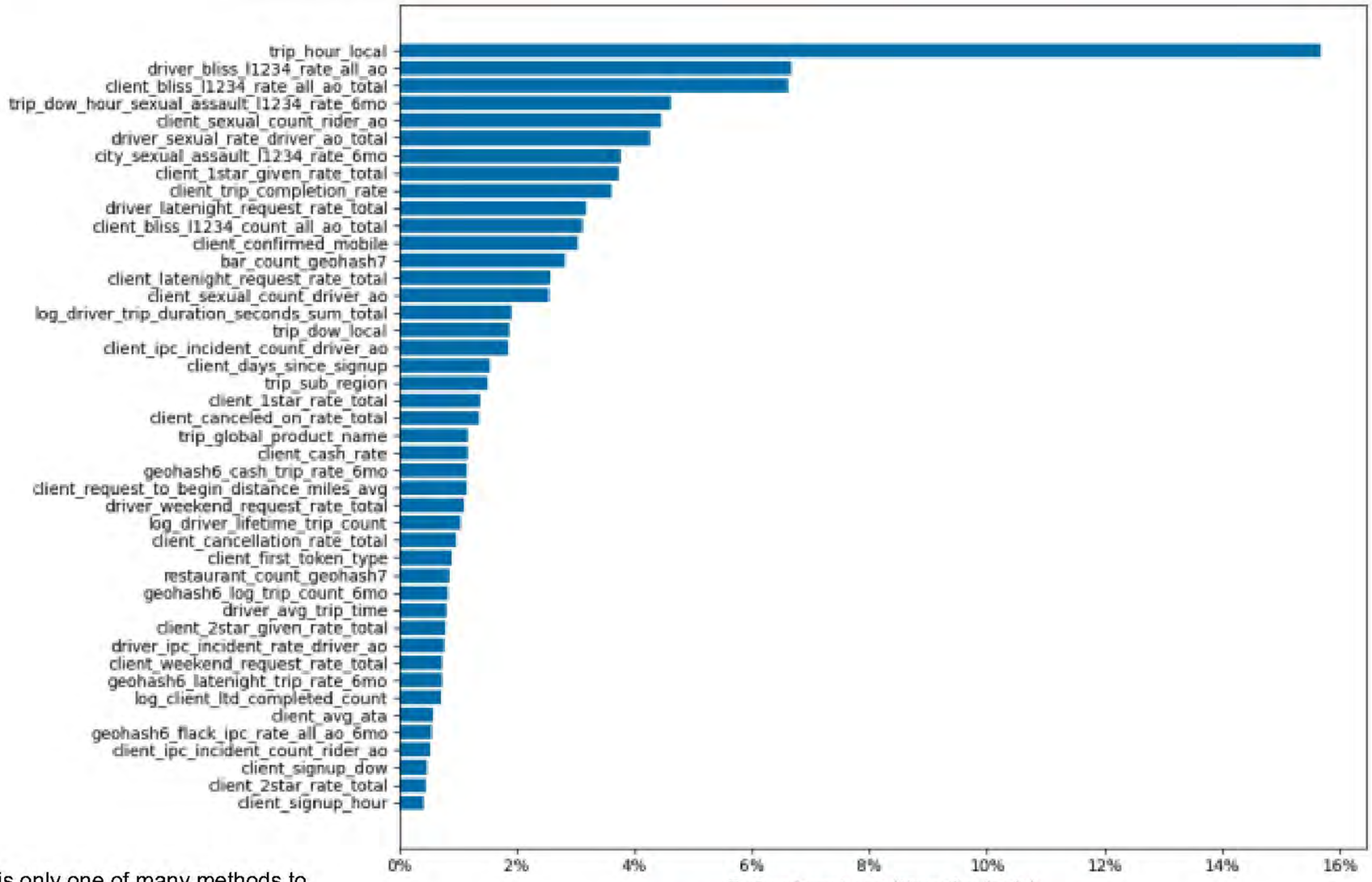
UBER_JCCP_MDL_003274288

P-01366.00096

Slide 80 Notes

- We rank each of the features based on their average contribution to the final S-RAD score computed for a specific driver-rider pair
  - Fewer available driver features may hurt overall performance, as well as impact the swapability of plans

Candidate model feature importance



*Total gain is only one of many methods to measure feature importance

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

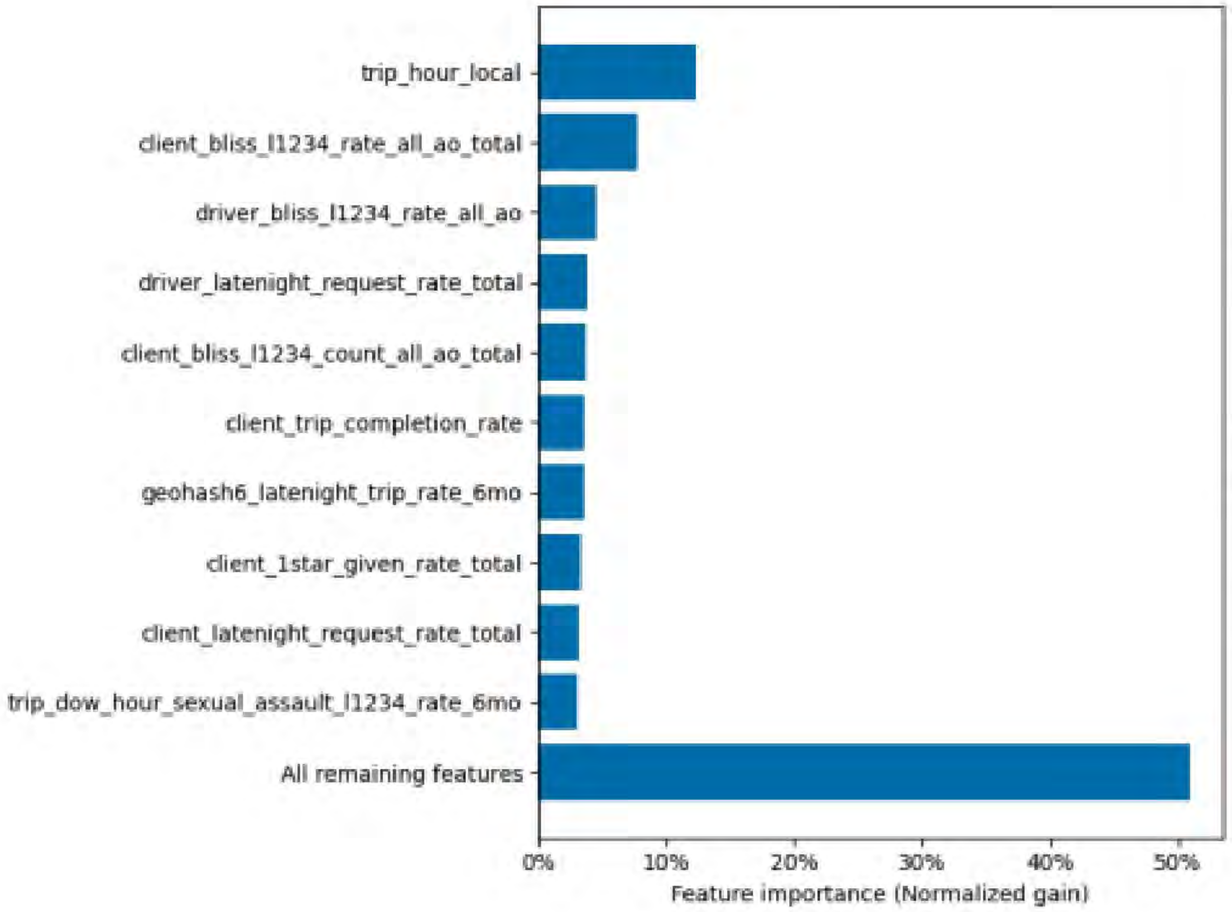
UBER_JCCP_MDL_003274290

P-01366.00098

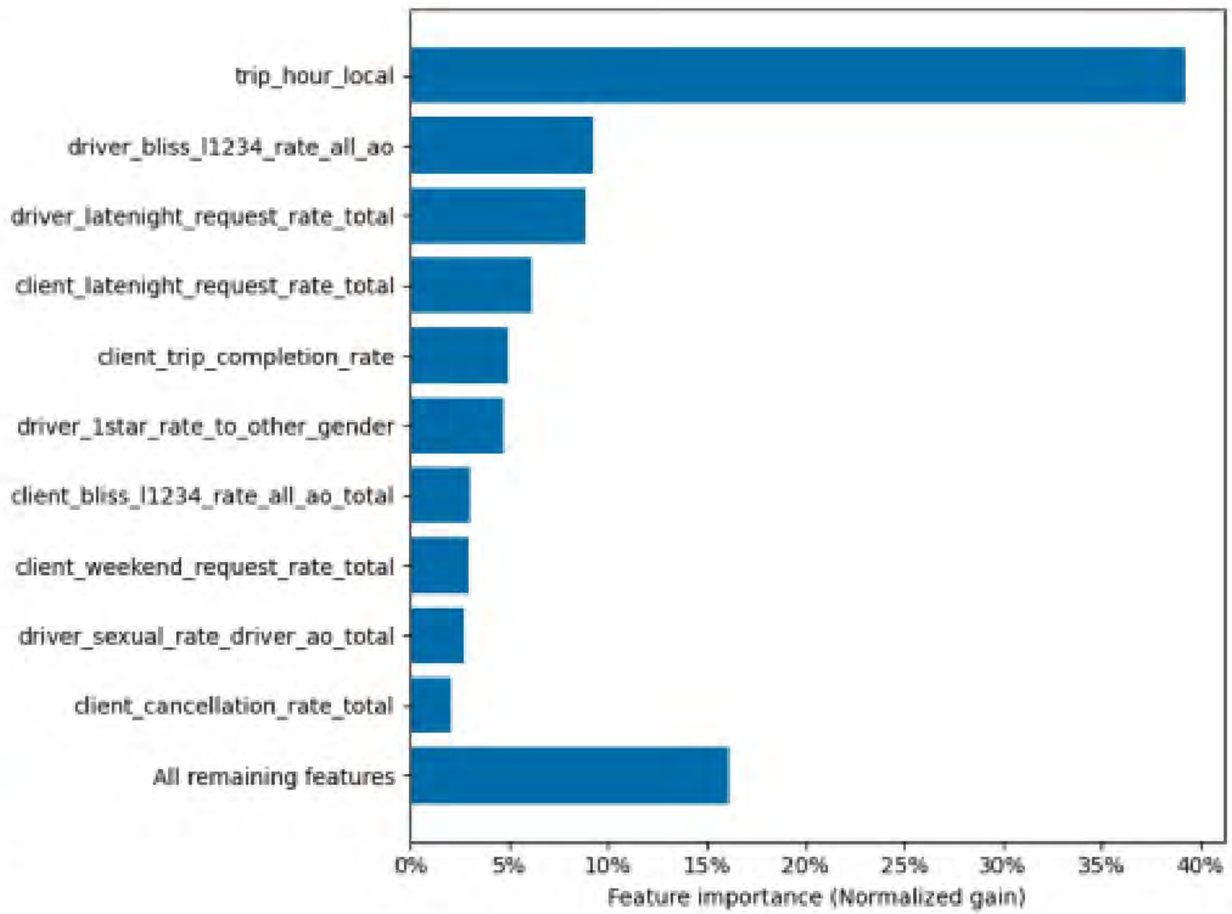
Slide 81 Notes

On average, how much does each feature contribute to the risk score?
Overall measure of utilization of the feature and its contribution to the score.

Production models feature importances



United States



LatAm

*Total gain is only one of many methods to measure feature importance

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274292

P-01366.00100

S-RAD
Leadership Update

3.3.2023

Uber

ATTORNEY-CLIENT PRIVILEGED

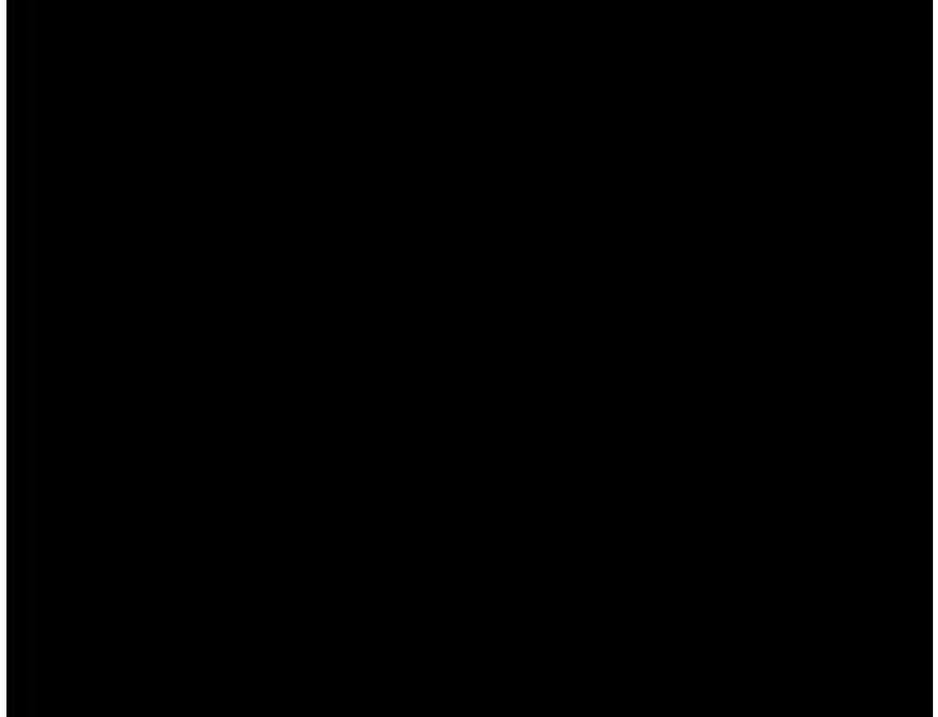
01 Executive Summary

02 S-RAD LATAM Expansion

03 Intervention Iteration: Enforced Downranking

01 Executive Summary

@zoe



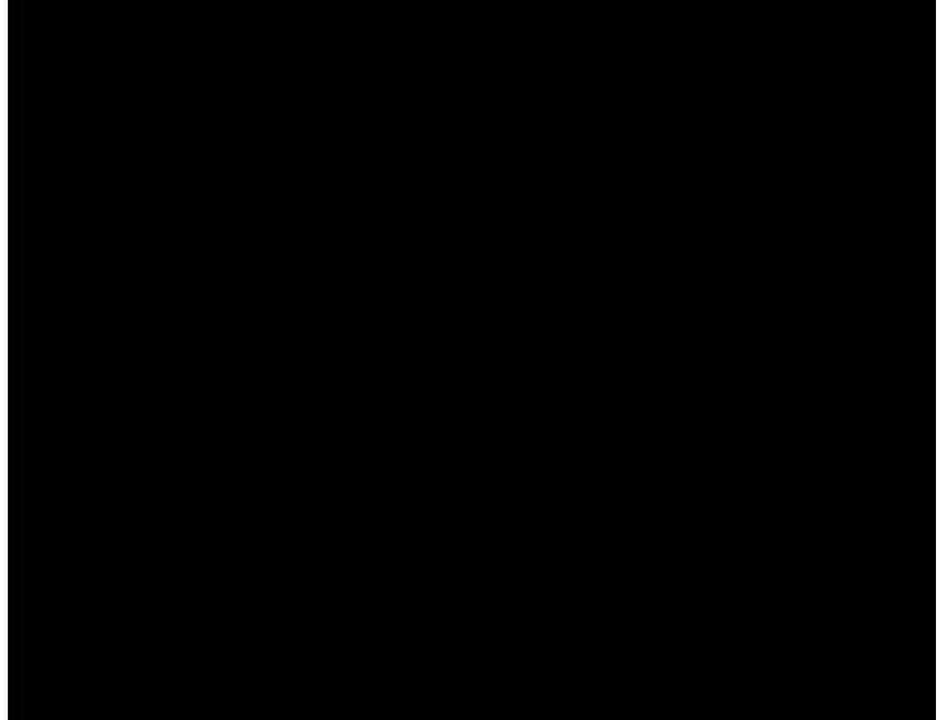
ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Executive Summary

- **S-RAD Downranking** has been launched to whole **LatAm**, which will cover additional **18pp of Global Serious SASM incidents**
- **S-RAD<>Marketplace Matching**: S-RAD intervention **efficiency dropped** and **more flagged high risk plans got dispatched** after Matching team launched an ETA based Hard-filtering product. After deep diving with Matching team, we recognize:
    - **Soft-filtering is no longer as effective** when working together with Matching products
    - **Slip-through rate has increased by +130%**(0.23% -> 0.53% of all trips). And 273 serious SA/SM incidents in the US and 156 in BR happened after slip-throughs(July-Dec 2022)
- **Next steps: Iterate the intervention to "Enforced Downranking"**
    - Build Tech solutions
    - Design XPs to validate its impact on Marketplace and Fairness

02 S-RAD LATAM Expansion @zoe



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274297

S-RAD LatAm expansion

- Earlier this week, we rolled out S-RAD to the rest of LATAM:
  - XP results show **negligible marketplace impact**
  - Fairness testing shows **no disparities** in **earnings** or **one-star** trips and **small disparities** in **ETAs** and **trips per driver** (to be monitored after launch)
- Expansion includes Chile: aligned with the local team that the new IC+ legislation does not pose material, incremental risks
- S-RAD is maintaining 20% holdout. Team will review marketplace metrics across the region in ~4 weeks

Expansion facts and estimates:

Live in ACAC, SoCo and MX

- 16 new countries
- 135 new cities

Expected increase in S-RAD Global Incident Coverage: 18pp (based on last 3 months)

Expected increase in Trip Coverage: 13pp (based on last 3 months)

CONFIDENTIAL

UBER_JCCP_MDL_003274298

P-01366.00106

LaTam Marketplace XP: Overall impact

Trip Distribution	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	17.8M	15.0M	2.89M
Treatment	17.8M	15.0M	2.87M
Treatment %	50.0%	50.0%	49.8%

Intervention Metrics	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Estimated TR (Control)	1.13%	0.55%	4.12%
Slip through (Treatment)	0.48%	0.22%	1.83%
Downranking efficiency	57.7%	60.5%	55.4%

ACAC/SoCo/Mexico (74 cities*) Metric	All Day		Day Time		Night time	
	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg post dispatch ETA	-	377.1	-	375.5	**6.0**	384.6
P90 post dispatch ETA	**3.1**	686.3	-	662.1	**13.6**	748.9
P95 post dispatch ETA	**3.4**	793.1	-	771.6	**11.5**	848.4
P99 post dispatch ETA	-	960.1	-	954.0	**6.5**	975.5
Avg request to begin	-	556.6	-	553.4	**4.8**	572.4
Completed/Requests	-	74.82%	-	76.93%	**-0.72%**	63.75%
Unfulfilled/Requests	-	4.94%	-	3.82%	**0.40%**	11.15%
Overall rider cancel %	-	18.87%	-	18.16%	-	22.60%
Pre-dispatch rider cancel %	-	1.97%	-	1.80%	-	2.71%
Driver cancel %	-	15.95%	**-0.04%**	15.06%	**0.13%**	21.01%
Rider given 1/2 star %	-	1.24%	-	1.24%	-	1.28%
Driver given 1/2 star %	**-0.02%**	2.90%	**-0.01%**	2.85%	**-0.06%**	3.27%

- Overall trigger rate near 1.1% target
- Day time trigger rate ~15% greater than recently observed in BR
- Night time trigger rate ~30% less than recently observed in BR
- Downranking efficiency slightly up compared to BR/US
- Minimal All Day and Day time impacts
- Some moderate Night time impacts
  - P95 ETA impacts ~50% greater on relative basis
  - Meaningful C/R and Unfulfilled impacts

-: p value < 0.10; Level effect: Absolute difference in metric value;

*: city_id in (1049,1165,1420,1424,1453,1469,1786,1795,1873,1892,1893,1977,2228,2265,2297) excluded due to data issues; Note: No corrections for multiple

CONFIDENTIAL

UBER_JCCP_MDL_003274299

P-01366.00107

No stat sig disparities in Driver Earnings

10/18/22 - 11/15/22, LatAm Cities

Driver Earnings



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 90 Notes

11:01

Still not statsig under a range of specifications (min_trips = {25, 50, 100}; fe_se = {0 | 0, city_woy + city_how + city_woy + city_how}

85 cities ran between 10/18/22 and 11/01/22: Santiago, Mexico City, San Jose PR, Lima

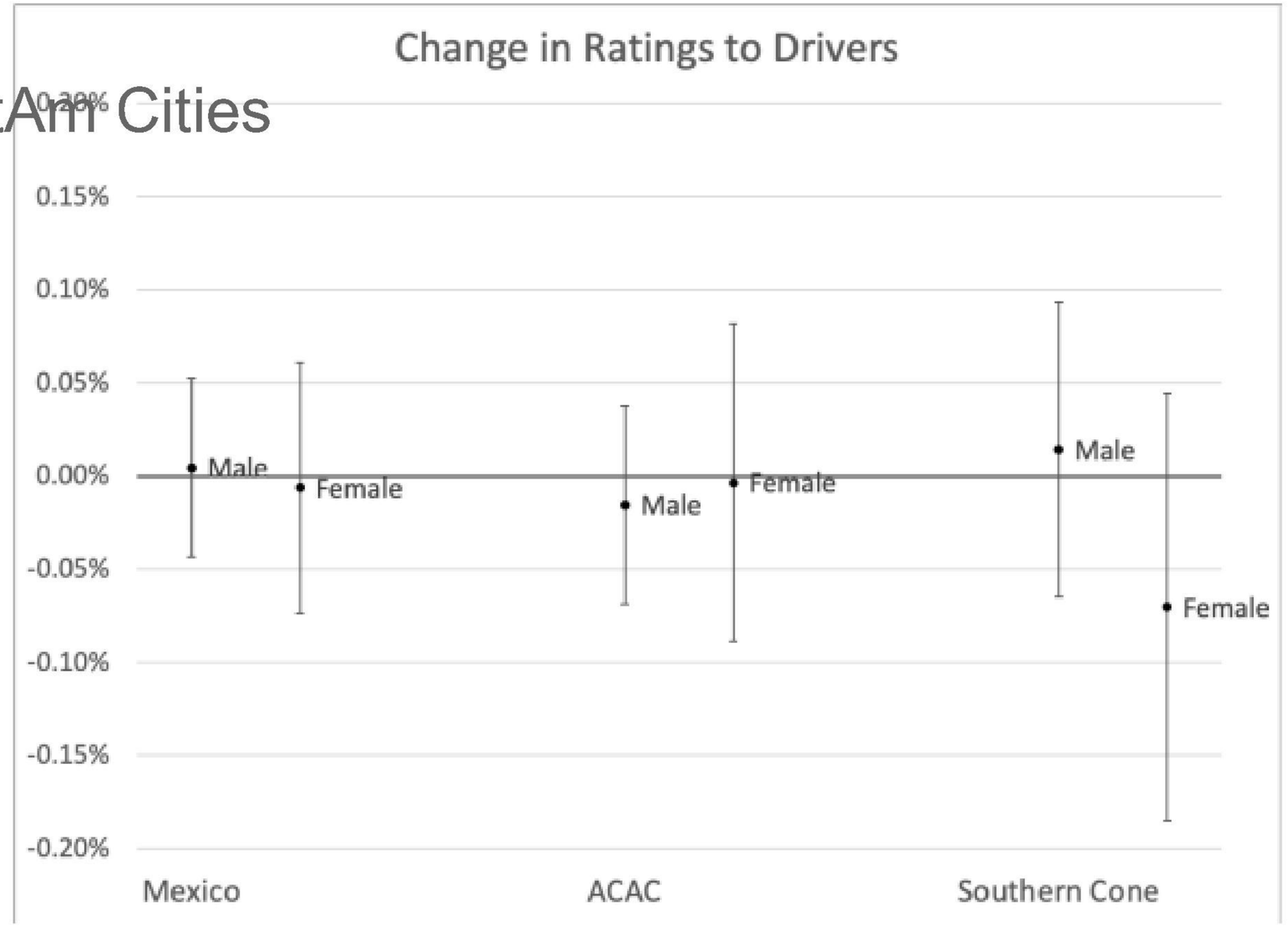
4 cities are currently running (11/01/22 to 11/15/22): **Buenos Aires (805), Bogota, Guadalajara, Monterrey,**

Sample size here is defined as the number of switchback periods * city * demographic group, which is in the hundreds of thousands for all tests.

No stat sig disparities in 1-star trips (to drivers)

10/18/22 - 11/15/22, LatAm Cities

One-Star Trips (to drivers)



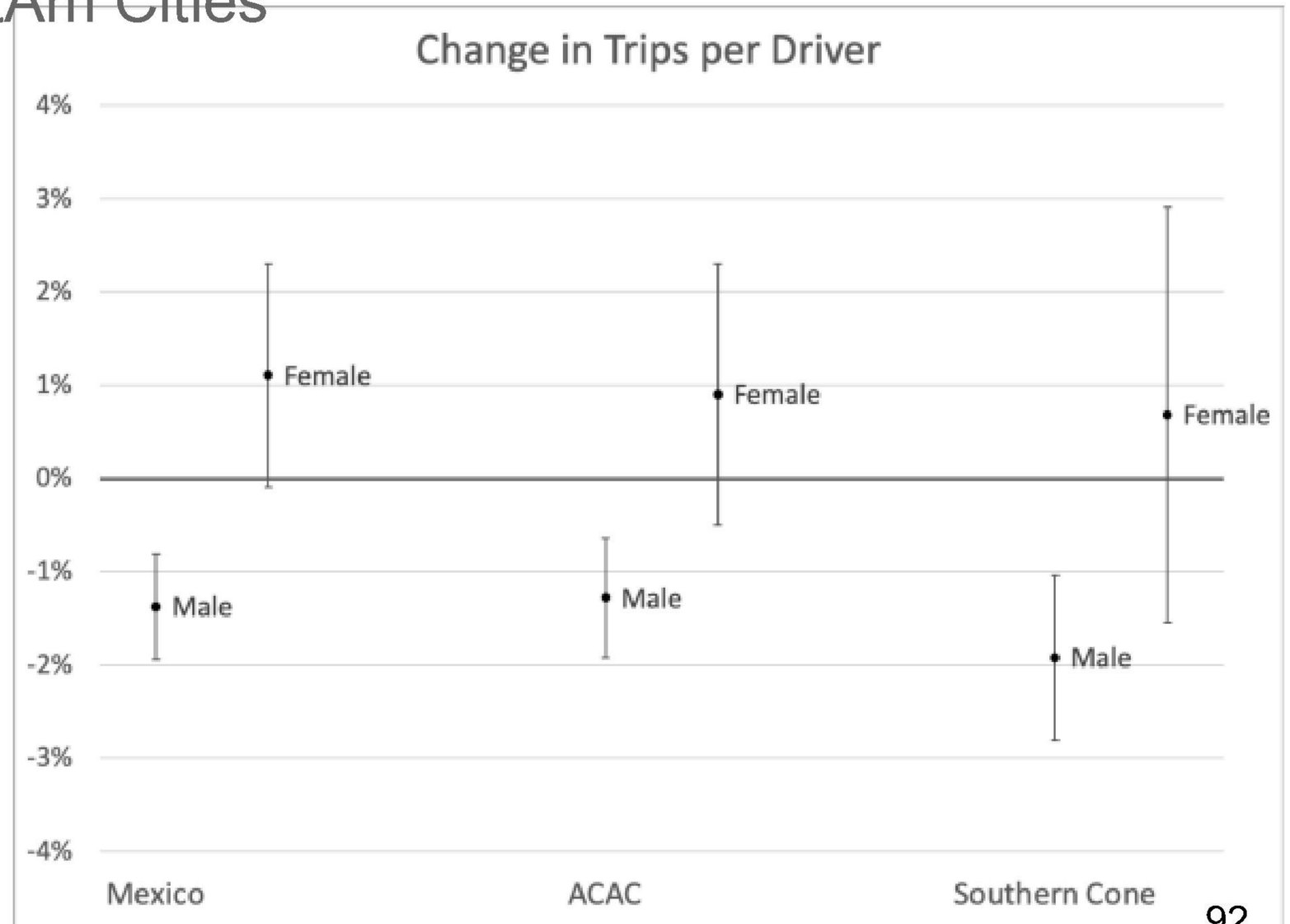
Slide 91 Notes

Asian (trips)
Technically it's good — people inferred as Asian by this method experience a drop in one-star trips. I wouldn't read too much into it because if we do 20 or 30 comparisons like this, a few are bound to be stat sig by chance

Stat sig disparities in trips per driver

10/18/22 - 11/15/22, LatAm Cities

Completed Trips



CONFIDENTIAL

UBER_JCCP_MDL_003274304

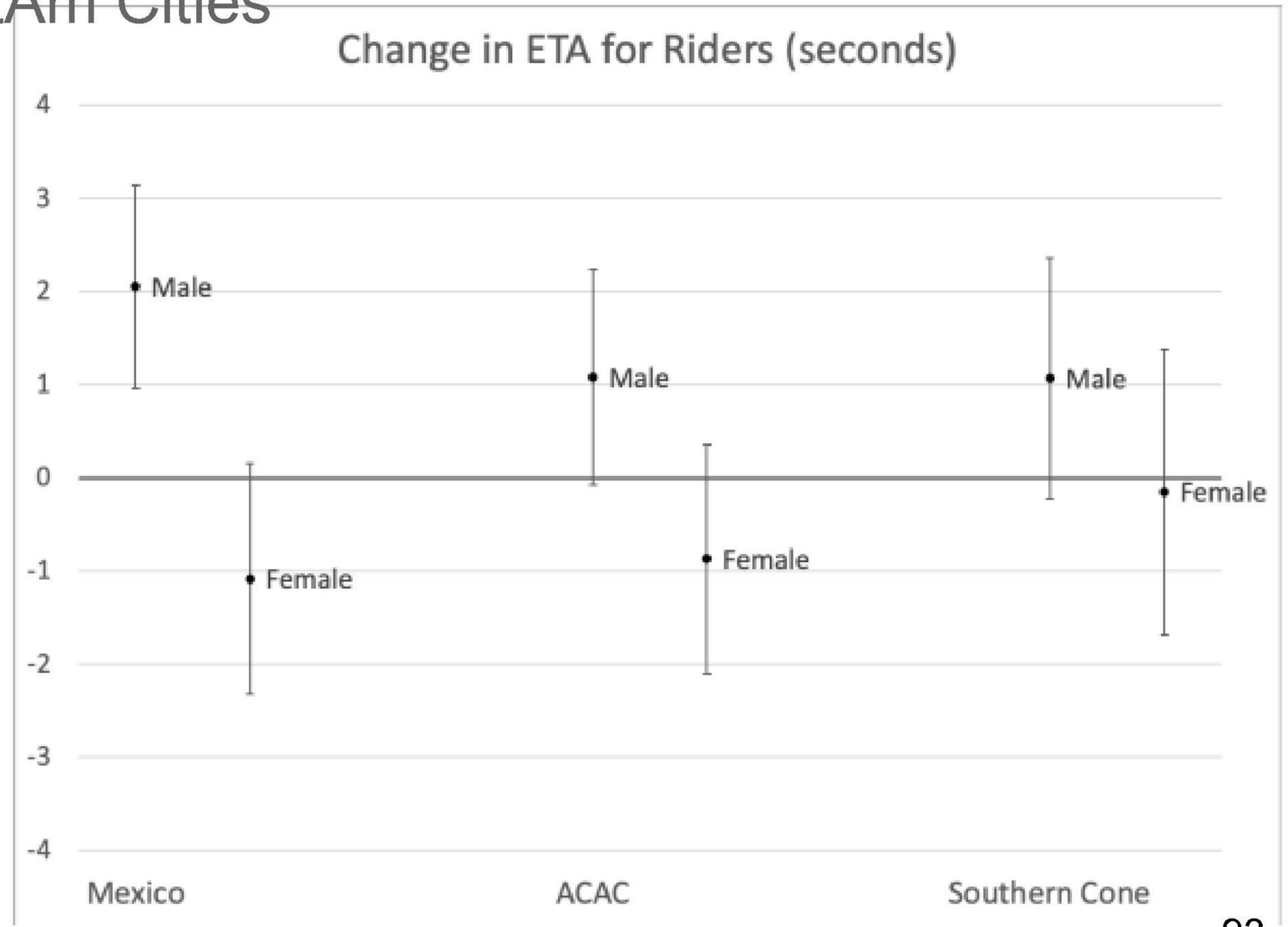
Slide 92 Notes

These are very small - the difference between ~1.66 and 1.67 trips per driver (within each 48-minute switchback period)
These differences are less robust than for earnings. They depend more on how you define the data set – do you use all switchback periods for men, even if the associated female switchback period was dropped because there were so few women driving then? The answer changes based on this decision.

Stat sig disparities in ETAs

10/18/22 - 11/15/22, LatAm Cities

ETAs



CONFIDENTIAL

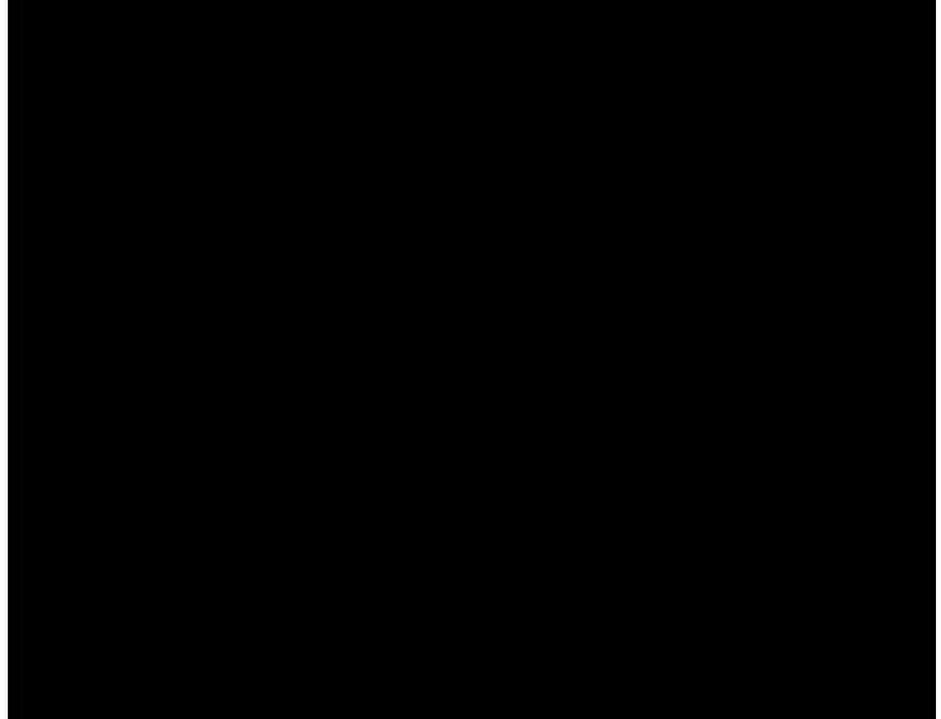
UBER_JCCP_MDL_003274306

Slide 93 Notes

Pooled across regions, it's stat sig
Still stat sig if you filter out periods with fewer or more trips (25 or 50 or 100)
Still stag sig with different specifications (changing fixed effects and standard errors)
Average ETA ~ 360 seconds

03 Intervention Iteration: Enforced Downranking

@zoe @gabriel @ben



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Gap in S-RAD Intervention

Risk Assessment → **Flagging** → **Actioning** → **Matching**

Assess risk of each plan

***Plans** with scores **above threshold** are flagged*

***Soft-filtering:** Objective Function(OF) Cost added to all flagged plans*

Marketplace engine dispatches plans based on OF to optimize overall market

Least-N intervention:
When all plans on a request are flagged, No cost added to least 25% risky plans

Due to the circumstances of the trip, all possible supply plans have scores above the actioning threshold. In these situations, a subset consisting of the lowest n% of supply plans can be dispatched.
These trips are referred to as **Type 1 Slip through** trips. They are inevitable as long as S-RAD does not block dispatches.

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 95 Notes

(either its location, time of day, or some other combination of risk factors

Late Issue worsen the slip-through

Risk Assessment → **Flagging** → **S-RAD Actioning** → **Matching Fast&Slow (MFS)** → **Matching**

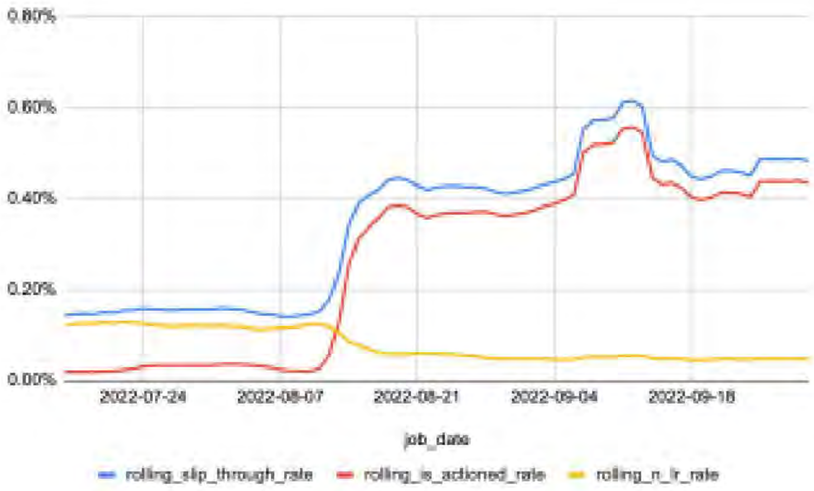
Assess risk of each plan

***Plans** with scores **above threshold** are flagged*

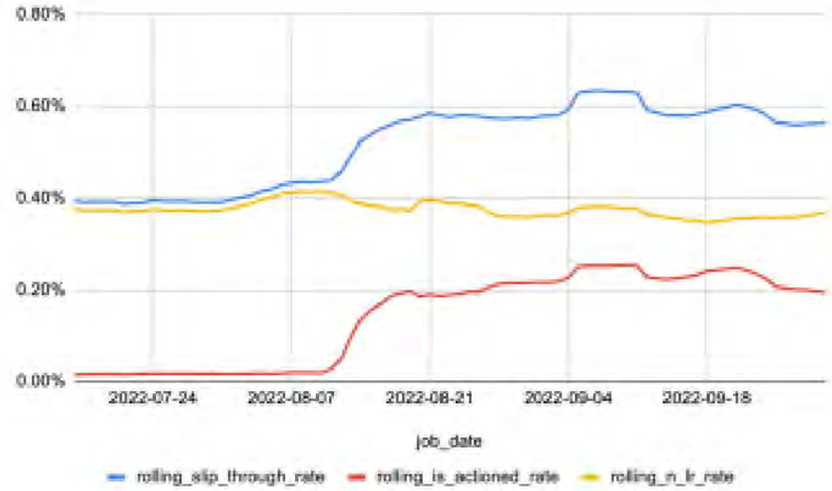
***Soft-filtering:** Objective Function(OF) Cost added to all flagged plans*

***Hard-filtering:** Only consider plans with an ETA < threshold*

Marketplace engine dispatches filtered plans based on OF to optimize overall market



*7 day rolling total slip through rate (blue), Type 1 slip through rate (yellow), Type 2 slip through rate (red) for all active cities in **Brazil***



*7 day rolling total slip through in the **US***

A high score supply plan is part of the global optimum (i.e. MFS), despite there being supply plans that have scores below the S-RAD threshold. In this situation, **'Soft-filtering' is degraded and gives way to other matching algorithms**.
These trips are referred to as **Type 2 Slip through** trips.
More high safety risk plans got dispatched after MFS launch. Some of them can result in serious SA/SM incidents later.

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274311

P-01366.00119

Slide 96 Notes

Based on historical data, Type 1 slip throughs tend to be stable while Type 2 slip throughs tend to be much less common. Concerningly, since mid Aug 2022, the proportion of Type 2 slip throughs had a sharp spike (red trace in below plots) and remained high, indicating ‘Soft-filtering’ intervention is less effective in ‘downranking’ and preventing the dispatch of high risk plans. This issue has been observed in both Brazil and the US.
a new Matching product favors a subset of supply plans for non-Safety purposes(i.e. Short ETA) without respecting S-RAD scores

Example

			With S-RAD Plan 2/3/5 can be dispatched before 1/4		With MFS Only Plan 2 can be dispatched before 1	
Supply Plan	Objective Function	ETA	SRAD Score	Adjusted Objective	ETA <600	Adjusted Objective
1	60	440	0.95	1498.56	440	1498.56
2	100	537	0.1	100	537	100
3	300	603	0.2	300	603	300
4	800	635	0.92	1499.3	635	1499.3
5	1400	812	0.2	1400	812	1400

Numbers are for illustrative purposes only

Plan is actioned by S-RAD

Plan is filtered by MFS

- S-RAD scores all supply plans
- Action if score is high
- Adjust OF with added cost for actioned plans
- MFS hard filter on ETA thresholds
- Remaining plans will be dispatched by OF

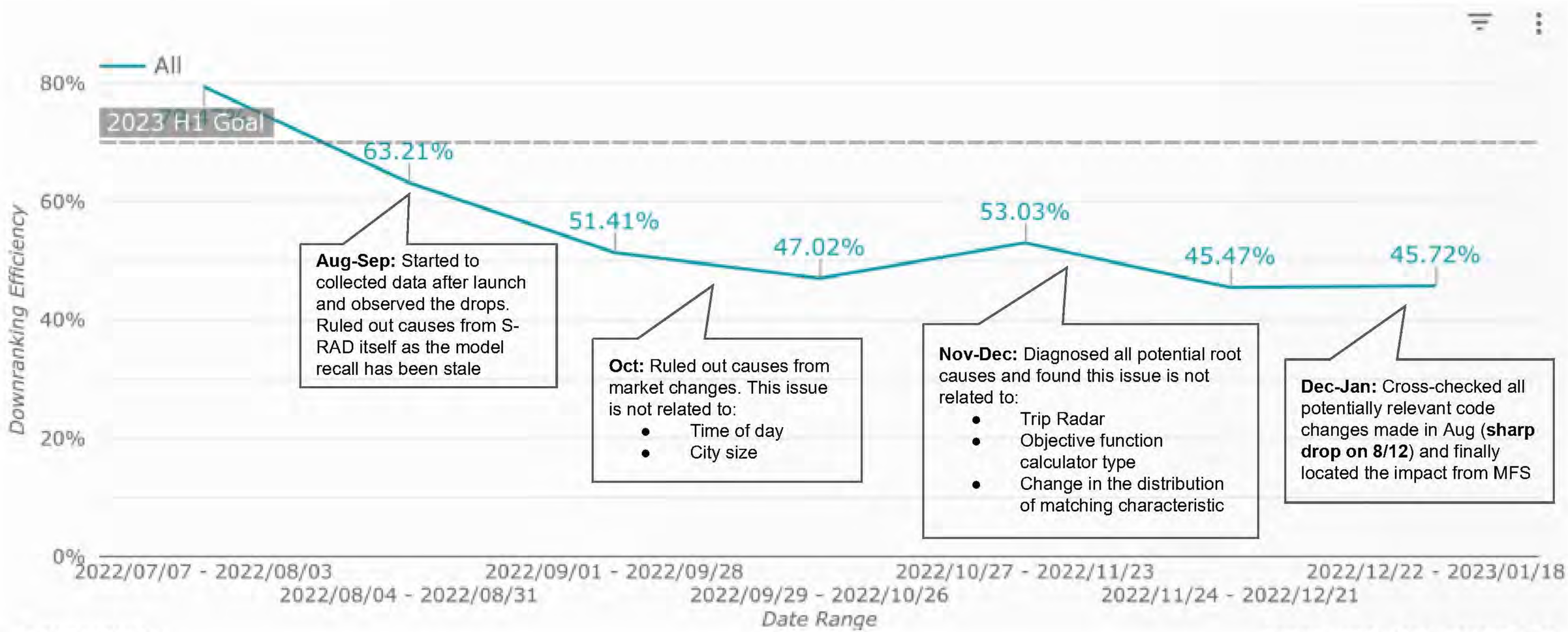
Happy Path -> Plan 2 is accepted and dispatched

Unhappy Path -> Plan 2 is rejected/canceled. Then Plan 1 will be dispatched regardless of S-RAD flag.

ATTORNEY-CLIENT PRIVILEGED

S-RAD Intervention Efficiency Drop

Efficiency is defined as, of the population of jobs that S-RAD would like to prevent from dispatching high risk pairs via downranking, how many did it actually intervene



Slide 98 Notes

pre MFS: a SRAD plan wouldn't be filtered before OF AT ALL

MFS pre Aug (OF filtering): a SRAD plan would be filtered by MFS when its OF value is high which is **almost all the time**

We set the SRAD OF value as 1450, hard filter OF value is 1499, so it is **almost always filtered**

MFS post Aug (ETA filtering): a SRAD plan is only sometimes filtered by MFS when the flagged plan has high ETA. **Efficiency drops represent the amount of low ETA that MP could have fulfilled but didn't in pre-Aug time**

Since MFS prunes supply plans, more high risk plans are dispatched after S-RAD flagging. In last 5 months, 273 serious SA/SM incidents in the US and 156 in BR happened after S-RAD flagged plans were dispatched.

	Brazil		United States	
	50/50 Safety XP (09/21 - 04/22)	**80/20 Holdout (07/22 - 12/22)**	**50/50 Safety XP (09/21 - 04/22)**	**80/20 Holdout (07/22 - 12/22)**
Number of requests S-RAD **active**	521M	796M	220M	429M
Number of requests S-RAD **inactive**	520M	204M	221M	109M
Trigger rate S-RAD **inactive**	1.22%	0.98%	1.17%	1.25%
Downranking efficiency	76.0%	52.9%	66.6%	55.4%
# Flagged serious SASM while S-RAD **active**	54	156	84	273

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274316

Slide 99 Notes

How do we measure the incidents we do not observe?

Other hypothesis beyond under-reporting?

By reporter type - findings does not support either situation:

(1) Nudges cause more reporting
(2) Nudges cause more incidents

Inspired Crash detection xp….they reported sooner and more. So we conducted a similar analysis looking at the time elapsed between trip start and incident reported.

Lag - if we saw them reporting sooner, maybe they would report more. But we did not see that.

Comparing to XP stage, S-RAD efficacy on reducing IR(Business Success Metric) dropped significantly as well. This drop is consistent with efficiency drop

Safety Impact		Time of Day		
Country	Observation period	Overall	Day 6 AM - 11 PM	Night 11 PM - 6 AM
Brazil	50/50 Safety XP (09/21 - 04/22)	-8.45%** (-12.2%, -4.74%) 5.13 → 4.71	-6.23%** (-11.0%, -1.43%) 3.41 → 3.21	-11.6%** (-17.5%, -5.76%) 27.5 → 24.4
	80/20 Holdout (07/22 - 12/22)	2.28% (-3.32%, 7.89%) 4.12 → 4.25	1.15% (-5.78%, 8.09%) 2.84 → 2.90	-4.70% (-13.4%, 4.00%) 21.1 → 19.9
United States	50/50 Safety XP (09/21 - 04/22)	-15.3%** (-19.6%, -11.0%) 7.09 → 6.03	-18.2%** (-23.8%, -12.6%) 4.63 → 3.71	-11.8%** (-18.5%, -5.05%) 21.0 → 19.2
	80/20 Holdout (07/22 - 12/22)	-2.61% (-7.60%, 2.38%) 8.39 → 8.16	-3.56% (-10.2%, 3.12%) 5.40 → 5.21	-3.81% (-11.2%, 3.54%) 26.1 → 24.8

**Statistically significant at 80% confidence level

ATTORNEY-CLIENT PRIVILEGED

Slide 100 Notes

How do we measure the incidents we do not observe?

Other hypothesis beyond under-reporting?

By reporter type - findings does not support either situation:

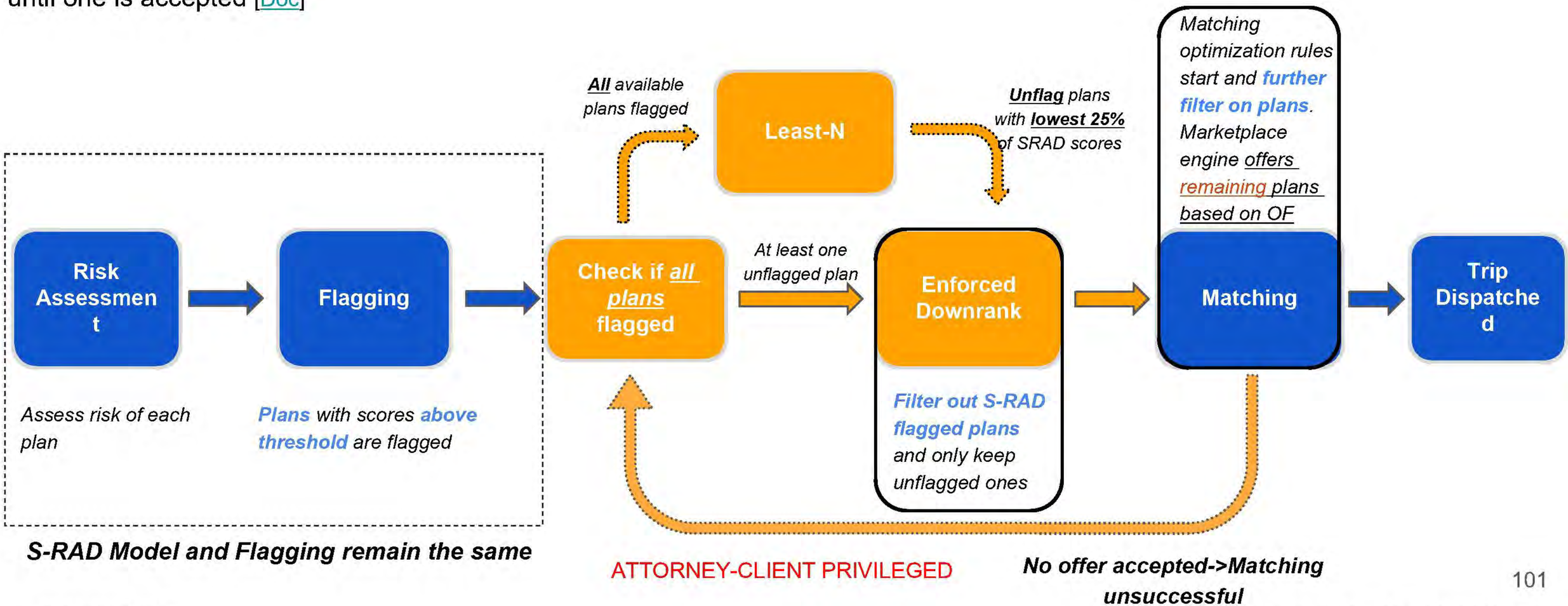
(1) Nudges cause more reporting
(2) Nudges cause more incidents

Inspired Crash detection xp….they reported sooner and more. So we conducted a similar analysis looking at the time elapsed between trip start and incident reported.

Lag - if we saw them reporting sooner, maybe they would report more. But we did not see that.

Enforced Downranking

When a user requests a trip, S-RAD filters out the high-risk plans for safety purposes so that they aren't initially made available for dispatch. Most of the time, one of the unflagged plans is accepted -- a match is made and the trip happens. But sometimes, none of these offers gets accepted or all plans get flagged. When that happens, lowest risk flagged plans will be offered as potential options, until one is accepted [Doc]



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Engineering design will not create any new services and will rely on the already used marketplace matching stack. The main changes will be made within multileg service



The new intervention will be applied within matching context inside the multileg service

All experiments for assessing the new intervention will be configured within MX platform and will be stored as Flipr configurations that will be read by multileg service

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 102 Notes

How do we measure the incidents we do not observe?

Other hypothesis beyond under-reporting?

By reporter type - findings does not support either situation:

(1) Nudges cause more reporting
(2) Nudges cause more incidents

Inspired Crash detection xp….they reported sooner and more. So we conducted a similar analysis looking at the time elapsed between trip start and incident reported.

Lag - if we saw them reporting sooner, maybe they would report more. But we did not see that.

- To assess any potential impacts of the enhanced downranking intervention, a marketplace XP will be conducted monitoring both marketplace impacts and driver fairness outcomes
- The current XP plan involves using the **existing holdout infra**, reducing scheduling lag and guaranteeing city availability
  - Subject to approvals by MX and Matching teams
- Non-XP cities will maintain S-RAD actioning using the existing soft filtering intervention
- Assuming no unexpected marketplace or fairness outcomes, all holdout cities will be transitioned to enhanced downranking post XP

Late March 2023
Remove subset of cities from holdout and transition to enhanced downranking

Late April 2023
4 weeks post XP start, roll back enhanced downranking in XP cities to analyze marketplace and fairness

Early May 2023
Assuming XP successful, roll out enhanced downranking to all holdout cities (US, BR, and LatAm)

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 103 Notes

How do we measure the incidents we do not observe?

Other hypothesis beyond under-reporting?

By reporter type - findings does not support either situation:

(1) Nudges cause more reporting
(2) Nudges cause more incidents

Inspired Crash detection xp….they reported sooner and more. So we conducted a similar analysis looking at the time elapsed between trip start and incident reported.

Lag - if we saw them reporting sooner, maybe they would report more. But we did not see that.

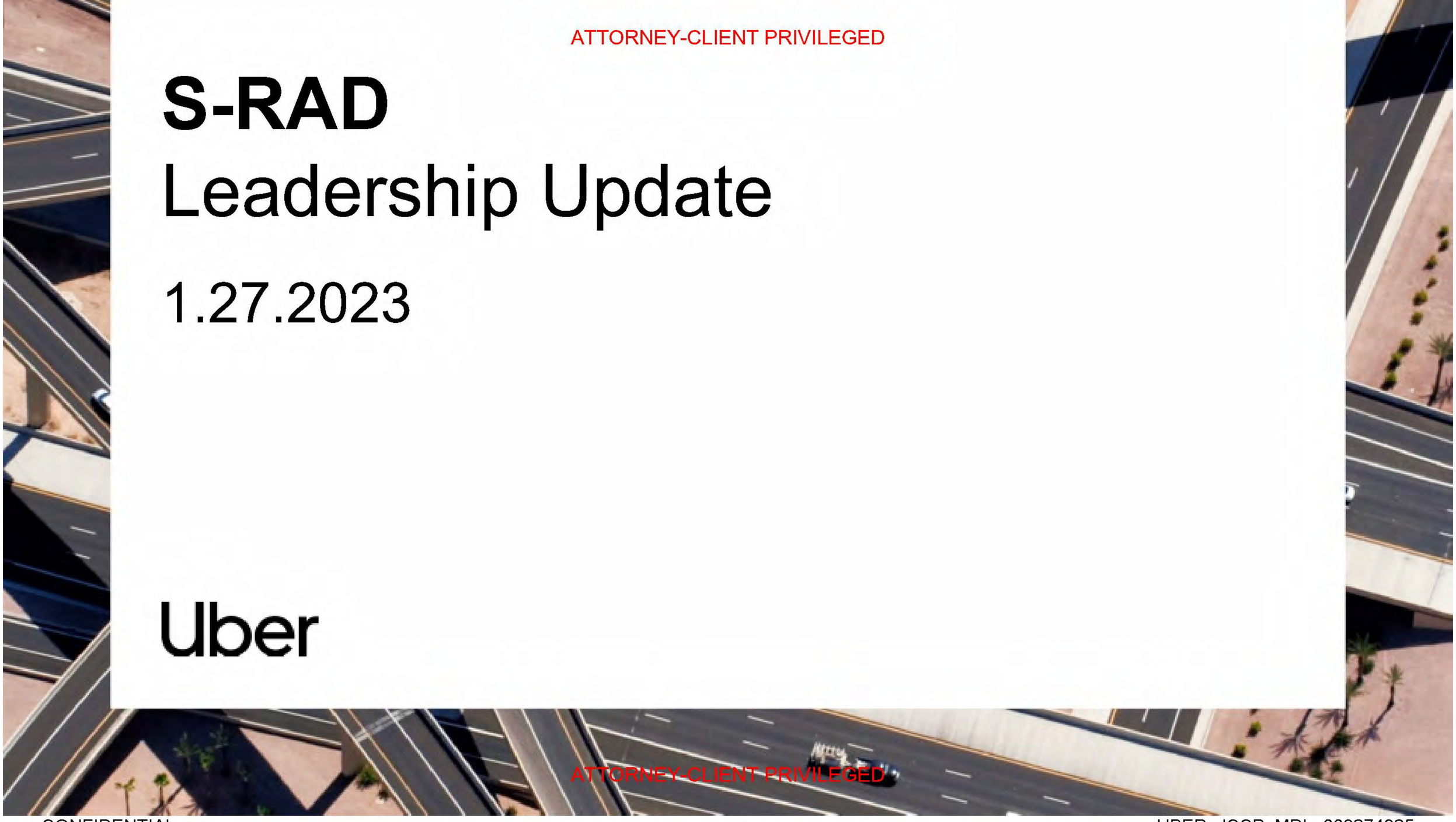
ATTORNEY-CLIENT PRIVILEGED

S-RAD

Leadership Update

1.27.2023

Uber



ATTORNEY-CLIENT PRIVILEGED

Agenda

01 Intro

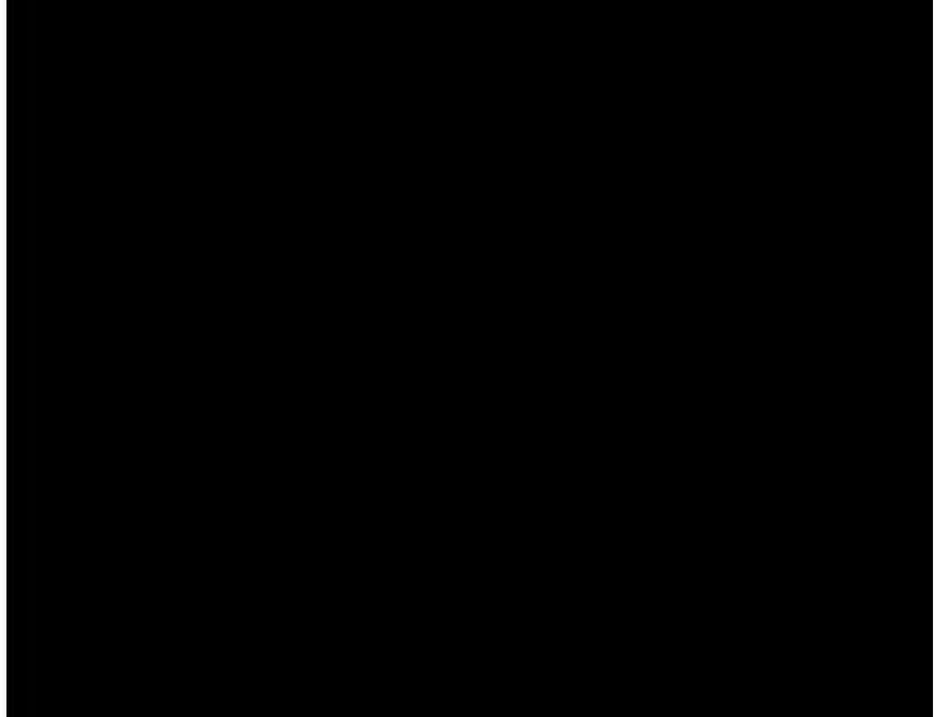
02 S-RAD LATAM Downranking Expansion(pre-read)

03 S-RAD Global Expansion Updates (pre-read)

04 Persistently Actioned User-Driver

01 Intro

@zoe



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274327

Intro

2

- [Pre-read] S-RAD **Latam Marketplace XP** completed in Q4 2022 (89 cities, 2 standard 2 week switchbacks)
  - XP results show **negligible marketplace impact**, supporting expansion launch.
  - Fairness test (by gender) shows **no disparities** in **Earnings** or **One-star** trips and **small disparities** in **ETAs** and **trips per driver**
  - Overall, the XP outcome **meets launch criteria** and S-RAD team is ready for roll-out. Regional approvals are expected to be completed by 2/3/2023.
    - **Chile:** Working team is evaluating the risks of a new IC+ regulation forbids all discrimination when offering trip requests to drivers and also may trigger transparency requirements.
- [Pre-read] S-RAD Global expansion is **on track**
  - S-RAD update to the UK board in Dec went well. No change in plans and still looking for **end of 2023** expansion in the **EU**. In response to the challenging regulatory environment, Legal and Policy team are working with EU stakeholders for full assessment in H1.
  - The team tested Prod models on historical data of expansion regions in order to understand model efficacy and scoring. The results (model recall) are promising. In next step of Global model development, the features marked risky by Legal while having minimal impact on performance will be excluded.
- [Late Issue update]S-RAD<>Marketplace Matching**:** Downranking efficiency dropped and more S-RAD flagged plans got dispatched after Matching team launched an ETA based Hard-filtering product. The team is working with Matching team on short and long term solution of this issue.
- **[Focus]Persistently Actioned User (PAU) - Driver**: Definition, Impact and Risk

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 107 Notes

Re: feature usage: This is further supported by trend in increased usage at the driver & rider level for Audio Recording as number of nudges delivered increases.

Re: US/BR downranking: We are currently investigating potential low liquidity in market, new marketplace product launches, and ongoing marketplace/surge XPs.

Slide 107 Comments

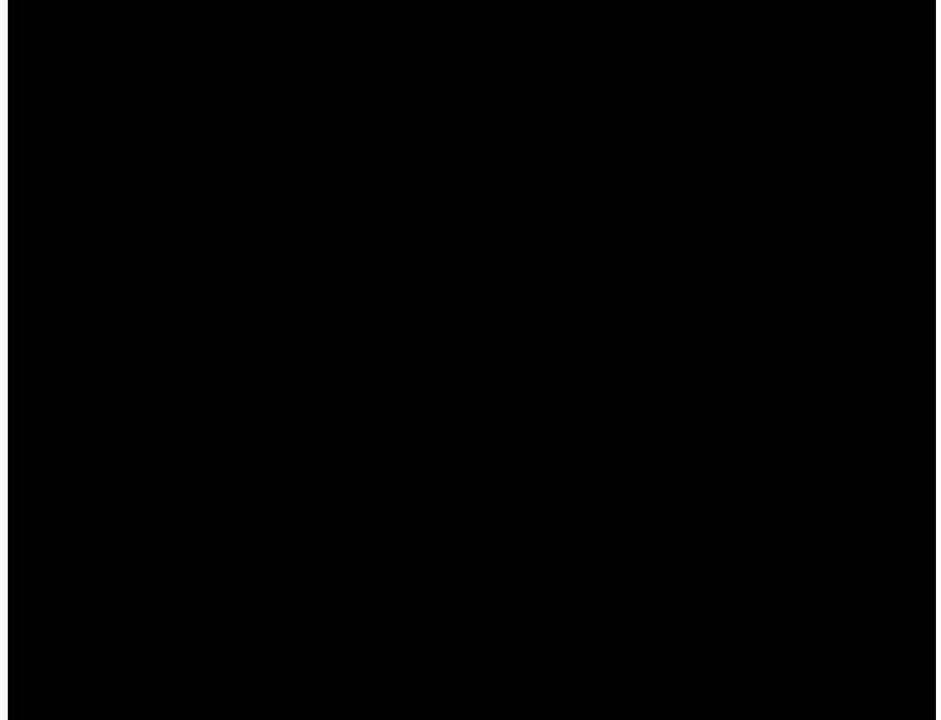
1 @gorkem@uber.com @bmarchi@uber.com @lfernandez@uber.com @gferreira@uber.com
Added this for leadership visibility. let me know if you have any concern.
Reassigned to gorkem@uber.com
Zoe Pu, 1/27/2023 07:27 AM

2 LGTM
Gorkem Ozkaya, 1/27/2023 07:27 AM

Pre-read

02 S-RAD LATAM Downranking Expansion

@ben @dan



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Pre-read

XP summary

- XP was structured as **2 standard 2 week switchbacks** with 96 min switches with all results combined for analyses
- 89 cities were included in the XP
  - **33 from Mexico**
    - 3 XL, 13 L, 8 M, 9 S
  - **30 from ACAC**
    - 4 XL, 10 L, 7 M, 9 S
  - **26 from SoCo**
    - 2 XL, 3 L, 8 M, 13 S
- XPs ran from **10/18/22 to 11/01/22** and **11/01/22 to 11/15/22**
- Links to XP
  - Part 1 (85 cities)
  - Part 2 (4 cities)

CONFIDENTIAL UBER_JCCP_MDL_003274331

P-01366.00139

Pre-read

Overall impact

Trip Distribution	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	17.8M	15.0M	2.89M
Treatment	17.8M	15.0M	2.87M
Treatment %	50.0%	50.0%	49.8%

Intervention Metrics	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Estimated TR (Control)	1.13%	0.55%	4.12%
Slip through (Treatment)	0.48%	0.22%	1.83%
Downranking efficiency	57.7%	60.5%	55.4%

ACAC/SoCo/Mexico (74 cities*) Metric	All Day		Day Time		Night time	
	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg post dispatch ETA	-	377.1	-	375.5	**6.0**	384.6
P90 post dispatch ETA	**3.1**	686.3	-	662.1	**13.6**	748.9
P95 post dispatch ETA	**3.4**	793.1	-	771.6	**11.5**	848.4
P99 post dispatch ETA	-	960.1	-	954.0	**6.5**	975.5
Avg request to begin	-	556.6	-	553.4	**4.8**	572.4
Completed/Requests	-	74.82%	-	76.93%	**-0.72%**	63.75%
Unfulfilled/Requests	-	4.94%	-	3.82%	**0.40%**	11.15%
Overall rider cancel %	-	18.87%	-	18.16%	-	22.60%
Pre-dispatch rider cancel %	-	1.97%	-	1.80%	-	2.71%
Driver cancel %	-	15.95%	**-0.04%**	15.06%	**0.13%**	21.01%
Rider given 1/2 star %	-	1.24%	-	1.24%	-	1.28%
Driver given 1/2 star %	**-0.02%**	2.90%	**-0.01%**	2.85%	**-0.06%**	3.27%

- Overall trigger rate near 1.1% target
- Day time trigger rate ~15% greater than recently observed in BR
- Night time trigger rate ~30% less than recently observed in BR
- Downranking efficiency slightly up compared to BR/US
- Minimal All Day and Day time impacts
- Some moderate Night time impacts
  - P95 ETA impacts ~50% greater on relative basis
  - Meaningful C/R and Unfulfilled impacts

-: p value < 0.10; Level effect: Absolute difference in metric value;

*: city_id in (1049,1165,1420,1424,1453,1469,1786,1795,1873,1892,1893,1977,2228,2265,2297) excluded due to data issues; Note: No corrections for multiple

CONFIDENTIAL

UBER_JCCP_MDL_003274332

P-01366.00140

Pre-read

Mexico region impact

Trip Distribution	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	8.22M	7.00M	1.22M
Treatment	8.20M	7.02M	1.18M
Treatment %	49.9%	50.1%	49.3%

Intervention Metrics	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Estimated TR (Control)	1.14%	0.49%	4.89%
Slip through (Treatment)	0.51%	0.20%	2.34%
[illegible]efficiency	55.4%	59.4%	52.1%

Mexico Cities (27 cities) Metric	All Day		Day Time		Night Time	
	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg post dispatch ETA	-	457.0	-	455.7	**10.7**	463.3
P90 post dispatch ETA	**4.3**	829.7	-	796.8	**20.3**	912.7
P95 post dispatch ETA	**4.6**	942.2	-	912.7	**16.2**	1016.0
P99 post dispatch ETA	-	1112.3	-	1100.0	-	1143.3
Avg request to begin	-	632.2	-	629.8	**9.2**	646.4
Completed/Requests	-	76.95%	-	78.09%	**-0.73%**	70.07%
Unfulfilled/Requests	-	3.20%	-	2.41%	**0.27%**	7.81%
Overall rider cancel %	-	18.82%	-	18.50%	**0.49%**	20.69%
Pre-dispatch rider cancel %	-	1.67%	-	1.73%	-	1.36%
Driver cancel %	-	13.96%	-	13.25%	**0.15%**	18.24%
Rider given 1/2 star %	-	1.35%	-	1.35%	**0.05%**	1.33%
Driver given 1/2 star %	**-0.03%**	4.01%	**-0.02%**	3.91%	**-0.08%**	4.68%

- Overall trigger rate in line with 1.1% target
- Day time trigger rate comparable to recent BR data
- Night time trigger rate ~10% less than recently observed in BR
- Downranking efficiency up compared to BR
- Compared to BR, Baseline avg ETAs up ~100% and C/R down ~5% on related basis
- Minimal All Day and Day time impacts
  - Some P90+ ETA impacts from Night time
- Some moderate Night time impacts
  - P90 ETA impacts ~90% greater on relative basis
  - Meaningful C/R and Unfulfilled impacts

-: p value < 0.10; Level effect: Absolute difference in metric value;
city_id = (1424, 1453, 1469, 2228, 2265, 2297) excluded due to data issues; Note: No corrections for multiple comparisons

CONFIDENTIAL
UBER_JCCP_MDL_003274333
P-01366.00141

ACAC region impact

Trip Distribution	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	5.44M	4.76M	680k
Treatment	5.43M	4.75M	678k
Treatment %	49.9%	49.9%	49.9%

Intervention Metrics	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Estimate TR (Control)	1.17%	0.62%	5.06%
Slip through (Treatment)	0.43%	0.22%	1.86%
Downranking efficiency	63.6%	63.9%	63.3%

ACAC Cities (27 cities) Metric	All Day		Day Time		Night Time	
	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg post dispatch ETA	-	313.7	**-1.2**	313.0	**5.3**	318.0
P90 post dispatch ETA	**3.9**	600.8	-	592.3	**17.1**	623.3
P95 post dispatch ETA	**4.5**	702.3	-	696.6	**15.8**	717.0
P99 post dispatch ETA	**4.9**	857.8	-	864.8	**13.2**	838.2
Avg request to begin	-	505.7	-	502.9	**5.6**	523.8
Completed/Requests	-	74.92%	-	76.26%	**-0.66%**	65.48%
Unfulfilled/Requests	-	5.15%	-	4.46%	**0.29%**	10.03%
Overall rider cancel %	-	18.48%	-	17.97%	-	22.10%
Pre-dispatch rider cancel %	-	1.85%	-	1.87%	-	1.67%
Driver cancel %	-	20.78%	-	19.74%	-	28.03%
Rider given 1/2 star %	-	1.18%	-	1.17%	**-0.09%**	1.27%
Driver given 1/2 star %	-	2.29%	-	2.26%	-	2.53%

-: p value < 0.10; Level effect: Absolute difference in metric value;
city_id = (1049, 1420, 1977) excluded due to data issues; Note: No corrections for multiple comparisons

- Overall trigger rate in line with 1.1% target
- Day time trigger rate ~20% greater than recently observed in BR
- Night time trigger rate ~10% less than recently observed in BR
- Downranking efficiency up ~75% during Night compared to BR
- Compared to BR, Baseline avg ETAs up ~25% and C/R down ~10% on related basis
- Minimal All Day and Daytime impacts
  - Some P90+ ETA impacts from Night time
- Some moderate Night time impacts
  - P90 ETA impacts ~1.3x greater on relative basis
  - Meaningful C/R and Unfulfilled impacts

CONFIDENTIAL

UBER_JCCP_MDL_003274334

Pre-read

SoCo region impact

Trip Distribution	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	4.19M	3.19M	992k
Treatment	4.21M	3.21M	1.00M
Treatment %	50.2%	50.1%	50.3%

Intervention Metrics	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Estimated TR (Control)	1.07%	0.62%	2.52%
Slip through (Treatment)	0.49%	0.26%	1.22%
Downranking efficiency	54.0%	57.2%	51.6%

SoCo Cities (20 cities) Metric	All Day		Day Time		Night Time	
	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg post dispatch ETA	**1.5**	306.5	**1.3**	296.5	-	338.0
P90 post dispatch ETA	-	604.3	-	572.7	-	684.1
P95 post dispatch ETA	-	711.1	-	680.2	-	787.9
P99 post dispatch ETA	-	887.6	-	875.2	-	918.7
Avg request to begin	**1.6**	479.3	**1.7**	465.4	-	523.3
Completed/Requests	-	70.75%	-	75.46%	**-0.75%**	55.73%
Unfulfilled/Requests	-	8.18%	-	5.86%	**0.98%**	16.53%
Overall rider cancel %	-	19.42%	-	17.71%	**-1.11%**	24.91%
Pre-dispatch rider cancel %	-	2.64%	-	1.86%	-	4.76%
Driver cancel %	-	13.39%	-	11.99%	-	18.93%
Rider given 1/2 star %	-	1.10%	-	1.07%	-	1.21%
Driver given 1/2 star %	-	1.39%	-	1.31%	-	1.72%

- Overall trigger rate in line with 1.1% target
- Day time trigger rate ~30% greater than recently observed in BR
- Night time trigger rate ~60% less than recently observed in BR
- Downranking efficiency up compared to BR
- Compared to BR, Baseline avg ETAs up ~25% and C/R down ~10% on related basis
- Minimal All Day and Day time impacts
  - Marginal avg ETA increase
- Some moderate Night time impacts
  - Large C/R and Unfulfilled impacts compared to no recent impacts in BR, especially given relatively low night time trigger rate

-: p value < 0.10; Level effect: Absolute difference in metric value;
city_id = (1165, 1786, 1795, 1873, 1892, 1893) excluded due to data issues; Note: No corrections for multiple comparisons

CONFIDENTIAL
UBER_JCCP_MDL_003274335
P-01366.00143

S-RAD LatAm expansion recommendations

- Based on the results of the Wave 2 marketplace experiments, we recommend rolling out S-RAD to the rest of LatAm using **1.1% as the overall target trigger rate**
- Non-BR LatAm cities would be onboarded to the **existing 80/20 holdout infra** for actioning and **monitored the same as BR/US**
- Given the slightly elevated night time impacts, especially with respect to ETA, C/R, and unfulfilled rate, we recommend
  - Comparing with first 4 weeks of holdout data to see if levels remain high
  - If so, we recommend **adjusting down the proportion** of the target flagging budget allocated to the night time

CONFIDENTIAL

UBER_JCCP_MDL_003274336

Fairness Testing Results

- Assess impact of S-RAD by gender
- Look at earnings, trips per driver, ETAs, and 1-star trips
- Mixed results
  - No disparities in earnings or one-star trips
  - But we do see small disparities in ETAs and trips per driver
- **Recommend**: because differences are small and not robust (e.g., difference in trips per driver, but not earnings), we recommend rollout with continued monitoring

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

No stat sig disparities in Driver Earnings

10/18/22 - 11/15/22, LatAm Cities

Driver Earnings



ATTORNEY-CLIENT PRIVILEGED

Slide 116 Notes

11:01

Still not statsig under a range of specifications (min_trips = {25, 50, 100}; fe_se = {0 | 0, city_woy + city_how + city_woy + city_how}

85 cities ran between 10/18/22 and 11/01/22: Santiago, Mexico City, San Jose PR, Lima

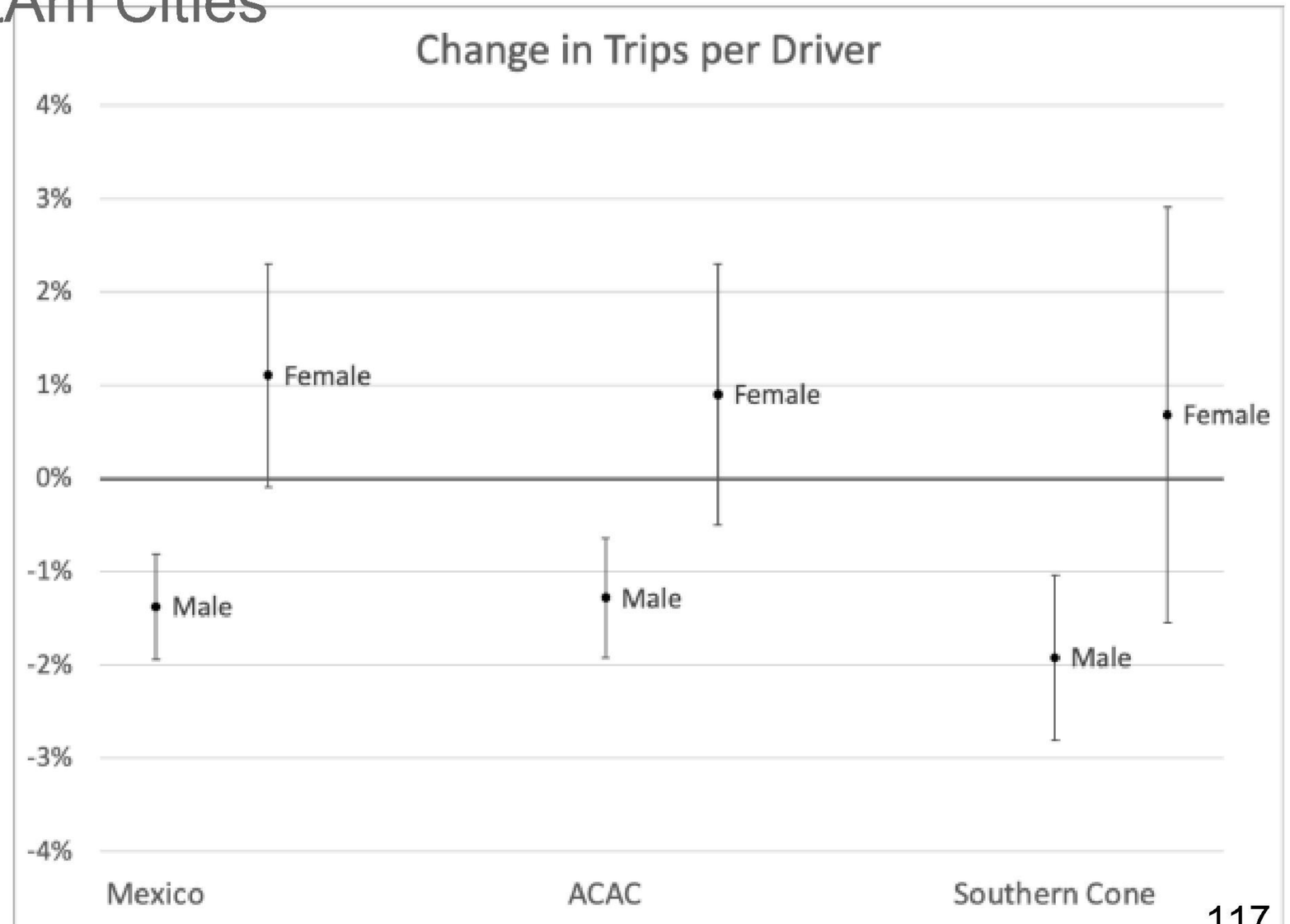
4 cities are currently running (11/01/22 to 11/15/22): **Buenos Aires (805), Bogota, Guadalajara, Monterrey,**

Sample size here is defined as the number of switchback periods * city * demographic group, which is in the hundreds of thousands for all tests.

Stat sig disparities in trips per driver

10/18/22 - 11/15/22, LatAm Cities

Completed Trips



CONFIDENTIAL

UBER_JCCP_MDL_003274340

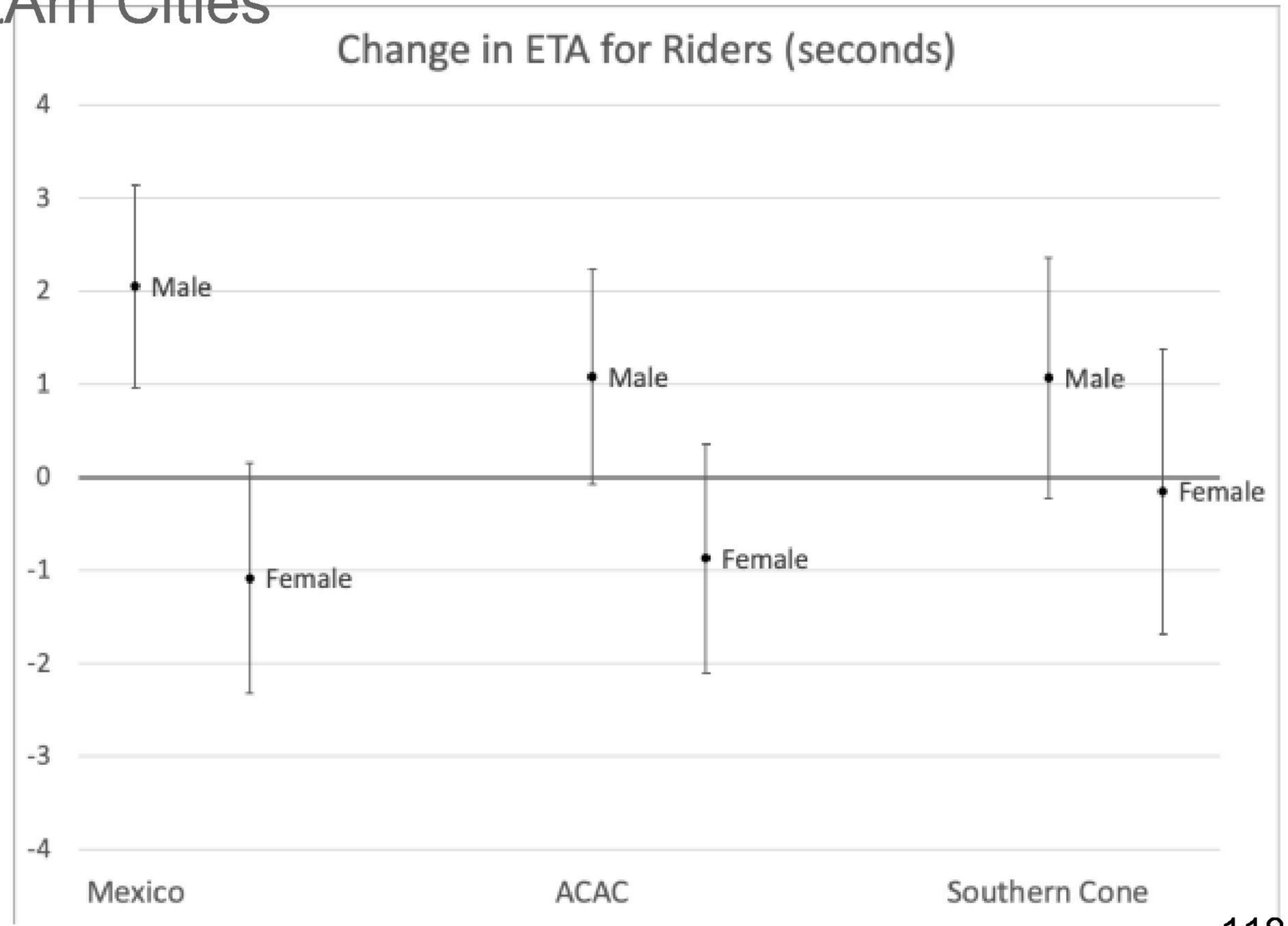
Slide 117 Notes

These are very small - the difference between ~1.66 and 1.67 trips per driver (within each 48-minute switchback period)
These differences are less robust than for earnings. They depend more on how you define the data set – do you use all switchback periods for men, even if the associated female switchback period was dropped because there were so few women driving then? The answer changes based on this decision.

Stat sig disparities in ETAs

10/18/22 - 11/15/22, LatAm Cities

ETAs



CONFIDENTIAL

UBER_JCCP_MDL_003274342

Slide 118 Notes

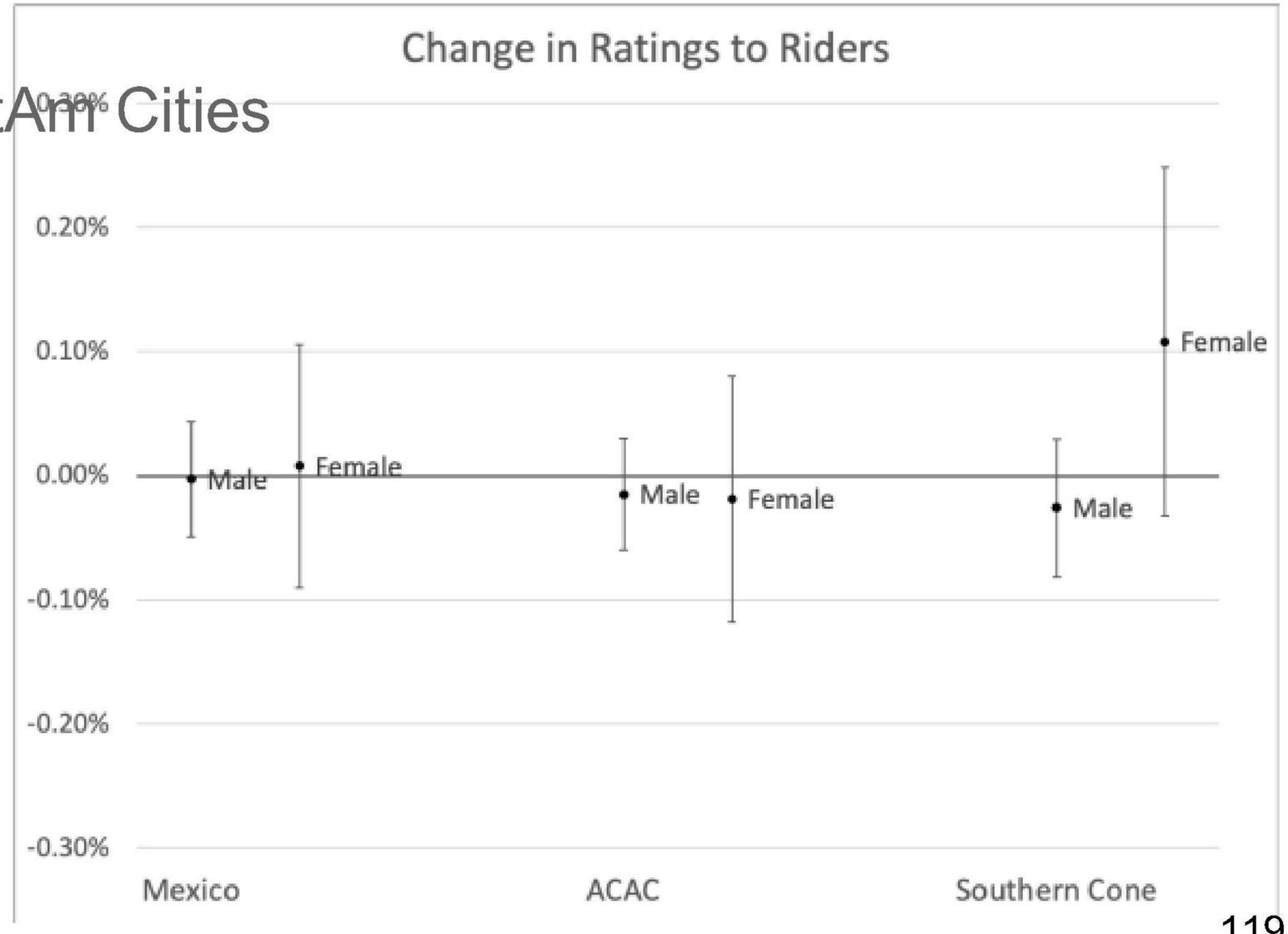
Pooled across regions, it's stat sig
Still stat sig if you filter out periods with fewer or more trips (25 or 50 or 100)
Still stag sig with different specifications (changing fixed effects and standard errors)
Average ETA ~ 360 seconds

Pre-read

No stat sig disparities in 1-star trips to riders

10/18/22 - 11/15/22, LatAm Cities

One-Star Trips (to Riders)



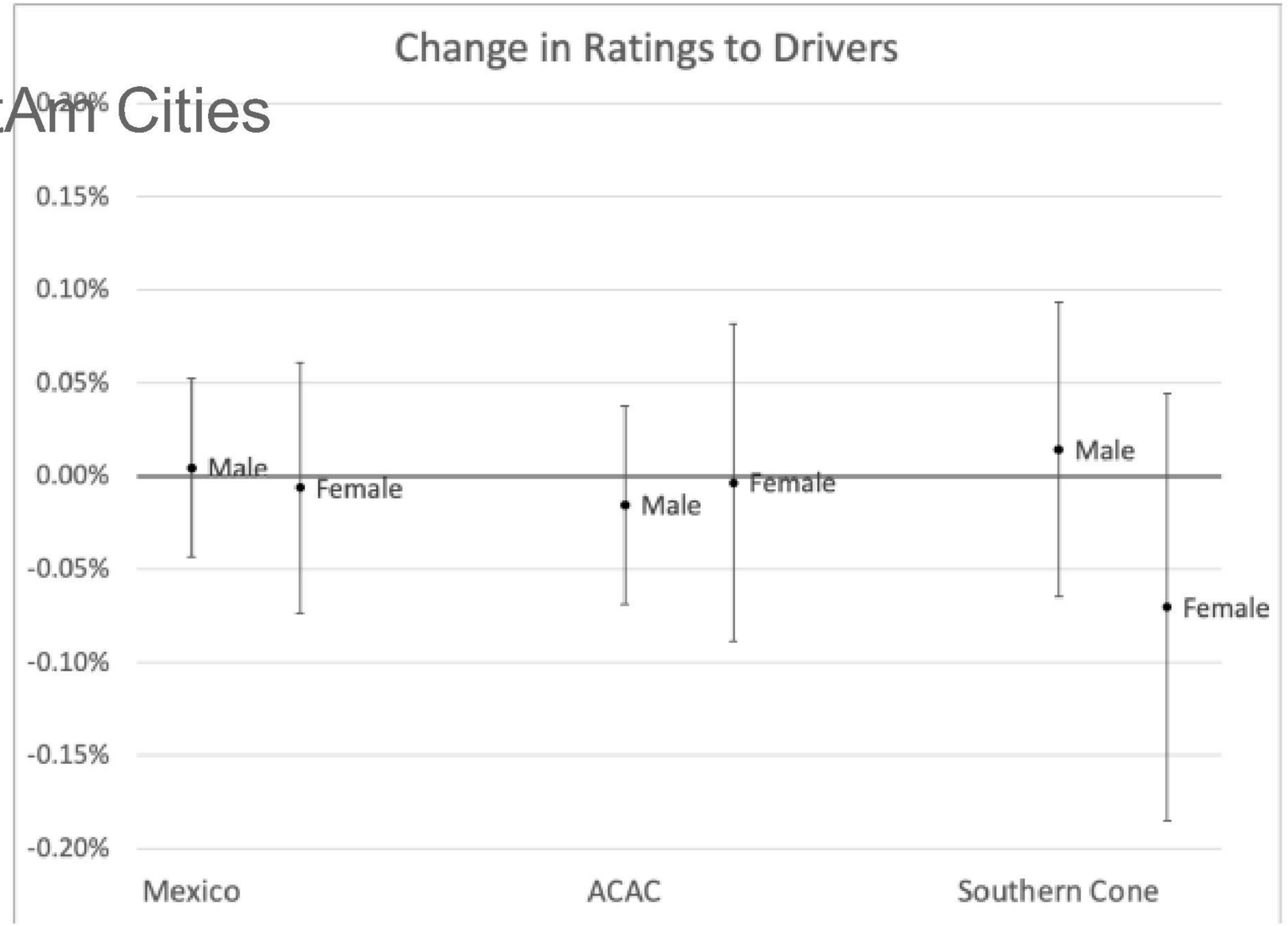
CONFIDENTIAL

UBER_JCCP_MDL_003274344

No stat sig disparities in 1-star trips (to drivers)

10/18/22 - 11/15/22, LatAm Cities

One-Star Trips (to drivers)



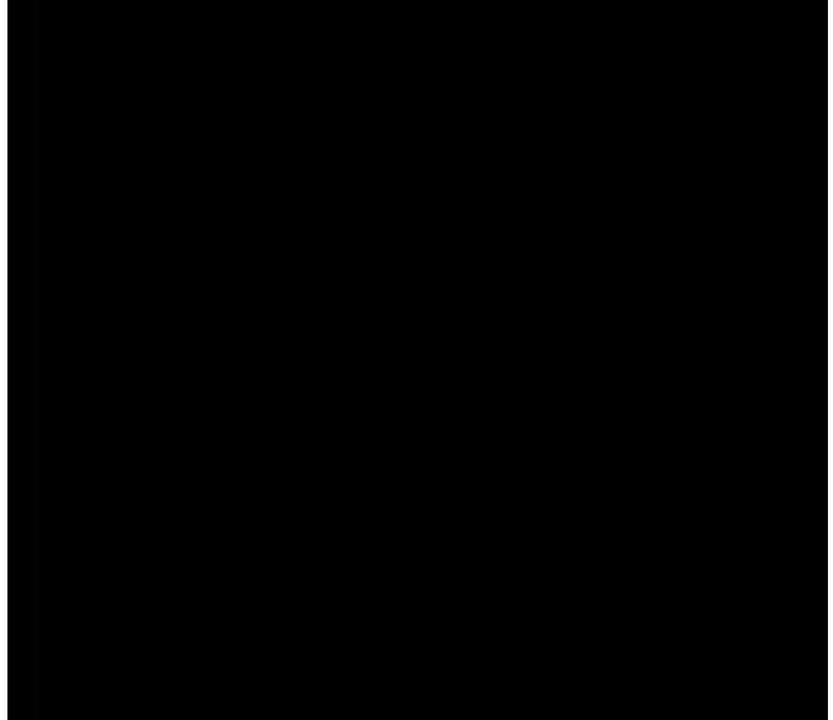
Slide 120 Notes

Asian (trips)
Technically it's good — people inferred as Asian by this method experience a drop in one-star trips. I wouldn't read too much into it because if we do 20 or 30 comparisons like this, a few are bound to be stat sig by chance

Pre-read

03 S-RAD Global Expansion Update

@zoe @ben



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274347

Pre-read

From model development to an XP

In Progress

Model Development (Phase 1)

Opportunity analysis:

- Checking existing model performance
- Testing trip/driver/rider characteristics that might help predict incidents
- Assessing the practicality of the downranking intervention

Building the baseline global model:

- Use regional data, including trip, user, incident and geo location data to train model
- Build new data models/pipelines for expansion

Product Design Tuning (Phase 2)

Actioning strategy: Experimentation to find optimal model and actioning methodologies with different feature sets

- Thresholds based on time/geography
- Handling supply/demand liquidity (e.g. least-N risky in S-rad)
- Handling slip-throughs (with nudges, etc.)
- Region-based masking of features with policy/legal/comms concerns

Fairness test to evaluate disparity in earnings, ETAs and other key metrics by gender or ethnicity

Deployment (XP to full launch)

Marketplace XP to evaluate impact on metrics such as ETAs, rider/driver cancellation, etc in XP market (two weeks)

H1 2023

Evaluation of model performance in active markets by

H2 2023

re

marketplace impact and fairness issues. Revisit Phase 2 if criteria not met.

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

A/C Privileged & Confidential

UBER_JCCP_MDL_003274348

P-01366.00156

Global Model Development

- UKI Board Update:
  - In December 2022, the team provided an overview of S-RAD to the UK Board. The aim was to provide the Board an understanding of how the product features work and the extra requirements and considerations that have to be made before deploying to a market such as the UK.
  - The Board was engaged throughout the presentation, understood the development process and the challenging policy/regulatory environment in the UK, and was aligned with our H2 timelines (pending full legal/policy assessment in H1)
- Global Model Development / Global expansion:
  - The team tested production models on historical data in expansion regions in order to understand model efficacy and scoring. The results (model recall) are promising and will serve as a baseline when the team builds the global model.
  - **REDACTED - PRIVILEGED**

Pre-read

Production S-RAD model performance in select expansion markets

- Production US model outperforms production LatAm consistently
  - This may be due to
    - LatAm model generalizing to new regions worse compared to US model
    - Lack of gender data globally
- **REDACTED - PRIVILEGED**
- Monthly recall data shows US prod model relatively stable through time
- Next step
  - Train baseline model using all global trips and readily available features from the US model not marked as potentially problematic by regional PLC teams

ATTORNEY CLIENT PRIVILEGED

CONFIDENTIAL

Pre-read

Offline performance data considerations

- Data range
  - 2022-01-01 - 2022-09-30
- Feature masking
  - Null imputation for features flagged by expansion markets' regional PLC teams
    - Driver_canceled_on_count_total:driver_uuid* †
    - Driver_lifetime_trip_count:driver_uuid* †
    - Trip_duration_seconds_sum_total:driver_uuid* †
    - Driver_1star_count_total:driver_uuid* †
    - Driver_2star_count_total:driver_uuid* †
    - Driver_inferred_gender:driver_uuid*
    - Rider_inferred_gender:client_uuid*
  - Feature used in LatAm* or US † production model

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274351

P-01366.00159

S-RAD prod model recall

Markets	Serious SASM IR (per MM)	Flagging Rate	Recall*			
			US model - All features	US model - Masked features	Latam model - All features	Latam model - Masked features
US (Prod)	6.99	1.25%	19.1%	-	-	-
BR (Prod)	4.22	1.1%	-	-	15.9%	-
AUS	8.22	1.1%	11.0%	7.1%	6.4%	5.9%
		1.25%	11.6%	7.7%	7.5%	6.4%
NZ	7.08	1.1%	15.8%	6.3%	11.6%	7.4%
		1.25%	17.9%	11.6%	11.6%	8.4%
IND	2.38	1.1%	6.2%	-	5.7%	-
		1.25%	7.7%	-	6.4%	-
EMEA	4.32	1.1%	10.2%	7.1%	7.9%	4.4%
		1.25%	11.1%	7.5%	8.6%	5.4%

*Estimated model recall. Not expected to reflect real incident rate change. Does not include time of day thresholds or how periodic threshold adjustments may impact actual online recall

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274352

P-01366.00160

S-RAD prod model recall - EMEA

Markets	Serious SASM IR (per MM)	Flagging Rate	Recall*			
			US model - All features	US model - Masked features	Latam model - All features	Latam model - Masked features
US (Prod)	6.99	1.25%	19.1%	-	-	-
BR (Prod)	4.22	1.1%	-	-	15.9%	-
EMEA - MEA	4.15	1.1%	8.5%	6.3%	8.3%	5.3%
		1.25%	9.2%	7.0%	8.9%	6.1%
EMEA - NEE	4.32	1.1%	11.9%	7.7%	8.1%	4.6%
		1.25%	13.1%	8.7%	8.8%	5.3%
EMEA - WSE	4.64	1.1%	9.2%	5.8%	6.2%	4.2%
		1.25%	10.4%	6.6%	7.6%	5.0%
UK**	3.74	1.1%	12.2%	8.7%	7.0%	5.6%
		1.25%	12.9%	10.1%	8.0%	7.3%

*Estimated model recall. Not expected to reflect real incident rate change. Does not include time of day thresholds or how periodic threshold adjustments may impact actual online recall

**UK belongs to EMEA - NEE region

ATTORNEY-CLIENT PRIVILEGED

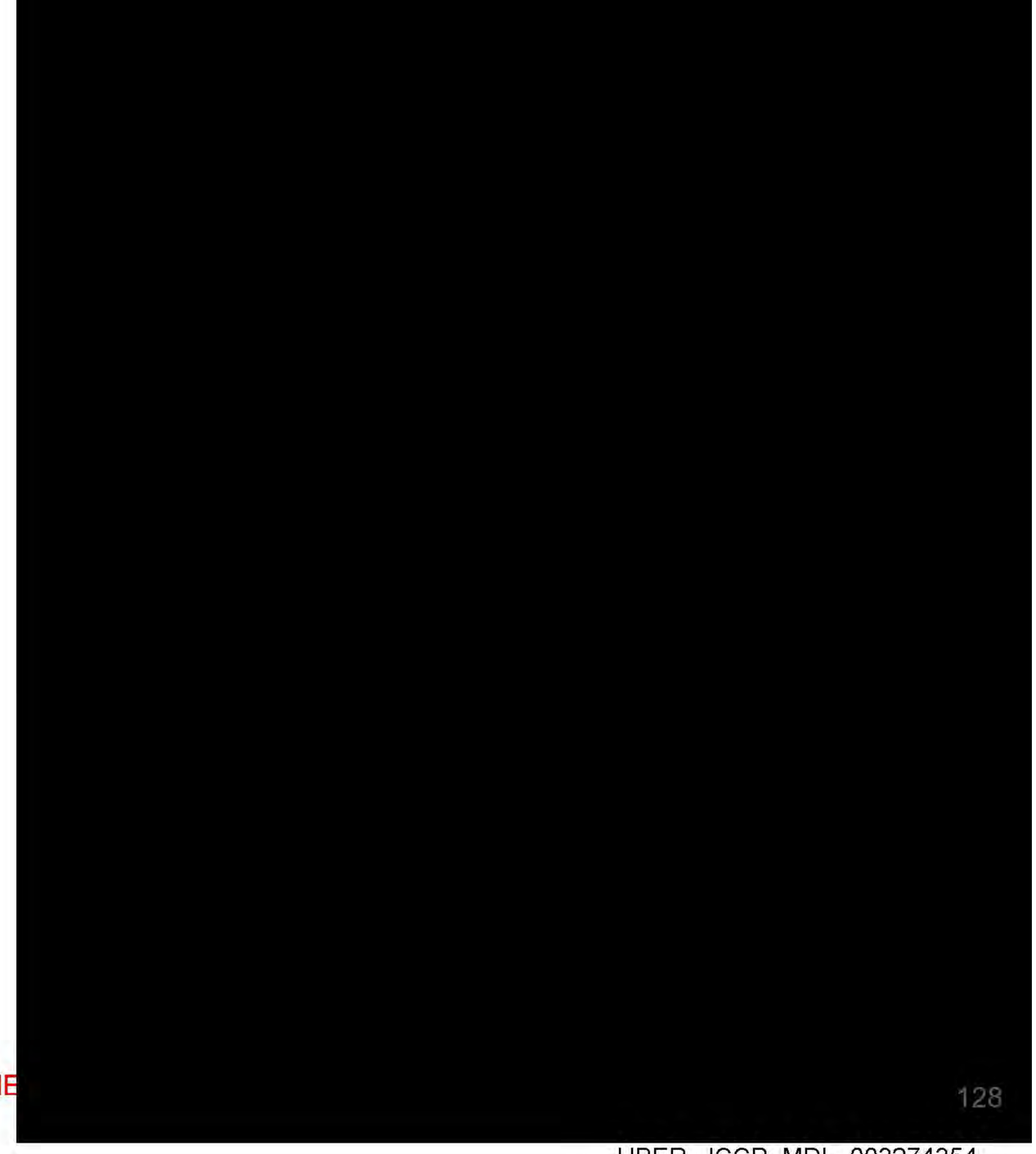
CONFIDENTIAL

UBER_JCCP_MDL_003274353

P-01366.00161

04 Persistently Actioned User-Driver

@alex



ATTORNEY-CLIE

CONFIDENTIAL

Persistently Actioned Drivers - Background



Deep dive after escalations: 3 Drivers(BR) are complaining that they are getting fewer dispatches

- S-RAD did flag more on these drivers but most trips did not get downranked
- Drivers have IPC reported against them and some got banned after complaint

This leads to more general questions:

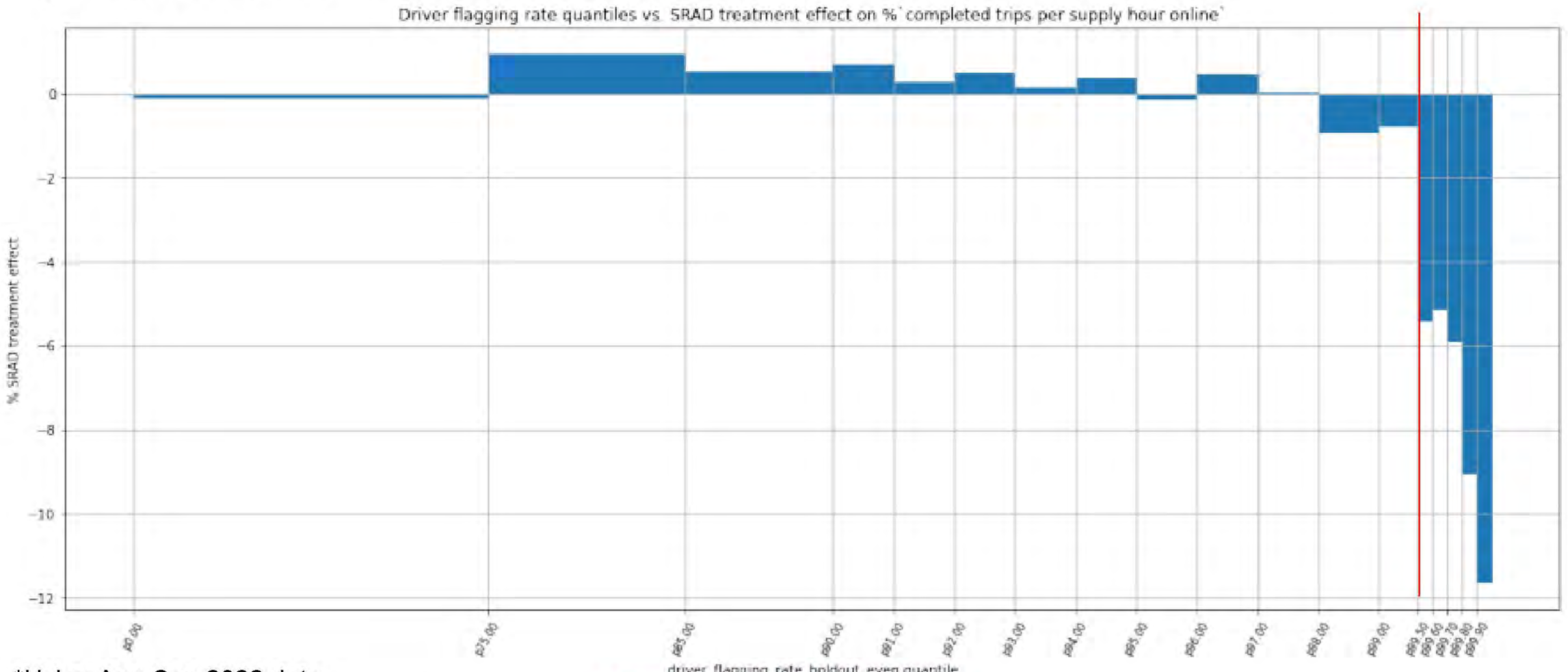
-Does a ‘Persistently Actioned User’-Driver(PAU) group exist, who are part of pairings being persistently flagged and down ranked?

-What do we know about this group?

ATTORNEY-CLIENT PRIVILEGED

Persistently Actioned Drivers - Definition

- Drivers who are above p99.5 flagging rate during holdout periods*
  [The treatment effect is at aggregated level]



*Using Aug-Sep 2022 data.
**Chart shown is based on US data.

ATTORNEY-CLIENT PRIVILEGED

Persistently Actioned Drivers - Impact

Market	Group	# Drivers	# Completed Trips per Hour**		$ Earnings per Hour**	
			Baseline*	SRAD Rel. Eff.*	Baseline*	SRAD Rel. Eff.*
Brazil	Persistently Actioned	4,041	1.20	-12.61%	$4.48	-13.05%
United States	Persistently Actioned	1,621	1.36	-6.68%	$19.11	-6.15%

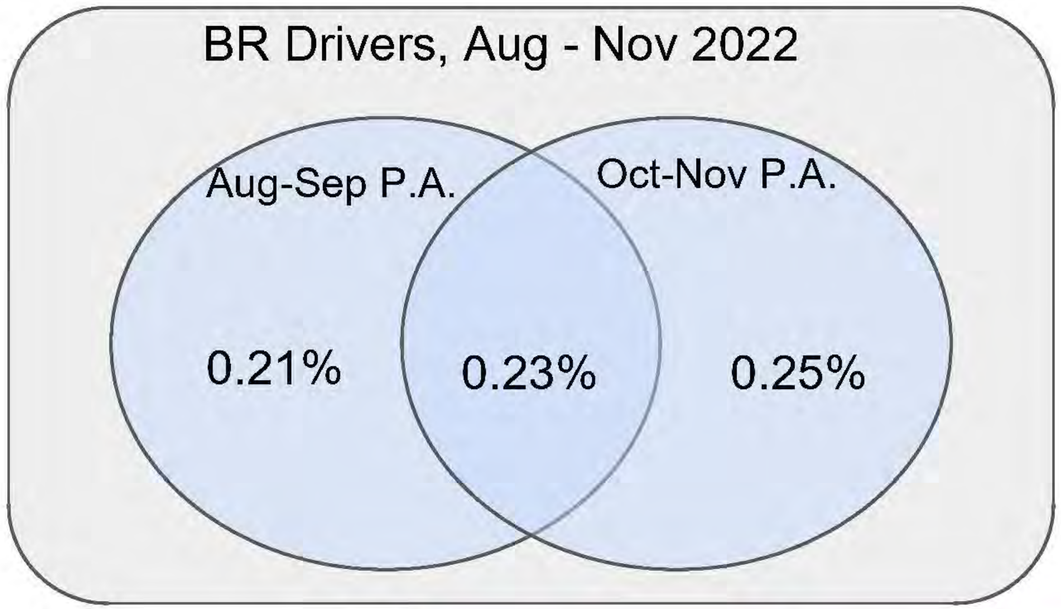
*Using Aug-Sup 2022 data.
**Hours are estimates of driver in-app hours based around hourly aggregations split around SRAD status changes.

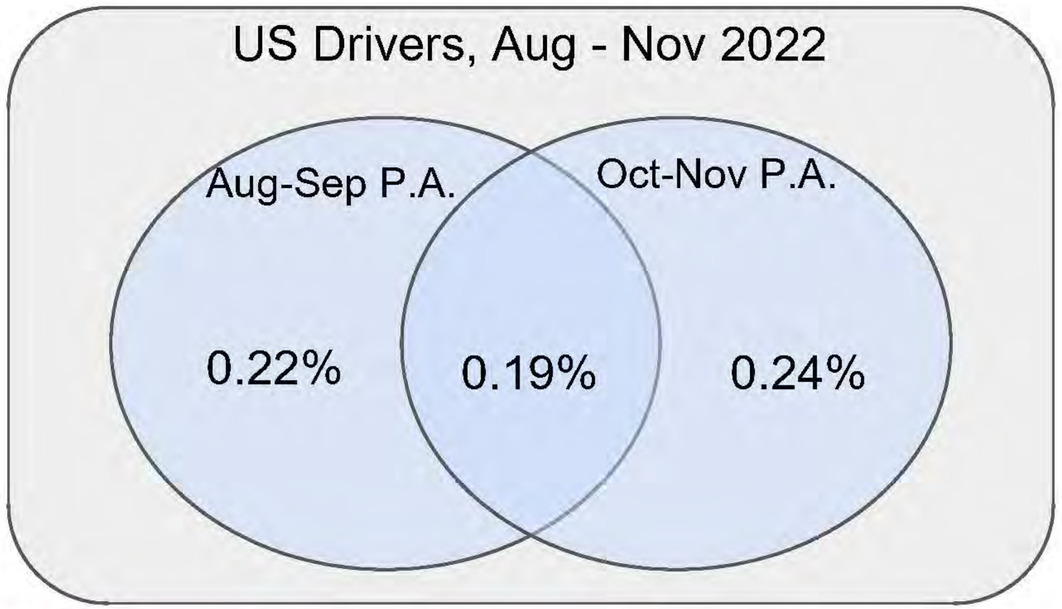
ATTORNEY-CLIENT PRIVILEGED

Slide 131 Notes

In absolute terms: PADs in the US make about $17.93 per hour instead of $19.11

How Persistent are PAUs?





3

Market	Group	Churn: % Aug-Sep Drivers who didn't drive during Oct-Nov	% Aug-Sep Drivers who are P.A. during Oct+Nov
Brazil	PA Drivers	26.58%	39.75%
	Population	18.07%	–
United States	PA Drivers	36.83%	26.86%
	Population	23.86%	–

ATTORNEY-CLIENT PRIVILEGED

Slide 132 Comments

1 @apokorny@uber.com Determine % of churn due to (eventual) driver deactivation
Reassigned to apokorny@uber.com
Ben Marchi, 1/27/2023 06:00 PM

2 can we also talk to DACT DS to see how many PA-driver also flagged by them?
Zoe Pu, 1/27/2023 05:39 PM

3 I'm on it
Alex Space, 1/27/2023 06:00 PM

Persistently Actioned Drivers - Characteristics

Persistently-actioned drivers are:

[On explainability]

- Much more likely to have a SASM incident reported against them
- Much more likely to have an IPC incident reported against them
- Much more likely to be driving at night
- Much less tenured on average (in terms of lifetime completed trips)

[On fairness]

- Slightly more likely to be male
- More likely to be inferred as white or Asian
- Spread across many cities, not restricted to any particular city size

Brazil Driver Group	% Drivers with reported-against SASM incident	% Drivers with reported-against IPC incident
Not Persistently Actioned	5.28%	15.95%
Persistently Actioned	30.64%	55.06%

REDACTED - PRIVILEGED

Full Analysis Readout

ATTORNEY-CLIENT PRIVILEGED

Slide 133 Comments

1 @dkolta@uber.com **REDACTED - PRIVILEGED**
Dan Svirsky, 1/25/2023 06:28 PM

Persistently Actioned Drivers – Policy Comms Risks & Legal Guidance

5

REDACTED - PRIVILEGED

REDACTED - PRIVILEGED

ATTORNEY-CLIENT PRIVILEGED

Slide 134 Comments

1 @dkolta@uber.com REDACTED - PRIVILEGED
Reassigned to dkolta@uber.com
Zoe Pu, 1/26/2023 05:04 PM

2 REDACTED - PRIVILEGED
Dan Svirsky, 1/25/2023 06:33 PM

3 REDACTED - PRIVILEGED
Emilie Boman, 1/25/2023 11:02 PM

4 REDACTED - PRIVILEGED
Dan Svirsky, 1/26/2023 05:04 PM

5 REDACTED - PRIVILEGED
Dan Svirsky, 1/26/2023 05:04 PM

S-RAD

Leadership Update

11.04.2022

Uber

ATTORNEY-CLIENT PRIVILEGED

Agenda

01 Executive Summary

02 S-RAD Nudges XP Recap (preread)

03 S-RAD Nudges XP Readout

04 Next steps for S-RAD Nudges

05 S-RAD US & BR Downranking Updates (preread)

06 S-RAD Global Expansion Updates (preread)

CONFIDENTIAL

UBER_JCCP_MDL_003274366

P-01366.00174

01 Executive summary @zoe

[redacted]

ATTORNEY-CLIE

CONFIDENTIAL

Executive Summary

- **S-RAD Nudges xp results** show **no stat sig impact in overall IPC incident rate** and **+10% reported serious IPC incident rate**, stat sig, rel. confidence interval (1.6%, 18.9%).
- However, **we do not believe nudges cause an increase in the true IPC incident rate.**
  - **No significant impact in marketplace metrics observed.**
  - We do see **slight directional increase** in **Feature usage** (ie Audio Recording and Follow My Ride).
- **Next Steps: Design new interventions to target top 5% risky trips and suggest not to expand S-RAD Nudges.**
- **(pre-read) S-RAD Downranking in US & BR marketplace metrics were w/in guardrails Aug & Sep**
  - **80/20 holdout** has increased exp. **variation of the metrics** (i.e. slip-thru, downranking efficiency)
  - Currently tracking and investigating a **decrease** in the ability of S-RAD to **successfully soft filter flagged supply plans**
- **(pre-read) S-RAD global expansion is on track with Latam expansion efforts** (stretch goal to launch in December).
- **(pre-read) Global model development efforts are underway as we collect feedback on feature requirements from regions.**

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

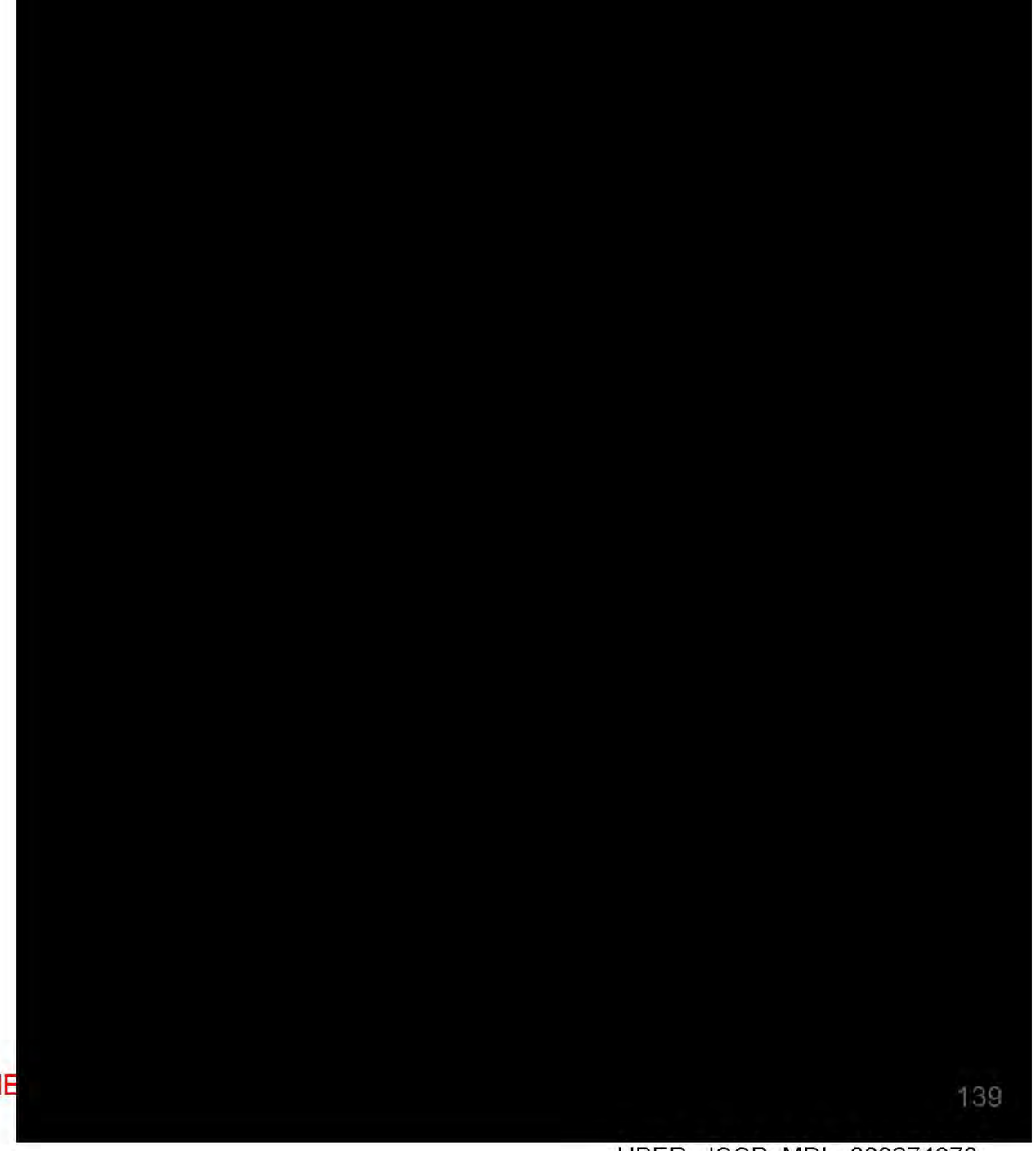
Slide 138 Notes

Re: feature usage: This is further supported by trend in increased usage at the driver & rider level for Audio Recording as number of nudges delivered increases.

Re: US/BR downranking: We are currently investigating potential low liquidity in market, new marketplace product launches, and ongoing marketplace/surge XPs.

Pre-read

02 S-RAD Nudges XP Recap



ATTORNEY-CLIE

CONFIDENTIAL

Pre-read

S-RAD Nudges Experiment Overview

Context	S-RAD has the potential to reduce serious SA/SM incidents on the platform, while being MP neutral
Problem	Top 5% high score trips represent ~35% of Serious SASM incidents in Mexico while Downranking only applies to top ~1%
Solution	Send just-in-time interventions or nudges to earners/riders on trips with high risk scores (PRD) Rotate through **5 messages** (**Message Copy doc**)
Primary Success Metrics	• Overall IPC incident rate [primary metric for XP]: **-5%** • Serious IPC incident rate [primary metric for XP]: **directional decrease**
Secondary Success Metrics	Directional increase in Audio Recording CTR, Follow My Ride CTR, RideCheck CTR (Impressions, CTR, Setup, Usage)
Guardrails	Driver Completed Trips, Driver Supply Hours, Driver Trip cancel rate, Push notifications opt-out rate, Safety Ticket Rate
XP end date	October 15, 2022

Nudges UX



Riders & Drivers will rotate through a set of 5 messages on flagged trips

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

03 S-RAD Nudges XP Readout

@zoe @alex @jenny

[redacted]

ATTORNEY-CLIE

Nudges 360 Recap: Safety impact metrics were not met but we saw positive stat sig impact in feature usage, safety sentiment and funnel metrics.

Xp results

impact

Overall reported IPC IR

+10%
reported serious IPC IR

No marketplace impact

Funnel metrics

Overall CTR: 5.8%

Driver CTR: 10.7%
Rider CTR: 4.3%

Click-thru rate

Safety Sentiment

+9.1%

Relative increase in drivers who responded "Always" feel safer driving with Uber



Example Nudge to Driver/Rider

Xp design

Driver A/B

Business constraint (<6 month xp) led to 2-cell design with Flow

Feature usage

Directional increase

In feature usage (Audio Recording, Follow My Ride)

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 142 Notes

Nudges 360 view: Safety impact metrics were not met but we saw positive stat sig impact in feature usage, safety sentiment and engagement metrics.

- The **Nudges experiment plan was created under certain constraints**, compromising integrity of the design
- The xp results show **no stat sig impact in overall IPC incident rate** and **+10% increase in *reported* serious IPC incident rate**, stat sig. However, **we do not believe nudges cause an increase in the true IPC incident rate.**
- **No significant impact in marketplace metrics observed.**
- We do see **slight directional increase** in **Feature usage** (ie Audio Recording and Follow My Ride).
    - This is further supported by trend in increased usage at the driver & rider level for Audio Recording as number of nudges delivered increases.
    - We observe **9.1% relative increase in drivers who responded that they "Always" feel safe driving with Uber.**

Overall CTR: 6.19%

Driver CTR: 11.15%

Rider CTR: 4.65%

https://querybuilder-ea.uberinternal.com/r/zRMxan2Pz

We faced some difficulties in both the experiment design and implementation which restricts our ability to rigorously measure the treatment effect.

Situation		Issues	Impact
Driver A/B xp design was built in order to meet a specific time constraint (<6 months)	**Experimental Design**	Rider contamination	~60k trips in which Rider receives nudges while driver is in control
		One-sided test conducted when two-sided test would have been better	
	Flow Implementation	Nudges sent despite cancellations	~37k trips that were below the threshold to be flagged had nudges sent
		Buffering	Nudges buffered for ~2 months
		Premature Flow Campaign End	
Created a "hacky" solution in Flow in operationalize the Driver A/B design	**Citrus Implementation**	Driver start time provided by citrus is both before and after the treatment driver receives their first nudge.	Created an inferred start time for drivers in treatment & control
	Difference in S-RAD Score	Treatment group has higher S-RAD score than control group	0.27% flat increase in flagging rates in the treatment group.

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

No stat sig impact in overall IPC incident rate and +10% increase in reported serious IPC incident rate, stat sig. However, we do not believe nudges cause an increase in the true IPC incident rate.

Summary

215	198K	1.06M	3.55M
Days in xp	Drivers in XP	Nudges sent to Drivers	Nudges sent to Riders

Primary Success Metrics

Reported Metric	Control (per Million)	Treatment (per Million)	Level Difference	Lev. 95% C.I.	Relative Difference	Rel. 95% C.I.	p value
IPC	131.882	133.525	1.644	(-1.633, 4.921)	1.2%	(-1.2%, 3.7%)	0.3252
Serious IPC	**11.343**	**12.506**	**1.163**	**(0.179, 2.146)**	**10.2%**	**(1.6%, 18.9%)**	**0.0204**

Readout

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 144 Notes

1. Why do we think this happened?
    a. Hypothesis: Awareness may lead people to report more
    b. Key: UNSEEN events
    c. Nudges drive people to engage with safety products more
    d. And if we believe products are net positives, eventually we should see
    e. If we give everyone nudges, then in the long run, we observe safety impact. But data does not support this. Baseline right might be higher than it was and may continue to be this way.
    f. Medium term cost: IPC incidents reported, going up
2. Do we know if any comms or feature awareness have increased reported IR?
    a. This will tell us that awareness product will have this impact on reporting
3. We do not know if awareness is causing more reporting?
4. Is SRAD-triggered notification causing more reporting?
5. Why is IPC negative? And Serious IPC stat sig?
6. Were you tracking this? Why was the xp not stopped sooner?
    a. We were tracking this.
    b. Given rare events, we needed enough time to get confidence on measurement and make sure it is not noise to avoid stopping prematurely.
7. Get incident count
    a. Num Serious IPC:
    b. Control 1130, 90MM trips
    c. Treatment 1135, 100MM trips

We explored possible reasons behind the increase in serious IPC IR and observed that the statistical significance goes away when we conduct segmented analysis.

Analysis	Takeaways
Removing Top 1% Scoring Trips	• Assuming the top 0-1% of risky trips would be within scope of downranking intervention, we looked at top 1-5% trips. We observe that stat sig increase in serious IPC IR goes away, and there is a very small, directional decrease in overall IPC.
Segmenting by Incident Type	• No stat sig impact on Serious SASM (which S-RAD targets).
Segmenting by Reporter Type	• Interestingly, rider-reported IPC is directionally down, while driver-reported IPC is directionally up.
Time Elapsed between Trip started and Incident Reported	• We see no stat-sig difference between treatment and control incident reporting times. Therefore, nudges do not have significant impact on reporting lag.

Readout

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 145 Notes

How do we measure the incidents we do not observe?

Other hypothesis beyond under-reporting?

By reporter type - findings does not support either situation:

(1) Nudges cause more reporting
(2) Nudges cause more incidents

Inspired Crash detection xp….they reported sooner and more. So we conducted a similar analysis looking at the time elapsed between trip start and incident reported.

Lag - if we saw them reporting sooner, maybe they would report more. But we did not see that.

Removing Top 1% Scoring Trips

Reported Metric	Control (per Million)	Treatment (per Million)	Level Difference	Lev. 95% C.I.	Relative Difference	Rel. 95% C.I.	p value
IPC	125.158	125.028	-0.130	(-3.329, 3.069)	-0.1%	(-0.027, 0.025)	0.937166
Serious IPC	10.524	11.378	0.854	(-0.093, 1.802)	8.1%	(-0.009, 0.171)	0.076967

Observations

- The stat sig increase in serious IPC IR goes away, and there is a very small, directional decrease in overall IPC.

Slide 146 Notes

How do we measure the incidents we do not observe?

Other hypothesis beyond under-reporting?

By reporter type - findings does not support either situation:

(1) Nudges cause more reporting
(2) Nudges cause more incidents

Inspired Crash detection xp….they reported sooner and more. So we conducted a similar analysis looking at the time elapsed between trip start and incident reported.

Lag - if we saw them reporting sooner, maybe they would report more. But we did not see that.

Segmenting by Incident Type

Reported Metric	Control (per Million)	Treatment (per Million)	Level Difference	Lev. 95% C.I.	Relative Difference	Rel. 95% C.I.	p value
SASM	20.298	20.519	0.221	(-1.065, 1.506)	1.1%	(-5.2%, 7.4%)	0.7354
Serious SASM	6.396	6.994	0.598	(-0.139, 1.335)	9.4%	(-2.2%, 20.9%)	0.1111
non-SASM IPC	111.584	113.007	1.423	(-1.592, 4.438)	1.3%	(-1.4%, 4.0%)	0.3545
Serious Non-SASM IPC	4.947	5.511	0.564	(-0.087, 1.216)	11.4%	(-1.8%, 24.6%)	0.0891

Observations

- S-RAD downranking is proven to reduce IPC incidents in general, but it is trained specifically to target serious SASM incidents.
- No stat sig impact on Serious SASM observed.
- SASM incidents are more rare than general IPC incidents, especially those of a serious nature. Hence, the confidence intervals for these metrics are very wide.

Slide 147 Notes

How do we measure the incidents we do not observe?

Other hypothesis beyond under-reporting?

By reporter type - findings does not support either situation:

(1) Nudges cause more reporting
(2) Nudges cause more incidents

Inspired Crash detection xp….they reported sooner and more. So we conducted a similar analysis looking at the time elapsed between trip start and incident reported.

Lag - if we saw them reporting sooner, maybe they would report more. But we did not see that.

Segmenting by Reporter Type

Reported Metric	Control (per Million)	Treatment (per Million)	Level Difference	Lev. 95% C.I.	Relative Difference	Rel. 95% C.I.	p value
Driver Reported IPC	53.588	54.926	1.338	(-0.758, 3.434)	2.5%	(-1.4%, 6.4%)	0.2104
Driver Reported Serious IPC	7.286	7.957	0.672	(-0.115, 1.458)	9.2%	(-1.6%, 2.0%)	0.0937
Rider Reported IPC	50.790	49.028	-1.762	(-3.771, 0.246)	-3.5%	(-7.4%, 0.5%)	0.0857
Rider Reported Serious IPC	3.928	4.372	0.444	(-0.136, 1.024)	11.3%	(-3.5%, 26.1%)	0.1333

Observations

- Reported incidents lose statistical significance when we segment by reporter type.
- Rider-reported IPC is directionally down, while driver-reported IPC is directionally up.

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274385

Slide 148 Notes

How do we measure the incidents we do not observe?

Other hypothesis beyond under-reporting?

By reporter type - findings does not support either situation:

(1) Nudges cause more reporting
(2) Nudges cause more incidents

Inspired Crash detection xp….they reported sooner and more. So we conducted a similar analysis looking at the time elapsed between trip start and incident reported.

Lag - if we saw them reporting sooner, maybe they would report more. But we did not see that.

We observe directional increase in driver feature usage and higher CTR on push notifications than regional average for both riders and drivers.

Secondary Success Metrics

Feature	Driver Control Usage*	Driver Treatment Usage*	Level Difference
Audio Recording	0.17%	+0.24	+0.07%
Follow My Ride	0.69%	0.88%	+0.19%
RideCheck**	1.71%	1.73%	+0.02%

Push notification Feature	Driver Treatment CTR	Latam Earner CTR avg*	Rider CTR	Latam Rider CTR avg*
Audio Recording	4.22%	~4%	4.11%	~0.95%
Follow My Ride	4.96%		3.68%	
RideCheck	9.53%		5.63%	

*Usage is based on % of trips driver (rider) used feature Mar 31 - Oct 15, 2022 (source)
**RideCheck usage is actually based on triggering by the app (not the user) when the driver goes off route.
Readout

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

No significant impact in marketplace metrics observed.

Guardrail Metrics

Metric	Control group value	Treatment group value	Absolute difference	Relative difference	p value*
Completed trips per XP day	**7.205**	**7.280**	**0.075**	**1.036%**	**0.006**
Supply minutes online per XP day	239.4	239.2	-0.174	-0.073%	0.806
Driver cancel over accept rate	0.1281	0.1280	-0.0002	-0.118%	0.833
Bliss ticket rate per XP day	**0.2061**	**0.2006**	**-0.0056**	**-2.693%**	**0.015**
Safety ticket rate per XP day	0.0062	0.0060	-0.0002	-3.201%	0.098

Note: Marketplace impact analysis data contained all trips from Nudge XP drivers from 2022-03-28 through 2022-05-29
* p values estimated via bootstrapping. No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274388

P-01366.00196

Overall results from Mexico Nudges experiment do not show safety impact and are marketplace neutral.

Category	Target	Results
Safety Impact (primary metrics)	• Overall IPC incident rate: -5% • Serious IPC incident rate: directional decrease	• No impact in overall IPC incident rate • +10% reported Serious IPC incident rate, stat sig
Feature usage (secondary metrics)	• Directional increase in: ○ Audio Recording usage ○ Follow My Ride usage ○ RideCheck usage	• Audio Recording usage ○ +0.02pp for driver t vs c ○ +0.001pp for rider t vs c • Follow My Ride usage: ○ +0.01pp for driver t vs c ○ -0.014pp for rider t vs c • RideCheck usage ○ +0.007pp for driver t vs c ○ +0.003pp for rider t vs c
Guardrail metrics	• No change +/- 1% in ○ Driver Completed Trips ○ Driver Supply Hours ○ Driver Trip cancel rate ○ Push notifications opt-out rate ○ Safety Ticket Rate	• No significant impact observed. • No significant impact observed. • No significant impact observed. • Per Uber app settings, Drivers cannot opt out of push notifications. • -2.4%, stat sig (number of safety tickets per day directionally consistent with the drop in Bliss tickets per day)

Slide 151 Notes

- In terms of **Safety Sentiment**, **treatment Drivers respond they feel safe “always” ~9% more often** than control Drivers.
- In terms of **Awareness**, **treatment Drivers respond ~2.5% more often that they are “aware” of the Audio Recording feature** than control drivers. This is key since it is the first nudge we send.

We observe directional increase in post-launch Sentiment survey to Drivers in terms of "feeling safe" and feature awareness.

In terms of **Safety Sentiment**, **treatment Drivers respond they feel safe "always" ~9% more often** than control Drivers.

In terms of **Awareness**, **treatment Drivers respond ~2.5% more often that they are "aware" of the Audio Recording feature** than control drivers. They also **remember** this one the most.

No difference between treatment & control drivers in feeling safer with the following features - **Follow my Ride, RideCheck, Safety Toolkit**

Treatment Drivers do not feel that certain **rider-specific features make them feel safer**.

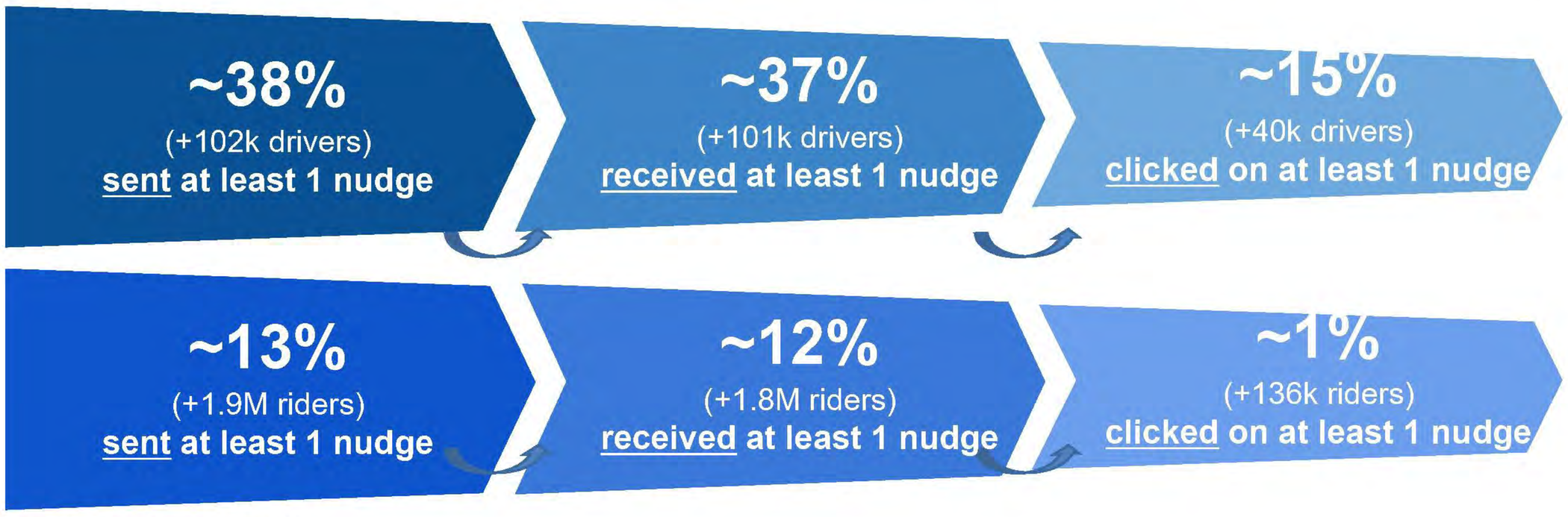
ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Directionally satisfactory driver funnel metrics. Reach of Nudges in Mexico user base during the XP: ~38%* of all active drivers and 13%* of all active riders received at least 1 nudge.

10.7%
Driver Click-Thru Rate from Sent

4.3%
Rider Click-Thru Rate from Sent



Data from March 31 to Oct 14, 2022
*Note: % share of active drivers to receive at least 1 nudge = # drivers that got 1 nudge during the xp)/(# of all active drivers). Today, this number reflects the drivers in treatment group (50%).

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

04 Next Steps for S-RAD Nudges

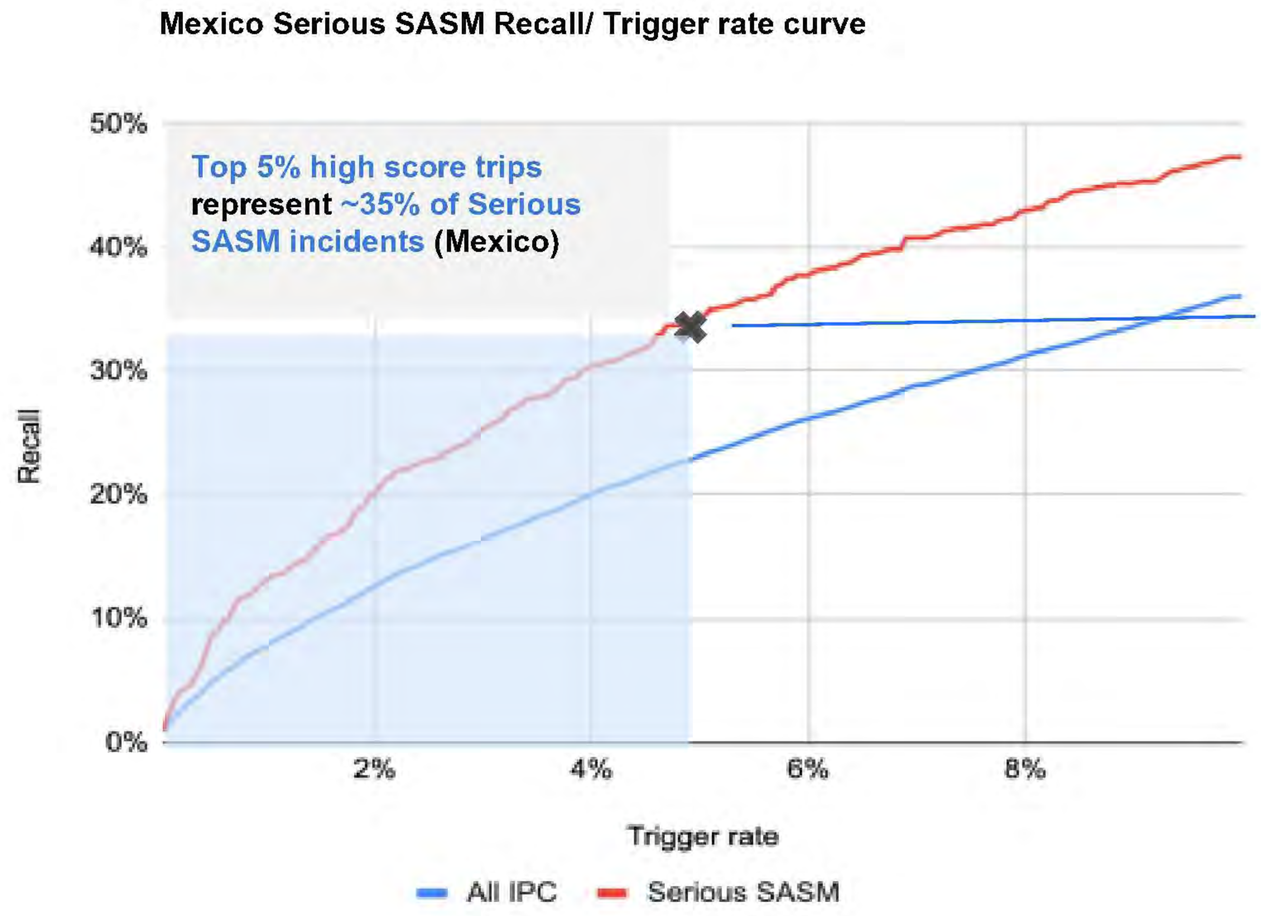
@zoe

[redacted]

ATTORNEY-CLIE

CONFIDENTIAL

We still believe there is an opportunity to target top 5% risky trips using S-RAD signal



ATTORNEY-CLIENT PRIVILEGED

*SASM recall in Mexico shadow mode data

CONFIDENTIAL

Slide 155 Notes

5% was based on power analysis. So we flag more trips above 5% but the # of incidents per trip goes down. the # of incidents is less concentrated beyond 5%.
Source: https://docs.google.com/presentation/d/1abl-GNK-223Hz0oSPE11JSFwjUEOdOtFGCz_naLLarA/edit#slide=id.gf771375934_0_7
Source: https://docs.google.com/presentation/d/1abl-GNK-223Hz0oSPE11JSFwjUEOdOtFGCz_naLLarA/edit#slide=id.g100e68c8735_0_15

Recommendation: For the 1-5% risky trips, we recommend to not expand Nudges and to instead redesign the S-RAD interventions with an IPC reduction focus.

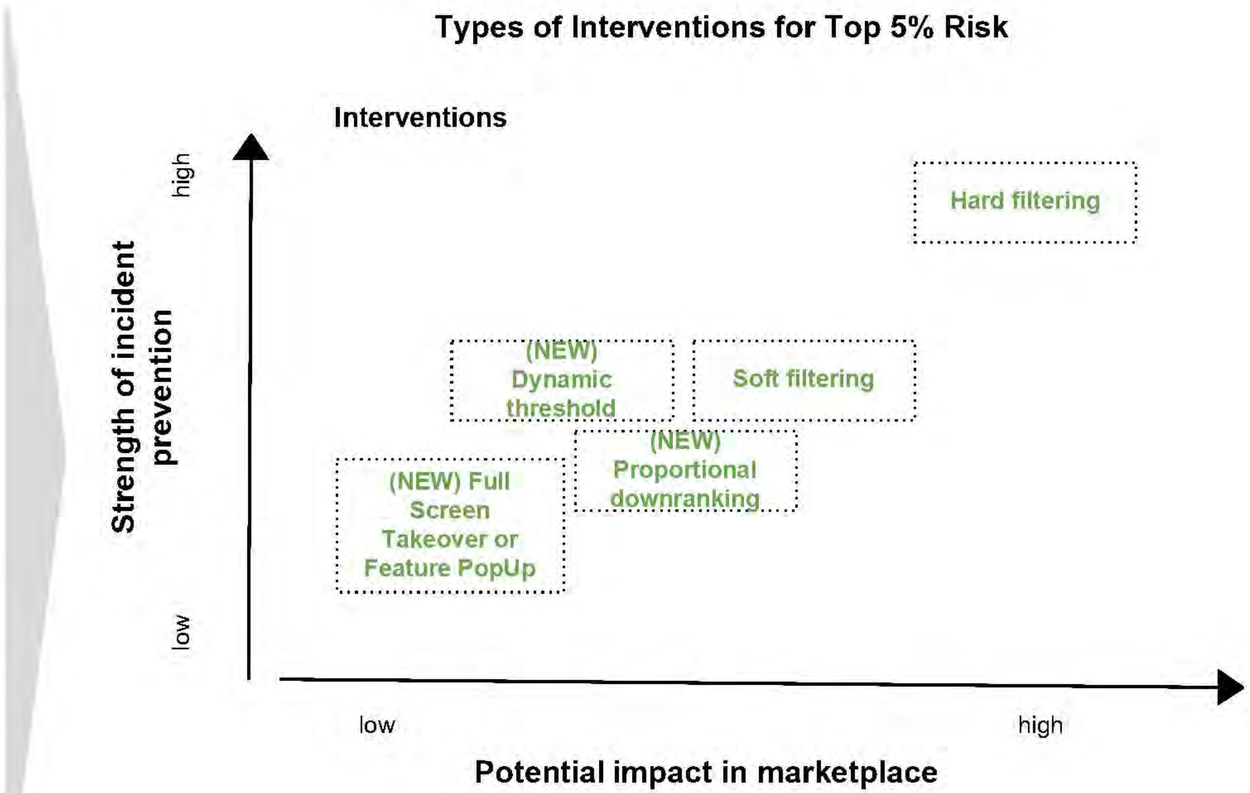
Context: Top 5% high score trips represent ~35% of Serious SASM incidents or ~25% of IPC incidents in Mexico.

Rationale: Nudges XP results show a risk of increasing SIPC incident rate, our topline metric.

Type of interventions:

1. Dynamic Threshold:
   - Increase Downranking actioning % in particular periods/areas
2. Harder Interventions:
   - Full Screen TakeOver (FSTO), Pop-up Audio Recording, RideCheck, Safe Mode etc.

Next steps: Rollout S-RAD downranking in Mexico to target top 1% (part of Latam expansion)



ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 156 Notes

3. Do we want to keep safety benefit from nudges? This would go to another team (Rebecca)

Decouple SRAD from Downranking

Additional analysis?

Deep dive on tickets and see if nudges are driving people to report. Signal would be that the feature was used, or mentioned comms.

S-RAD product has great potentials to bring Safety benefits to top 5% risky trips.

Future of nudgesFor next steps,

In MX, we will prioritize and deploy Downranking solution as part of Latam expansion by Jan 2023, which should address the top 1% risky trips first.

For the 1-5% risky trips, we recommend to redesign the interventions with a IPC reduction focus. There are two options under considerations

Pre-read

05 S-RAD US & BR Downranking Updates

[redacted]

ATTORNEY-CLIE

CONFIDENTIAL

Pre-read

Overall Brazil Marketplace Impact Summary

Dates: 8/4/22 - 8/31/22

Trip Distribution	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Holdout	33.2M	30.5M	2.64M
Enabled	135M	123M	12.0M
Enabled %	80.3%	80.1%	81.9%

Intervention Metrics	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Estimated TR (Holdout)	0.98%	0.46%	6.98%
Slip through (Enabled)	0.34%	0.13%	2.42%
Downranking efficiency	65.6%	70.8%	65.3%

BR (116 cities) Metric	All Day		Day Time		Night time	
	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg post dispatch ETA	-	209.0	-	204.6	**4.0**	254.5
P90 post dispatch ETA	-	512.7	-	493.7	-	568.5
P95 post dispatch ETA	-	595.8	-	579.0	-	644.5
P99 post dispatch ETA	-	734.5	-	730.2	-	745.9
Avg request to begin	-	375.7	-	369.6	**3.8**	438.1
Completed/Requests	-	81.76%	-	83.19%	-	66.88%
Unfulfilled/Requests	-	3.95%	-	3.36%	-	10.14%
Overall rider cancel %	-	12.56%	-	11.82%	**0.30%**	20.42%
Pre-dispatch rider cancel %	-	1.88%	-	1.76%	-	2.61%
Driver cancel %	-	20.44%	-	19.40%	-	31.56%
Rider given 1/2 star %	-	0.78%	-	0.77%	-	0.85%
Driver given 1/2 star %	**-0.01%**	2.19%	-	2.14%	**-0.09%**	2.81%

-: p value < 0.10; Level effect: Absolute difference in metric value; Note: No corrections for multiple comparisons

Observations

- Overall trigger rate is 0.98% (target 1.1%)
- Slip-thru rate is in line with safety XP data (0.34%)
- Downranking efficiency is lower than previous month (85% in July), with significant drops in M & S cities
- p95 ETA, C/R and overall rider cancel % are within guardrails
- Continue to observe stat sig decrease in driver given 1/2 star rating %

ATTORNEY CLIENT PRIVILEGED

Slide 158 Notes

- BR marketplace is not very healthy (~50% cancellations from Rider or Driver) at night from S cities.

BR S-RAD holdout

Trip Distribution	XL Cities (15 cities)			L Cities (30 cities)		
	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Holdout	23.7M	21.7M	1.94M	7.67M	7.11M	567k
Enabled	98.2M	89.1M	9.12M	29.7M	27.4M	2.31M
Enabled %	80.6%	80.4%	82.5%	79.5%	79.4%	80.3%

Intervention Metrics	XL Cities (15 cities)			L Cities (30 cities)		
	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Estimated TR (Holdout)	0.98%	0.46%	6.81%	0.95%	0.45%	7.22%
Slip through (Enabled)	0.28%	0.11%	1.93%	0.41%	0.16%	3.29%
Downranking efficiency	71.0%	75.0%	71.6%	57.4%	63.9%	54.5%

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Pre-read

BR S-RAD holdout

BR (116 cities)	XL Cities (15 cities)						L Cities (30 cities)					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg post dispatch ETA	-	201.1	-	196.9	-	242.4	**1.2**	220.7	**1.0**	215.3	**4.7**	284.8
P90 post dispatch ETA	**2.0**	387.6	-	358.0	**8.4**	461.0	**3.7**	444.8	-	397.4	**11.5**	562.7
P95 post dispatch ETA	-	451.3	-	421.7	-	525.5	**2.8**	526.5	-	476.6	**9.4**	649.6
P99 post dispatch ETA	-	582.0	-	557.2	-	643.0	**4.0**	690.4	-	653.4	**10.3**	778.4
Avg request to begin	-	371.9	-	365.8	-	430.3	**1.4**	378.8	**1.2**	372.1	-	456.8
Completed/Requests	-	82.14%	-	83.60%	-	67.64%	-	84.42%	-	85.64%	-	69.95%
Unfulfilled/Requests	-	3.85%	-	3.19%	-	10.40%	-	2.76%	-	2.37%	-	7.58%
Overall rider cancel %	-	12.25%	-	11.55%	-	19.35%	**0.09%**	11.24%	**0.09%**	10.51%	-	20.09%
Pre-dispatch rider cancel %	-	2.07%	-	1.96%	-	2.76%	-	1.70%	-	1.55%	-	2.56%
Driver cancel %	-	20.68%	-	19.57%	-	31.88%	-	18.63%	**0.08%**	17.80%	-	28.71%
Rider given 1/2 star %	-	0.77%	-	0.76%	-	0.84%	-	0.80%	-	0.79%	-	0.88%
Driver given 1/2 star %	-	2.26%	-	2.21%	**-0.07%**	2.89%	-	1.98%	-	1.94%	**-0.12%**	2.47%

-: p value < 0.10; Level effect: Absolute difference in metric value; Note: No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Pre-read

BR S-RAD holdout

Trip Distribution	M Cities (30 cities)			S Cities (41 cities)		
	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Holdout	1.61M	1.49M	118k	217k	200k	16.9k
Enabled	6.49M	6.01M	479k	804k	740k	63.5k
Enabled %	80.2%	80.2%	80.2%	78.7%	78.7%	78.9%

Intervention Metrics	M Cities (30 cities)			S Cities (41 cities)		
	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Estimated TR (Holdout)	1.07%	0.48%	8.50%	1.16%	0.59%	7.85%
Slip through (Enabled)	0.71%	0.24%	6.67%	1.13%	0.51%	8.34%
Downranking efficiency	33.2%	50.0%	21.6%	2.0%	12.8%	-6.2%

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Pre-read

BR S-RAD holdout

BR (116 cities)	M Cities (30 cities)						S Cities (41 cities)					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg post dispatch ETA	-	259.4	-	254.2	**8.9**	324.8	-	338.4	-	335.5	-	376.0
P90 post dispatch ETA	**4.6**	558.6	-	536.1	**23.4**	619.0	-	636.4	-	643.4	**-24.1**	603.4
P95 post dispatch ETA	-	651.7	-	634.2	**16.5**	698.5	-	721.1	-	733.9	-	657.9
P99 post dispatch ETA	-	794.5	-	797.1	**17.5**	784.7	-	826.5	-	850.9	-	705.2
Avg request to begin	-	407.6	-	401.4	-	489.9	-	481.5	-	478.4	-	516.7
Completed/Requests	-	67.75%	-	69.72%	-	42.86%	**0.58%**	48.36%	**0.64%**	50.45%	-	23.02%
Unfulfilled/Requests	**0.16%**	10.04%	**0.18%**	9.53%	-	16.68%	-	11.90%	-	11.51%	-	16.66%
Overall rider cancel %	-	20.32%	-	18.98%	-	37.41%	**-0.44%**	37.68%	**-0.56%**	36.10%	-	56.99%
Pre-dispatch rider cancel %	-	0.79%	-	0.71%	-	1.31%	-	0.93%	-	0.87%	-	1.28%
Driver cancel %	**0.23%**	24.67%	**0.24%**	23.62%	-	40.59%	-	31.38%	-	30.46%	-	46.92%
Rider given 1/2 star %	-	0.85%	-	0.85%	-	0.92%	**0.12%**	0.87%	**0.12%**	0.89%	**0.56%**	0.24%
Driver given 1/2 star %	-	1.98%	-	1.95%	**-0.35%**	2.68%	-	1.44%	-	1.44%	-	1.55%

-: p value < 0.10; Level effect: Absolute difference in metric value; Note: No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Pre-read

Overall US Marketplace Impact Summary

Dates: 8/4/22 - 8/31/22

Trip Distribution	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Holdout	17.2M	14.6M	2.65M
Enabled	64.5M	54.3M	10.24M
Enabled %	79.0%	78.9%	79.5%

Intervention Metrics	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Estimated TR (Holdout)	1.31%	0.81%	4.10%
Slip through (Enabled)	0.53%	0.40%	1.22%
Downranking efficiency	59.5%	50.1%	70.2%

US (196 cities)	All Day		Day Time		Night time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg post dispatch ETA	**1.9**	375.9	**1.2**	367.7	**6.4**	419.3
P90 post dispatch ETA	**4.3**	849.3	-	822.1	**10.2**	915.9
P95 post dispatch ETA	**4.5**	958.0	-	936.4	**12.5**	1010.7
P99 post dispatch ETA	**4.0**	1120.6	-	1116.1	**9.8**	1131.1
Avg request to begin	**1.4**	522.7	-	513.3	**5.0**	572.6
Completed/Requests	**-0.09%**	89.63%	-	90.59%	**-0.25%**	84.23%
Unfulfilled/Requests	-	0.64%	-	0.51%	-	1.42%
Overall rider cancel %	**0.07%**	8.19%	**0.05%**	7.54%	**0.21%**	11.81%
Pre-dispatch rider cancel %	-	4.75%	-	4.42%	**0.31%**	5.89%
Driver cancel %	**0.07%**	8.59%	**0.06%**	7.75%	**0.14%**	13.04%
Rider given 1/2 star %	-	0.90%	-	0.89%	-	0.96%
Driver given 1/2 star %	**-0.02%**	1.61%	**-0.01%**	1.52%	**-0.04%**	1.80%

-: p value < 0.10; Level effect: Absolute difference in metric value; Note: No corrections for multiple comparisons

Observations

- Overall trigger rate is 1.31% (target 1.25%)
- Slip-thru rate is slightly higher this month vs previous month (0.4% in July) and slightly higher than seen during the safety XP. Slip-through degradation is similarly poor in M/S cities
- p95 ETA, C/R and overall rider cancel % are within guardrails
- Continue to observe stat sig decrease in driver given 1/2 star rating %

ATTORNEY CLIENT PRIVILEGED

CONFIDENTIAL

Pre-read

US S-RAD holdout

Trip Distribution	XL Cities (27 cities)			L Cities (52 cities)		
	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Holdout	13.3M	11.33M	1.95M	2.81M	2.33M	487k
Enabled	49.2M	41.5M	7.69M	11.0M	9.28M	1.75M
Enabled %	78.7%	78.6%	79.7%	79.7%	80.0%	78.2%

Intervention Metrics	XL Cities (27 cities)			L Cities (52 cities)		
	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Estimated TR (Holdout)	1.31%	0.79%	4.32%	1.31%	0.86%	3.45%
Slip through (Enabled)	0.49%	0.38%	1.12%	0.66%	0.50%	1.49%
Downranking efficiency	62.6%	52.6%	74.2%	49.6%	41.4%	57.0%

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Pre-read

US S-RAD holdout

US (196 cities)	XL Cities (27 cities)						L Cities (52 cities)					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg post dispatch ETA	**2.1**	334.5	-	326.8	**6.5**	375.9	-	509.1	-	499.4	**6.7**	558.0
P90 post dispatch ETA	**3.2**	706.8	-	658.1	-	822.4	**9.4**	916.2	**7.3**	871.0	**16.3**	1021.9
P95 post dispatch ETA	**4.4**	827.4	-	778.0	**8.7**	944.0	**8.6**	1040.0	**6.2**	1001.1	**16.5**	1130.5
P99 post dispatch ETA	**3.4**	1051.2	-	1019.3	**6.9**	1125.7	**4.8**	1234.8	-	1217.9	**10.7**	1273.3
Avg request to begin	**1.6**	479.2	-	470.8	**5.6**	524.9	-	666.4	-	654.3	-	727.9
Completed/Requests	-	90.59%	-	91.42%	-	85.76%	**-0.19%**	87.05%	-	88.33%	**-0.64%**	80.35%
Unfulfilled/Requests	-	0.46%	-	0.35%	-	1.09%	-	1.09%	-	0.88%	-	2.23%
Overall rider cancel %	-	7.42%	-	6.85%	-	10.71%	**0.14%**	10.29%	-	9.44%	**0.42%**	14.75%
Pre-dispatch rider cancel %	-	3.91%	-	3.61%	-	4.90%	-	5.38%	**0.22%**	5.12%	-	6.10%
Driver cancel %	**0.07%**	8.41%	**0.07%**	7.60%	-	12.84%	-	9.92%	-	8.92%	-	15.06%
Rider given 1/2 star %	-	0.90%	-	0.89%	-	0.97%	-	0.91%	-	0.90%	-	0.96%
Driver given 1/2 star %	**-0.01%**	1.81%	**-0.01%**	1.71%	**-0.04%**	2.40%	**-0.02%**	0.95%	-	0.90%	-	1.23%

-: p value < 0.10; Level effect: Absolute difference in metric value; Note: No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

US S-RAD holdout

Trip Distribution	M Cities (52 cities)			S Cities (65 cities)		
	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Holdout	753k	609k	144k	345k	282k	62.4k
Enabled	2.92M	2.37M	547k	1.38M	1.12M	258k
Enabled %	79.5%	79.6%	79.1%	80.0%	79.9%	80.5%

Intervention Metrics	M Cities (52 cities)			S Cities (65 cities)		
	All Day	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Overall	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Estimated TR (Holdout)	1.39%	0.88%	3.52%	1.27%	0.81%	3.38%
Slip through (Enabled)	0.69%	0.47%	1.66%	0.64%	0.44%	1.52%
Downranking efficiency	50.1%	47.0%	52.7%	49.5%	45.4%	55.0%

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Pre-read

US S-RAD holdout

US (196 cities)	M Cities (52 cities)						S Cities (65 cities)					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg post dispatch ETA	-	534.3	-	532.6	-	539.0	-	467.1	-	464.4	-	478.9
P90 post dispatch ETA	**5.8**	909.1	-	891.3	**13.1**	951.1	-	804.7	-	795.2	-	829.5
P95 post dispatch ETA	**5.9**	1009.7	-	996.9	**13.5**	1039.7	-	902.5	-	901.2	-	905.0
P99 post dispatch ETA	**5.4**	1157.4	-	1160.7	-	1149.2	-	1024.5	-	1038.5	-	985.5
Avg request to begin	-	674.6	-	669.4	-	697.3	-	618.4	-	612.7	-	645.2
Completed/Requests	**-0.34%**	84.70%	**-0.20%**	86.15%	**-0.90%**	78.29%	**0.31%**	86.36%	**0.38%**	87.88%	-	79.30%
Unfulfilled/Requests	-	1.61%	-	1.38%	-	2.70%	-	1.45%	-	1.22%	-	2.56%
Overall rider cancel %	**0.25%**	12.11%	-	11.22%	**0.73%**	15.97%	**-0.21%**	10.58%	**-0.32%**	9.70%	-	14.65%
Pre-dispatch rider cancel %	-	9.78%	-	9.47%	**1.28%**	11.20%	-	10.41%	-	9.34%	-	13.66%
Driver cancel %	**0.14%**	7.69%	-	6.96%	-	11.06%	-	5.96%	**-0.14%**	5.41%	-	8.66%
Rider given 1/2 star %	-	0.80%	-	0.80%	-	0.81%	-	0.80%	-	0.79%	**-0.13%**	0.89%
Driver given 1/2 star %	-	0.70%	-	0.69%	-	0.78%	-	0.51%	-	0.50%	-	0.53%

-: p value < 0.10; Level effect: Absolute difference in metric value; Note: No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Pre-read

06 S-RAD Global Expansion Updates

[redacted]

ATTORNEY-CLIE

CONFIDENTIAL

A/C Privileged & Confidential

S-RAD Expansion Update: we are on track of the roadmap

Today

Code Freeze
Dec 8

Latam Marketplace xps

Aug 22-Nov 15

Wave 2 marketplace xp o[illegible] until Nov 15th

Latam Fairness Testing

w/c Nov 21

Dependency: conclusion of marketplac[illegible]

Tech readiness

Q1 2023

Global model development, gender inference data (India)

EU + UK*

TBD

Dependency: Full Legal Assessment, PC Strategy, Academic paper

SRAD model Offline Analysis

w/c Nov 7

Dependency: Legal approval to begin offline analysis of existing S-RAD model in other regions for global expansion

Latam SRAD Launch

December (stretch goal)

Dependency: approvals, no disparate impact in marketplace or fairness testing results

India, ANZ, MEA*

Q2 2023

Dependency: Legal considerations, e.g. use of gender

ATTORNEY CLIENT PRIVILEGED

ATTORNEY-CLIENT PRIVILEGED

S-RAD

Leadership Update

08.26.2022

Uber

ATTORNEY-CLIENT PRIVILEGED

Agenda

01 Executive Summary (5 min)

02 Downranking Expansion (15 min)

03 S-RAD Nudges Data & Next Steps (10 min)

04 US & Brazil Downranking (pre-read)

05 S-RAD Academic Paper Partnership (pre-read)

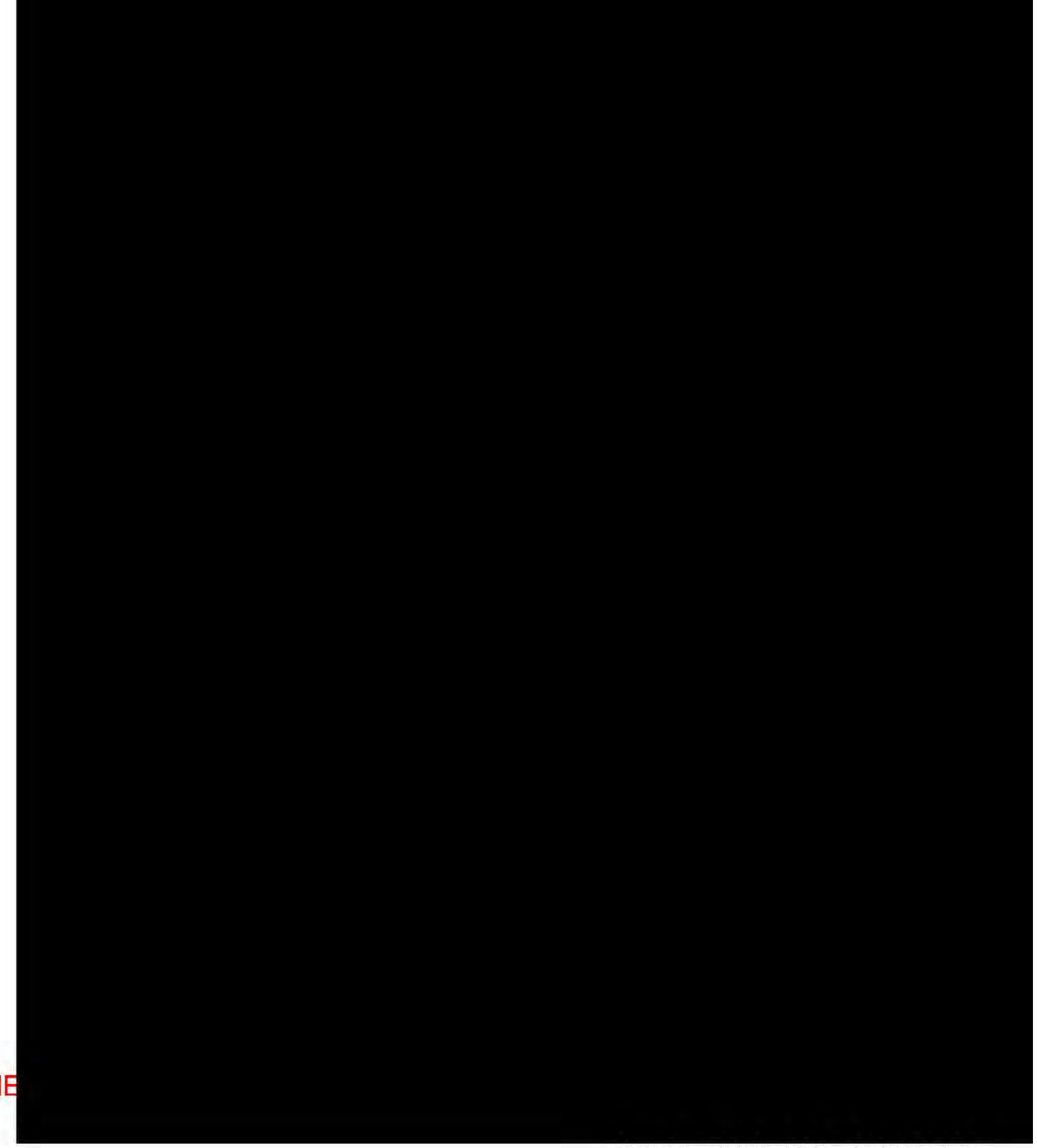
CONFIDENTIAL

UBER_JCCP_MDL_003274414

P-01366.00222

Executive summary

@zoe



ATTORNEY-CLIE



S-RAD Downranking & Nudges

Executive Summary

Downranking expansion has begun in SSL Latam region, followed by ROW

- In Latam, we will have 2 waves of marketplace xps prior to launch in January (stretch goal: Dec.)
- To expand SRAD beyond Latam in a fast and efficient manner, it requires both tech readiness and PLC alignment. We would like to discuss the roadmap today.

S-RAD nudges (push notifications) show positive lift in safety sentiment/awareness, with no marketplace impact (expected to run till Oct 15th)

- High Click-Thru-Rates and other funnel metrics confirm engagement metrics.
- Next steps: launch a Nudges Survey for drivers & riders and Roundtable for drivers to further understand safety sentiment.

(Pre-Read) US & Brazil downranking performance is within expectations. However, 20% holdout group raises the level for minimal detectable effect (MDE).

- We have been running @80/20 for ~7 weeks, without any alarms. We recommend setting guardrails at 2x MDE; pending socialization with Ops.

(Pre-Read) Currently debating the Data Use Agreement (DUA) for academic partnership

- The goal of the academic partnership is to validate S-RAD safety and fairness findings.

ATTORNEY-CLIENT PRIVILEGED

Downranking Expansion @zoe

[redacted]

ATTORNEY-CLIE

Our strategy for S-RAD Downranking Global Expansion is based on 3 pillars

Pillar 1

Scope

- **Target:**
  - Serious SA/SM incident prevention
- **Business:**
  - Mobility only
- **Geos:**
  - Global

Out of scope:
- Delivery
- All IPC
- Serious Physical Assault

Pillar 2

Product Readiness

- **Model readiness:**
  - Global Model training & recall performance
- **PLC alignment:**
  - Conduct feasibility and risks assessment
  - Privacy requirements
  - Academic paper

Pillar 3

Business/Safety Impact

- **Business impact**:
  - No significant negative marketplace impact
- **Safety Impact:**
  - Meet a target recall level
- **Fairness Testing:**
  - No negative impacts on Earnings, Completed trips , Utilization, Ratings to riders/drivers, ETAs

ATTORNEY-CLIENT PRIVILEGED

Slide 175 Notes

1. If we take a faster path and skip a step, what would we lose?
    a. We lose confidence in safety impact
2. Do we really believe the global model will work for all?
    a. We believe we can replicate SDM experience, with certain countries as exceptions
    b. We can evaluate global model on each country
3. Do we feel comfortable with holdout or need to run safety xp?
4. Fairness testing
    a. Do we need to look at ethnicity in Europe?

SRAD Expansion Roadmap in next 12 months with Challenges

Scope: Mobility, Serious SA/SM incidents Prevention

Local regional models may shrink dev time; but will be very challenging to maintain & improve. We recommend a **global model strategy.**

Latam Expansion
Q3-Q4 2022
(December: stretch goal)

Dependencies: Marketplace xp re

Tech readiness
Q1 2023

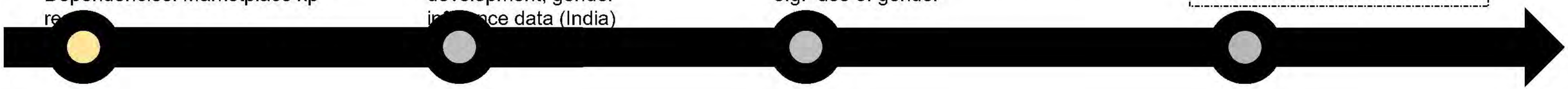
Global model development, gender in[illegible]nce data (India)

India, ANZ, MEA*
Q2 2023

Dependency: Legal considerations, e.g. use of gender

REDACTED - PRIVILEGED

REDACTED - PRIVILEGED



ATTORNEY-CLIENT PRIVILEGED

Slide 176 Notes

Why would we need to build a global model and then train locally?

Could we look into accelerating the roadmap? India/ANZ/MEA in H1..

Essentially anything that legal/policy framework allows and we see good recall, we launch marketplace XPs in H1.

Should we assume that we are not going to have a safety xp in rest of world?
Can we assume retrained models will work and just use holdout for model performance?

Do TL;DR
Talk about risks alongside the timeline

1. Show this schedule today.
2. Opportunity to compress timeline
    a. Show risks
    b. Show tradeoffs where we can compress
    c. Call out EU transparency - pushing up comms plan (ie academic paper)

Slide 176 Comments

Slide 176 Comments (Continued)

1 **REDACTED - PRIVILEGED**

Roger Kaiser, 8/29/2022 05:23 PM

2 [redacted]@dkolta@uber.com @eboman@uber.com **REDACTED - PRIVILEGED**

Jennifer Arias, 8/29/2022 05:23 PM

Long term sustainability of a global model drives our decision to develop a global model over regional model.

	Pros	Cons
Regional Model Separate models for each regions (US, LatAm, EMEA, etc)	• Features: have more flexibility to add/remove features • Performance: easier and faster to achieve good performance • Data: local data set is less complex	• Maintenance: high costs for maintaining each separate regional model • Sustainability: not sustainable to have multiple regional models running at the same time
Global Model Single universal model trained on global data	• Maintenance: Low effort • Sustainability: more sustainable in the long term	• Features: Need to design how to mask out sensitive features (ie gender) for certain markets • Performance: requires more fine tuning, model training, iterations, and time to achieve satisfactory performance • Data: global data set preparation is more complex

ATTORNEY-CLIENT PRIVILEGED

Slide 177 Notes

XP Feasiblity, Scalability (1) are the same

Scalability - how much resources you need from an Eng perspective
For regional vs global, we are only scoring 1 supply plan
If one model uses a lot more features than the other,

For safety impact, we can still combine analysis if either its a separate model or single model

EU Expansion Raises Significant PLC Challenges

Context:

- UberFiles a created more challenging PLC environment to navigate.
- GDPR raises transparency requirements

Prerequisites for rollout (legal)

- Legal review for EU as a whole, and country-specific
- EU-focused fairness testing

Prerequisites for rollout (policy)

- Move up timeline for academic paper; be ready to rely on the results or point to the existence of the partnership
- Work with third-party groups and start to build support

Prerequisites for rollout (comms)

- Prepare a proactive comms plan
- Prepare to discuss SRAD publicly

ATTORNEY-CLIENT PRIVILEGED

As previously agreed by leadership, a safety xp is not required for Latam expansion. We will only run a marketplace xp and if we see no significant negative impact, we will launch.

Marketplace XP Design

Hypothesis: S-RAD will have minimal marketplace impact in LatAm sub-regions

High-Level Success Criteria: No negative stat sig impact in marketplace metrics

Scope:

- Trigger Rate: 1.1%
- Products Affected: Rides product - UberX
- Cities*:
  - Wave 1 (8/22-9/05): 28 cities from ACAC, SoCo*
  - Wave 2 (10/16-10/30): 45 cities from ACAC, Mexico, SoCo

*Due to some misconfigs, we had to push out wave 1 by 5 days and missed 3 cities (Valparaiso, Concepcion, Montevideo), which may impact ability to reach power for wave 1. We have accounted for these cities in Wave 2.

XP Metrics

XP Metrics:

- P95 ETA
- Overall completed/requests
- Overall rider cancellation rate

Fairness:

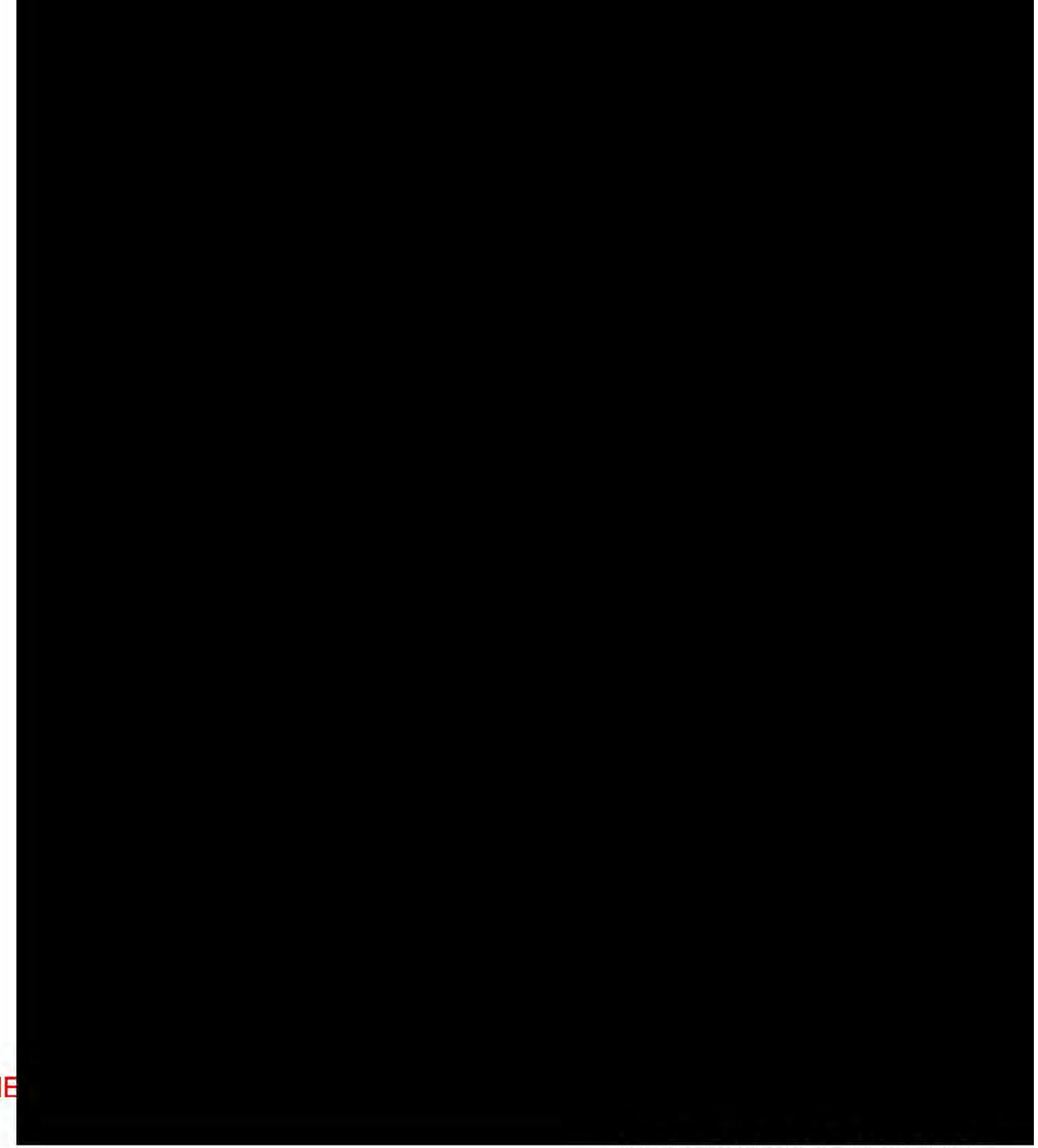
- Earnings
- Completed trips
- Utilization
- Ratings to riders/drivers
- ETAs

Slide 179 Notes

1. How do we choose the cities?
2. When will you share the final list?
3. Can we set guardrails for the marketplace xp?
    a. This is the xp to set or understand the impact of SRAD on these metrics.
4. Why are we setting at 1.1% trigger rate for the whole region?
5. Can we change the trigger rate at subregional level?
6. What does trigger rate mean?

S-RAD Nudges Data & Next Steps

@jenny @alex



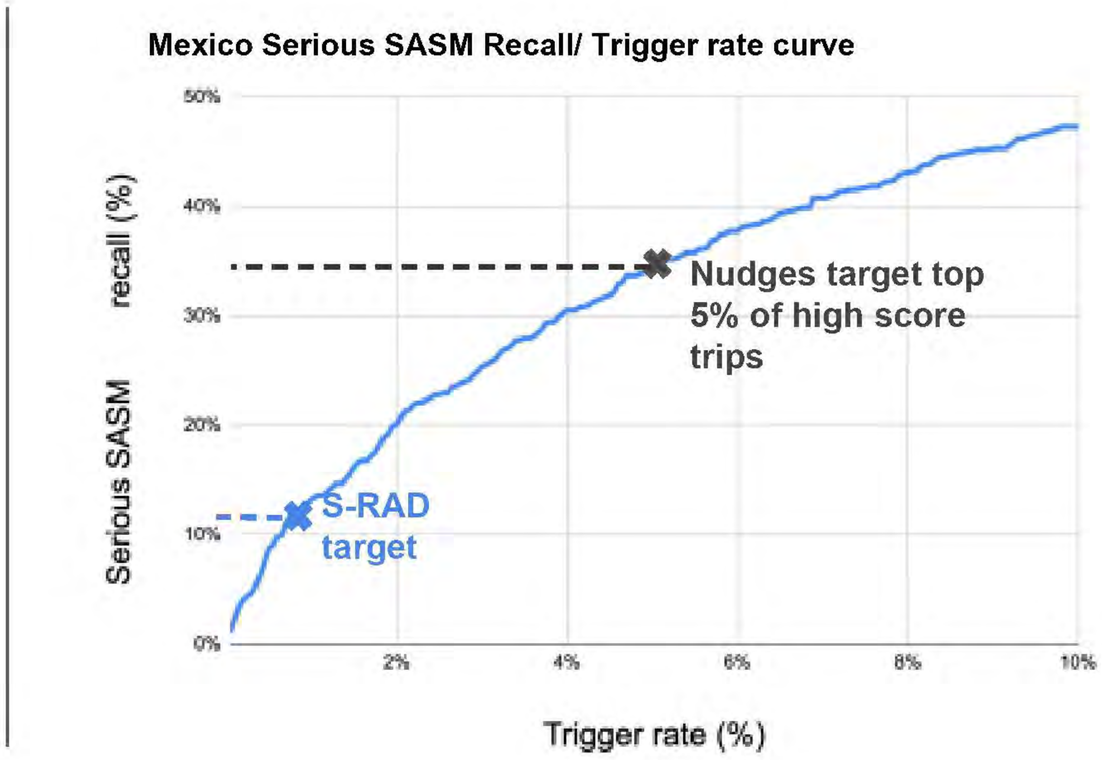
ATTORNEY-CLIE

Slide 180 Notes

We want feedback on expansion strategy.

Opportunity to improve S-RAD's impact via new interventions, such as nudges

Top 5% high score trips represent ~35% of Serious SASM incidents (Mexico)



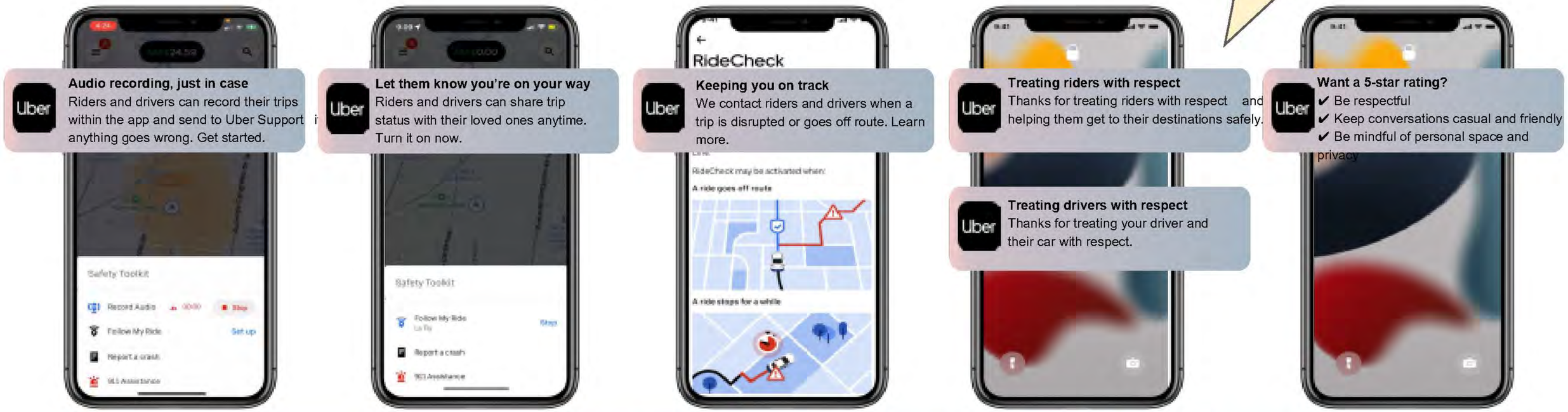
*SASM recall in Mexico shadow mode data

Experimentation Plan

ATTORNEY-CLIENT PRIVILEGED

Hypothesis: If we send safety related nudges to users on high score trips, we may be able to prevent IPC incidents (including SASM) on the platform

~5x *Drivers click thru nudges 4&5 vs nudges 1-3*



Audio Recording	Follow My Ride	RideCheck* *Cycle through twice	Safety Tip on Respect	5-Star Rating
Priming: Emphasize idea of being watched.			*Behavioral prescription: Provide clear set of guidelines.*	*Reciprocity bias: Reinforce positive actions.*

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274431

Slide 182 Notes

These message are dedicated for Nudges.

We have to check if other products or notifications send similar information.

If we do not see Safety Impact by the end of xp, can we roll out Nudges based on lift in Safety Sentiment in Mexico?

Considerations	Description	Current Status
Marketplace Impact	• Not hurting the marketplace	• No significant impact observed in marketplace metrics.
Safety Impact	• Reduce serious SASM incidents	• Under XP until Oct 15. ○ Targets: ■ -5% IPC incident rate ■ Directional decrease in Serious SASM
OR		
Safety Sentiment	• Improve user awareness and sentiment in Uber's safety efforts	• Overlap analysis with existing Safety Sentiment Survey completed ○ Treatment Drivers respond they **feel safe "always" ~9% more** often than control Drivers. ○ Treatment Drivers respond **~2.5% more often that they are "aware"** of the Audio Recording feature than control drivers • Nudges Survey & Driver Roundtable pending

ATTORNEY-CLIENT PRIVILEGED

Slide 183 Notes

- In terms of **Safety Sentiment**, **treatment Drivers respond they feel safe “always” ~9% more often** than control Drivers.
- In terms of **Awareness**, **treatment Drivers respond ~2.5% more often that they are “aware” of the Audio Recording feature** than control drivers. This is key since it is the first nudge we send.

No significant impact observed in marketplace metrics. And it is still to early to look into safety impact.

Metric	Control group value	Treatment group value	Absolute difference	Relative difference	p value*
Completed trips per XP day	**7.205**	**7.280**	**0.075**	**1.036%**	**0.006**
Supply minutes online per XP day	239.4	239.2	-0.174	-0.073%	0.806
Driver cancel over accept rate	0.1281	0.1280	-0.0002	-0.118%	0.833
Bliss ticket rate per XP day	**0.2061**	**0.2006**	**-0.0056**	**-2.693%**	**0.015**
Safety ticket rate per XP day	0.0062	0.0060	-0.0002	-3.201%	0.098

Note: Marketplace impact analysis data contained all trips from Nudge XP drivers from 2022-03-28 through 2022-05-29
* p values estimated via bootstrapping. No corrections for multiple comparisons

Source

ATTORNEY-CLIENT PRIVILEGED

Nudges xp results so far show directionally satisfactory driver engagement metrics





Data from June 1- 30, 2022
*Note: % share of active drivers to receive at least 1 nudge = # drivers that got 1 nudge in the last month)/(# of all active drivers). Today, this number reflects the drivers in treatment group (50%).

ATTORNEY-CLIENT PRIVILEGED

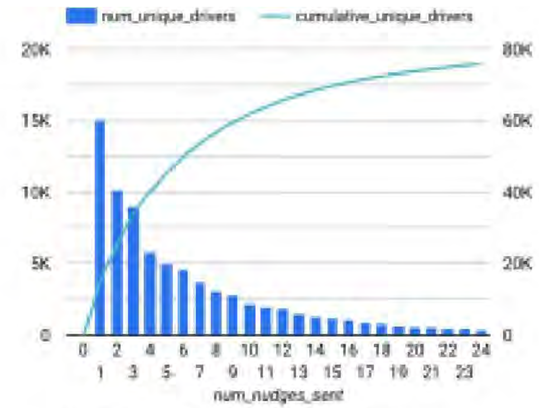
Slide 185 Notes

Sent:
Drivers with nudge sent in June: 51,248
Riders with nudge sent in June: 490,200
% of drivers sent nudges in June in all of Mexico: ~30.9%
% of riders sent nudges in June: ~8.1%
Delivered:
Drivers who received a nudge (delivered) in June: 50,099
Riders who received a nudge (delivered) in June: 463,189
% of drivers receiving nudges in June: ~30.2%
% of riders receiving nudges in June: ~7.6%
Clicked:
Drivers who clicked on nudges in June: 13,111
Riders who clicked on nudges in June: 25,527
% of drivers who clicked on nudges in June: ~7.9%
% of riders who clicked on nudges in June: ~0.4%

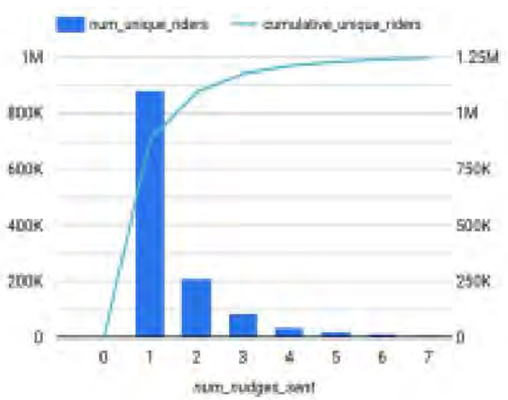
Reach of Nudges in Mexico user base in June '22: ~30% of all active drivers and 8% of all active riders received at least 1 nudge*.

Dashboard

Driver nudge interaction distribution



Rider nudge interaction distribution



Click Thru Rate by User Type



*Data from June 1- 30, 2022. Note: % share of active drivers to receive at least 1 nudge = # drivers that got 1 nudge in the last month)/(# of all active drivers). Today, this number reflects the drivers in treatment group (50%).

Dashboard

Observations

- Driver Nudge Interaction: 50% of drivers have cycled through all nudges at least once since we began the xp
- Rider Nudge interaction: Riders cycle through far less nudges because they do not take as many trips as drivers.
  - ~70% of riders received only 1 nudge
- In terms of engagement, June '22 driver click-thru-rate (CTR) is around 11-12%, while rider CTR is around 5%, outperforming the regional average (Spenders: 1.1%. Earners:4%).
- Lowlight: We inadvertently missed extending the flow campaigns for nudges, resulting in nudges being off for 10 days. However, we turned on the flows quickly without polluting the treatment/control driver pools.

ATTORNEY-CLIENT PRIVILEGED

Slide 186 Notes

Sent:
Drivers with nudge sent in June: 51,248
Riders with nudge sent in June: 490,200
% of drivers sent nudges in June in all of Mexico: ~30.9%
% of riders sent nudges in June: ~8.1%
Delivered:
Drivers who received a nudge (delivered) in June: 50,099
Riders who received a nudge (delivered) in June: 463,189
% of drivers receiving nudges in June: ~30.2%
% of riders receiving nudges in June: ~7.6%
Clicked:
Drivers who clicked on nudges in June: 13,111
Riders who clicked on nudges in June: 25,527
% of drivers who clicked on nudges in June: ~7.9%
% of riders who clicked on nudges in June: ~0.4%

We designed a Nudges Safety Sentiment Survey to complement the existing Safety Survey and get nudges-specific measure on users' perception of the app and the quality of their experience.

Goals

Safety Sentiment

- In your experience using Uber, how much do you agree or disagree with each of the following statement: "Uber is committed to safety" ?

Awareness

- In relation to these push notifications, which of the following statements do you agree with?

Perception

- What makes those notifications interesting to you?
- Why do these notifications make you feel uncomfortable?

Nudges Sentiment Survey

ATTORNEY-CLIENT PRIVILEGED

We will send a survey to users who have participated in the nudges xp.

Survey Design

Context: The SRAD Nudges experiment running in Mexico affects the user experience of the drivers and riders who participate.

Goal: We would like to create and send a sentiment survey to participants to measure their perception of the app and the quality of their experience.

High-Level Success Criteria: No degradation in users' safety sentiment, Uber's commitment to safety, or feeling uncomfortable

Channel: E-mail

Will we use a 3rd Party Partner: Yes

Scope:

Drivers

- Control: drivers who have been on a flagged trip within 1 week's time, and who have spent more than 1 month in control group.
- Treatment: drivers who have received a nudge within 1 week's time, and who have spent more than 1 month in treatment group.

Riders

- Control: Riders who have been on a flagged trip within 1 week's time, and who have never received a nudge in their lifetime.
- Treatment: Riders who have received a nudge within 1 week's time.

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274441

P-01366.00249

Overlap analysis with existing Safety Survey revealed key insights.

From the existing Monthly Safety Sentiment Survey[1]

1. **Please select the word that best fills in the blank and completes the sentence.**
   I _____ feel safe driving with Uber (Randomize Always to Never vs Never to Always)
   - Always
   - Usually
   - Sometimes
   - Seldom
   - Never
2. **Please select the word that best fills in the blank and completes the sentence.**
   I _____ feel safe driving with Uber at night (Randomize Always to Never vs Never to Always)
   - Always
   - Usually
   - Sometimes
   - Seldom
   - Never

5. **Which, if any, of the following features do you think are valuable in helping you feel safe when driving with Uber?**

   RANDOMIZE

   - Emergency Contacts, Phone number anonymization, Audio Recording, Emergency Assistance, RideCheck, Safety Toolkit, Insurance, Face covering policy, Community Guidelines, Live help from a Safety Agent, Dashcam registration, Speed limit alerts, New rider verification, Follow my ride , Driving hour limits

   Answer choices for each
   - I am not aware that Uber has this
   - I assume Uber has this, but am not certain
   - I know Uber has this

6. **Which, if any, of the following rider specific features do you think are valuable in helping you feel safe when driving with Uber?**

   - Verify Your Ride (PIN), Share trip, Guest Rides

…we were able to extract key takeaways[2]

- In terms of **Safety Sentiment**, **treatment Drivers respond they feel safe "always" ~9% more often** than control Drivers.
- In terms of **Awareness**, **treatment Drivers respond ~2.5% more often that they are "aware" of the Audio Recording feature** than control drivers. This is key since it is the first nudge we send.
- **No difference between treatment & control drivers in feeling safer with** the following features - **Follow my Ride, RideCheck, Safety Toolkit**
- **Treatment Drivers do not feel** that certain **rider-specific features make them feel safer**.

1 Driver Safety Survey Questions
2 Overlap Analysis. Note: Treatment: Drivers that took the survey within 2 weeks of receiving any nudge. Control: Drivers that took the survey within 2 weeks of being on a flagged trip.

CONFIDENTIAL

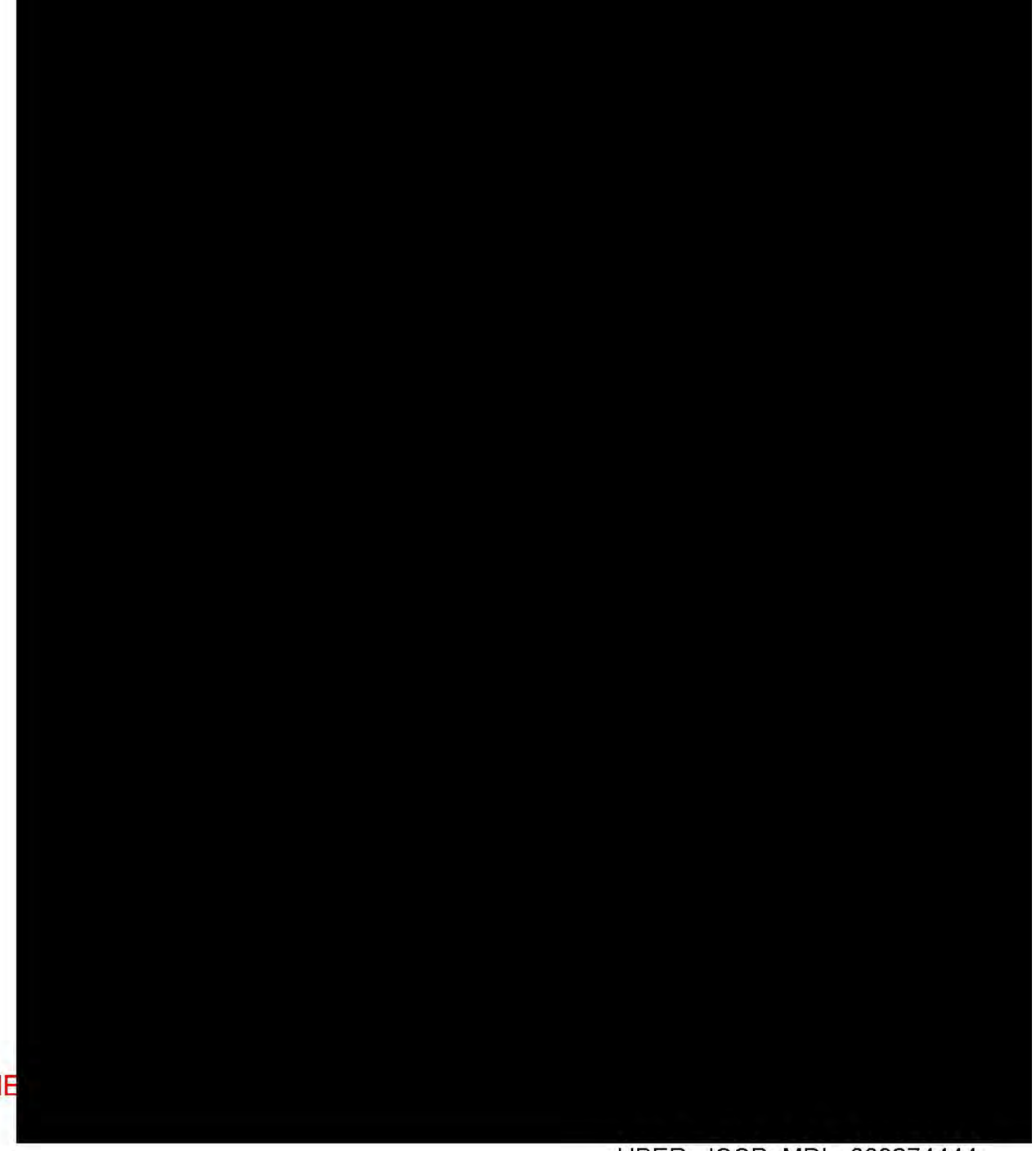
Slide 189 Notes

We should make a caveat that we calculated a lot of (over 20 with 5% significance) p-values here, so we would expect to see at least one false positive significant result.

Pre-read

US & BR Downranking

@zoe @alex



ATTORNEY-CLIE

Pre-read

S-RAD in US & Brazil is running without issues

- Our alerts are working properly, having sent already a few warnings for a few cities but no cause for concern.
- We have calculated new guardrail metrics of US & Brazil for overall and day/night based on new MDE.
    - The MDE estimates of the 20% holdout schedule are ~2x the MDEs from a 50% switchback holdout
- Key Metrics:
    - **[P0 OKR] Trip Coverage:** 37.9% (July); expecting to hit 48.5% in August.
    - **[P1 OKR] Safety metrics:** TBD % prevented Serious SASMs (rolling 3 months) at country level
        - We expect to have Safety metrics by [October 15, 2022]
- Model Excellence requirements:
    - **[Model Freshness]**: Model refresh will be reconsidered in Q4.

Data as of last completed month: July.
Source: OKR Scorecard, Dashboard

ATTORNEY-CLIENT PRIVILEGED

Pre-read

New guardrail metrics for US reflect changes in MDEs due to holdout design

		Metrics & Thresholds (Level Difference)	Actions
Overall	Warn	Δ Overall completed/requests > -0.3% Δ Overall rider cancellation rate > 0.2% Δ p95 ETA > 15s	• Email stakeholders • DS/DA Investigation • Determine next steps
	Critical	Δ Overall completed/requests > -0.6% Δ Rider cancellation rate > 0.4% Δ p95 ETA > 30s	• Call RAPID team meeting to evaluate lowering trigger rate in one or more cities
Grouped by XL/L/M/S city sizes	Warn	Δ Night time completed/requests > -1% Δ Night time rider cancellation rate > +0.5% Δ Unfulfilled rate > +1% Δ p95 Night time ETA > 20s	• Email stakeholders • DS/DA Investigation • Determine next steps
	Critical	Δ Night time completed/requests > -2% Δ Night time rider cancellation rate > +1% Δ Unfulfilled rate > +2% Δ p95 Night time ETA > 40s	• Call RAPID team meeting to evaluate lowering trigger rate in one or more cities

Observations

- Small increases to some thresholds including:
  - Overall completed/requests
  - Overall rider cancellation rate
  - Unfulfilled rate
- Next steps: meet with US ops team to get approvals

ATTORNEY-CLIENT PRIVILEGED

Pre-read

New guardrail metrics for Brazil reflect changes in MDEs due to holdout design

		Metrics & Thresholds (Level Difference)	Actions
Overall	Warn	Δ Overall completed/requests > -0.5% Δ Overall rider cancellation rate > 0.3% Δ p95 ETA > 15s	• Email stakeholders • DS/DA Investigation • Determine next steps
	Critical	Δ Overall completed/requests > -1% Δ Rider cancellation rate > 0.6% Δ p95 ETA > 30s	• Call RAPID team meeting to evaluate lowering trigger rate in one or more cities
Grouped by XL/L/M/S city sizes	Warn	Δ Night time completed/requests > -2% Δ Night time rider cancellation rate > +1% Δ p95 Night time ETA > 60s	• Email stakeholders • DS/DA Investigation • Determine next steps
	Critical	Δ Night time completed/requests > -4% Δ Night time rider cancellation rate > +2% Δ p95 Night time ETA > 90s	• Call RAPID team meeting to evaluate lowering trigger rate in one or more cities

Observations

- Small increases to some thresholds including:
  - Overall completed/requests
  - Overall rider cancellation rate
- Next steps: meet with Brazil ops team to get approvals

ATTORNEY-CLIENT PRIVILEGED

Pre-read

S-RAD Academic Partnership Paper

@dan svirsky

[redacted]

ATTORNEY-CLIE

Pre-read

An academic project will help provide transparency and external validation, while maintaining some level of decision-making on format, timing and audience.

Goals for Uber

De-Risk S-RAD

Academic paper allows us to go public in a careful, controlled way

Show commitment to transparency

We believe in peer-reviewed research to validate the impact of our work

Demonstrate Safety Impact, Fairness Approach

S-RAD is one example of how machine learning can help predict incidents, without impacting fairness

Risks/considerations

- *What happens if the product gets leaked before paper is released?*
- *What happens if the paper has negative results?*
- *Can we find a partner who is ready for the public scrutiny?*
- *Should partners have access to underlying data? If so, how can we set up a safe, transparent mechanism to accomplish this?*
- *Do expansion plans for EU mean we should accelerate our timeline?*

ATTORNEY-CLIENT PRIVILEGED

Slide 195 Notes

- What questions will the academic be asking?
- How will we frame/guide the research.
- focus on Risks - and then mitigations. Come with a recommendation for how we will mitigate each of the risks.

On setting up a safe mechanism to share data with 3rd party, we could consider working with Gaurav Paul's team if we want to provide a constrained data infrastructure to the academic partner

Pre-read

Timeline

Today

Finalizing Data Use Agreement (DUA) & academic candidates*

Q4 2022

Setting scope, conducting data analysis, outlining the results

Q2 2023

Drafting paper, review of findings

Q4 2023

Vetting and submission

Q2 2024

This timeline can be recalibrated per the transparency and comms requirements when expanding to other markets.

* The 2 candidates are: Shamus Khan (expert in sexual assault statistics) from Columbia University and Jennifer Doleac (expert in data science on public safety and bias) from Justice Tech Lab at Texas A&M

Request for Academic Research Data Use Agreement (DUA)

ATTORNEY-CLIENT PRIVILEGED

Slide 196 Notes

Provide background on candidates we were testing….
New def vs Old def

S-RAD
Leadership Update

06.17.2022

Uber

ATTORNEY-CLIENT PRIVILEGED

Agenda

01 Executive Summary (5 min)

02 Holdout Validation (5 min)

03 Model Candidates & Model Excellence (5 min)

04 Rollout & Monitoring Plan (10 min)

05 Next steps (5 min)

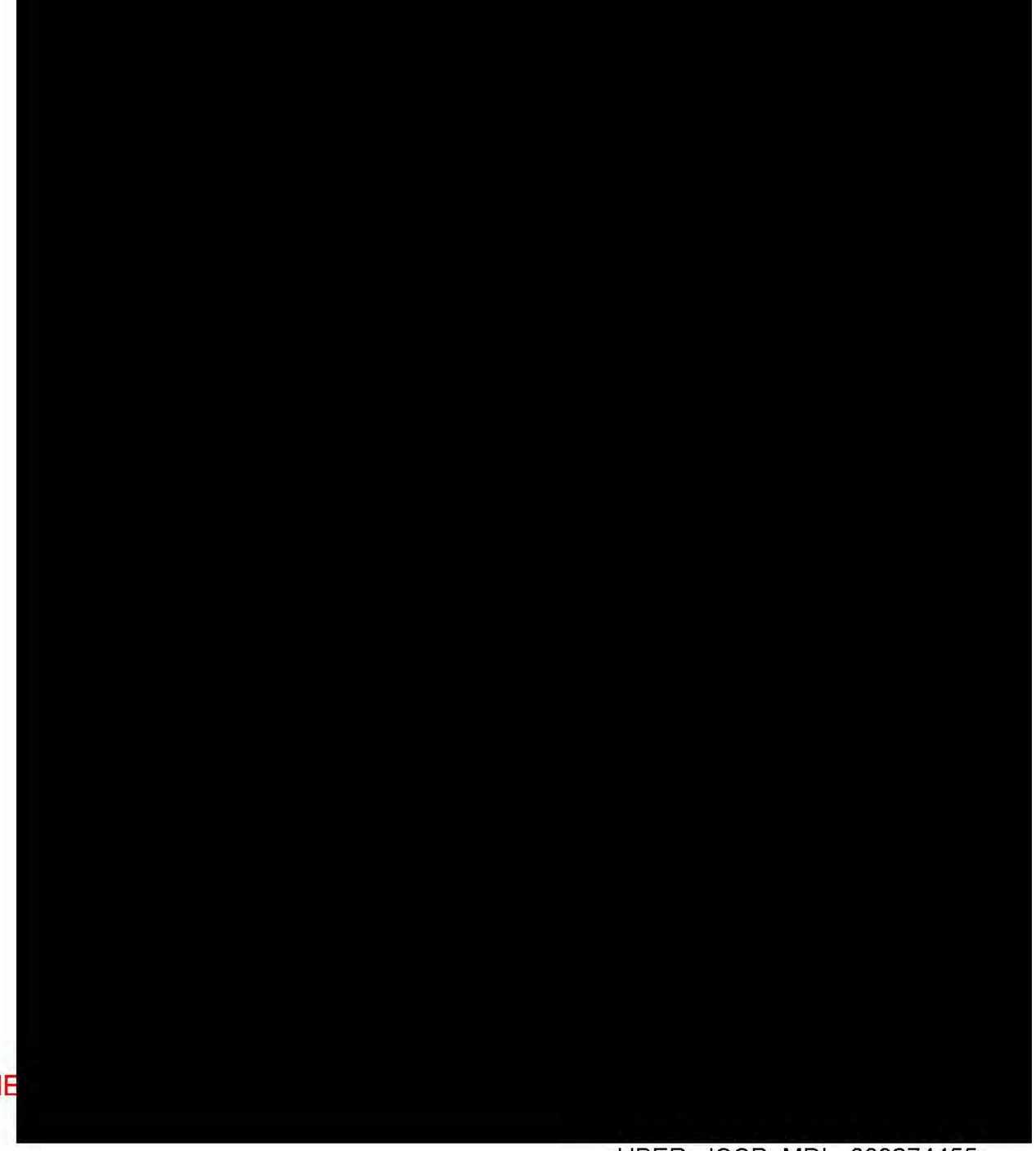
CONFIDENTIAL

UBER_JCCP_MDL_003274454

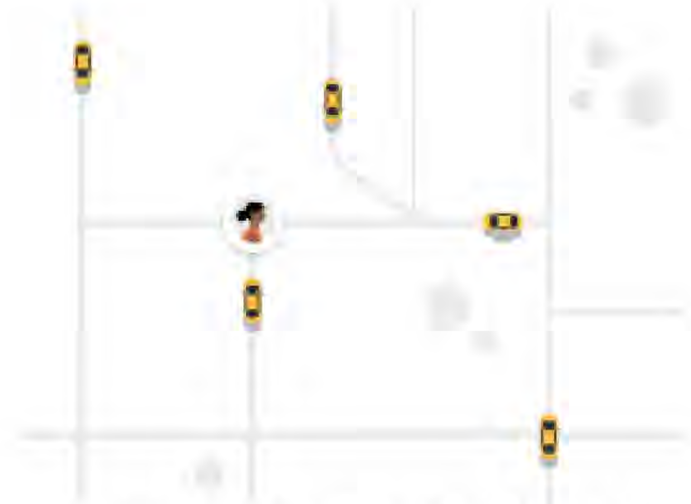
P-01366.00262

Executive summary

@jenny, @dharmin



ATTORNEY-CLIE



S-RAD US/BR Launch Plan

Executive Summary

Aligned with MX on 80/20 randomized holdout strategy

- Holdout validation test shows no stat sig impact on parallel switchback xps

Planned rollout in US & Brazil on July 6th to all Uber X trips. Selected model candidates

- Launching retrained model in Brazil. +1.5pp lift in recall compared to prod model
- Launching retrained model in the US. Similar perf compared to prod model

Aligned with Uber AI team on Model Excellence SLA requirements

- Will meet key model excellence requirements by launch date

Aligning with US & Brazil regional teams on rollout plan

- Aligned with US Ops. Guardrail metrics TBD after we see initial data post launch
- Working with Brazil Ops team to get sign off from Silvia Penna

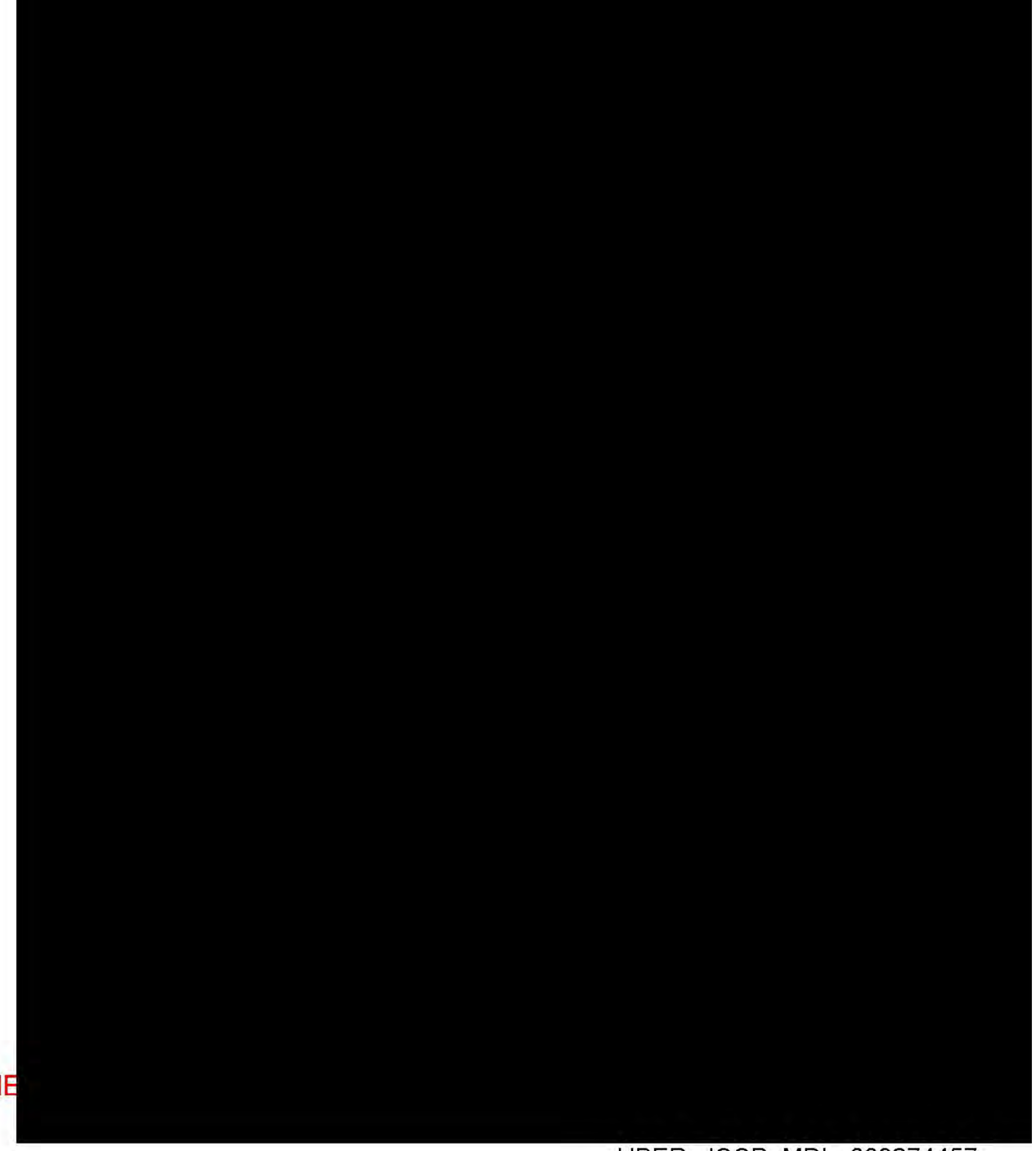
Finalizing monitoring plan

- Finalized metrics to be monitored
- Monitoring & alerting process to be refreshed and finalized

ATTORNEY-CLIENT PRIVILEGED

Holdout Validation

@gorkem



ATTORNEY-CLIE

MX team aligned on rolling out SRAD with 20% randomized holdout

Conclusion of holdout validation: No stat sig impact on parallel switchbacks

Differences across treated and control cities

	Differences across treated/control cities		
Metric	**5% FPR**	**10% FPR**	**MDE**
mean_eta_post_request	-0.28 pp (0.67)	-0.53 pp (0.64)	-0.50% (0.85)
requests_completed_rate	1.43 pp (0.31)	2.26 pp (0.24)	4.04% (0.14)
completed_trips	0.05 pp (0.96)	-1.81 pp (0.29)	3.75%* (0.07)
unique_session_count_bb8_hp	-0.72 pp (0.55)	-1.02 pp (0.59)	4.32%** (0.04)
eyeball_eta	0.40 pp (0.75)	0.72 pp (0.71)	0.16% (0.94)
supply_hours	0.02 pp (0.99)	-0.45 pp (0.81)	6.03%*** (0.01)
zero_rate	-0.67 pp (0.38)	-0.57 pp (0.66)	0.56% (0.84)

Note: Impact on false positive rates are expressed in percentage points and in percent for MDE. Number of A/A XPs (observations) considered are 30,400. Standard errors are clustered at the city level and p-values are shown in brackets. ***, **, * indicates statistical significance at the 1%, 5%, and 1% level respectively. All regressions consider city-pairs fixed effects and regression that study impacts on MDE also controls for metric-city-level mean MDE in previous month.

Experiment Summary

Background

- We ran the experiment from 5/10 - 6/7 in 152 US cities
- 50/50 split in treatment and control

Main findings of xp

- No stat sig differences in FPR across Marketplace metrics. 5% false positive rate = % of AA tests whose p-value < 5%
- No evidence that S-RAD affects internal validity of primary switchbacks run in those cities
- SRAD increasing MDE on primary switchback xps, but impact is sufficiently small to not be a blocker
- SRAD treatment intervals are random and uncorrelated with primary switchback treatment

Final Decision: Go ahead from MX team!

- S-RAD holdouts can operate on 288-minute switch frequency and starts at a set of allowed times (5 options) without affecting primary switchback xps.

Sources: S-RAD Holdout Configuration Backend | Block-level randomization for S-RAD holdout - 1 pager | S-RAD Parallel Switchback Design

ATTORNEY-CLIENT PRIVILEGED

Slide 202 Notes

- Solving for: *would primary switchback xps be affected if S-RAD is run in the background?*

The state of S-RAD for each time interval would be randomly assigned such that the overall time S-RAD is inactive matches the target holdout group percentage, uniformly distributed across all cities and times of day. More specifically, for each city and time interval, the state of S-RAD would be defined such that **Probability(S-RAD inactive) = holdout%**.
S-RAD holdouts can only operate on **288-minute** switch frequency and starts at a set of allowed times (5 options)

152 cities with SRAD
50% in t and 50% c
Would primary switchbacks would have been affected if SRAD was run in background ?

Are you more likely to find a difference?
Do we find a diff in false positive rates…
No stat sig results across Marketplace metrics

False positive rates means:

No evidence that sdrad affects internal validity of parallel switchbacks run in those cities

Is SRAD increasing MDE on primary switchback xps? Is sufficiently small for this to be a blocker

Average MDE across metrics is 3.4% and average impact on MDEs is 2.6%, so this would mean that instead of an MDE of 3.4%, our MDEs would

be 3.5%.

Why would MDE increase?
SRAD is random shock, uncorrelated with primary switchback treatment.
It increases volatility, so increases MDE of primary switchback

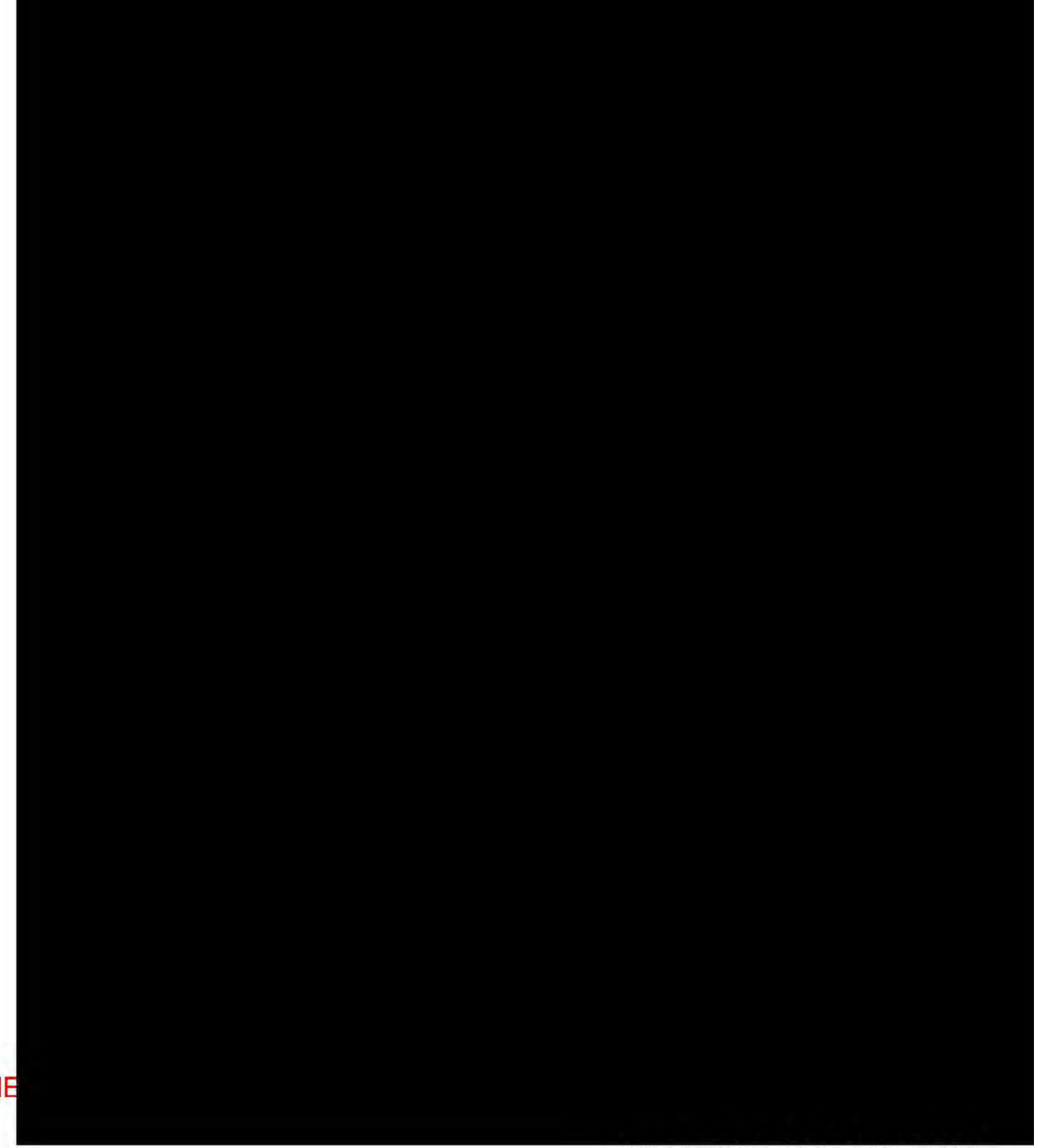
nfra:
Backend configs will support randomization in holdout assignment, allowing changing the holdout% at city-level while being able to reproduce schedules with the same holdout assignments.

https://docs.google.com/document/d/1LiwgVMaXhhl8B6g6OlC1pwxL4gWTVXwd8Tz5ckbWjKU/edit

zero_rate: percent eyeballs with zero cars available

Model Candidates & Model Excellence

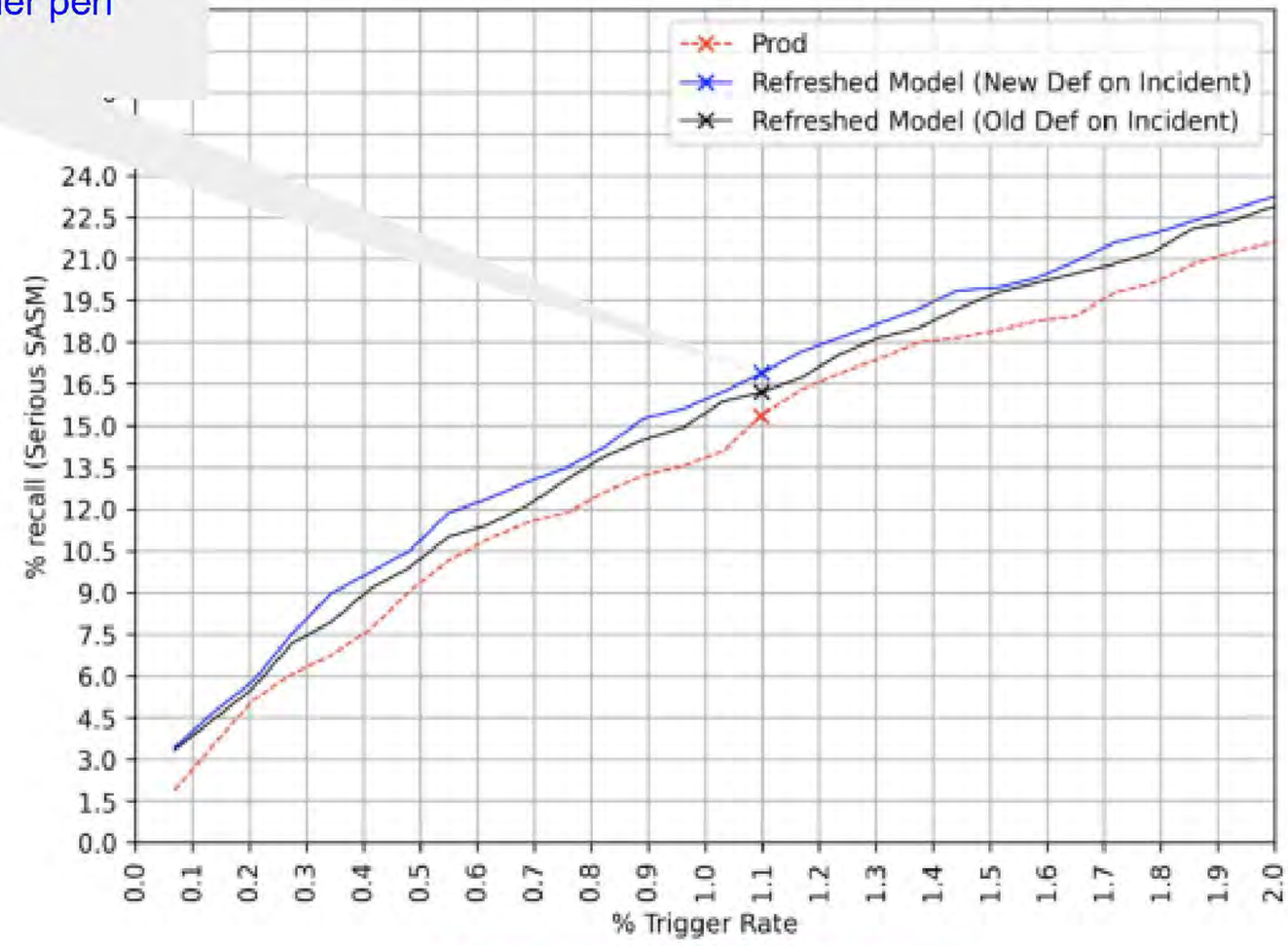
@mingxuan,
@gorkem



ATTORNEY-CLIE

Brazil model retrained with new serious SASM definition

Launch candidate has higher perf than current prod model



Features:
46 Features (same as old model)

New: definition of Serious SASM incidents includes Physical stalking

Training period:
4 years (2018-01-01 to 2022-01-31, xp treatment group trips excluded)

Trigger Rate:
1.1%

Result(recall Serious SASM):
16.9% vs. 16.2% vs. 15.4%

Sources: SRAD Brazil Model 2022.06

ATTORNEY-CLIENT PRIVILEGED

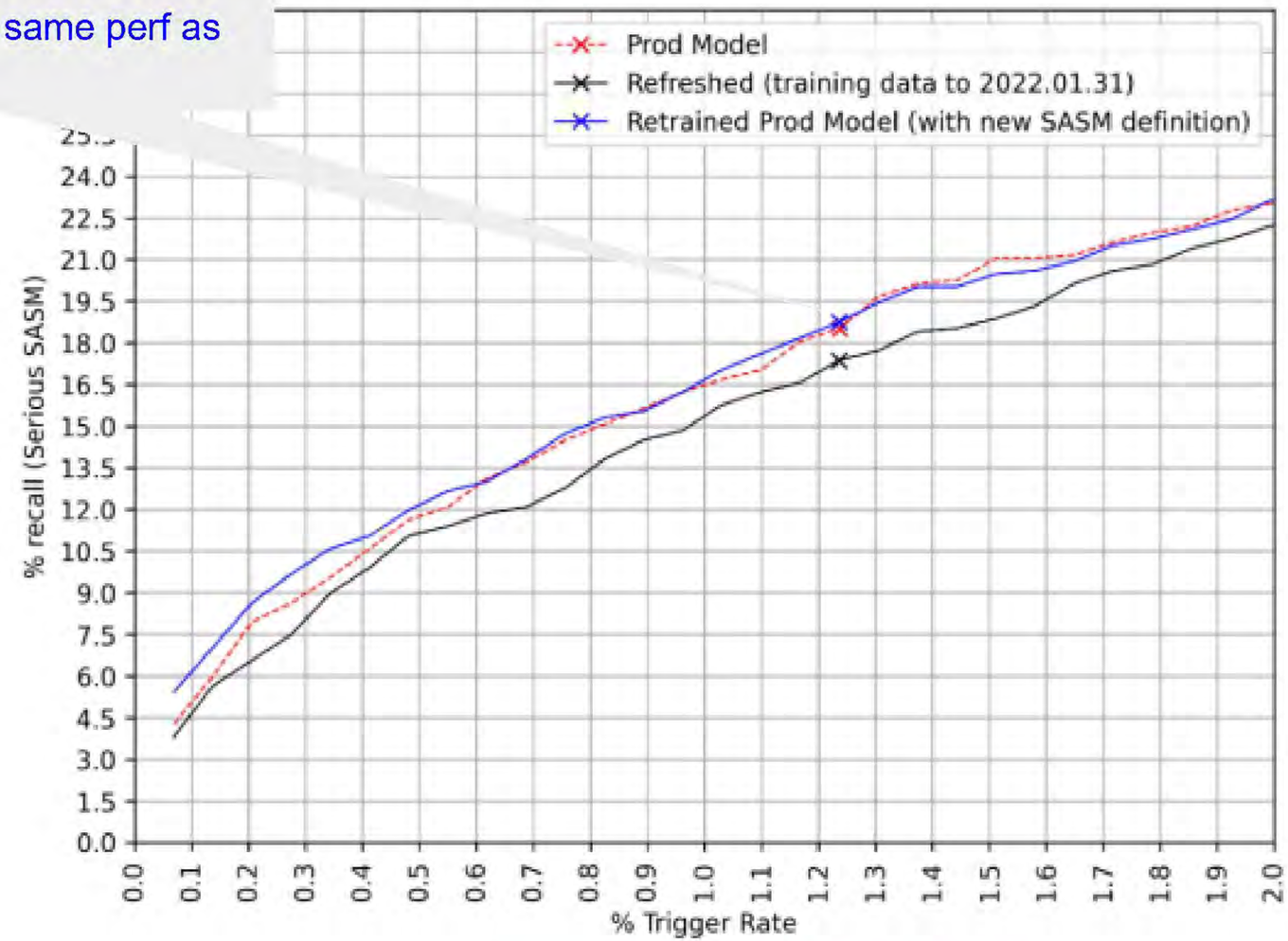
*new definition includes Physical Stalking

Slide 204 Notes

Provide background on candidates we were testing….
New def vs Old def

US model retrained with new serious SASM definition

Launch candidate has same perf as current prod model



Features:
49 Features (same as old model)

New: definition of Serious SASM incidents includes Physical stalking

Training period:
3 years (2018-01-01 to 2020-12-31)

Trigger Rate:
1.25%

Result(recall Serious SASM):
18.75% vs. 18.5% vs. 17.9%

Sources: US SRAD 2022.06

ATTORNEY-CLIENT PRIVILEGED

*new definition includes Physical Stalking

Slide 205 Notes

Mingxuan: I think we should go with Prod Model. Major reason is we don't see benefit/lift on recall of re-training with latest data.
We will keep iterating new models offline in H2 and upgrade the model whenever we feel confident that new model is better.

We will meet key model excellence requirements by launch date

	Description	What we will meet	Timeline to meet SLA
Model Accuracy	*Average of accuracy of deployed models on test data.*	MVP metric: AUC	Early July
Prediction Performance	*Weighted average of online prediction accuracy of deployed models.*	MVP metric: AUC	Early July
Training Feature Quality	*Aggregate of Freshness, Duplicates, XDC Consistency & Missing Partitions for datasets used in the model.*	Meets DQ requirements, barring MA UI issue	Dependency on MA team to fix UI issue
Model Freshness	*Maximum of days between today and the training date of deployed models.*	Target days to refresh: 365 (previously 720 days)	Early July
Training Dataset Tiering	*Project Tier = avg(model data tier) for deployed models with production traffic.*	Tier 1	Early July
Monorepo Adoption	*Percentage of models defined in the monorepo.*	Will not meet at launch	H2
Automation	*Percentage of the total trained models that are automated in a given project.*	Will not meet. Retraining models does not necessarily improve SRAD's performance. So current plan is to manually retrain model once a year	Revisit once we build a global model
Training Reliability	*Success rate of ALL training jobs in your project (includes trained and deployed models).*	Will not meet. Not relevant since training is not automated.	Post automation

ATTORNEY-CLIENT PRIVILEGED

Slide 206 Notes

1. **Model accuracy** and
2. **prediction performance**
    a. we can meet before July 6 launch
    b. For all the holdout periods, we have to accumulate
    c. Currently we have not turned it on, but once in shadow mode we can provide prediction performance. We will launch at 80/20 and shadow mode at 50/50.
    d. The actual metric to the threshold will take some time.
    e. Is AUC the right metric? The team can choose.
        i. Will it be problematic if we change the metric over time? No. It can be updated in a few months. We can also backfill the AUC.
    f. SRAD team will share AUC next week (week of June 20)
3. **Training Feature Quality**
    a. Databook was fixed. Model excellence team will support if its not green.
    b. Michelangelo feature store has partition check is not correct for SRAD bc there is no partition table
    c. FYI: We will move to new model for Brazil, but may or may not move to the new model for US (TBD).
4. **Model Freshness**
    a. We want to target 365.
    b. But if new model does not perform better, we will leave at 720.
5. **Training dataset quality**
    a. If we do not deploy the new model in US, we may have an issue.
6. **Automation** - systemic approach, retraining pipeline on recent data, train model and compare with production model. Doesnt mean we need to deploy. Humans are engaged in early stages of the model. Deployment is decision by the team.
    a. We do not automate. But we will build global model in H2 and see if it makes
    b. The requirement - prepare all the systems to retrain the production model.
        i. Dedicated retraining pool - for canvas

1. Use a dedicated production pool for your xp

ii. Dedicated ad hoc pool - for canvas

1. Tool exists

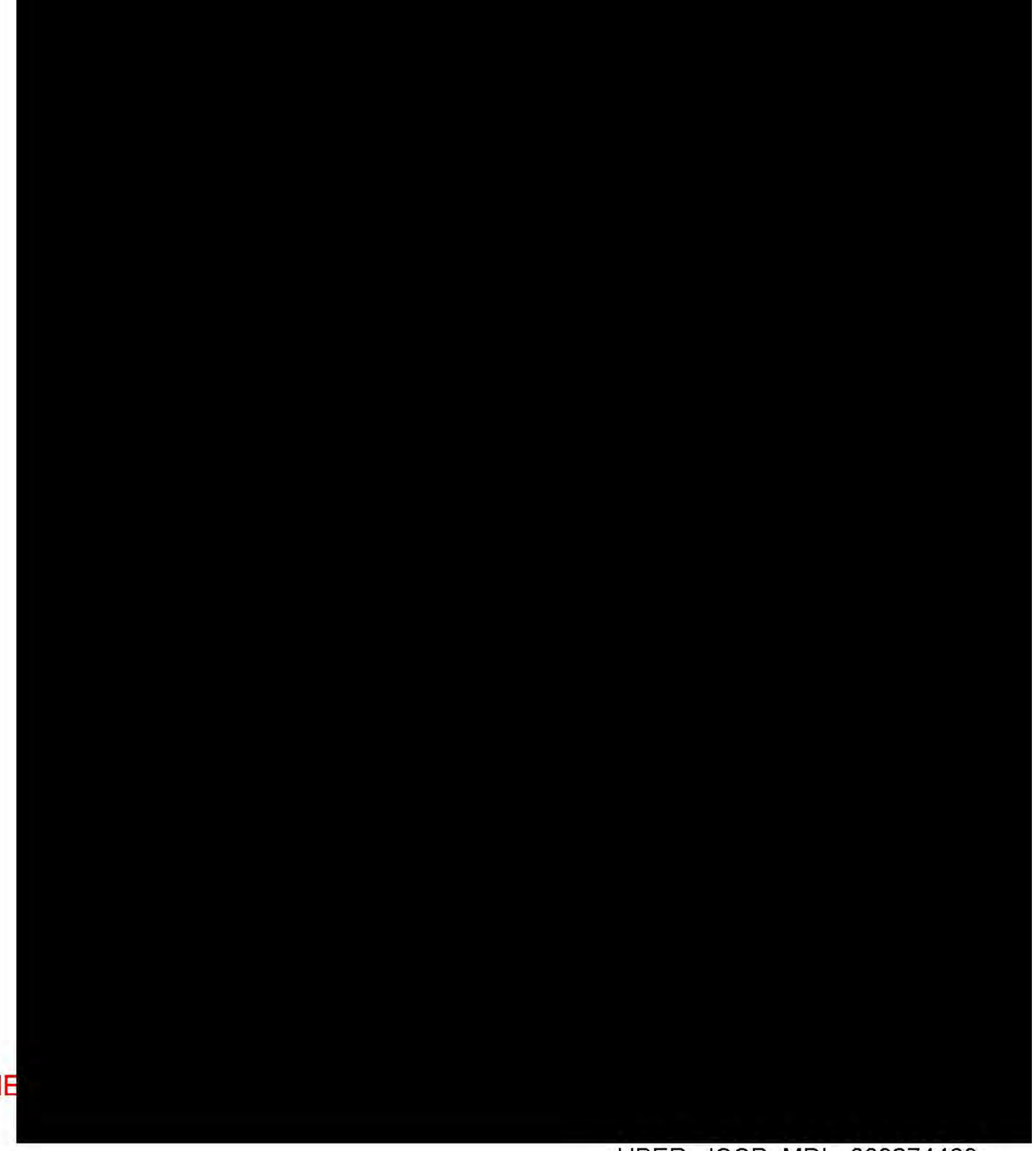
7. **Canvas**
   a. H2 goal is to have all tier 1 models onboarded onto Canvas 100%

8. **Training reliability** - how reliable are the retraining jobs; Definition: Successful re-training job over retrainings?
   a. Once the team decides how often we are retraining, we will be monitoring the training reliability.

Any other metrics to be concerned about? They look good.

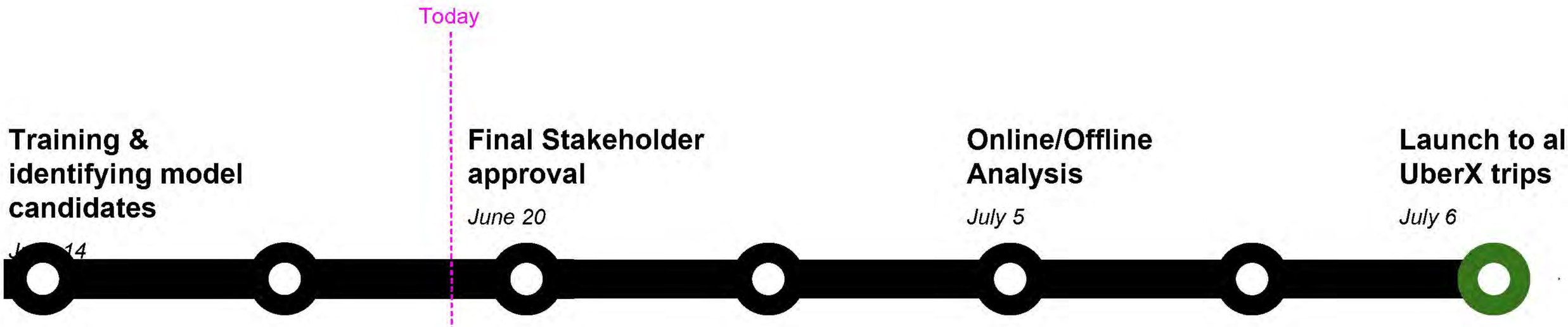
Rollout & Monitoring Plan

@dharmin, @jenny



ATTORNEY-CLIE

Rollout Plan



ATTORNEY-CLIENT PRIVILEGED

Slide 208 Notes

Provide background on candidates we were testing….
New def vs Old def

Monitoring: Metrics

Input Metrics

ML Product Health *(reported monthly)*	• Trip Trigger Rate • Recall Rate • Scores distribution

Infra Health *(Tracking & alerting)*	• Multileg
	  ○ Failure rate
	  ○ Latencies
	• uScorer
	  ○ Checkpoint failure rate
	  ○ Latencies
	• Michelangelo
	  ○ Failure rate
	  ○ Latencies
	  ○ Feature availability
	  ○ Score availability

Output Metrics

Safety Metrics *(reported monthly)*	• % prevented Serious SASMs (rolling X months)
Marketplace Metrics *(reported monthly)*	• Trip coverage • Slip thru rate • Impact on Overall P95 ETA, rider cancellation rate, Driver cancellation rate and C/R
Fairness *(reported bi-annually)*	• Driver supply hours • Driver earnings • Gender impact • Ethnicity impact

ATTORNEY-CLIENT PRIVILEGED

Source

Slide 209 Notes

Output metrics:
Business health + fairness

Input metrics:
ML and Infra

Alerting & Actioning framework

	Metric(s)	Alerts & Actions
Near Real Time	• Trigger Rate (hourly)	• If hourly moving average of Peak flagging rate above 75% sustained over 15 minutes ○ Pause triggering in the city ○ DS to review within 24 hrs and re-configure thresholds ○ ProdOps to inform stakeholder group
Daily	• Trigger Rate (daily)	• If over or under triggering ○ DS to re-configure thresholds ○ ProdOps to inform stakeholder group **Note**: Existing thresholds are for 50/50 XPs and need to be revisited post 80/20 rollout
Monthly	• Marketplace metrics ○ Impact on Overall P95 actual ETA, rider cancellation rate, Driver cancellation rate and C/R	• If breaching guardrails ○ Call RAPID team meeting to evaluate lowering trigger rate in one or more cities **Note**: Guardrails will be established w/ Ops post launch

ATTORNEY-CLIENT PRIVILEGED

Source

Slide 210 Notes

On calculating thresholds:
2 options:

1. Come up with a less stat rigorous way to compute thresholds
2. Need more data due to holdout in order to compute these thresholds on reliable estimates
    a. May need 1-3 months
    b. We should be able to monitor trigger rates with more granularity
    c. Marketplace numbers can be a little fuzzy early on
    d. We have shown that when we stay within our target trigger rates, the marketplace works out.

Final thresholds to be defined post launch

Guardrail Metrics (Overall impact)

These thresholds will be revisited after rolling out and updated in coordination with Ops teams.

	Metrics & Thresholds	Actions
	Δ Overall completed/requests > -0.2% Δ Overall rider cancellation rate > 0.1% Δ p95 ETA > 15s	• Email stakeholders • DS/DA Investigation • Determine next steps
	Δ Overall completed/requests > -0.4% Δ Rider cancellation rate > 0.2% Δ p95 ETA > 30s	• Call RAPID team meeting to evaluate lowering trigger rate in one or more cities

ATTORNEY-CLIENT PRIVILEGED

Final thresholds to be defined post launch

Guardrail Metrics for XL/L city groups (Brazil)

These thresholds will be revisited after rolling out and updated in coordination with Ops teams.

	Metrics & Thresholds (grouped by XL/L/M/S city sizes)	Actions
	Δ Night time completed/requests > -7% Δ Night time rider cancellation rate > +8% Δ p95 Night time ETA > 7% (approx 60 sec for XL)	• Email stakeholders • DS/DA Investigation • Determine next steps
	Δ Night time completed/requests > -10% Δ Night time rider cancellation rate > +15% Δ p95 Night time ETA > 10% (approx 90 sec for XL)	• Call RAPID team meeting to evaluate lowering trigger rate in one or more cities

ATTORNEY-CLIENT PRIVILEGED

Final thresholds to be defined post launch

Guardrail Metrics (US)

These thresholds will be revisited after rolling out and updated in coordination with Ops teams.

	Metrics & Thresholds (grouped by XL/L/M/S city sizes)	Actions
	Δ Night time completed/requests > -5% Δ Night time rider cancellation rate > +5% Δ Unfulfilled rate > +3% Δ p95 Night time ETA > 5%	• Email stakeholders • DS/DA Investigation • Determine next steps
	Δ Night time completed/requests > -10% Δ Night time rider cancellation rate > +10% Δ Unfulfilled rate > +5% Δ p95 Night time ETA > 10%	• Call RAPID team meeting to evaluate lowering trigger rate in one or more cities

ATTORNEY-CLIENT PRIVILEGED

S-RAD RAPID (will be primarily used for decision to turn off/on safety net)

Process	Monitoring for Brazil	Monitoring for US
Recommend	Leandro & Gorkem	Leandro & Gorkem
Agree	Dharmin	Dharmin
Perform	S-RAD Team	S-RAD Team
Input	S-RAD, Brazil Safety/Marketplace & Legal Teams	S-RAD, US Safety/Marketplace & Legal Teams
Decide	Gus & George	Gus & Danielle

A/C Privileged & Confidential

CONFIDENTIAL

Alerting & Monitoring (Eng runbook)

Because S-RAD was designed to fail open (i.e., in case of errors, let the rider X driver pair be matched), the following metrics aren't very concerning for the on-call:

- trigger count low
- trigger error high
- error rate high
- Kafka topic is being throttled

The real change of impact to the Marketplace is when **S-RAD over-triggering**. That's the only scenario when we want to be cautious and **disable S-RAD**

- *during business hours:* adjust the threshold to a high value (ie 2)
- **outside business hours or during holidays:**
  - If a critical alert occurs in a given city, it will likely auto resolve within ~30 minutes itself when the XP switches to control. So do not take any action on the first alert.
  - If a critical alert occurs in a given city twice within a 3 hour period, then shut the product off in that city. Email srad-working-group@uber.com to inform them of the actions taken.

Source

ATTORNEY-CLIENT PRIVILEGED

Next Steps

@jenny

[redacted]

ATTORNEY-CLIE

Next Steps

- Finalize monitoring plan
  - Monitoring & alerting process to be refreshed and finalized
- Meet with Brazil GM for final sign-off
- Policy meeting with external stakeholders

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Rollout Plan (PLC)

Today

Internal presentation to calibrate and receive feedback

Meeting with NYU (Fairness)

June 21

Meeting with NNEDV (women safety)

June 22

Meeting with CDT (Privacy)

June 24

Launch

ATTORNEY-CLIENT PRIVILEGED

Slide 218 Notes

Provide background on candidates we were testing….
New def vs Old def

ATTORNEY-CLIENT PRIVILEGED

S-RAD

Leadership Update

05.06.2022

Uber

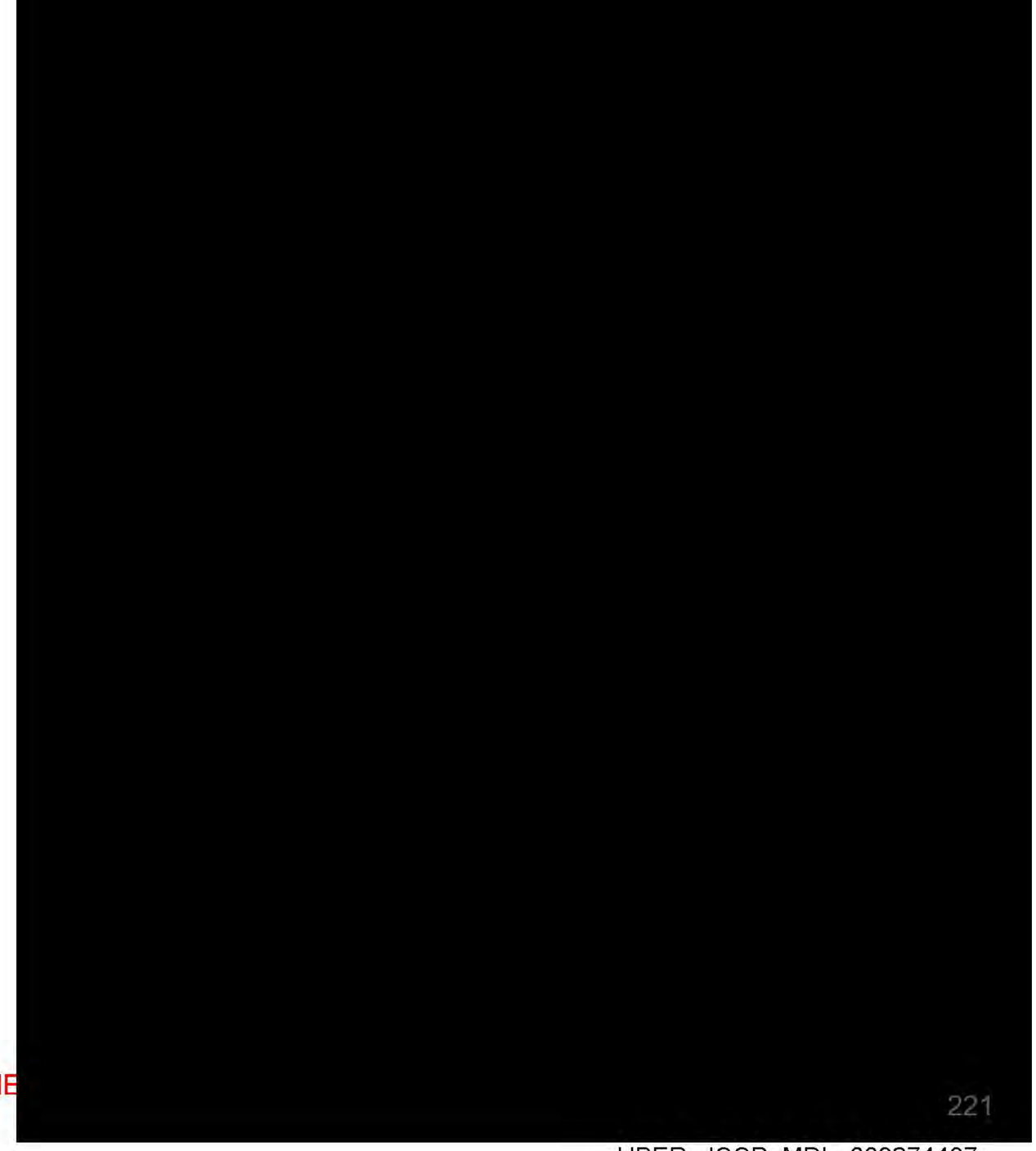


ATTORNEY-CLIENT PRIVILEGED

Summary

- Final safety impact readout (5 min)
- Comms plan (5 min)
- Policy plan (5 min)
- Holdout strategy (5 min)
- Roadmap
- [Marketplace / Fairness impact - for offline reading]

XP: Final Safety Impact Readout @ben [5 min]



ATTORNEY-CLIE

CONFIDENTIAL

UBER_JCCP_MDL_003274487

S-RAD safety XP impact readout results summary

- All/Serious SASM and serious IPC incident rate reductions in line with interim analyses
  - Slightly more differentiation between day/night results, especially for the US
- IR reduction estimates are more precise (i.e., comparatively smaller CIs)
- Still seeing lackluster BR nighttime performance (in comparison to recall)
- All IPC IR estimates most different compared to previous analyses due to changes in the definition for all IPC
  - Change made to align with updated Safety Standard Taxonomy
  - New definition translates to approximately 3x more IPCs compared to old definition
  - Minimal changes to SASM incident counts

Final readout from 180 days

>1.5 billion trip requests

196 active cities
223M requests in treatment
53B plans scored
1.18% trigger rate*



110 active cities
528M requests in treatment
128B plans scored
1.22% trigger rate*



	US	Brazil
Overall serious SASM recall (control)	15.2%	15.3%
% of treatment request with scores > threshold	0.39%	0.30%
Control SASM rate per 1M completed trips* (#)	42.5 (8393)	21.0 (8649)
Control serious SASM rate per 1M completed trips* (#)	7.09 (1401)	5.13 (2118)
Control IPC rate per 1M completed trips*	206 (40768)[1]	89.9 (37081)[1]
Control serious IPC rate per 1M completed trips(#)	9.10 (1796)	7.09 (2925)

[1]Note: Definitions changed for both SASM and IPC. We see very small difference for SASM (new definition includes some stalking cases previously excluded); almost no difference for serious IPCs. New definition translates to approximately 3x more IPCs compared to old definition

*Data as of: 4/30/2022

SOURCE: Ongoing SRAD Parallel Switchback XP Marketplace impact

ATTORNEY-CLIENT PRIVILEGED

Strong safety impact trend in the U.S.

Confidence intervals are smaller, meaning more precise IR reduction estimates

US safety impact summary

XP dates: 09/21 - 04/22; Incident data as of 04/30/22

Request Distribution	Control	Treatment
Day (6 AM - 11 PM)	187M	187M
Night (11 PM - 6 AM)	36.1M	36.0M

Safety Impact	Time of Day		
Incident Type	Overall	Day 6 AM - 11 PM	Night 11 PM - 6 AM
Overall SASM rate (per 1M requests)	-3.71%** (-5.64%, -1.77%) 42.5 → 40.9	-2.71%** (-5.00%, -0.42%) 35.9 → 34.5	-6.37%** (-9.96%, -2.77%) 79.7 → 76.7
Serious SASM rate (per 1M requests)	-15.3%** (-19.8%, -11.0%) 7.09 → 6.03	-18.2%** (-23.8%, -12.6%) 4.63 → 3.71	-11.8%** (-18.5%, -5.05%) 21.0 → 19.2
Overall IPC rate*** (per 1M requests)	-3.56%** (-4.44%, -2.68%) 206 → 199	-2.33%** (-3.35%, -1.31%) 182 → 177	-7.39%** (-9.12%, -5.67%) 343 → 321
Serious IPC rate*** (per 1M requests)	-12.7%** (-16.6%, -8.82%) 9.10 → 7.96	-15.1%** (-20.1%, -10.0%) 6.00 → 5.02	-9.71%** (-15.8%, -3.64%) 26.6 → 24.6

**Statistically significant at 80% confidence level

***IPC definition changed to match new Safety Data standard

Observations

- All/Serious SASM incident rate reductions in line with interim analyses
- Daytime US serious SASM IR reduction is outpacing model recall (~13%), though the recall is still within the CI
- Serious IPC impact shows consistently weaker performance compared to serious SASM
  - Looking to expand target incident types in future S-RAD iterations
- IPC estimates tend to be more precise compared to SASM estimates

***Notes**

- No corrections for multiple comparisons
- Short term spillovers appear to have minimal impact on estimated IRs, but long term spillovers may exist and are unquantified

ATTORNEY-CLIENT PRIVILEGED

SOURCE: Ongoing SRAD Parallel Switchback XP Marketplace impact

Robust safety impact in Brazil

Brazil safety impact summary

XP dates: 09/21 - 04/22; Incident data as of 04/30/22

Request Distribution	Control	Treatment
Day (6 AM - 11 PM)	479M	479M
Night (11 PM - 6 AM)	48.5M	48.9M

Safety Impact	Time of Day		
Incident Type	Overall	Day 6 AM - 11 PM	Night 11 PM - 6 AM
Overall SASM rate (per 1M requests)	-6.09%** (-7.96%, -4.22%) 21.0 → 19.7	-4.29%** (-6.52%, -2.06%) 16.2 → 15.6	-10.3%** (-13.8%, -6.91%) 82.6 → 73.3
Serious SASM rate (per 1M requests)	-8.45%** (-12.2%, -4.74%) 5.13 → 4.71	-6.23%** (-11.0%, -1.43%) 3.41 → 3.21	-11.6%** (-17.5%, -5.76%) 27.5 → 24.4
Overall IPC rate*** (per 1M requests)	-2.72%** (-3.65%, -1.79%) 89.9 → 87.3	-1.03% (-2.09%, 0.03%) 76.4 → 75.5	-8.78%** (-10.7%, -6.83%) 266 → 242
Serious IPC rate*** (per 1M requests)	-8.21%** (-11.4%, -5.04%) 7.09 → 6.51	-5.72%** (-8.75%, -2.68%) 4.81 → 4.58	-12.2%** (-17.3%, -7.08%) 36.7 → 31.9

**Statistically significant at 80% confidence level

***IPC definition changed to match new Safety Data standard

Observations

- All/Serious SASM and serious IPC IR reductions in line with interim analyses
- BR serious SASM nighttime performance has improved compared to the previous peek
  - Gap to offline model recall (28%) still present. Investigation wip.
- The difference in IPC IR estimate is due to change in IPC definition, so this change is not unexpected
  - ~2x jump in IPC incident volume compared to previous analyses

***Notes**

- No corrections for multiple comparisons
- Short term spillovers appear to have minimal impact on estimated IRs, but long term spillovers may exist and are unquantified

ATTORNEY-CLIENT PRIVILEGED

SOURCE: Ongoing SRAD Parallel Switchback XP Marketplace impact

CONFIDENTIAL

UBER_JCCP_MDL_003274491

P-01366.00299

Comms plan
@andrew
[5 min]

[redacted]

ATTORNEY-CLIE

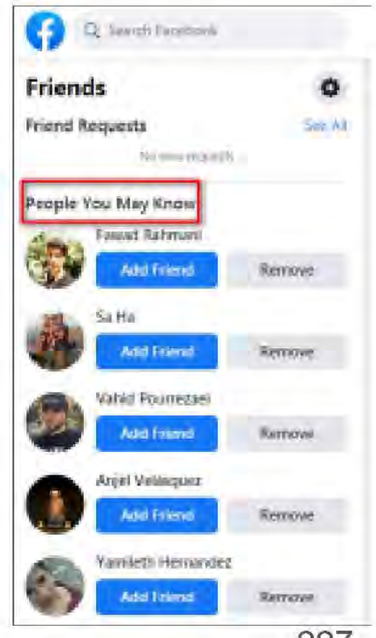
CONFIDENTIAL

Comms Strategy: ***No Proactive PR***

We recommend a "breadcrumb" strategy and finding the right venue to discuss SRAD *after* a full launch while being prepared for a whistleblower style leak

Why no proactive PR?	"Breadcrumb" strategy?	Reacting to "full leak"
• There is no outlet or reporter we would trust to write a balanced story on SRAD right now • Sharing testing results would mean we admit groups were not part of SRAD and could have been exposed to increased risk • Fear of a leak is not a justification for exposing ourselves to significant scrutiny. • What exactly would a leak reveal?	• Weave in more bold language alluding to SRAD in blogs, speeches, etc. • Think 3x marketplace site language - *"Uber may also modify pairings of drivers and riders in certain instances to help maintain a safe platform"* • Identify opportunities to touch on SRAD (Marketplace Risk, Ai/ML events, academic journals) • If a leak happens, we can't be accused of hiding the basic principles of SRAD	• We'll have a BLOG POST ready to publish in case needed. • Language in blog will serve as a guide for how we talk about SRAD in the "breadcrumb" strategy • General theme should lean into *better matches* vs. *safer matches* and using data to create more pleasant experience for riders and drivers. • We want to avoid *"Uber's Rape Prevention Tool"* type stories.





ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Policy Strategy

@dan @ana paula [5 min]

[redacted]

ATTORNEY-CLIE

CONFIDENTIAL

Recommend a conservative approach to briefing third parties prior to SRAD roll-out

Objectives:

- Reinforce our commitment to safety and the responsible development of AI.
- Protect Uber's ability to launch/use SRAD and mitigate regulatory risks.

Options	Details	Pros & Cons
Conservative [RECOMMENDED]	**Engagement:** Brief small group of advocates we engaged with on SRAD previously. - Present update on product - Gather feedback <u>only</u> on fairness testing/ongoing monitoring **Comms:** reactive, if leaked.	+ Retain third party support + Retain ability to collect more data and make stronger public case for SRAD at a later date. - If leaked, risk of regulatory scrutiny and blowback from privacy/transparency advocates.
Aggressive	**Engagement:** Brief larger list of advocates, and engage with select regulators + AGs **Comms:** reactive, if leaked.	+ Wider base of third party support + Greater control of narrative with regulators, AGs, third parties - Increased risk of leaks - Risk of delays given additional feedback/input from wider group of third parties. (Or we ignore the feedback, threatening the relationship). - Risk of holding SRAD rollout if regulators/AGs ask us to.

ATTORNEY-CLIENT PRIVILEGED

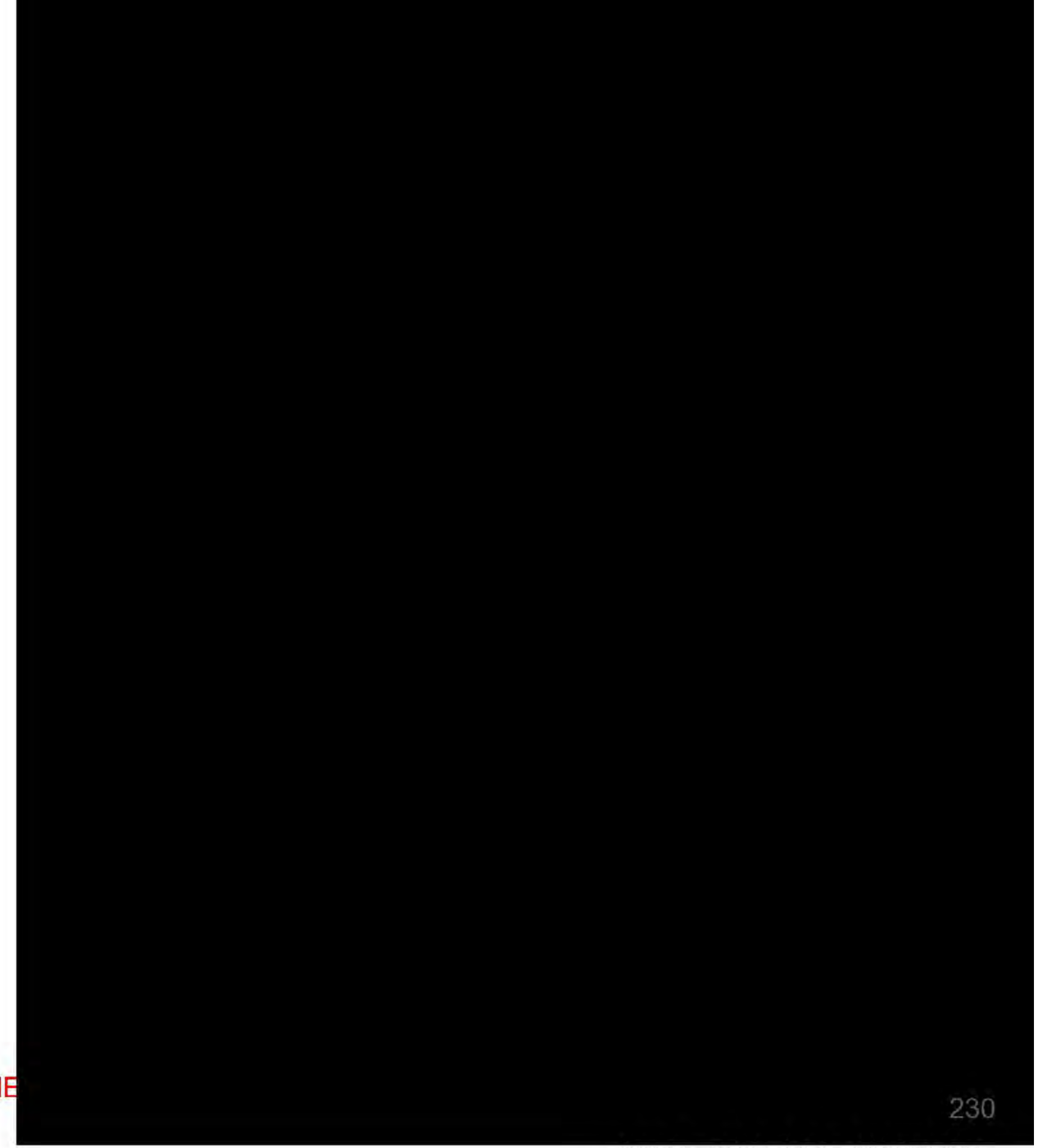
Slide 229 Notes

Recommended third party targets: NYU Law, Upturn, NNEDV, CDT and Leadership

Holdout Strategy

@ben

[5 min]



ATTORNEY-CLIE

CONFIDENTIAL

UBER_JCCP_MDL_003274497

Holdout Strategy summary & next steps

Holdout Framework

SRAD

- Randomly turn on/off SRAD every 288 minutes
- 80/20 split (configurable)
- Can only start during specific times of the day (3 slots)

Primary Rides Switchback

- Minimal impact for end MX users
- Switching periods can be 96 or 288 minutes
- Reduces the number of potential XP start times by half

Holdout Testing

- Conduct A/A test for a month
  - May 10th - June 9th
  - 154 cities
- Make sure that SRAD does not affect primary SB's: 1) internal validity, 2) power
- Quantify potential carryover effects to inform necessary corrections for primary switchback XPs

CONFIDENTIAL

UBER_JCCP_MDL_003274498

P-01366.00306

Roadmap

[redacted]

ATTORNEY-CLIE

CONFIDENTIAL

Path to full rollout in US & Brazil

Ongoing | Planned
Complete | Developing

May | Jun | Jul

PLC + M + Priv

- Draft Blog
- Reactive Comms Plan
- Finalize Reactive Blog
- Internal Messaging for Marketing
- Privacy Requirements
- External Facing - Future of Safety positioning
- Fairness Testing
- Stakeholder list
- Other Stakeholder engagement
- Prezo to Civil Rights advocates
- Memo from ORCAA
- Safety Advisory Board meeting

Eng + DS + Prod

- Holdout Strategy Framework
- Holdout Testing
- Safety impact readout
- Marketplace impact readout
- Product Launch & Monitoring plan
- Retrain Model Recompute Thresholds
- Launch US & BR

ATTORNEY-CLIENT PRIVILEGED

Soft-Filtering Roadmap (till EOY)

Underway | Planned
Complete | Developing

Jun — Jul — Aug — Sep — Oct — Nov — Dec

PLC + M + Priv

- Reactive Blog
- External Facing - Future of Safety positioning

Eng + DS

- LatAm Marketplace test
- US Full Rollout
- Latam Full Rollout

Prod

- BR Full Rollout
- Nudges Expansion in US & BR
- SRAD Nudges XP Mexico
- SRAD Nudges XP Readout

ATTORNEY-CLIENT PRIVILEGED

Safety XP:
Marketplace impact
03-07-22 - 04-03-22

[redacted]

ATTORNEY-CLIE

CONFIDENTIAL

BR parallel safety XP

- Overall TR: 1.07%
- Day TR: 0.51%
- Night TR: 6.94%
- 7 day rolling TR as of 2022-03-20: 1.07%
- # abnormal days: 0

Trip Distribution	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	76.7M	7.29M
Treatment	76.6M	7.37M

BR (110 cities)	***All Day***		***Day Time***		***Night time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
Avg_post_dispatch_eta	**1.6**	257.9	**0.6**	253.0	**14.1**	308.8
p95_post_dispatch_eta	**5.1**	700.4	-	665.5	**16.6**	805.2
p99_post_dispatch_eta	**3.9**	904.4	-	875.7	**10.9**	988.5
request_to_begin_sec_avg	**1.8**	422.8	**1.0**	417.3	**12.1**	478.8
completed/requests	**-0.07%**	78.56%	-	80.08%	**-0.72%**	62.73%
unfulfilled/requests	-	6.34%	-	5.60%	-	14.19%
rider_cancellation_perc	**0.09%**	13.23%	**0.04%**	12.56%	**0.62%**	20.24%
driver_cancellation_perc	-	23.91%	-	22.66%	**0.36%**	36.70%

- : Not Stat-sig
Level Effect: Absolute Difference

CONFIDENTIAL

UBER_JCCP_MDL_003274503

BR parallel safety XP

Trip Distribution	XL Cities		L Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	54.5M	5.41M	17.4M	1.50M
Treatment	54.4M	5.49M	17.5M	1.49M

BR (110 cities)	***XL Cities (15 cities)***						***L Cities (30 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	**1.6**	246.3	**-**	241.3	**14.6**	294.2	**1.9**	282.0	**0.8**	276.0	**15.3**	351.6
p95_post_dispatch_eta	**13.8**	567.5	**2.9**	507.7	**41.8**	713.7	**10.0**	688.1	**1.9**	610.9	**30.5**	876.6
p99_post_dispatch_eta	**11.6**	801.2	**4.5**	721.5	**29.6**	991.3	**6.3**	947.0	**2.4**	877.4	**16.1**	1114.0
request_to_begin_sec_avg	**2.1**	416.2	**1.2**	410.5	**12.4**	471.0	**1.6**	436.3	**0.6**	430.4	**12.9**	504.8
completed/requests	**-0.09%**	81.18%	**-**	82.63%	**-0.78%**	66.82%	**-**	76.33%	**-**	78.08%	**-0.69%**	56.03%
unfulfilled/requests	**-**	4.58%	**-**	3.87%	**-**	11.75%	**-**	8.71%	**-**	7.78%	**-**	19.55%
rider_cancellation_perc	**0.11%**	12.33%	**0.06%**	11.71%	**0.67%**	18.54%	**0.08%**	13.23%	**-**	12.49%	**0.58%**	21.91%
driver_cancellation_perc	**-**	24.15%	**-**	22.79%	**0.38%**	37.02%	**-**	21.72%	**-**	20.79%	**0.36%**	33.72%

- : Not Stat-sig; Level Effect: Absolute Difference

BR parallel safety XP

Trip Distribution	M Cities		S Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	4.27M	345k	477k	35.9k
Treatment	4.26M	345k	474k	36.5k

BR (110 cities)	***M Cities (30 cities)***						***S Cities (35 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	**1.3**	300.0	**0.8**	296.3	**7.7**	348.3	-	364.1	**-1.9**	362.3	-	392.6
p95_post_dispatch_eta	**5.2**	722.8	**3.9**	692.9	**8.9**	808.1	-	787.2	-	798.7	**-20.1**	721.4
p99_post_dispatch_eta	**4.8**	926.2	**3.1**	922.9	**9.8**	935.4	-	887.0	-	912.0	**-17.2**	745.7
request_to_begin_sec_avg	**0.7**	443.5	-	440.2	**7.3**	486.7	-	510.9	-	508.7	-	551.6
completed/requests	-	57.53%	**0.11%**	59.61%	**-0.31%**	31.31%	-	43.70%	-	45.40%	-	19.61%
unfulfilled/requests	**-0.09%**	18.62%	**-0.11%**	17.78%	-	29.38%	-	13.33%	-	13.08%	-	17.01%
rider_cancellation_perc	-	21.89%	-	20.74%	**0.37%**	36.68%	-	40.83%	**-0.25%**	39.48%	-	60.15%
driver_cancellation_perc	-	29.62%	-	28.66%	-	45.68%	-	33.75%	-	33.21%	-	46.19%

- : Not Stat-sig; Level Effect: Absolute Difference

US parallel safety XP

- Overall TR: 1.13%
- Day TR: 0.73%
- Night TR: 3.25%
- 7 day rolling TR as of 2022-03-20: 1.11%
- # abnormal days: 0

Trip Distribution	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	33.0M	6.14M
Treatment	32.9M	6.21M

US (196 cities)	***All Day***		***Day Time***		***Night time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
Avg_post_dispatch_eta	**1.6**	410.7	**1.2**	404.6	**3.9**	444.2
p95_post_dispatch_eta	**2.4**	1131.6	**1.9**	1107.4	**3.9**	1195.5
p99_post_dispatch_eta	**2.3**	1347.4	**2.4**	1338.3	**-**	1371.5
request_to_begin_sec_avg	**1.3**	539.3	**1.0**	534.5	**3.4**	565.9
completed/requests	**-0.04%**	89.04%	**-**	89.94%	**-0.10%**	84.07%
unfulfilled/requests	**-**	0.49%	**-**	0.40%	**-**	1.01%
rider_cancellation_perc	**0.05%**	8.74%	**0.03%**	8.17%	**0.13%**	11.90%
driver_cancellation_perc	**-**	7.96%	**-**	7.26%	**-**	11.87%

- : Not Stat-sig
Level Effect: Absolute Difference

CONFIDENTIAL

UBER_JCCP_MDL_003274506

US parallel safety XP

Trip Distribution	XL Cities		L Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	25.7M	4.59M	5.28M	1.05M
Treatment	25.6M	4.67M	5.28M	1.05M

US (196 cities)	***XL Cities (27 cities)***						***L Cities (52 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	**1.6**	355.8	**1.3**	349.8	**4.1**	389.4	-	616.5	-	610.1	**3.7**	649.4
p95_post_dispatch_eta	**5.1**	931.5	**4.0**	870.1	**7.9**	1081.8	-	1240.3	-	1197.1	**7.7**	1347.6
p99_post_dispatch_eta	**4.5**	1219.1	**2.8**	1159.7	**8.9**	1367.8	-	1521.1	-	1478.7	-	1627.5
request_to_begin_sec_avg	**1.5**	486.5	**1.1**	481.8	**3.8**	512.8	-	742.1	-	737.2	-	767.3
completed/requests	**-0.05%**	90.63%	-	91.38%	**-0.15%**	86.43%	-	84.14%	-	85.50%	-	76.91%
unfulfilled/requests	-	0.16%	-	0.12%	-	0.39%	-	1.35%	-	1.11%	**-0.10%**	2.66%
rider_cancellation_perc	**0.06%**	7.52%	-	7.03%	**0.16%**	10.28%	-	12.67%	-	11.82%	-	17.10%
driver_cancellation_perc	-	7.54%	-	6.87%	-	11.40%	-	10.00%	-	9.15%	-	14.54%

- : Not Stat-sig; Level Effect: Absolute Difference

US parallel safety XP

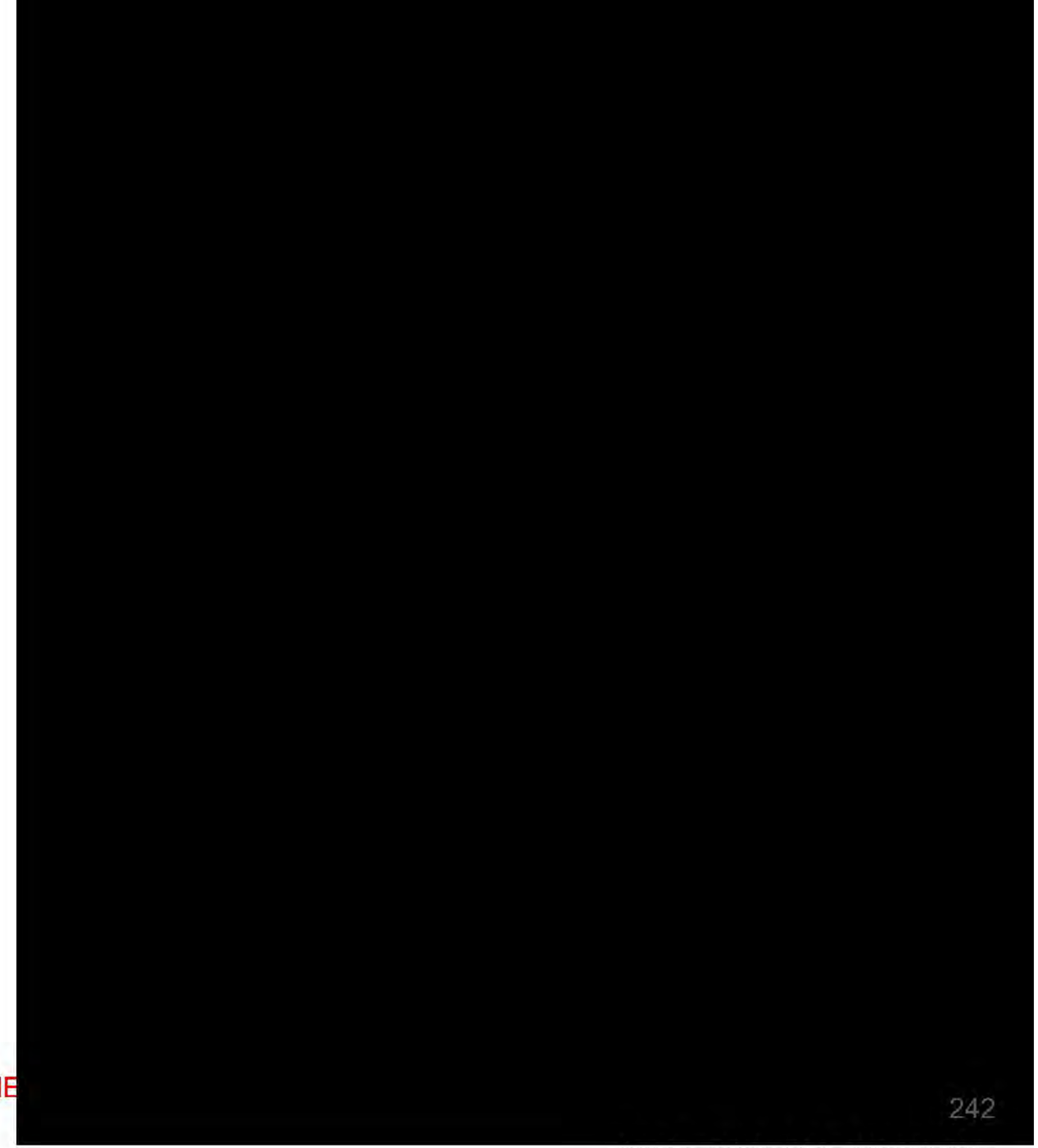
Trip Distribution	M Cities		S Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	1.38M	336k	637k	155k
Treatment	1.38M	335k	636k	155k

US (196 cities)	***M Cities (52 cities)***						***S Cities (65 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	-	594.4	-	603.7	-	553.9	-	545.9	-	552.0	-	517.3
p95_post_dispatch_eta	-	1189.0	-	1173.3	-	1228.9	-	1080.6	-	1085.3	-	1066.4
p99_post_dispatch_eta	-	1427.7	-	1453.7	-	1363.0	**5.3**	1181.1	**5.5**	1203.9	-	1112.9
request_to_begin_sec_avg	-	698.6	-	707.7	-	659.0	-	668.2	-	671.9	-	650.1
completed/requests	-	80.94%	-	82.16%	-	75.61%	-	82.69%	-	84.08%	**-0.45%**	76.33%
unfulfilled/requests	-	2.58%	-	2.28%	-	3.95%	-	2.30%	-	2.08%	-	3.36%
rider_cancellation_perc	-	14.59%	-	14.04%	-	16.94%	-	13.14%	-	12.39%	**0.39%**	16.54%
driver_cancellation_perc	-	8.75%	-	8.19%	-	11.24%	-	6.53%	-	5.96%	-	9.25%

- : Not Stat-sig; Level Effect: Absolute Difference

Fairness testing results

@dan



ATTORNEY-CLIE

CONFIDENTIAL

UBER_JCCP_MDL_003274509

Fairness Testing Results

- No concerning disparities by gender
- No concerning disparities by ethnicity, using several different inference methods
- No concerning disparities across geography between HUD-qualified and non-qualified census tracts.
- No concerning disparities between non-binary or transgender drivers and other drivers.
- Sample size is (mostly) big enough to reject disparities that have practical meaning
  - Less true for transgender and non-binary cohorts
- Worked with civil rights NGOs on developing best practices for ethnicity inferences.
  - Broadly, the best strategy is to use different inference approaches and see what they say directionally, taken together.

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 243 Notes

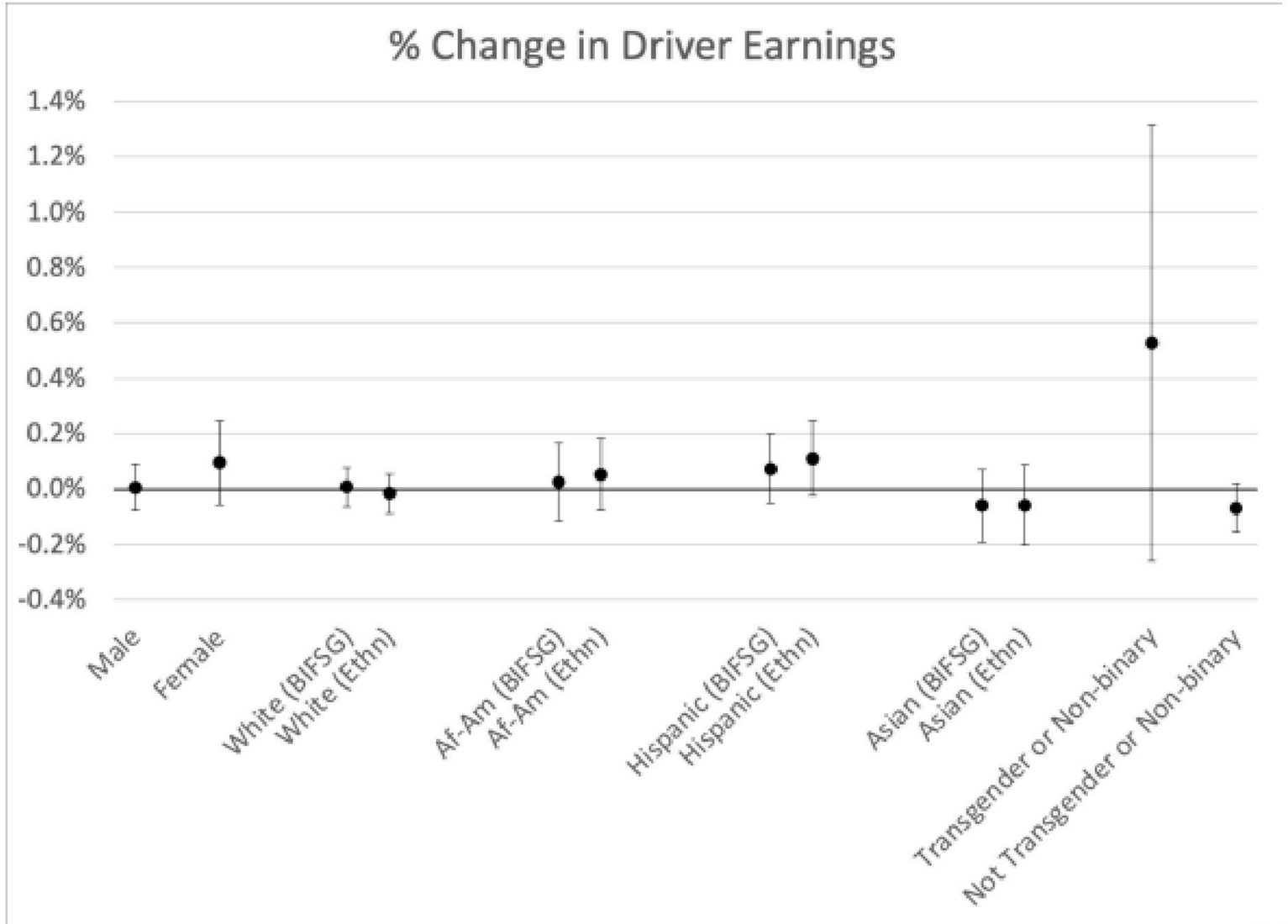
Sample size here is defined as the number of switchback periods * city * demographic group, which is in the hundreds of thousands for all tests. For transgender and non-binary drivers, the number of such drivers is so small (roughly 10,000 across the whole country in this time period) that there are lots of switchback periods with no trips with a non-binary or transgender driver. In general, we have to make a choice about what to do with periods with very few observations. For all analyses here, I require there to be 50 trips in a 48-minute period, though the results don't depend on this threshold – they hold if you require 100 trips or 0 trips.

No stat sig disparities in Driver Earnings

Jan 4 - Apr 3, US Cities

Driver Earnings

- BIFSG and Ethn refer to two different ethnicity inference methods
- Transgender or Non-Binary refers to drivers who self-report as transgender or whose driver's license lists gender as X



CONFIDENTIAL

Slide 244 Notes

Ethn relies on the order of letters in a full name. BIFSG performs a Bayesian combination based on a user's census tract demographics, first name, and surname

No stat sig disparities in Driver Earnings

Jan 4 - Apr 3, US Cities

Driver Earnings

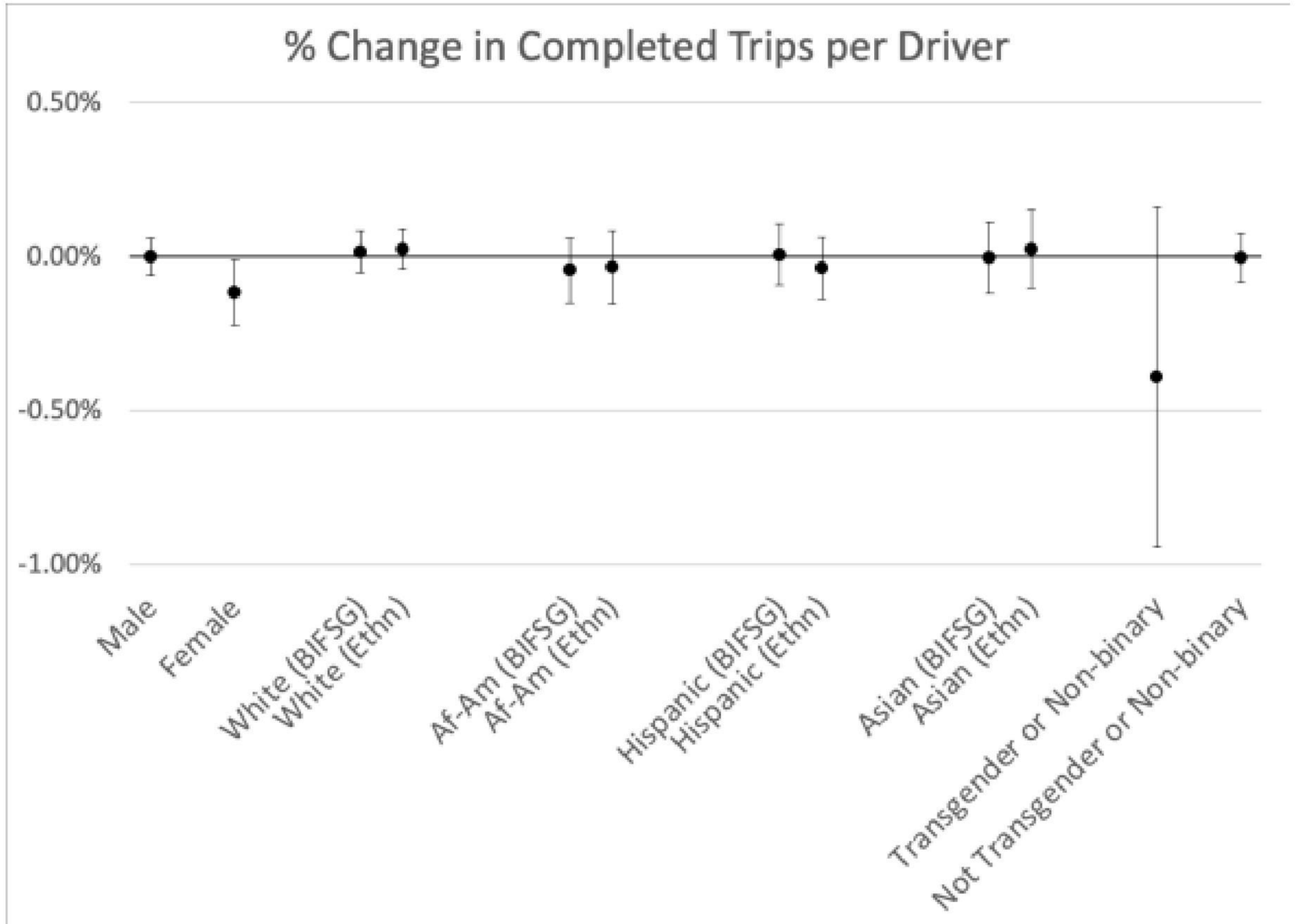
Weekend Nights



CONFIDENTIAL

No stat sig disparities in Completed Trips

Jan 4 - Apr 3, US Cities



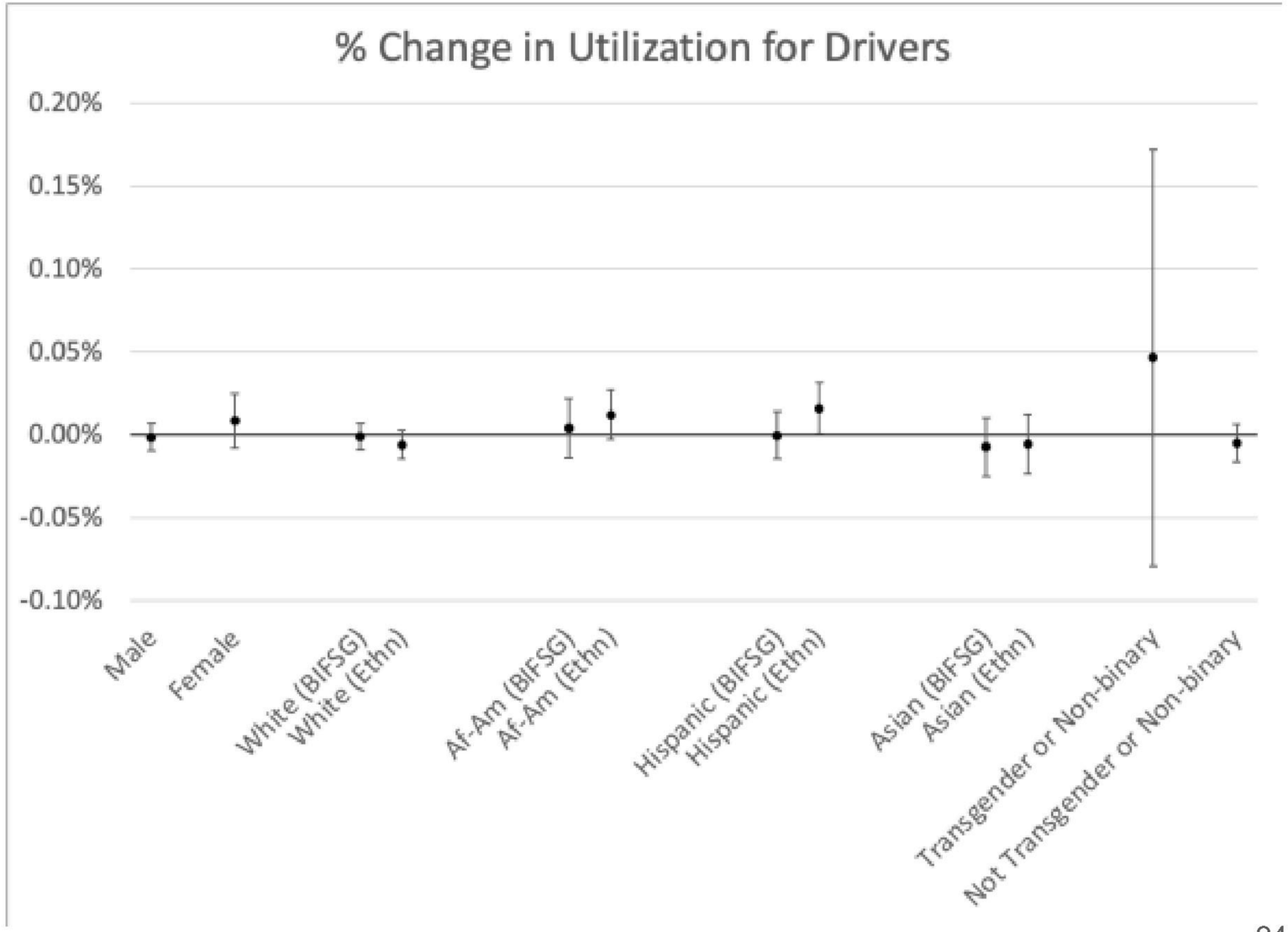
Completed Trips

CONFIDENTIAL

No stat sig disparities in Utilization

Jan 4 - Apr 3, US Cities

Utilization



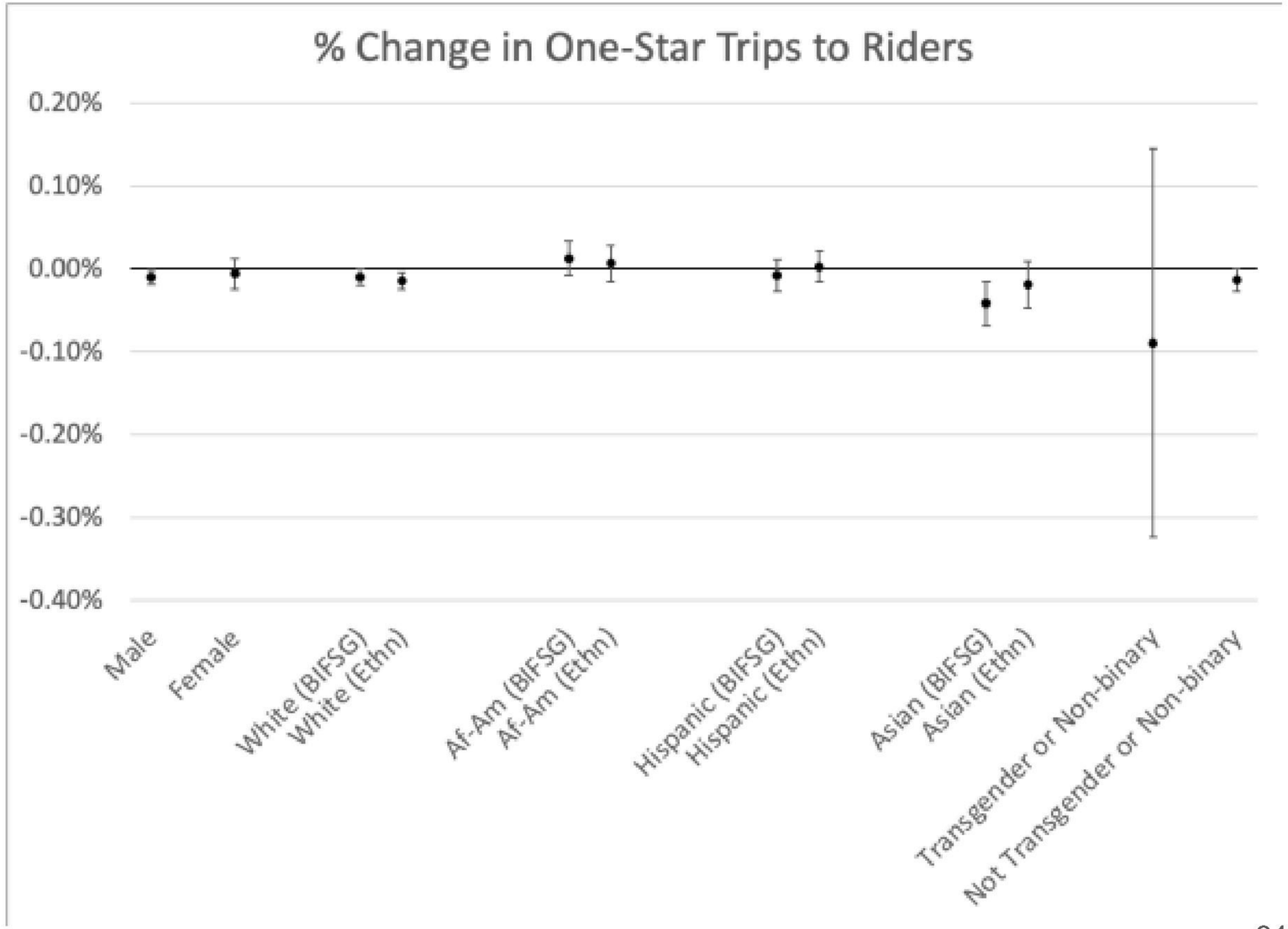
CONFIDENTIAL

UBER_JCCP_MDL_003274516

No stat sig disparities in 1-star trips

Jan 4 - Apr 3, US Cities

One-Star Trips (to Riders)

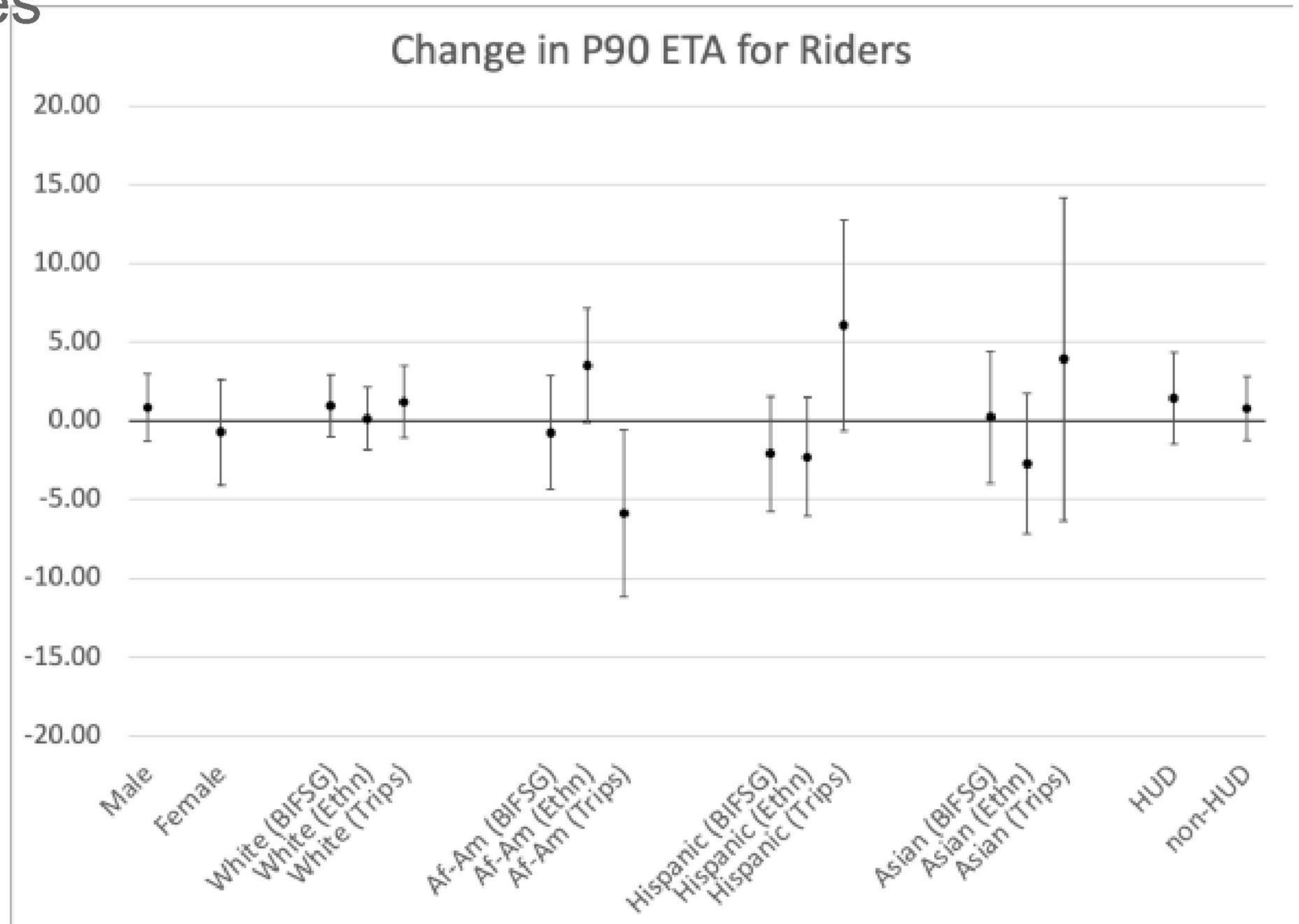


CONFIDENTIAL

No stat sig disparities in p90 ETAs

Mar 1 - Mar 15, US Cities

P90 ETAs



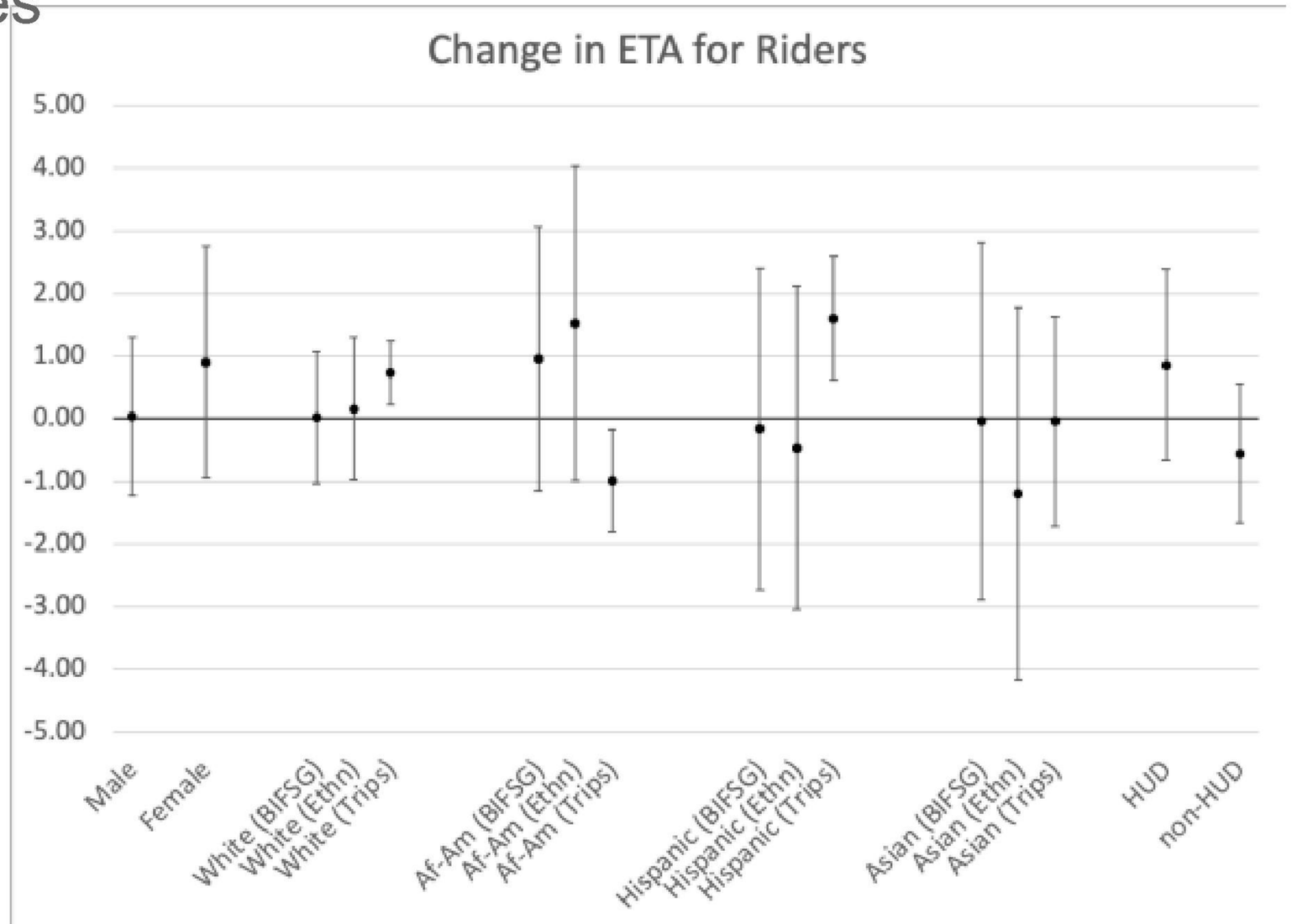
CONFIDENTIAL

UBER_JCCP_MDL_003274518

No stat sig disparities in ETAs

Mar 1 - Mar 15, US Cities

ETAs



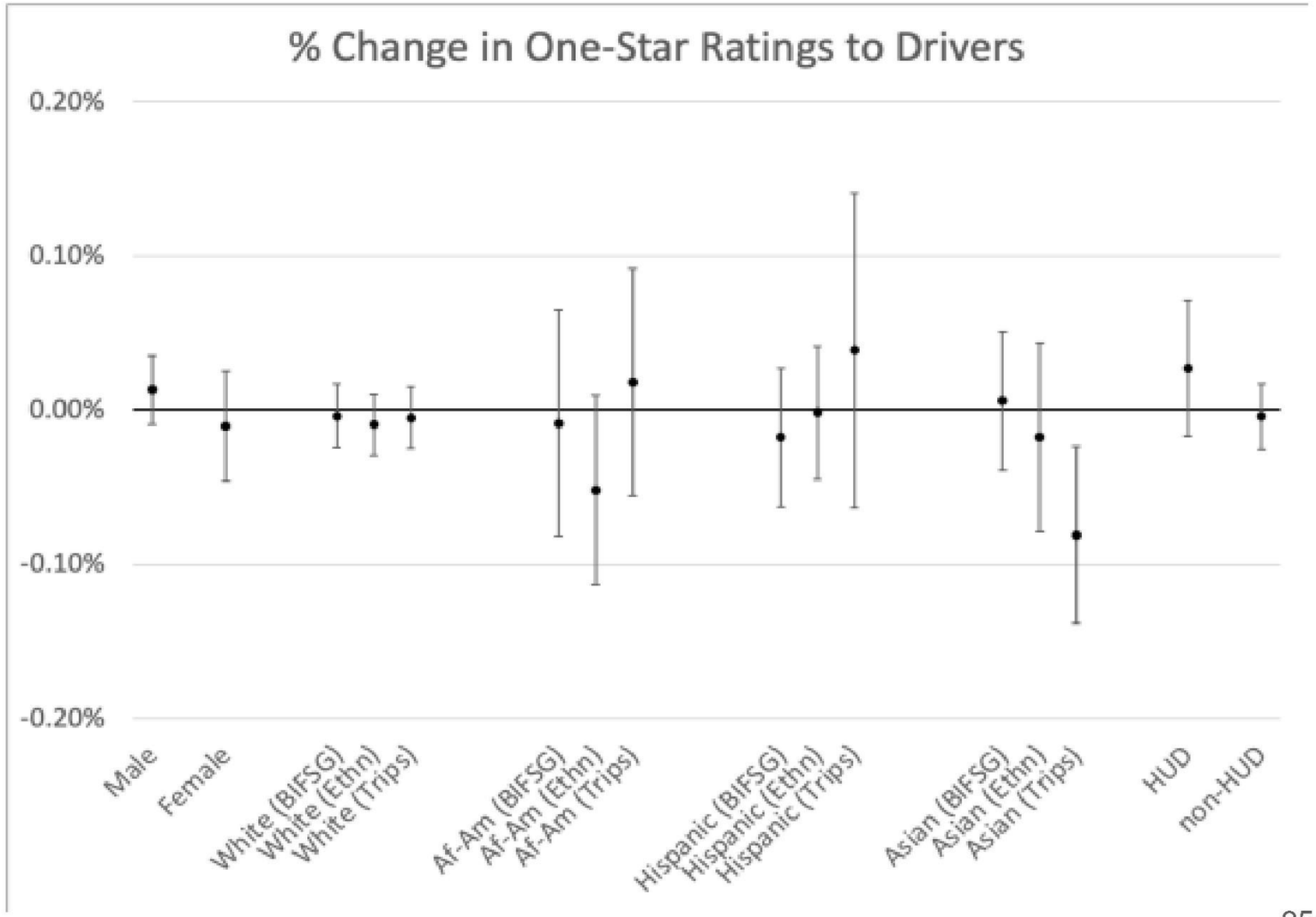
CONFIDENTIAL

UBER_JCCP_MDL_003274519

No stat sig disparities in 1-star trips

Mar 1 - Mar 15, US Cities

One-Star Trips (to Drivers)



CONFIDENTIAL

Slide 251 Notes

Asian (trips)
Technically it's good — people inferred as Asian by this method experience a drop in one-star trips. I wouldn't read too much into it because if we do 20 or 30 comparisons like this, a few are bound to be stat sig by chance

S-RAD

Leadership Update

03.25.2022

Uber

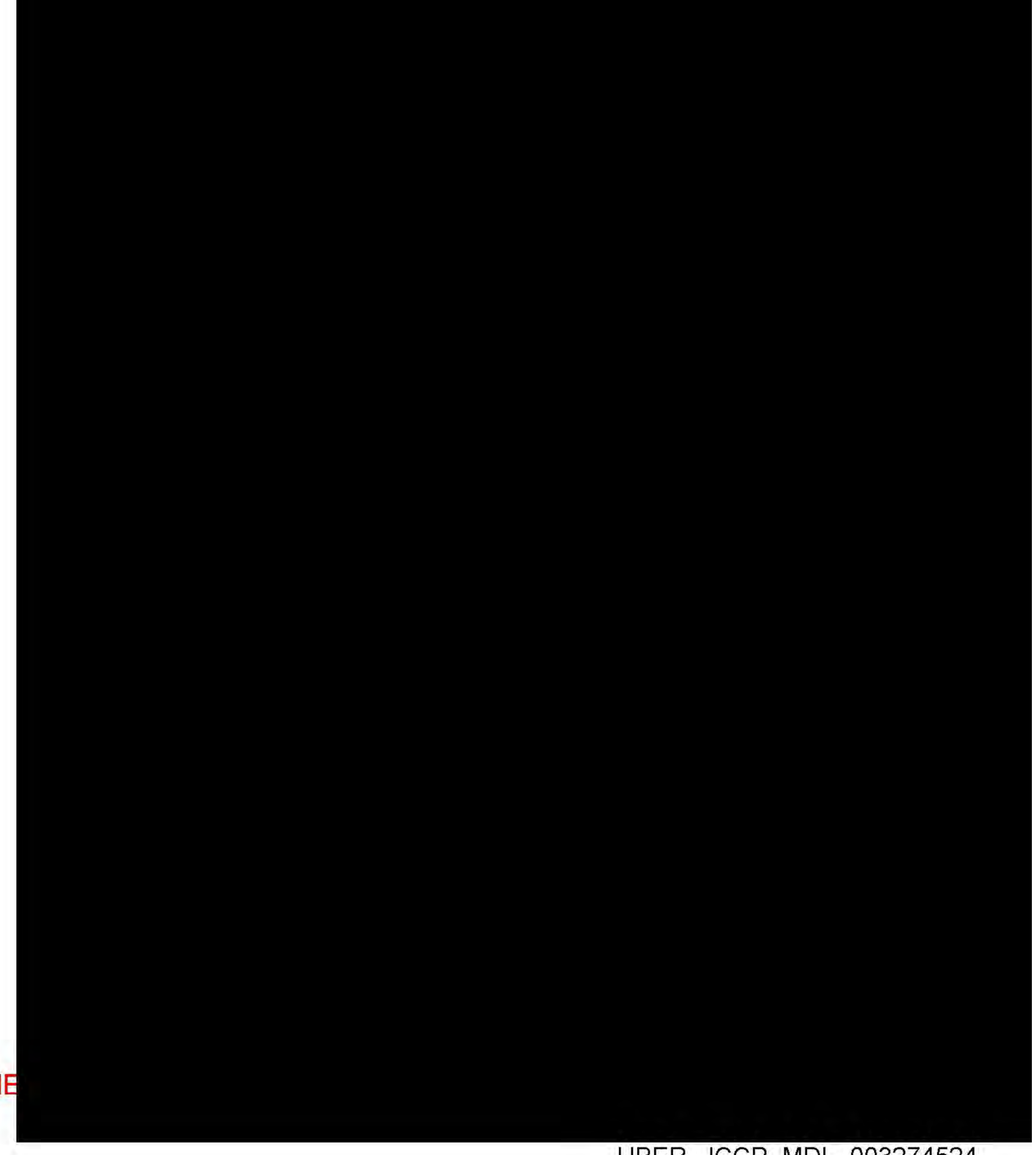
ATTORNEY-CLIENT PRIVILEGED

Summary

- **Soft filtering xp results** (3 min)
  - Safety Impact
  - MP impact
- **Holdout Strategy** (10 min)
  - Exploring 2 randomized holdout strategies
- **Policy & Comms Strategy** (10 min)
- **Next Steps / Roadmap** (2 min)

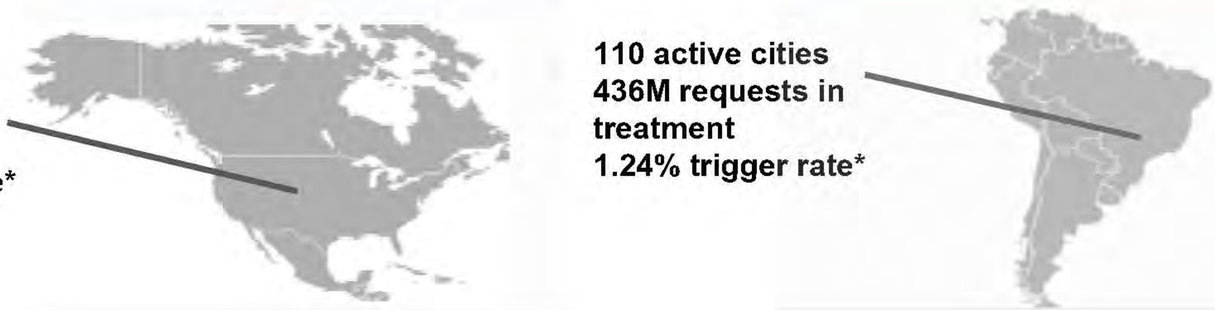
ATTORNEY-CLIENT PRIVILEGED

Soft-filtering XP results (3 min)



ATTORNEY-CLIE

We have run the xp for **158 days** out of 189 planned, seeing **~1.2 billion requests** in the experiment and with no remarkable changes in the baseline metrics.

	US	Brazil
	196 active cities 177M requests in treatment 1.20% trigger rate*	 110 active cities 436M requests in treatment 1.24% trigger rate*
Overall serious SASM recall (control)	15.0%	15.9%
% of treatment request with scores > threshold	0.40%	0.31%
Control SASM rate per 1M requests* (#)	39.7 (6935)	19.3 (8379)
Control serious SASM rate per 1M requests* (#)	6.34 (1107)	4.00 (1734)
Control IPC rate per 1M requests*	58.0 (10137)	31.3 (13558)
Control serious IPC rate per 1m requests(#)	8.25 (1442)	5.54 (2399)

Data as of: 3/15/2022
SOURCE: Ongoing SRAD Parallel Switchback XP Marketplace impact

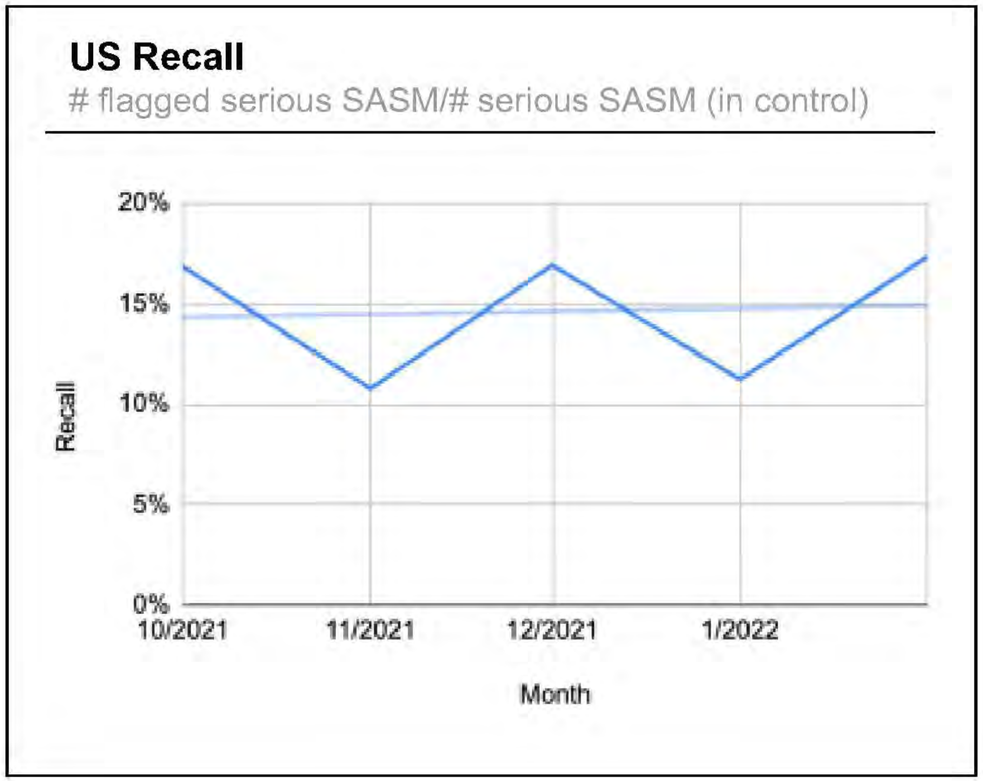
ATTORNEY-CLIENT PRIVILEGED

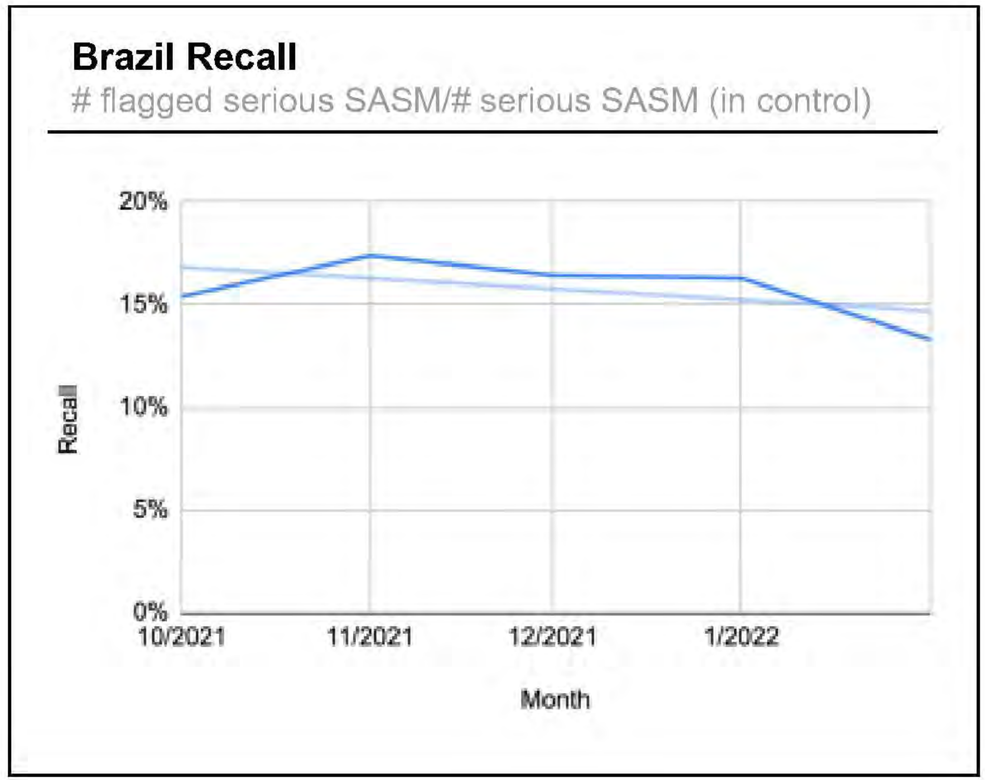
Slide 255 Notes

We have been following our TR adjustment strategy throughout the XP, which is +/- 15% target TR at the country-level and +/- 25% target TR for XL cities (for 3 days out of the previous 14)

Note: Brazil's trigger rate was slightly above the agreed threshold (1.24% vs 1.1%) due to Carnaval. In the US, the trigger rate was slightly below the agreed threshold (1.20% versus 1.25%).

Recall in US has been relatively stable, but degradation in BR presents the opportunity to boost performance with a model refresh





ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

SASM safety impact continues to look promising. From peak ~1 month ago, confidence intervals are a bit tighter & negative, meaning we are reducing IR rates with more certainty

US serious SASM IR reduction is outpacing model recall, particularly during the day

BR shows greater impact at night, likely due to differences in TR

Incident type	US Overall	US Day (6am - 11pm)	US Night (11pm - 6am)	Brazil Overall	Brazil Day (6am - 11pm)	Brazil Night (11pm - 6am)
Overall SASM rate per 1M requests* (#)	-4.74% (-7.29%, -2.19%) 39.7 → 37.8	-3.99% (-7.01%, -0.96%) 33.8 → 32.2	-6.62% (-11.4%, -1.88%) 70.2 → 66.7	-5.67% (-7.98%, -3.36%) 19.3 → 18.2	-4.58% (-7.32%, -1.85%) 15.4 → 14.7	-7.96% (-12.3%, -3.61%) 58.6 → 52.4
☆ Primary XP metric Serious SASM rate per 1M requests* (#)	-15.5% (-21.3%, -9.66%) 6.34 → 5.38	-15.4% (-23.3%, -7.49%) 4.07 → 3.39	-15.6% (-24.2%, -6.92%) 18.1 → 15.7	-8.29% (-13.3%, -3.31%) 4.00 → 3.67	-7.65% (-14.0%, -1.32%) 2.73 → 2.54	-8.73% (-16.9%, -0.60%) 16.5 → 14.7
Trip Distribution	177M in T 177M in C	148M in T 148M in C	28.8M in T 28.9M in C	436M in T 435M in C	395M in T 395M in C	40.5M in T 40.1M in C

BR under performing during the night compared to offline model recall (~29%)

1 Data as of: 3/15/2022

SOURCE: Ongoing SRAD Parallel Switchback XP Marketplace impact

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 257 Notes

Serious SASM is S-RAD's designed target. In Brazil we note a little bit more impact at night than the day.

Compared to February's sneak peek, all confidence intervals for the metrics are now negative and the ranges are tighter, which give us signal that we have reliable info to say that we are reducing incident rates and with more certainty. In terms of impact for Serious SASM incident rate, the impact in the US is greater than in Brazil.

Despite regional differences, the team will dig further into what can be behind the difference.

The S-RAD model is tuned for SASM but we are also seeing improvements in IPC and serious IPC incident rates

Incident type	US			Brazil		
	Overall	Day (6am - 11pm)	Night (11pm - 6am)	Overall	Day (6am - 11pm)	Night (11pm - 6am)
Overall IPC rate per 1M requests* (#)	-5.34% (-7.43%, -3.24%) 58.0 → 54.8	-4.31% (-6.84%, -1.77%) 47.8 → 45.3	-7.60% (-11.3%, -3.87%) 111 → 104	-4.85% (-6.68%, -3.02%) 31.3 → 29.7	-2.83% (-4.99%, -0.66%) 25.1 → 24.5	-9.95% (-13.4%, -6.52%) 92.0 → 80.6
Serious IPC rate per 1M requests* (#)	-13.8% (-19.0%, -8.64%) 8.25 → 7.14	-14.4% (-21.3%, -7.43%) 5.39 → 4.56	-13.1% (-20.9%, -5.29%) 23.1 → 20.5	-7.86% (-12.1%, -3.62%) 5.54 → 5.09	-7.09% (-12.4%, -1.78%) 3.88 → 3.64	-8.69% (-15.8%, -1.57%) 21.8 → 19.3
Trip Distribution	177M in T 177M in C	148M in T 148M in C	28.8M in T 28.9M in C	436M in T 435M in C	395M in T 395M in C	40.5M in T 40.1M in C

Higher confidence in estimates compared to overall SASM

Consistently weaker performance compared to serious SASM

1 Data as of: 3/15/2022

SOURCE: Ongoing SRAD Parallel Switchback XP Marketplace impact

ATTORNEY-CLIENT PRIVILEGED

Slide 258 Notes

Q: If we see more safety IPC impact is it because: (1) we see IPC incidents more often (than SASM) or (2) is signal not as strong because we didn't design S-RAD for IPC.
A: Model is tuned for SASM but we are seeing improvements in risk overall: broader IPC and broader SASM. Model was not trained for IPC but we will pick it up because it is high risk. Confidence is relatively the same for IPC and SASM incident rates. The effect is not as pronounced in IPC but in a later iteration of the model, it is something we could do.

US marketplace impact shows small impact on C/R and ETA, primarily driven by XL cities during the day

US marketplace impact snapshot

Dates observed: 2/7/22 - 3/6/22

US (196 cities) Metric	All Day		Day Time		Night time	
	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg_post_dispatch_eta	**1.9**	431.1	**1.5**	425.0	**3.7**	464.1
p95_post_dispatch_eta	**3.4**	1108.4	**2.6**	1090.1	**5.3**	1154.6
p99_post_dispatch_eta	**2.9**	1310.4	**2.1**	1304.5	**4.8**	1325.3
request_to_begin_sec_avg	**1.3**	558.4	**1.0**	552.7	**3.1**	589.4
completed/requests	**-0.05%**	87.87%	**-0.05%**	88.81%	-	82.83%
unfulfilled/requests	-	0.65%	-	0.55%	-	1.20%
rider_cancellation_perc	**0.06%**	9.63%	**0.06%**	9.06%	**0.09%**	12.71%
driver_cancellation_perc	-	7.97%	-	7.27%	-	11.75%

"-" means Not Stat-sig
"Level Effect" means Absolute Difference

Observations

- **Overall and day time C/R have decreased slightly by 0.05%**
  - 27 cities in US are XL, representing ~75% of total trips during this time
  - No stat sig differences in requests or number of completed trips
- **ETAs have been in line with expectations**
  - First time stat sig impact for day time average ETA
  - Baseline day time average ETA up over 25% from beginning of year

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

US parallel safety XP XL/L cities

Trip Distribution	XL Cities		L Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	23.0M	4.16M	5.01M	1.00M
Treatment	23.0M	4.12M	5.01M	1.00M

US (196 cities)	***XL Cities (27 cities)***						***L Cities (52 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	**2.0**	369.2	**1.6**	362.5	**3.8**	406.8	-	655.9	-	652.7	**3.0**	671.8
p95_post_dispatch_eta	**3.5**	949.9	**2.8**	885.8	**4.6**	1102.1	**3.7**	1260.6	**2.1**	1226.2	**7.3**	1342.5
p99_post_dispatch_eta	**3.5**	1230.7	**3.1**	1166.3	-	1385.4	-	1511.3	-	1485.6	**6.3**	1572.6
request_to_begin_sec_avg	**1.3**	496.4	**1.0**	490.2	**3.1**	531.0	-	787.6	-	785.3	-	799.3
completed/requests	**-0.05%**	90.01%	**-0.05%**	90.78%	-	85.68%	-	81.26%	-	82.57%	-	74.65%
unfulfilled/requests	**-0.01%**	0.19%	-	0.15%	-	0.44%	-	1.80%	-	1.56%	-	3.08%
rider_cancellation_perc	**0.06%**	8.01%	**0.05%**	7.51%	**0.09%**	10.82%	**0.08%**	14.89%	-	14.16%	-	18.53%
driver_cancellation_perc	-	7.46%	-	6.78%	-	11.28%	-	10.44%	-	9.66%	-	14.45%

- : Not Stat-sig; Level Effect: Absolute Difference

US parallel safety XP M/S cities

Trip Distribution	M Cities		S Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	1.29M	316k	618k	151k
Treatment	1.29M	316k	617k	149k

US (196 cities)	***M Cities (52 cities)***						***S Cities (65 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	**2.7**	598.9	**2.2**	611.4	**4.7**	547.2	-	532.3	-	541.2	**4.5**	494.5
p95_post_dispatch_eta	**3.1**	1157.3	-	1154.5	-	1163.9	**3.2**	1006.0	-	1012.4	-	987.7
p99_post_dispatch_eta	**5.2**	1357.2	**4.6**	1379.5	**7.3**	1302.8	-	1132.4	-	1153.2	-	1073.2
request_to_begin_sec_avg	-	709.3	-	719.1	**4.0**	668.2	-	663.0	-	669.3	**5.0**	636.3
completed/requests	-	79.49%	-	80.66%	-	74.64%	-	81.76%	-	83.01%	-	76.35%
unfulfilled/requests	-	3.04%	-	2.77%	-	4.21%	-	2.78%	-	2.64%	-	3.39%
rider_cancellation_perc	-	15.49%	-	15.02%	-	17.41%	**0.13%**	13.45%	-	12.82%	-	16.13%
driver_cancellation_perc	-	8.39%	-	7.74%	-	11.15%	-	6.48%	-	5.91%	-	8.96%

- : Not Stat-sig; Level Effect: Absolute Difference

BR shows some impact on C/R & rider cancel rate, with a couple of abnormal days due to Carnaval

Brazil marketplace impact snapshot

Dates observed: 2/7/22 - 3/6/22

BR (110 cities)	All Day		Day Time		Night time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg_post_dispatch_eta	**2.6**	266.3	**1.1**	260.9	**17.7**	315.8
p95_post_dispatch_eta	**10.0**	706.0	**3.2**	674.6	**30.4**	796.1
p99_post_dispatch_eta	**9.2**	912.6	**3.5**	888.7	**25.8**	980.4
request_to_begin_sec_avg	**2.3**	431.0	**1.1**	424.5	**14.2**	489.6
completed/requests	**-0.17%**	76.72%	**-0.09%**	78.60%	**-1.07%**	58.99%
unfulfilled/requests	**0.05%**	7.65%	**-**	6.67%	**0.30%**	17.03%
rider_cancellation_perc	**0.13%**	13.68%	**0.07%**	12.90%	**0.74%**	20.99%
driver_cancellation_perc	**0.06%**	24.68%	**-**	23.29%	**0.37%**	37.99%

"-" means Not Stat-sig
"Level Effect" means Absolute Difference

Observations

- **C/R greater impact compared to ~1 month ago**
  - Consistent stat sig impact across XL/L/M/S cities, biggest contribution from XL cities, which represent 71% of trips in treatment
  - No associated stat sig difference in number of completed trips
- **Rider cancels impacted, espec. at night**
  - Largest differences seen in XL/L cities at night
- **ETA impacts in line with expectations**
  - p95 and p99 are slightly higher during both day and night compared to last peak

CONFIDENTIAL

UBER_JCCP_MDL_003274535

P-01366.00343

BR parallel safety XP XL/L cities

Trip Distribution	XL Cities		L Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	53.8M	5.85M	17.1M	1.68M
Treatment	54.0M	5.90M	17.1M	1.69M

BR (110 cities)	***XL Cities (15 cities)***						***L Cities (30 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	**2.8**	252.7	**1.2**	247.6	**18.4**	298.3	**2.4**	297.0	**0.9**	290.0	**18.3**	366.8
p95_post_dispatch_eta	**17.7**	586.8	**3.6**	529.3	**53.1**	725.7	**16.2**	717.5	**4.0**	647.1	**45.6**	884.6
p99_post_dispatch_eta	**16.4**	819.1	**6.0**	746.3	**42.2**	990.9	**11.2**	975.3	**3.0**	918.8	**30.5**	1107.4
request_to_begin_sec_avg	**2.7**	423.2	**1.4**	416.5	**15.0**	481.8	**1.6**	449.3	**-**	442.5	**13.4**	515.9
completed/requests	**-0.18%**	79.48%	**-0.09%**	81.25%	**-1.17%**	63.37%	**-0.17%**	73.78%	**-0.09%**	76.03%	**-0.97%**	51.17%
unfulfilled/requests	**-**	5.69%	**-**	4.80%	**0.30%**	13.97%	**0.08%**	10.67%	**-**	9.36%	**0.35%**	24.16%
rider_cancellation_perc	**0.14%**	12.85%	**0.07%**	12.10%	**0.85%**	19.66%	**0.09%**	13.70%	**0.05%**	12.90%	**0.59%**	21.83%
driver_cancellation_perc	**0.07%**	24.76%	**-**	23.28%	**0.38%**	38.02%	**-**	23.12%	**-**	21.96%	**0.32%**	36.42%

- : Not Stat-sig; Level Effect: Absolute Difference 1 Data as of: 3/15/2022

BR parallel safety XP M/S cities

Trip Distribution	M Cities		S Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	4.15M	378k	480k	40.2k
Treatment	4.15M	380k	482k	40.2k

BR (110 cities)	***M Cities (30 cities)***						***S Cities (35 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	**1.8**	306.6	**0.9**	301.9	**11.3**	358.7	-	378.3	-	377.0	-	395.3
p95_post_dispatch_eta	**7.6**	723.4	**3.5**	698.2	**18.6**	791.0	-	752.9	-	769.8	-	663.1
p99_post_dispatch_eta	**9.4**	924.9	**4.0**	921.7	**23.3**	933.3	-	872.4	-	899.1	-	730.8
request_to_begin_sec_avg	**1.3**	447.5	-	443.5	**7.5**	493.1	-	526.0	-	524.7	-	549.8
completed/requests	**-0.11%**	56.35%	-	58.79%	**-0.43%**	29.58%	-	42.19%	-	43.98%	**0.71%**	19.96%
unfulfilled/requests	-	20.18%	-	19.08%	-	32.66%	-	13.93%	-	13.59%	-	18.31%
rider_cancellation_perc	**0.10%**	21.42%	**0.10%**	20.22%	-	35.07%	-	41.62%	-	40.29%	-	58.21%
driver_cancellation_perc	-	30.10%	-	29.01%	**0.55%**	46.69%	-	34.63%	-	33.86%	-	48.71%

- : Not Stat-sig; Level Effect: Absolute Difference 1 Data as of: 3/15/2022

Holdout Strategy (10 min)

[redacted]

ATTORNEY-CLIE

Goal: Rollout S-RAD fully with a holdout but we want to move away from Parallel Switchbacks to a simpler Randomized Holdout framework

From Parallel Switchbacks (today)…

- Susceptible to edge cases
- Lot of Eng maintenance
- Very manual, brittle framework tied to MX calendar
- Difficult to achieve balance
- Holdout removes possibility for future XPs
- If something goes wrong, we will impact the primary experiment (and might not know until much later)

…To Randomized Holdouts (future)

- Straightforward to implement and maintain
- Decoupled from the MX calendar
- Achieves balance
- Keeps open the possibility of running parallel XPs in the future

The **future holdout strategy** is anchored on maintaining the integrity of **3 fundamental aspects** of **S-RAD product**:

1. **Track model performance and monitor potential drift**
2. **Create unadulterated population need for model retraining**
3. **Be a clean mechanism for necessary ongoing trigger threshold refresh**

CONFIDENTIAL

Randomized Holdout Options

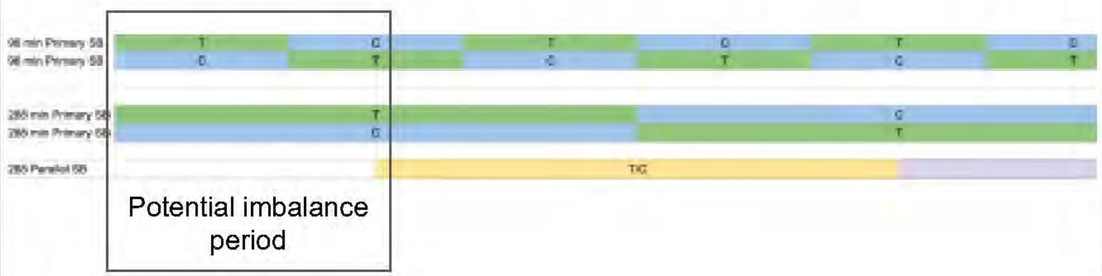
Primary XP Schedule Aware

Goal: Maintain complete balance between S-RAD and primary XP

Structure: Limit MX users to only schedule XPs to start at specific times and align S-RAD randomized units to MX calendar with prescribed offset

Potential issues:

- Impossible to align S-RAD intervals for both 96 and 288 min XPs for all 48 min blocks and have perfect balance
- Proposed 288 min S-RAD unit is long and S-RAD's impact on the market are highly heterogeneous throughout the day



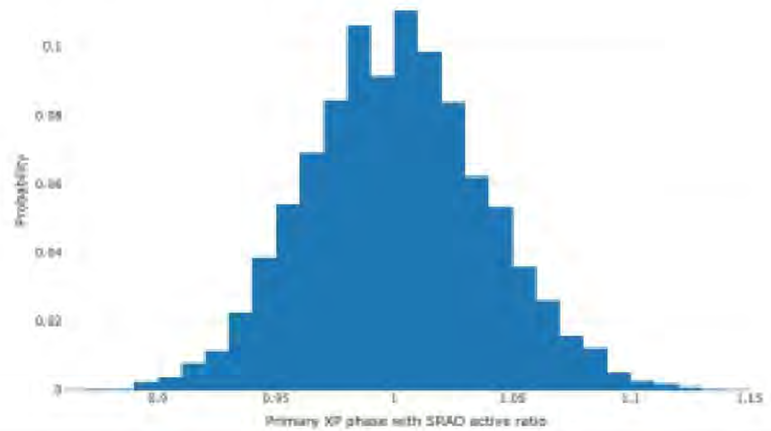
Primary XP Schedule Agnostic

Goal: Maintain balance between S-RAD and primary XP on average

Structure: S-RAD randomly assigns its state with a frequency completely independent of the MX calendar

Potential issues:

- Balance in primary XP not guaranteed
  - Example T/T:C/T ratio distribution for 96 min SB + 1hr S-RAD



Slide 267 Notes

Issues for Safety team:
More erroneous alerts (over triggering/ under triggering)
SRAD behaves differently during different times of day/week

Aligning on a finalized holdout design

Open questions	**Next steps**
What are the implications of the various holdout designs on S-RAD operation? • Alerting, maintaining thresholds, etc.	Currently investigating, but good line of sight to workable options to minimize shocks due to gaps in S-RAD coverage
What is the level of confidence necessary to assess the impacts of S-RAD holdout on standard marketplace XPs?	MX has drafted validation proposal, but need to finalize scale (both # cities impacted and length of downtime)
Can we assess both randomization plans?	May be limited by finalized MX assessment
Is the current parallel switchback framework an acceptable fallback?	Exploring scheduling improvements to see if possible to achieve target balance, but infra concerns remain

Open Questions

- How will we evaluate which option is better?
- Is there a world where we will not be able to have a holdout group?
- Align on the how we will validate whether holdout strategy does not systematically impact switchback xps
  - What will be the design of the test?
  - How big does the test need to be?
  - How many cities will be impacted?
- Determine which (or both) of the 2 randomization options we will test & how
- Have a fallback strategy in case either option does not work

CONFIDENTIAL

UBER_JCCP_MDL_003274543

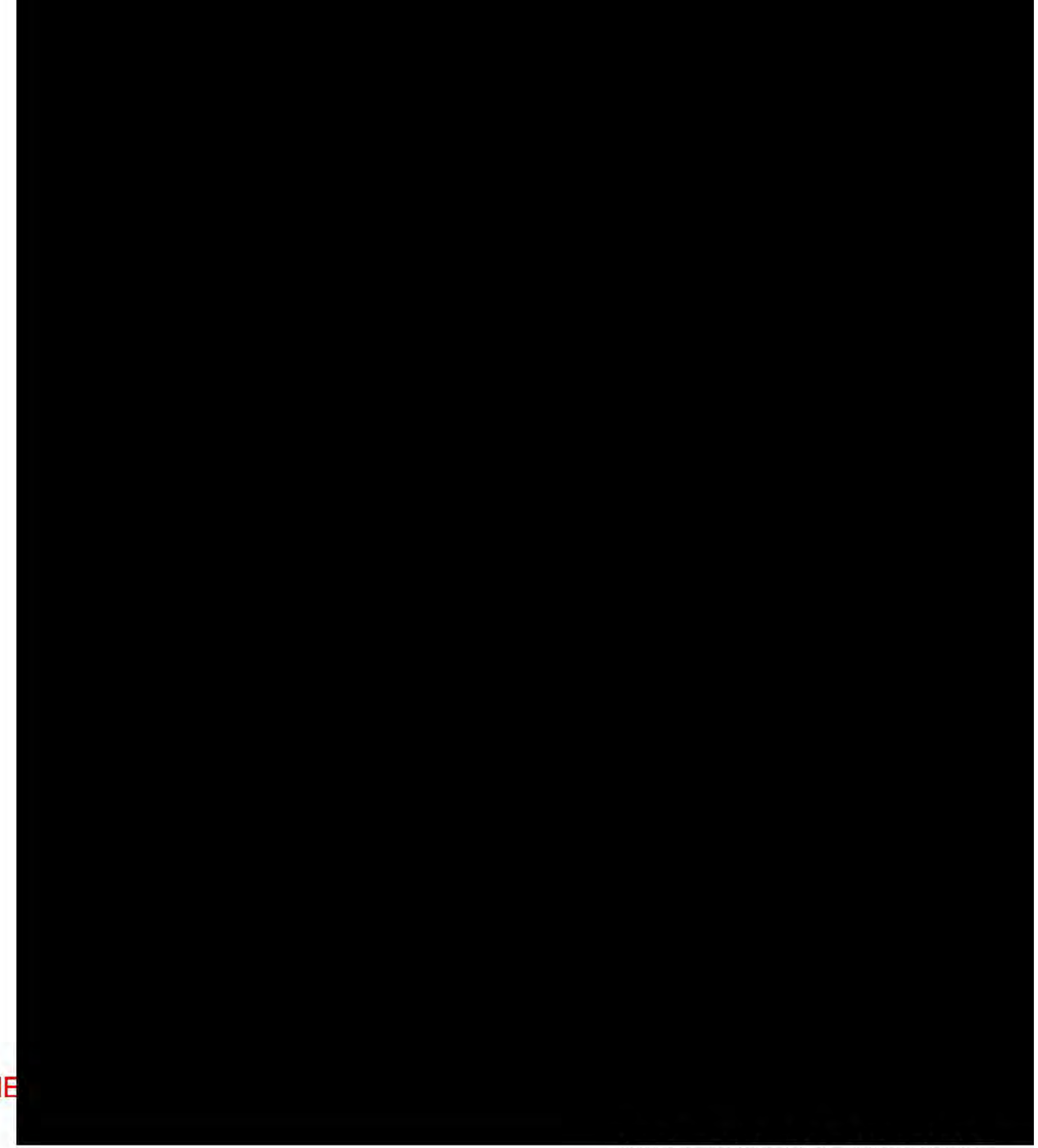
P-01366.00351

Next steps

- Determine partial rollout timeline and plan (by April 7th)
- Execute partial rollout (May), with ~1 month budgeted
- Understand results and make a decision on rollout strategy

CONFIDENTIAL

Policy & Comms Strategy (10 min)



ATTORNEY-CLIE

Where Things Stood (2020)

Internal Work

- XP work confirming minimal marketplace impact
- Hosted ORCAA
- Approved, designed and conducted fairness testing showing no evidence of disparities

External Work

- Met with safety groups, civil rights advocates, gender rights groups, privacy groups, and academics to educate about S-RAD and get feedback
- Participants came from 20 to 30 organizations, including ACLU Racial Justice Project

Takeaways

- No one said “Do not do this.” Some experts argued there was a moral imperative to move forward with this.
- Discomfort with using inferred gender in production without consent
- Acknowledgment of complexity.
- ACLU technologist: “You have a very hard problem to solve, and one in which **there's obviously no right answer**. There are so many axes on which one could comment, and **ultimately you all have to make the decisions.** Nonetheless, **thank you for talking with us**.”

Attorney Client Privileged

What We Did

Internal Work

- Removed gender in the US, not in Brazil
- Additional testing to measure safety
- Analysis to stress test demographic inferences
- Adopted internal policy around inferring demographics, securing data, and deleting it

External Work

- ORCAA audit of switchback methodology and fairness testing
- Joint research with Upturn and NYU Center on Race, Inequality, and the Law on best practices for ethnicity inferences and fairness testing
- Small changes to What Moves Us to note that dispatch can incorporate safety information
- Ethicist consultation on best way to run experiments once the algorithm rolls out

Attorney Client Privileged

CONFIDENTIAL

UBER_JCCP_MDL_003274547

Recommendations

We **do not recommend** major comms/marketing announcements

We **do recommend** briefing key regulators / stakeholders before launch

- The downside risk of the story getting defined by outsiders is too high
- As much as possible, we need to control the story when regulators / stakeholders first learn about it

We **do recommend** identifying an academic for a long-term project replicating safety and fairness results

- In the event of a leak, and in discussions with stakeholders, shows we believe in the work and have nothing to hide

Reactive Plan

- Policy/Comms FAQ
- Have ORCAA memo ready to share with journalists, advocates, regulators
- Point to extensive testing, outreach to advocates, and public-facing research on fairness testing. Point to ongoing testing and break-glass metrics.
- Point to ongoing academic partnership on safety and fairness data as good faith signal we have nothing to hide

Attorney Client Privileged

Slide 274 Notes

What we want to balance is the risk of going public in a way that sparks enormous costs (ridiculous CPUC data request; litigation; poorly-informed outrage) with the risk of staying *too* quiet and seeming secretive if publicity happens by a leak

2019/20 advocates

- (Upturn, NYU Law, NNEDV, RALIANCE)

UBER PATENTS REVEAL EXPERIMENTS WITH PREDICTIVE ALGORITHMS TO IDENTIFY RISKY DRIVERS

Surveilling drivers under the guise of safety is a common thread in Uber's patents. Experts warn the systems described could reinforce existing inequalities.



Belle Lin

October 30 2021, 5:00 a.m.

Where Things Stand

Minimum (must haves)*

- User's ability to correct their data and inferred data in the model
- Ability to opt-out of the use of gender in the model
- Gender will only be used for safety reasons, never for marketing
- Gender and ethnicity variables safely stored and accessible only to the right teams
- Inferred ethnicity will only be used for fairness testing
- The model is not discriminating against any particular group
- The model has a significant safety effect and the gender variable makes it meaningfully stronger

To be defensible

- Ongoing fairness testing (gender and ethnicity)
- Public explanation of how inferences are being used
- Understand and incorporate the concerns of the trans community
- Messaging on Privacy Policy site, What Moves Us and Download Your Data
- Give users the ability to self-declare their gender, and only infer if they decline to do so

For advocate support

- Download Your Data tool available in-app
- Interface to correct data real-time (not email)
- Users opting in by providing their own gender and ethnicity
- External and independent audit of safety and fairness testing results

* Green = We've taken steps to address this

* Yellow = work left to do

Attorney Client Privileged

Slide 276 Notes

- 1) Took gender out
- 2) Continued internal data science on safety / fairness testing
- 3) Hired ORCAA to do an audit
- 4) External research on inference best practices

What We Did

Internal Work

- Removed gender in the US, not in Brazil
- Additional testing to measure safety
- Analysis to stress test demographic inferences
- Adopted internal policy around inferring demographics, securing data, and deleting it

External Work

- ORCAA audit of switchback methodology and fairness testing
- Joint research with Upturn and NYU Center on Race, Inequality, and the Law on best practices for ethnicity inferences and fairness testing
- Small changes to What Moves Us to note that dispatch can incorporate safety information
- Ethicist consultation on best way to run experiments once the algorithm rolls out



ıt Privileged

CONFIDENTIAL

UBER_JCCP_MDL_003274553

P-01366.00361

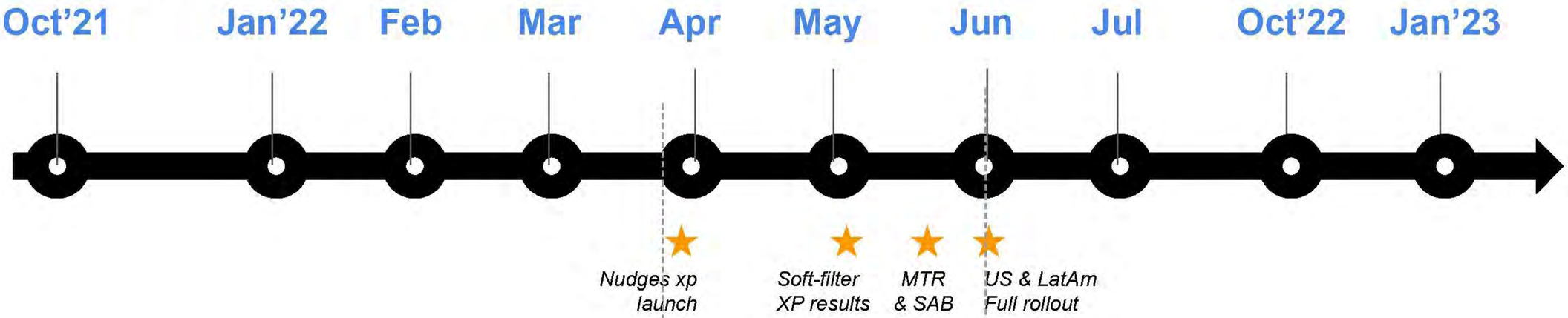
Next Steps/Roadmap

[redacted]

ATTORNEY-CLIE

2022 Roadmap

Tentative | Not started | Ongoing | Completed



Uber

ATTORNEY-CLIENT PRIVILEGED

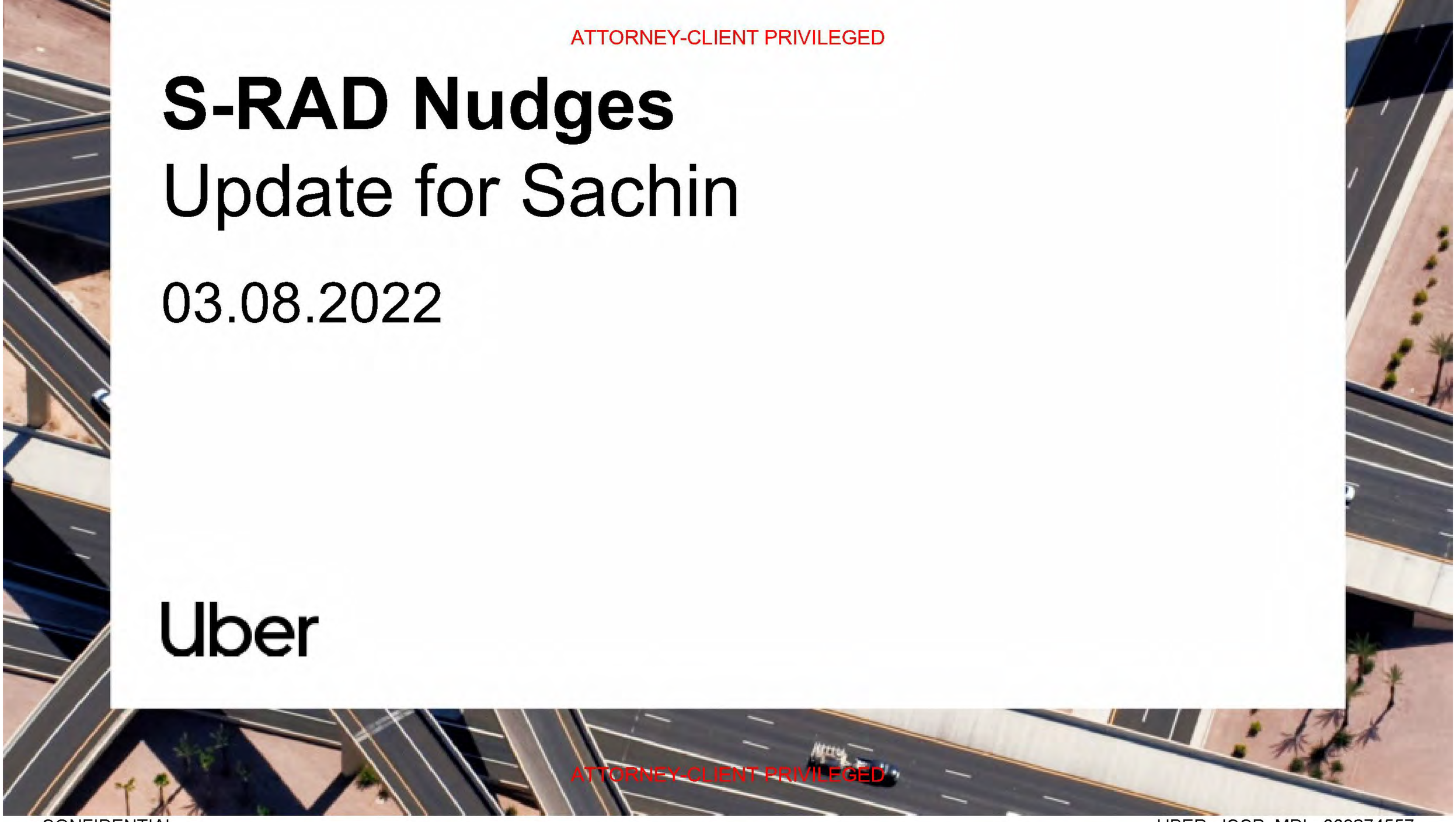
Slide 279 Notes

https://docs.google.com/presentation/d/19Sf917H6hwFixdWdOIpY_-GuKpjKeI3lI0XiNc_SQks/edit#slide=id.gdd02d22cfd_0_2

S-RAD Nudges

Update for Sachin

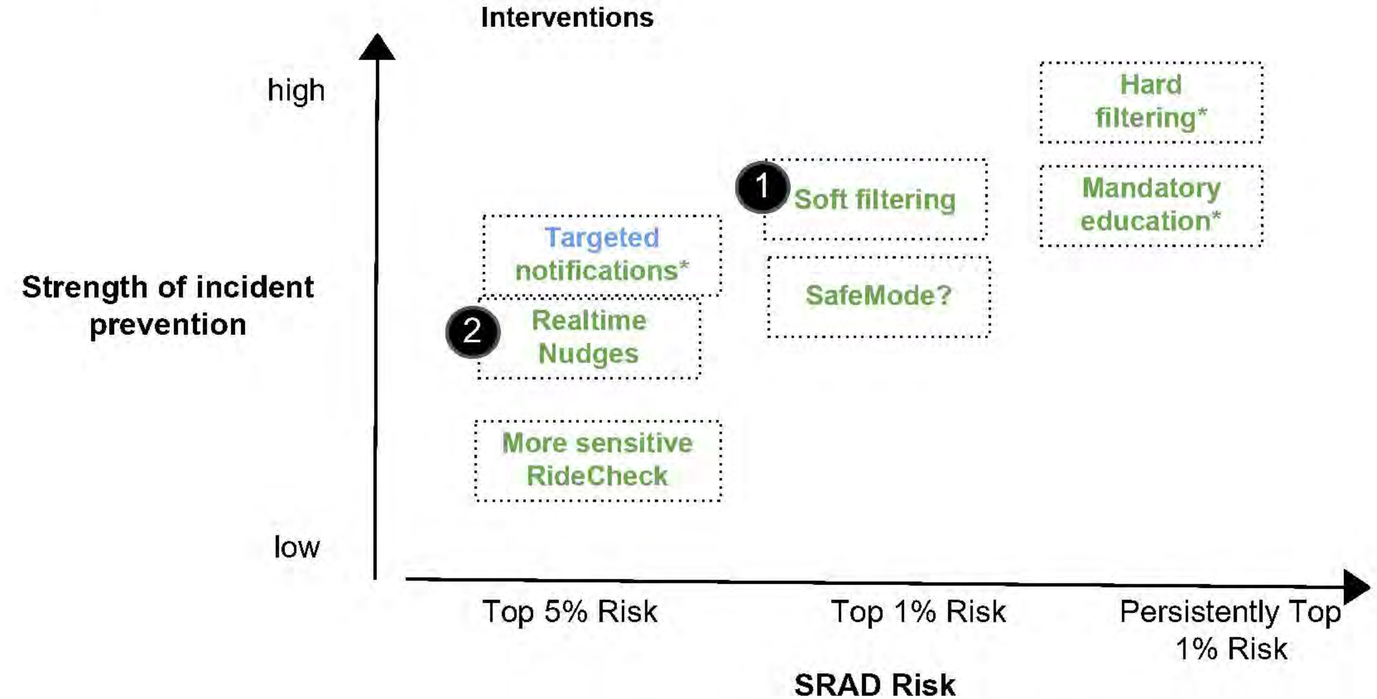
03.08.2022



Uber

Our long term strategy is to leverage SRAD scores to explore multiple IPC prevention interventions

1. We are currently conducting experiments in US/Brazil for Soft-filtering intervention
2. The following slides focus on “Nudges” that will be sent in realtime to riders & drivers at trip start



ATTORNEY-CLIENT PRIVILEGED

*Ideas described in the notes below

Slide 281 Notes

Targeted notifications - would send targeted messages to users who have past incident reports against them and are flagged by SRAD
More sensitive ridecheck - would reach out to riders and drivers earlier if SRAD score is high
Targeted notifications - would be sent to users who are on high score trips, but also have a history of reported against incidents
SafeMode might be triggered when S-RAD score is high (not yet decided since positioning might be an issue)
Hard filtering - If a user is persistently flagged, we may hard filter high score plans for such a user
Mandatory education - If persistently flagged users have a pattern of safety incident reports, we could require mandatory education in between sessions

Nudges allows us to intervene even if soft-filter doesn't affect matching

Initially we wanted to target trips that escaped soft-filtering

- 5-7% of SASM incidents occur on 0.4% trips that bypass soft-filtering*

However, we have evolved to target a higher % of trips

- **25% of SASM incidents occur on 5% trips** with high SRAD scores**
- We will increase the reach of S-RAD from 1% soft-filter to 5% elevated scores

We leveraged these three behavioral principles as we crafted messages

Priming	Emphasize idea of being watched.
Behavioral prescription	Provide clear set of guidelines.
Reciprocity Bias	Reinforce positive actions.

* Data from US/BR Safety XPs
** SASM recall in Mexico shadow mode data

ATTORNEY-CLIENT PRIVILEGED

Slide 282 Notes

The what.

- **Priming:** Emphasize the idea of being watched to prime good behaviour and greater sense of risk in being caught
- **Behavioral Prescription:** Provide clear set of guidelines for desired behaviour
- **Reciprocity Bias:** Respond to a positive action with another positive action

Near final Copy

Nudges will rotate through a set of messages to riders & drivers on flagged trips



Audio Recording	Follow My Ride	RideCheck	5-Star Rating	Safety tip on Respect
If Audio recording is already setup, riders/earners can start the recording with 2 taps.	Earner is displayed the contact previously selected in the Settings to share trip with.	Riders/Earners can learn more about RideCheck triggers on the landing page	Motivate good behavior by tying it to ratings	Reinforcing specific positive actions to encourage a sense of social norm when using the app.

ATTORNEY-CLIENT PRIVILEGED

User flow details for setting up vs turning on various tools are in the backup (here)

Slide 283 Notes

The How?

Priming - what is priming and what are we seeking to achieve with priming messages?

Priming

Presenting someone with a communication that prepares them to be more receptive to a particular point of view or take a specific action.

Tactic

Emphasize idea of being watched to prime good behavior. Given salience to greater sense of risk in being caught.

What messages are we using here?

Explain Audio recording

Explain Follow my Ride

Explain Ride Check

1. Behavioral prescription - what is that and what are we trying to achieve with those types of messages?

Behavioral Prescription

Articulation of recommended action(s) to be taken by specific people under appropriate circumstances.

Tactic

Provide clear set of guidelines for desired behavior, making it clear what is and isn't acceptable.

What messages are we using here>
5-Star Rating

Explain 5-star rating - checklists work (evidence?)

2. Reciprocity

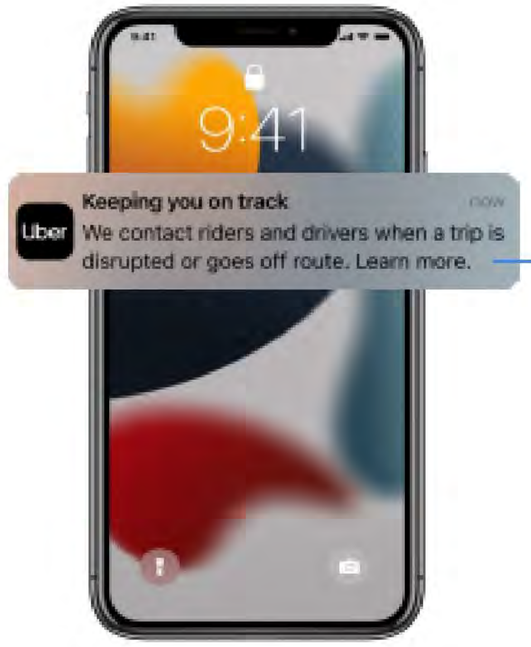
Once they know that they are being watched and what is good behavior/good actions, let's push the user to feel that their positive action can lead to a great good/collective of positive actions.

Reciprocity
People feel an obligation to do something for someone who's done something for them.

Tactic
Respond to a positive action with another positive action. Create social norms and give salience to correct behaviors.

Screenshot thanks to simulating trip on: https://studio.uberinternal.com/simulator

RideCheck push notification to a new landing page





ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 284 Notes

https://www.figma.com/file/tqBxcb8IB8jwAJHMFiD5V2/Ride-Check-New-Landing-Page?node-id=54%3A5767

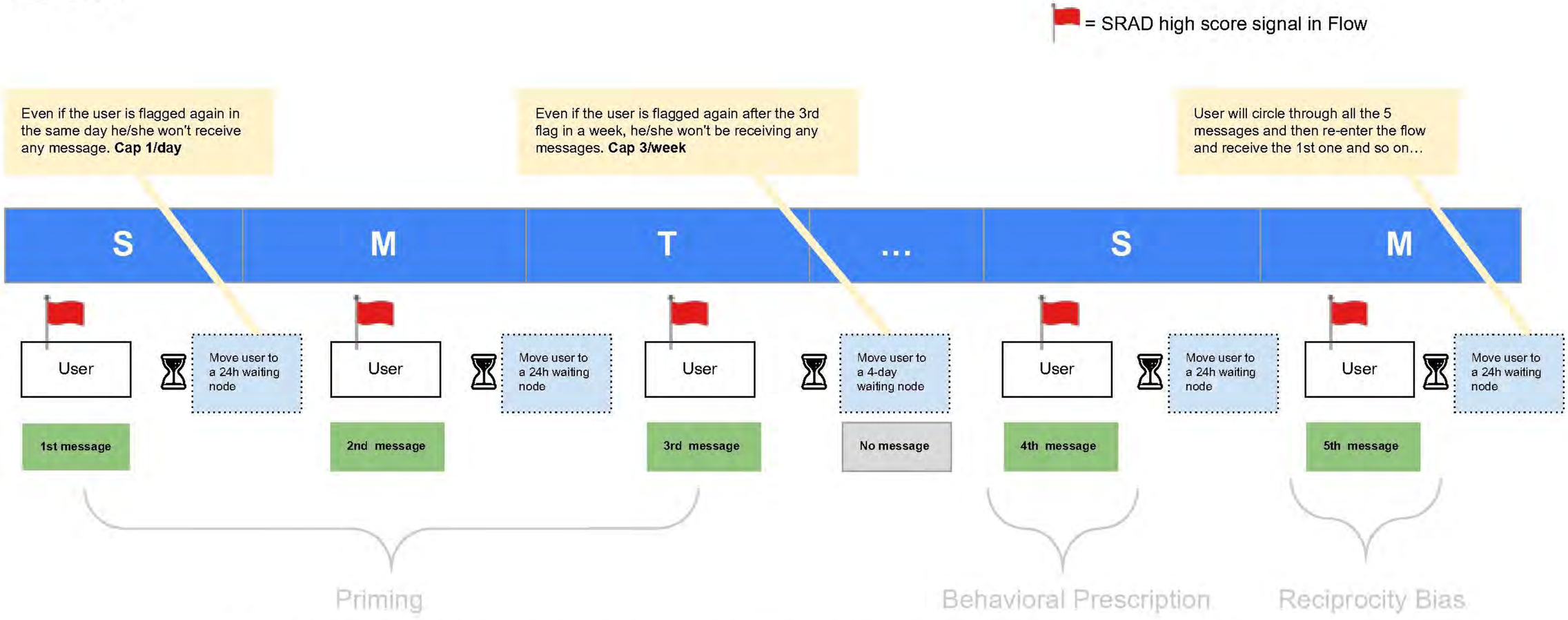
We will run a Driver A/B test in Mexico to evaluate the impact of Nudges.

- Several XP options considered. Selected Driver A/B.
  - Options: Driver A/B, Rider A/B, Trip A/B, City A/B, Rider-Driver A/B/C/D
  - Considerations: Coverage, spillover effects, messaging sparsity, length of XP
- In Driver A/B XP, we'll send messages to both driver and rider on a high score trip. There will be some spillover effects on riders.
- We expect ~6 months to measure 5% effect on IPC rate.
  - The intervention may not be powerful enough to measure the effect size.

* XP plan, Power Analysis

ATTORNEY-CLIENT PRIVILEGED

Nudges per user are capped to once per day, thrice per week



Both rider & driver receive push notifications and share the same cap.

ATTORNEY-CLIENT PRIVILEGED

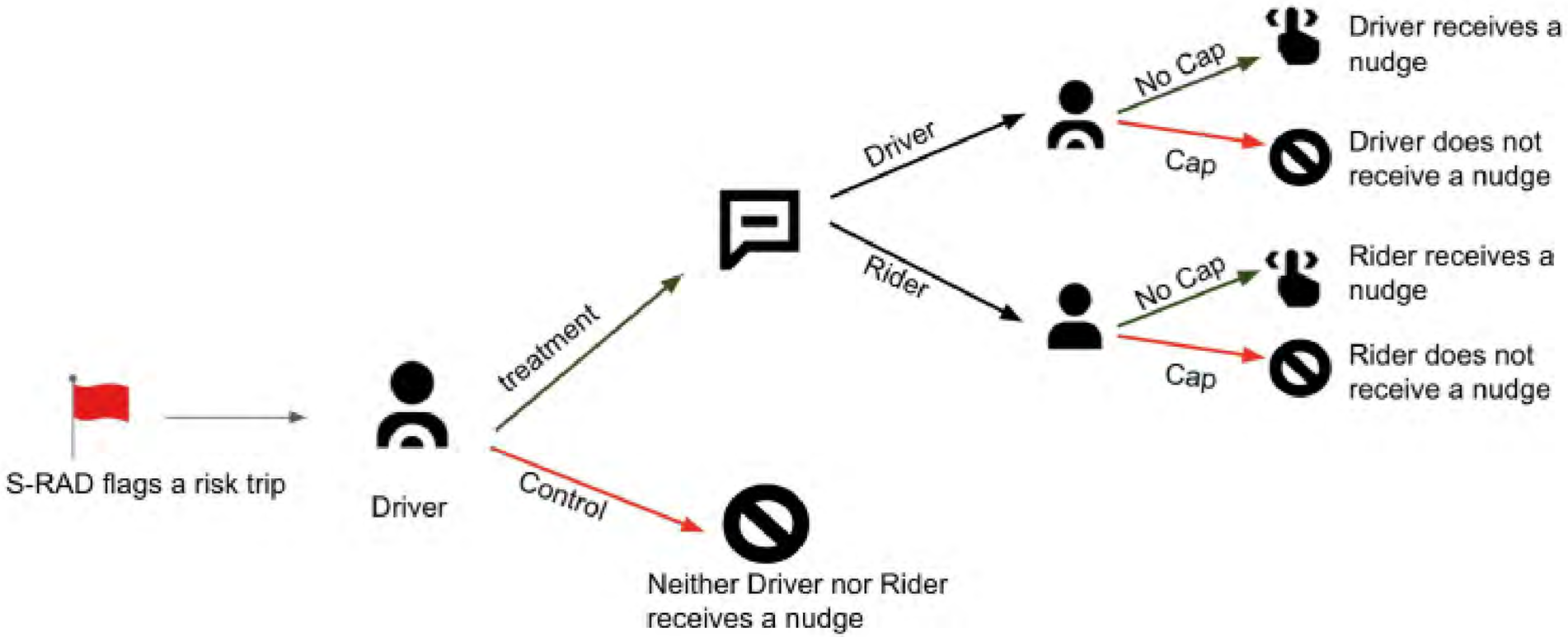
Slide 286 Notes

The when and why?

Cap is recommended based on analysis that on average ~6% of drivers in Mexico are flagged daily, using 1.1% trigger rate.

3/week: business rationale…Manage fatigue by applying a frequency cap on messages sent to the same user to once per day and 3 times per week.
4-day waiting period helps….Weekend ?

Driver & Rider messages are capped independently



Slide 287 Notes

DELETED CURRENT XP DESIGN:
Driver A/B -
dependent caps
Medium
Medium spill over on rider side -> XP contamination
High
Would have sent nudges to 29% of risky riders (~4% of total riders)
High
Riders will see nudges less frequently since they depend on drivers being in treatment.

Frequency Analysis shows we'll achieve good coverage of riders & earners in treatment

Assuming 5% trip trigger rate in MX, simulation projects user coverage and frequency cap view.

Daily Cap	Weekly Cap	Coverage**

Driver	
% of Flagged at least once	% of Flagged more than once
23.67%	10.18%

Driver	
% of Flagged at least 1 day	% of Flagged more than 3 days
50.34%	8.86%

Rider	
% of Flagged at least once	% of Flagged more than once
6.07%	0.69%

Rider	
% of Flagged at least 1 day	% of Flagged more than 3 days
9.07%	0.11%

% Covered | % Hit Cap

* User coverage based on MX shadow data between 1/14/2022 and 2/25/2022 (**43 days**).

72.8%

Of Drivers covered

15.0%

Of Riders covered

** Coverage is defined as the % share of riders or drivers who would have received at least 1 push notifications over the time period analyzed.

* Simulation based upon MX shadow data between 1/14/2022 to 2/25/2022 (analysis).

ATTORNEY-CLIENT PRIVILEGED

We'll measure impact on IPC rates, overall safety contact rate and push notifications opt-out.

Group	Metric	Description
Primary Metrics *(Safety)*	**IPC Rate**	**Interpersonal conflict incident rate, includes SA/SM**
	Serious IPC Rate	**Serious interpersonal conflict incident rate, includes Serious SA/SM**
	Driver ratings	Rider to driver ratings
Secondary Metrics *(Safety Feature Usage)*	Audio Recording	AR Impressions, CTR, Setup, Usage
	Follow My Ride CTR	Follow My Ride Impressions, CTR, Setup, Usage
	RideCheck CTR	RideCheck push notification impressions, CTR, Ride Check Opt-out
Guardrail metrics	Driver Supply Hour	Hours online (off trip + on trip)
	Driver cancellation rates	Cancellations after trip starts
	Driver completed trips	Completed rides trips
	Push notifications opt-out rate	**Driver opt out of push notifications**
	Safety Contact Rate	**Safety bliss tickets rate**
Funnel metrics *(only on treatment)*	Open sessions	Opening the app till closing
	Impressions	Any time the user saw the push notification
	Push notifications	Delivered, clicked, dismissed
	Push notifications deep links	Deep link click-thru-rate (CTR)

Slide 289 Notes

Source: https://docs.google.com/document/d/1ODAQwQrerjFuj5EC1945QLZ9YFjv0M2320nxXu-MmJk/edit

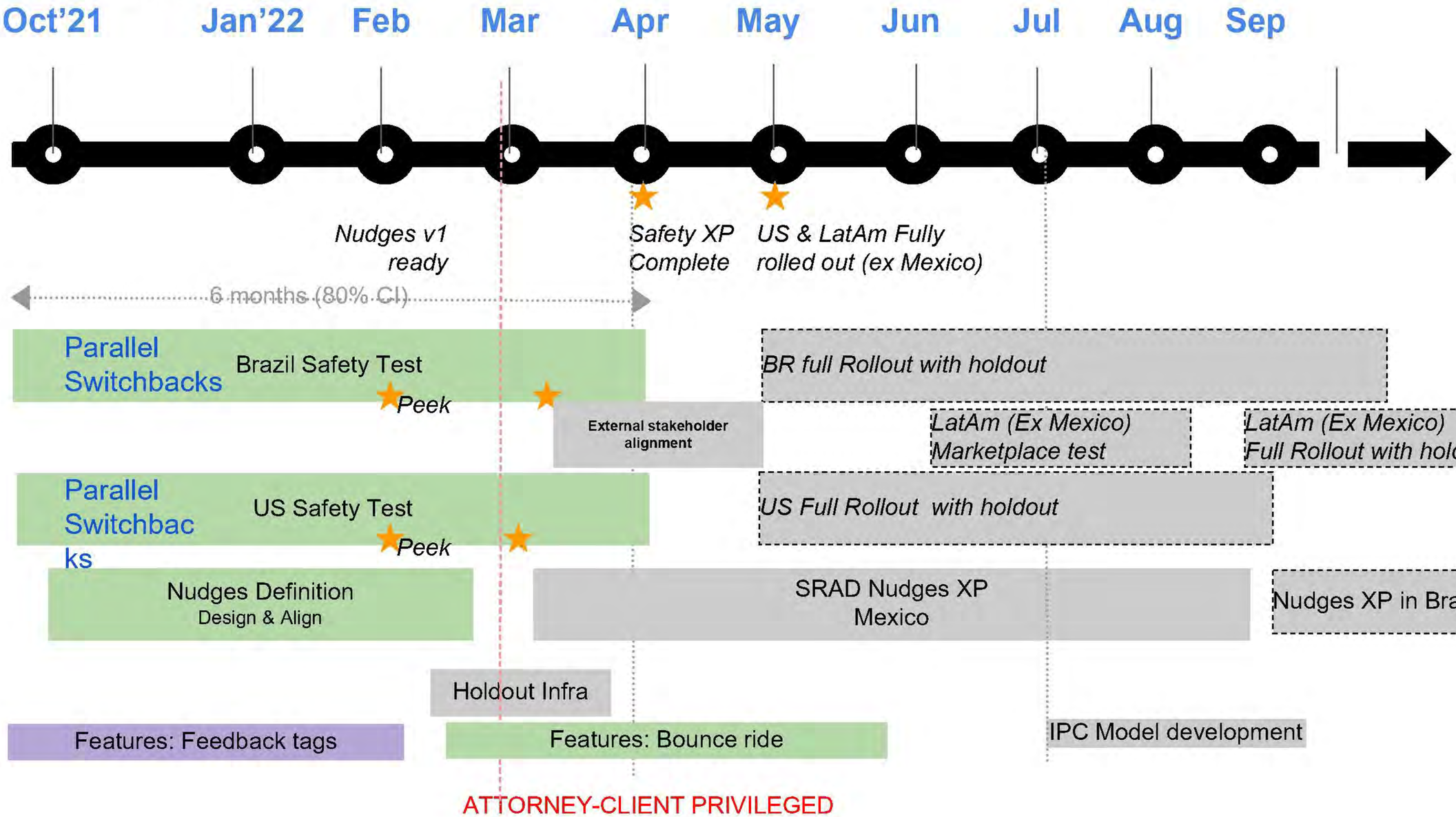
1. Validate safety impact
2. Measure awareness impact as well

We will monitor & provide updates of guardrail metrics on a bi-weekly basis.

A dashboard will be shared to see both safety and marketplace metrics.

2022 Roadmap

Tentative | Not started | Ongoing | Completed



Uber

ATTORNEY-CLIENT PRIVILEGED

Slide 290 Notes

Next steps:

PIA approval

Comms Plan

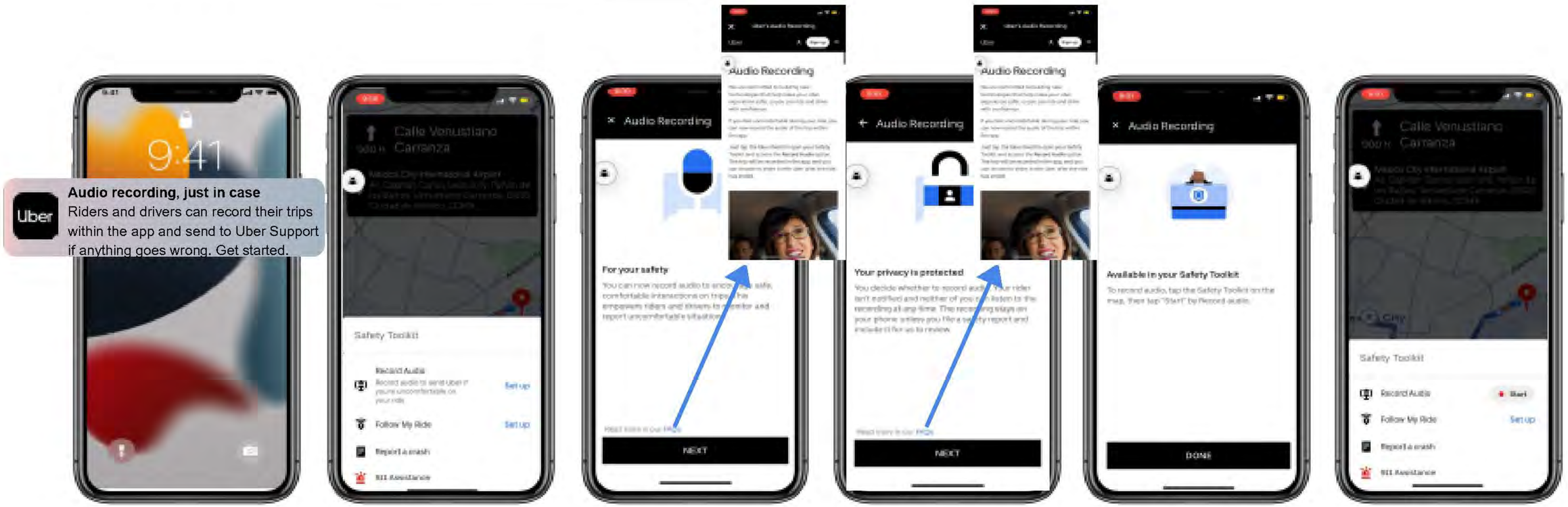
Finalize Ridecheck info page

https://docs.google.com/presentation/d/19Sf917H6hwFixdWdOIpY_-GuKpjKeI3lI0XiNc_SQks/edit#slide=id.gdd02d22cfd_0_2

Backup

S-RAD Nudge Driver Journey & Experience (iOS)

Setting up **Audio Recording**



Push notification	Safety toolkit menu	Setup page #1	Setup page #2	Setup page #3	Safety toolkit menu
Push notification is sent.	Earner sees menu of Safety tools and needs to set up Audio Recording to get started.	Earner views 1st setup page, with link to FAQs on Audio recording. The FAQ page leads to a landing page.	Earner advances to the next step in set up. FAQ link is also visible here.	Final page in setup informing the earner where to find the audio recording and how to start.	The journey ends with the Safety toolkit menu view with the Audio Recording tool now ready to Start.

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274578

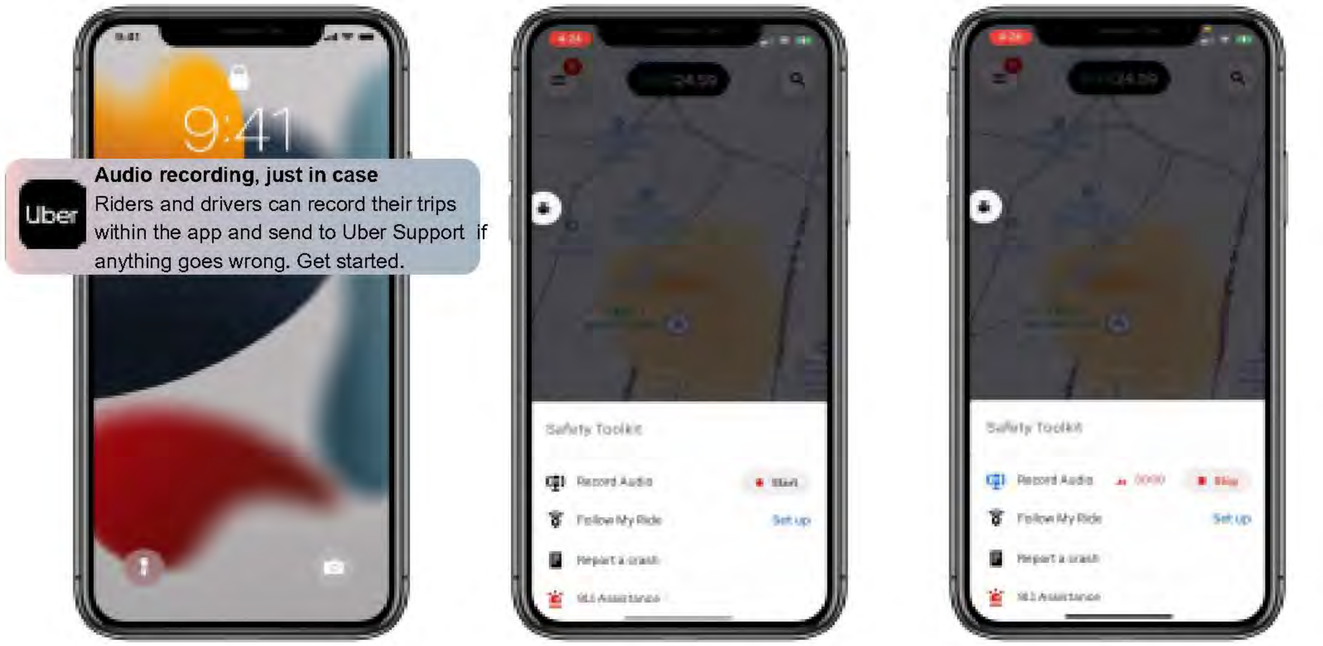
P-01366.00386

Slide 292 Notes

Driver deep link: uberdriver://safety_toolkit

S-RAD Nudge Driver Journey & Experience (iOS)

Audio Recording in action



Push notification	Safety toolkit menu	Start/Stop
Push notification is sent.	Audio recording is already setup and ready to use.	Earner can start/stop the recording with just 2 taps.

+ 24 hour waiting period*

*Cap is recommended based on analysis that on average ~6% of drivers in Mexico are flagged daily.

ATTORNEY-CLIENT PRIVILEGED

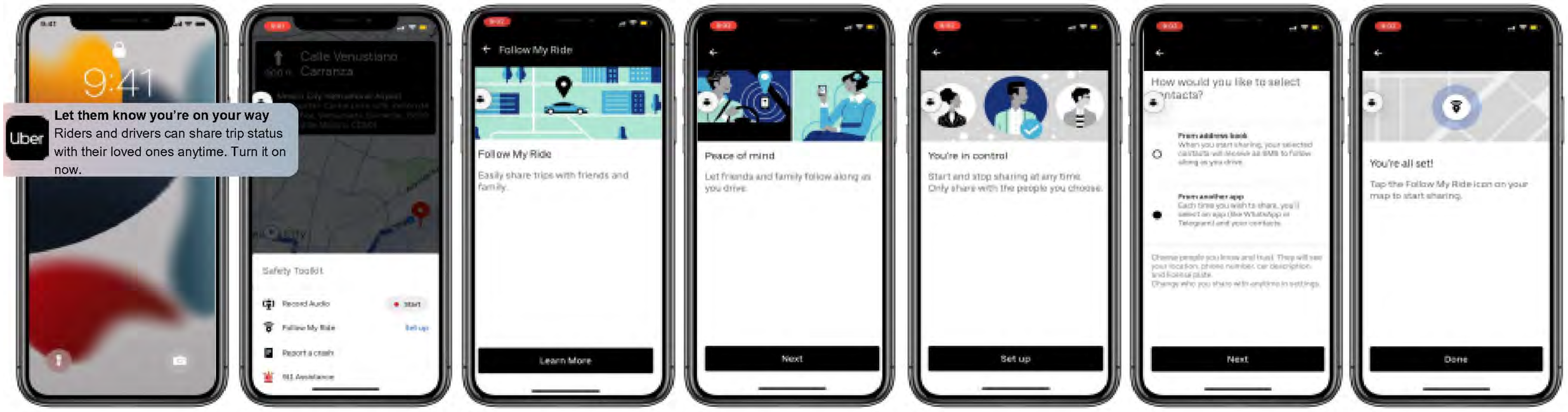
CONFIDENTIAL

Slide 293 Notes

Driver deep link: uberdriver://safety_toolkit

S-RAD Nudge Driver Journey & Experience (iOS)

Setting up **Follow My Trip**



Push notification	Safety toolkit menu	Setup page #1	Setup page #2	Setup page #3	Setup page #4	Setup page #5
Push notification is sent.	Earner sees menu of Safety tools and needs to set up Follow My Ride.	One-liner on what the tool does.	Empathetic message.	Empowering message.	Earner chooses to select contact from address book or from another map	Setup is complete.

ATTORNEY-CLIENT PRIVILEGED

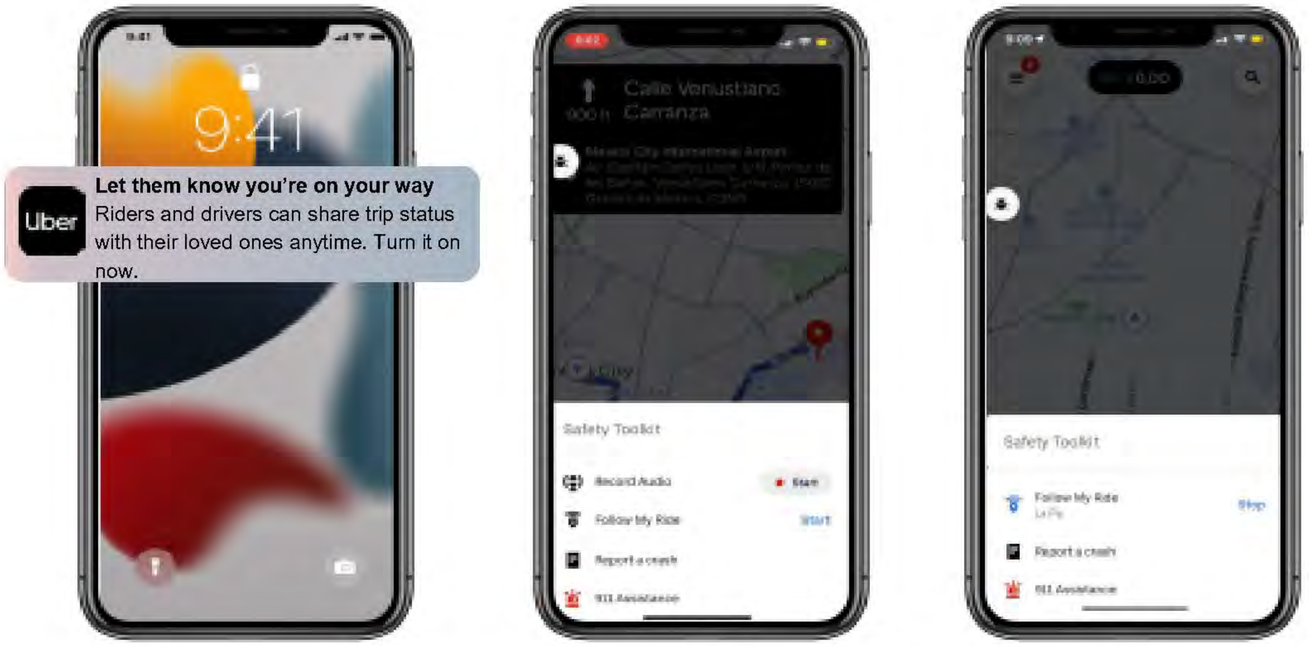
CONFIDENTIAL

Slide 294 Notes

Where does Learn More go to?

S-RAD Nudge Driver Journey & Experience (iOS)

Follow My Trip



Push notification	Safety toolkit menu	Clicks start
Push notification is sent.	Earner is returned to Safety toolkit menu and Follow My Ride option is now enabled.	Earner is displayed the contact previously selected in the Settings to share trip with.

+ 24 hour waiting period

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

S-RAD Nudge Driver Journey & Experience (iOS)

Follow My Trip in action

Option 1: Sharing contact from another app

Option 2: Sharing contact from address book



Push notification	Safety toolkit menu	Clicks start	WhatsApp option	SMS option	Account → Settings	Address book option
Push notification is sent.	Earner is returned to Safety toolkit menu and Follow My Ride option is now enabled.	Earner is displayed the most recent contacts and app of choice. Earner can scroll to select more recent options.	Earner chooses to share via WhatsApp.	Earner chooses to share via SMS.	In order to change the sharing options, the earner needs to go back to settings once Offline.	Earner scrolls and selects a contact from the address book

ATTORNEY-CLIENT PRIVILEGED

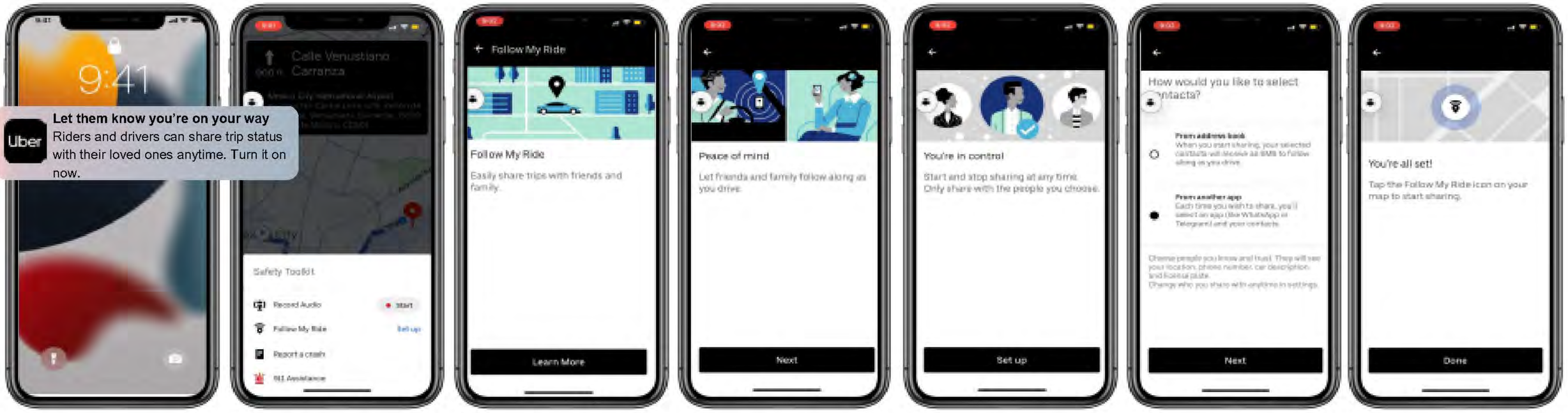
CONFIDENTIAL

UBER_JCCP_MDL_003274585

P-01366.00393

S-RAD Nudge Driver Journey & Experience (iOS)

Setting up **Follow My Trip**



Push notification	Safety toolkit menu	Setup page #1	Setup page #2	Setup page #3	Setup page #4	Setup page #5
Push notification is sent.	Earner sees menu of Safety tools and needs to set up Follow My Ride.	One-liner on what the tool does.	Empathetic message.	Empowering message.	Earner chooses to select contact from address book or from another map	Setup is complete.

ATTORNEY-CLIENT PRIVILEGED

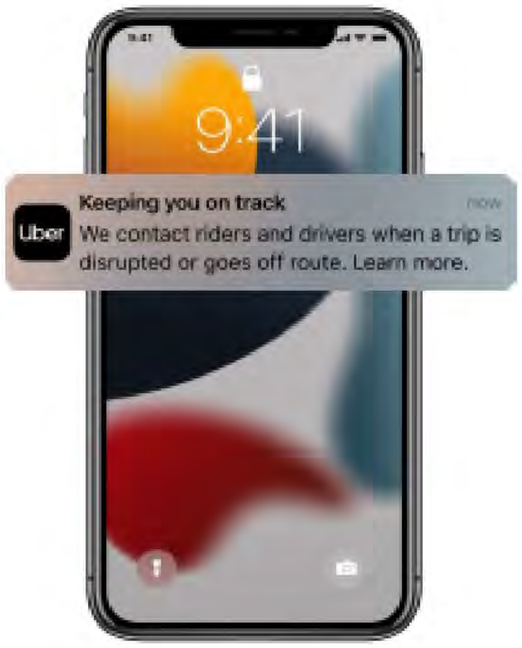
CONFIDENTIAL

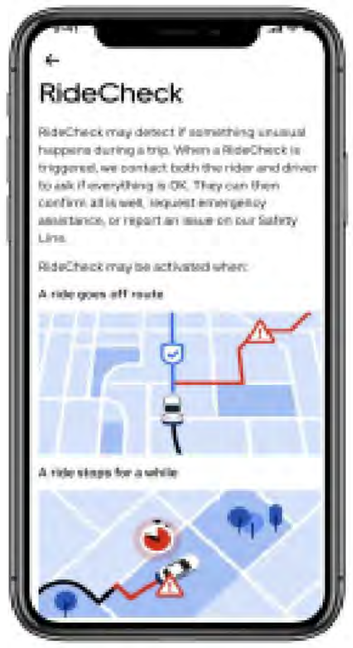
Slide 297 Notes

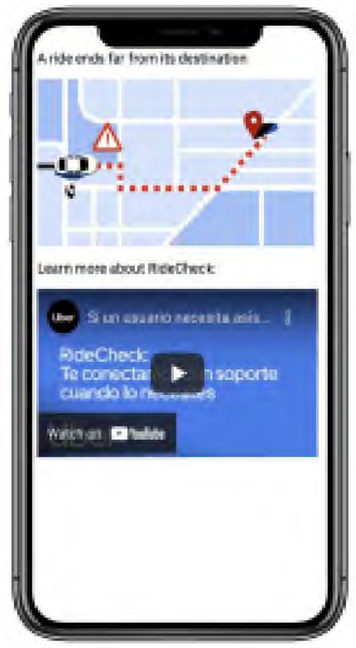
Where does Learn More go to?

S-RAD Nudge Driver Journey & Experience (iOS)

RideCheck push notification to new landing page







Push notification	New RideCheck settings page
Push notification is sent.	New landing page available to both Rider & Drivers explaining the functionality of RideCheck.

+ 4 day waiting period*

Capping messages at 3/week for both rider/driver.

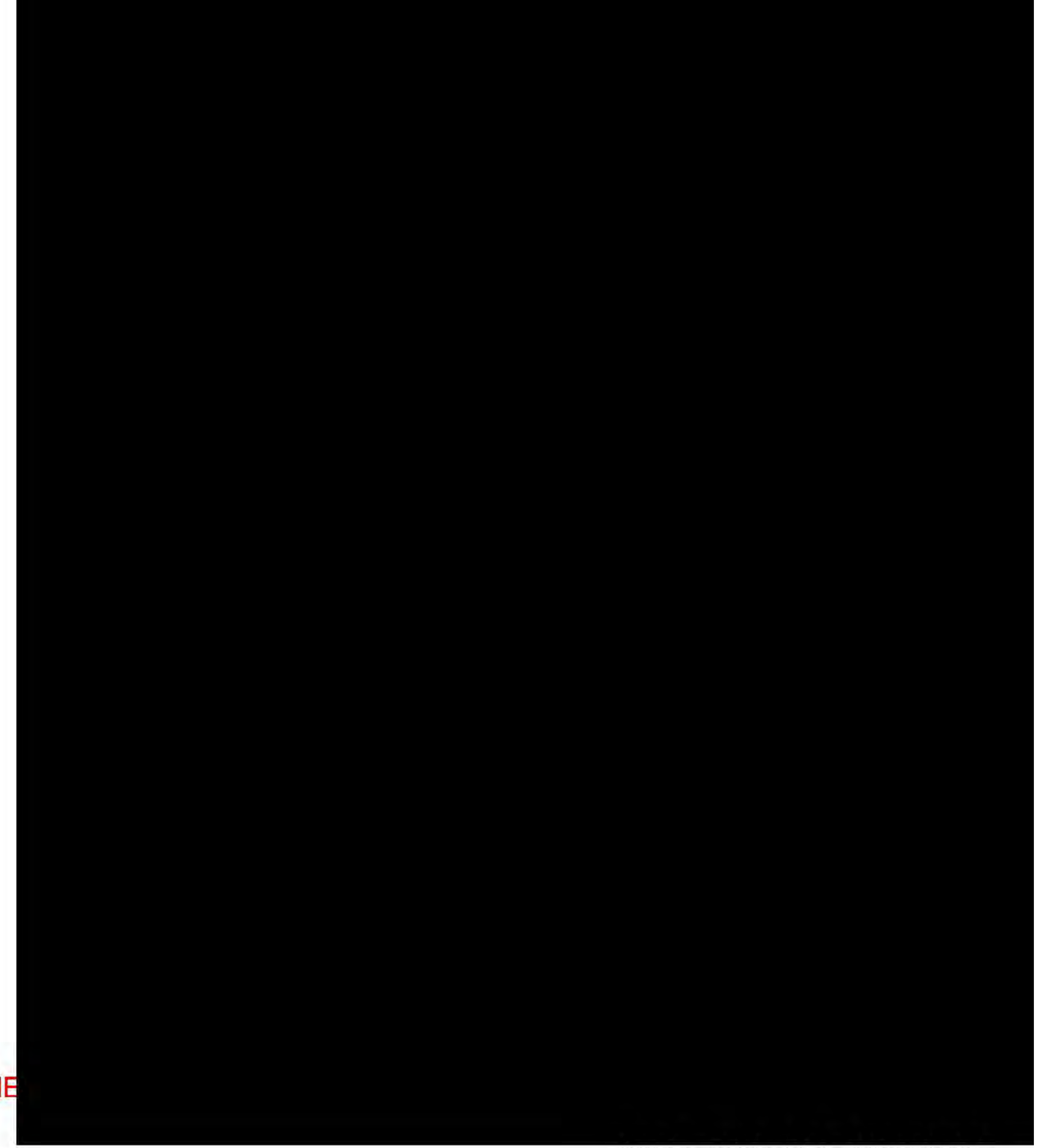
ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Slide 298 Notes

https://www.figma.com/file/tqBxcb8IB8jwAJHMFiD5V2/Ride-Check-New-Landing-Page?node-id=54%3A5767

Soft-filtering Safety Impact



ATTORNEY-CLIE

Results under review

S-RAD parallel switchback safety XP

Since the large-scale rollout (9/24-1/31), S-RAD has actioned trips for 130+ days

	Brazil*	**United States***
Number of active cities	110	196
Number of requests in treatment	351M	141M
Trigger rate in control	1.23%	1.21%
% treatment requests with scores > threshold	0.32%	0.39%
Control SASM rate per 1M requests* (#)	19.5 (6797)	40.0 (5561)
Control SASM rate per 1M flagged requests* (#)	192 (822)	589 (994)
Control serious SASM rate per 1M requests* (#)	4.05 (1411)	6.26 (871)
Control serious SASM rate per 1M flagged requests* (#)	55.0 (236)	74.1 (125)

*Data as of 2/04/22

ATTORNEY-CLIENT PRIVILEGED

Results under review

BR cumulative safety impact (9/24/21 - 1/31/22)*

Safety Impact	Time of Day		
Incident Type	Overall	Day 6 AM - 11 PM	Night 11 PM - 6 AM
Overall SASM rate (per 1M requests)	-5.95% (-8.82%, -3.08%) 19.5 → 18.3	-5.71% (-9.07%, -2.34%) 15.6 → 14.8	-6.13% (-11.7%, -0.60%) 58.0 → 53.2
Serious SASM rate (per 1M requests)	-10.5% (-16.5%, -4.38%) 4.05 → 3.64	-10.2% (-17.9%, -2.50%) 2.76 → 2.51	-10.5% (-20.5%, -0.46%) 16.7 → 14.6

Trip Distribution	Control	Treatment
Day (6 AM - 11 PM)	318M	318M
Night (11 PM - 6 AM)	32.4M	32.7M

*Notes
- Data as of 2/04/22
- Data for 130 out of 189 planned XP days
- 80% confidence intervals reported
- Point estimates and confidence intervals expected to be biased towards extremes
- Confidence intervals wider due to incomplete XP
- Spillover effects may be present and are unquantified
- No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

Results under review

US cumulative safety impact (9/24/21 - 1/31/22)*

Safety Impact	Time of Day		
Incident Type	Overall	Day 6 AM - 11 PM	Night 11 PM - 6 AM
Overall SASM rate (per 1M requests)	-5.42% (-8.59%, -2.24%) 40.0 → 37.7	-5.34% (-9.08%, -1.60%) 34.3 → 32.2	-5.53% (-11.6%, 0.50%) 69.6 → 66.5
Serious SASM rate (per 1M requests)	-14.7% (-22.1%, -7.29%) 6.26 → 5.39	-13.8% (-24.0%, -3.55%) 3.96 → 3.41	-15.7% (-26.5%, -4.90%) 18.2 → 15.8

Trip Distribution	Control	Treatment
Day (6 AM - 11 PM)	118M	118M
Night (11 PM - 6 AM)	23.2M	23.2M

*Notes
- Data as of 2/04/22
- Data for 130 out of 189 planned XP days
- 80% confidence intervals reported
- Point estimates and confidence intervals expected to be biased towards extremes
- Confidence intervals wider due to incomplete XP
- Spillover effects may be present and are unquantified
- No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

S-RAD

Leadership Update

03.01.2022

Uber

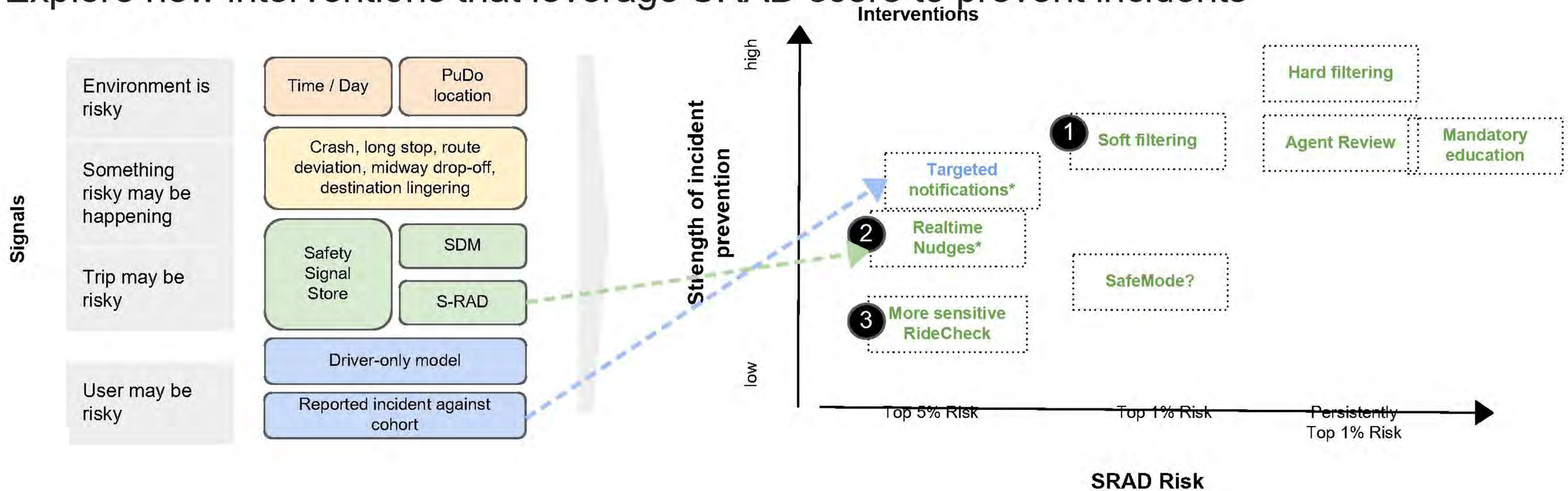
Summary

- **Nudges** (15 min)
  - Review messages & user experience
  - Provide overview of metrics
    - Reporting cadence
  - Experiment design & duration
- **Launch options** (5 min)
- **Roadmap** (5 min)

ATTORNEY-CLIENT PRIVILEGED

SRAD enhanced interventions long term strategy

Explore new interventions that leverage SRAD score to prevent incidents



ATTORNEY-CLIENT PRIVILEGED

Slide 305 Notes

Source: https://docs.google.com/presentation/d/1abl-GNK-223Hz0oSPE11JSFwjUEOdOtFGCz_naLLarA/edit#slide=id.gf771375934_0_7
Source: https://docs.google.com/presentation/d/1abl-GNK-223Hz0oSPE11JSFwjUEOdOtFGCz_naLLarA/edit#slide=id.g100e68c8735_0_15

Nudges target trips with high SRAD scores

Nudges are push notifications sent to users

5-7% of SASM incidents occur on

0.4% trips that bypass soft-filtering*

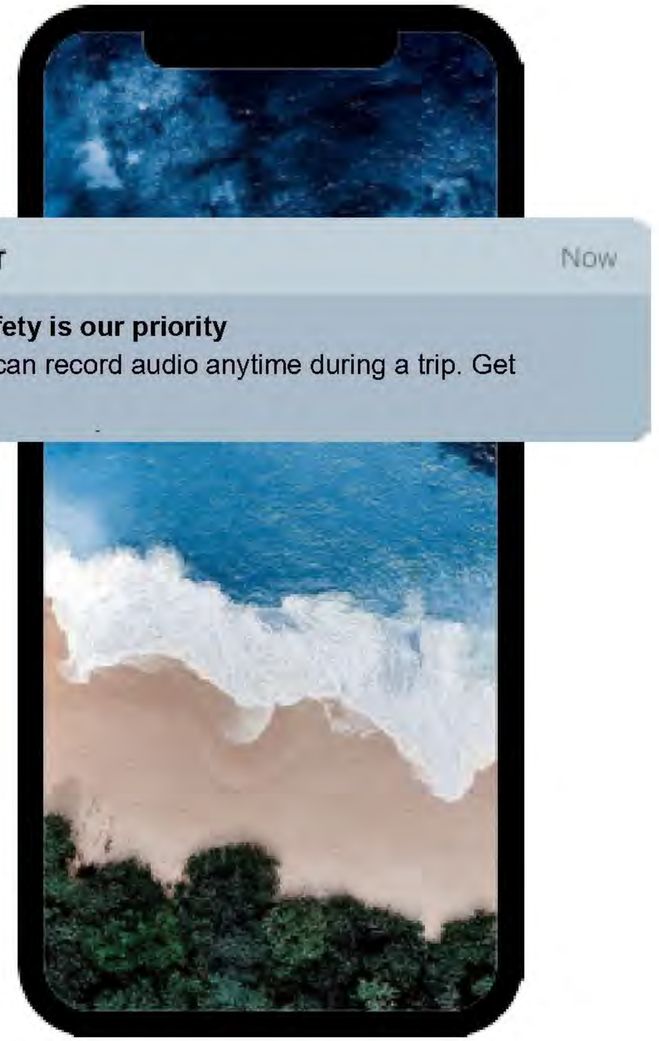
25% of SASM incidents occur on

5% trips with high SRAD scores**

← *Target trips for Nudges*

Just-in-time nudges content is grounded by

Priming	Emphasize idea of being watched.
Behavioral prescription	Provide clear set of guidelines.
Reciprocity Bias	Reinforce positive actions.



Example push notification to Driver/Rider

* Data from US/BR Safety XPs

** SASM recall in Mexico shadow mode data

ATTORNEY-CLIENT PRIVILEGED

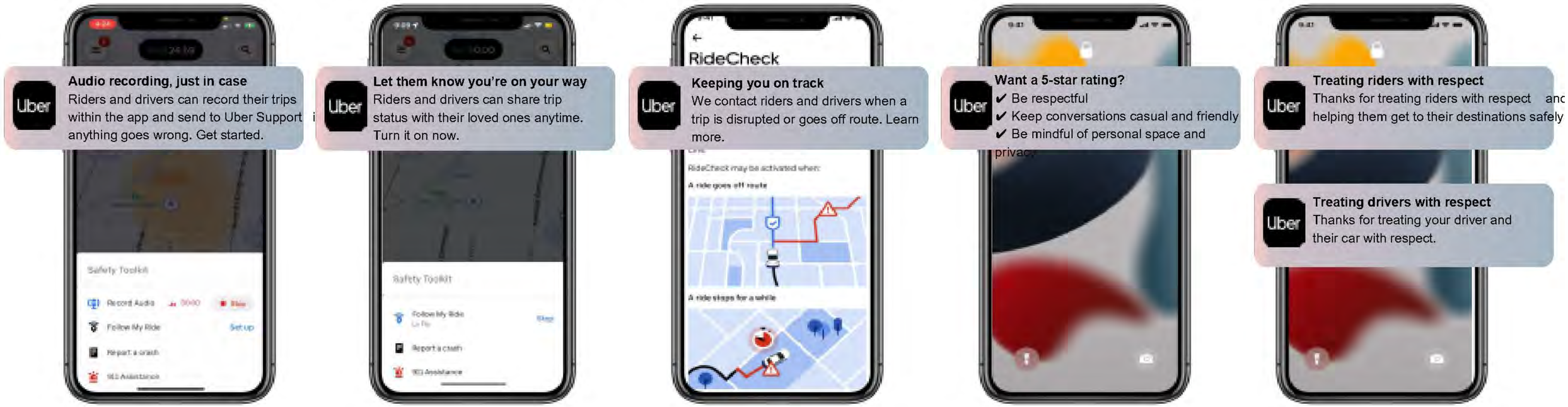
CONFIDENTIAL

Slide 306 Notes

The what.

- **Priming:** Emphasize the idea of being watched to prime good behaviour and greater sense of risk in being caught
- **Behavioral Prescription:** Provide clear set of guidelines for desired behaviour
- **Reciprocity Bias:** Respond to a positive action with another positive action

Nudges will rotate through a set of 5 messages to riders & drivers on flagged trips



Audio Recording	Follow My Ride	RideCheck	5-Star Rating	Safety tip on Respect
If Audio recording is already setup and ready to use, Earner can start/stop the recording with just 2 taps.	Earner is displayed the contact previously selected in the Settings to share trip with.	Users can learn more about RideCheck triggers on the landing page	Motivate good behavior by tying it to ratings	Reinforcing specific positive actions to encourage a sense of social norm when using the app.

ATTORNEY-CLIENT PRIVILEGED

Slide 307 Notes

The How?

Priming - what is priming and what are we seeking to achieve with priming messages?

Priming

Presenting someone with a communication that prepares them to be more receptive to a particular point of view or take a specific action.

Tactic

Emphasize idea of being watched to prime good behavior. Given salience to greater sense of risk in being caught.

What messages are we using here?

Explain Audio recording

Explain Follow my Ride

Explain Ride Check

1. Behavioral prescription - what is that and what are we trying to achieve with those types of messages?

Behavioral Prescription

Articulation of recommended action(s) to be taken by specific people under appropriate circumstances.

Tactic

Provide clear set of guidelines for desired behavior, making it clear what is and isn't acceptable.

What messages are we using here>
5-Star Rating

Explain 5-star rating - checklists work (evidence?)

2. Reciprocity

Once they know that they are being watched and what is good behavior/good actions, let's push the user to feel that their positive action can lead to a great good/collective of positive actions.

Reciprocity
People feel an obligation to do something for someone who's done something for them.

Tactic
Respond to a positive action with another positive action. Create social norms and give salience to correct behaviors.

Screenshot thanks to simulating trip on: https://studio.uberinternal.com/simulator

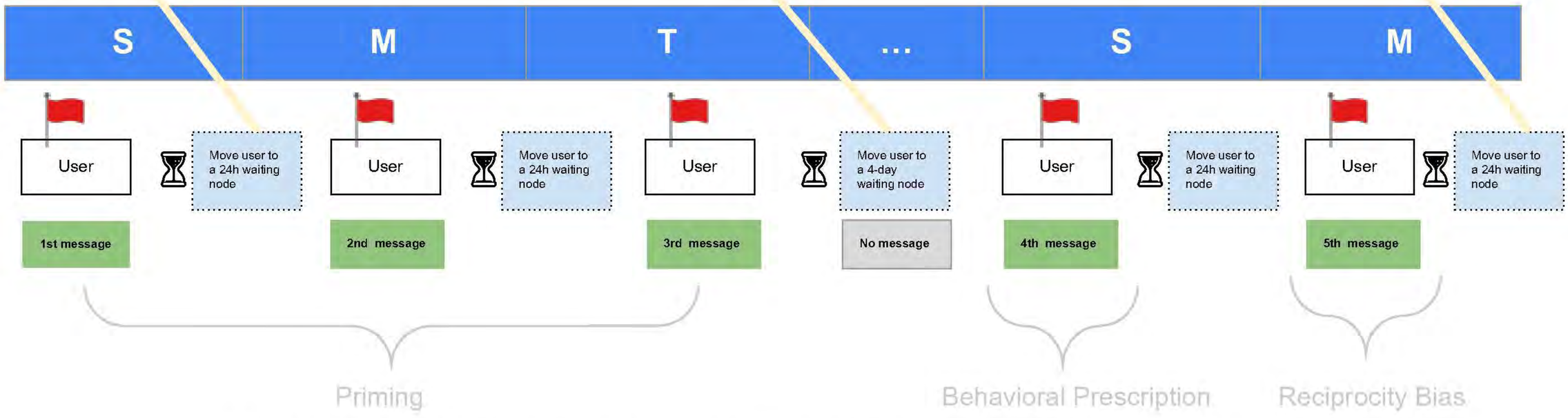
Nudges per user capped to once per day, thrice per week

= SRAD high score signal in Flow

Even if the user is flagged again in the same day he won't receive any message. **Cap 1/day**

Even if the user is flagged again after the 3rd flag in a week, he won't be receiving any messages. **Cap 3/week**

Earner will circle through all the 5 messages and then re-enter the flow and receive the 1st one and so on…



Both rider & driver receive push notifications and share the same cap.

Link to Flow campaign.

ATTORNEY-CLIENT PRIVILEGED

Slide 308 Notes

The when and why?

Cap is recommended based on analysis that on average ~6% of drivers in Mexico are flagged daily, using 1.1% trigger rate.

3/week: business rationale…Manage fatigue by applying a frequency cap on messages sent to the same user to once per day and 3 times per week.
4-day waiting period helps….Weekend ?

Frequency Analysis

Assuming 5% trip trigger rate in MX, simulation projects user coverage and frequency cap view.

Daily Cap

Driver	
% of Flagged at least once	% of Flagged more than once
23.67%	10.18%

Rider	
% of Flagged at least once	% of Flagged more than once
6.07%	0.69%

Weekly Cap

Driver	
% of Flagged at least 1 day	% of Flagged more than 3 days
50.34%	8.86%

Rider	
% of Flagged at least 1 day	% of Flagged more than 3 days
9.07%	0.11%

% Covered | % Hit Cap

Coverage**

* User coverage based on MX shadow data between 1/14/2022 and 2/25/2022 (43 days).

72.8%

Of Drivers covered

15.0%

Of Riders covered

** Coverage is defined as the % share of riders or drivers who would have received at least 1 push notifications over the time period analyzed.

* Simulation based upon MX shadow data between 1/14/2022 to 2/25/2022 (analysis).

ATTORNEY-CLIENT PRIVILEGED

Targeting a 6 month driver A/B experiment in Mexico. Regional team is excited about the launch.

- Marketplace impact results in ~1.5 - 2 months after launch
- Safety impact results in ~6 months after launch

Experiment	Rider/Driver A/B		Driver A/B**	
Trip Trigger Rate / Metric	5% MDE	10% MDE	5% MDE	10% MDE
1% trip trigger rate, SASM IR	108.03	27.01	54.01	13.50
5% trip trigger rate, SASM IR	52.15	13.04	26.08	6.52
5% trip trigger rate, all IPC IR	11.44	2.86	**5.72 months**	1.43

* Power analysis configured as one-sided test with power = 80% and confidence level = 80%

* For Glass breaker, if treatment's driver supply hour significantly decreased by 1%. Estimated duration ~ 1.5 month, power =80%, confidence level = 90%

** If the Driver is in treatment, send message to both driver and rider

ATTORNEY-CLIENT PRIVILEGED

* XP plan, Power Analysis

ATTORNEY-CLIENT PRIVILEGED

Key Metrics Covering Safety, Product Usage, and Marketplace

Group	Metric	Description
Primary Metrics *(Safety)*	**IPC Rate**	**Interpersonal conflict incident rate, includes SA/SM**
	Serious IPC Rate	**Serious interpersonal conflict incident rate, includes Serious SA/SM**
Secondary Metrics (*Safety Feature Usage*)	Audio Recording	AR Impressions, CTR, Setup, Usage
	Follow My Ride CTR	Follow My Ride Impressions, CTR, Setup, Usage
	RideCheck CTR	RideCheck push notification impressions, CTR, Ride Check Opt-out
Guardrail metrics	**Driver Supply Hour**	**Hours online (off trip + on trip)**
	Driver cancellation rates	Cancellations after trip starts
	Driver completed trips	Completed rides trips
	Push notifications opt-out rate	Driver opt out of push notifications
	Safety Contact Rate	**Safety bliss tickets rate**
Funnel metrics *(only on treatment)*	Open sessions	Opening the app till closing
	Impressions	Any time the user saw the push notification
	Push notifications	Delivered, clicked, dismissed
	Push notifications deep links	Deep link click-thru-rate (CTR)

Slide 311 Notes

Source: https://docs.google.com/document/d/1ODAQwQrerjFuj5EC1945QLZ9YFjv0M2320nxXu-MmJk/edit

1. Validate safety impact
2. Measure awareness impact as well

We will monitor & provide updates of guardrail metrics on a bi-weekly basis.

A dashboard will be shared to see both safety and marketplace metrics.

XP Launch options

1. Nudges XP without soft-filtering
    a. Marketplace XP only [2 months], followed by full rollout
        - Pros: Avoid delays on soft-filtering expansion. Prove that Nudges doesn't hurt marketplace.
        - Cons: We will not be able to measure safety impact
    b. **Marketplace + Safety XP [6 months]**
        - Pros: Able to measure nudges' safety impact
        - Cons: **XP in Mexico will push soft-filtering rollout expansion in Mexico to Q4'22.** 5% MDE may be hard to achieve considering the soft intervention
2. Nudges XP with soft-filtering fully rolled out
        - Over-complicates experimentation
        - Need to wait for current XPs to complete (earliest launch intercept would be May)

Recommendation: Option 1b. Launch in March. Optionality to rollout if directional safety impact.

ATTORNEY-CLIENT PRIVILEGED

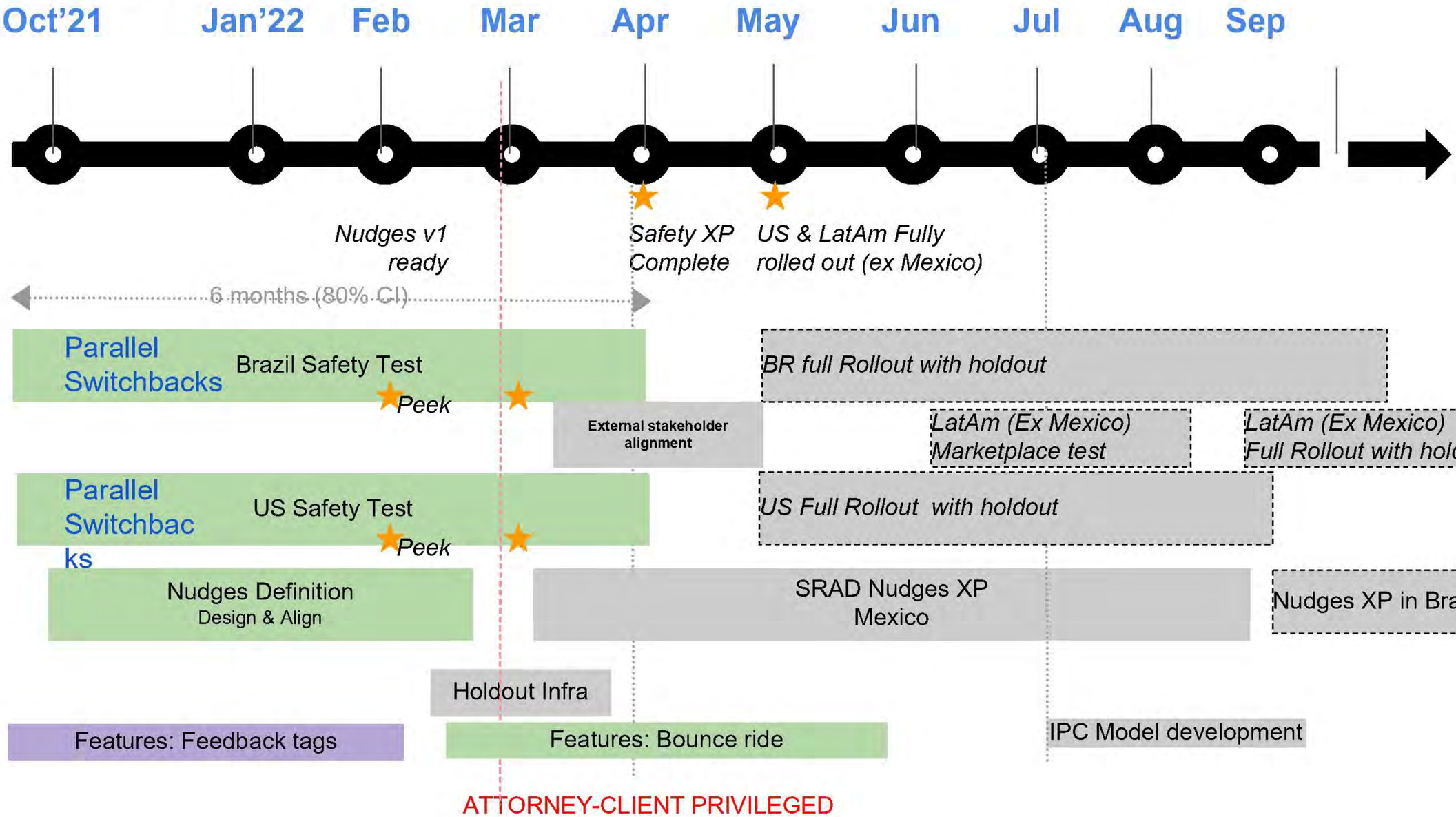
Slide 312 Notes

Roll out s-rad

Source: https://docs.google.com/document/d/1ODAQwQrerjFuj5EC1945QLZ9YFjv0M2320nxXu-MmJk/edit

2022 Roadmap

Tentative | Not started | Ongoing | Completed



Uber

ATTORNEY-CLIENT PRIVILEGED

Slide 313 Notes

Next steps:

PIA approval

Comms Plan

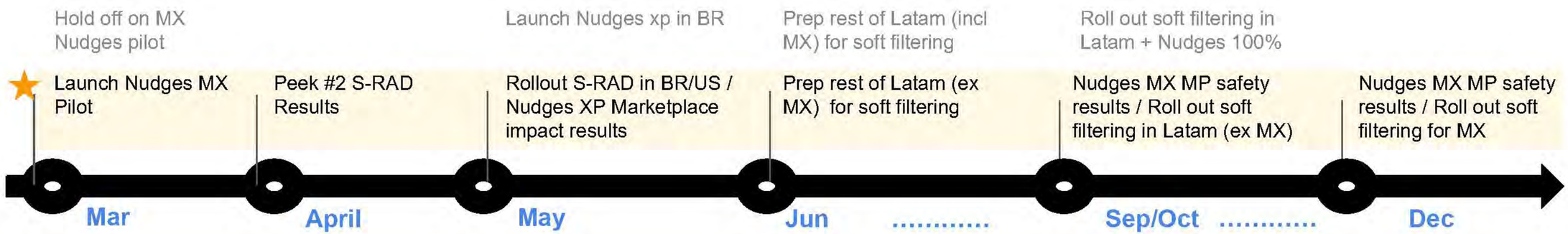
Finalize Ridecheck info page

https://docs.google.com/presentation/d/19Sf917H6hwFixdWdOIpY_-GuKpjKeI3lI0XiNc_SQks/edit#slide=id.gdd02d22cfd_0_2

Backup

Uber

The interaction of soft-filtering & nudges together is unclear so we have explored a few launch options



Options	S-RAD Rollout	Nudges Roll out	Considerations
Brazil	✓	depends	Turn on nudges as xp once soft filtering is rolled out fully. However, interaction of nudges with soft-filtering is unclear.
Mexico	✓	✓	Rollout nudges 100% without xp.
★ **Latam (ex Mexico)**	✓	(only for Mexico)	Mexico will be without soft filtering until the nudges xp is completed.

ATTORNEY-CLIENT PRIVILEGED

Slide 315 Notes

AI:
Add frequency analysis

Recommendations:
Run nudges in Mexico - lets launch
Full rollout of soft-filtering in US & BR, and we can re-visit nudges here
Launch in Latam ex Mexico once we do marketplace tests

Source: https://docs.google.com/document/d/1ODAQwQrerjFuj5EC1945QLZ9YFjv0M2320nxXu-MmJk/edit

The mexico xp by design is set up considering no soft-filtering. Bc we are testing to see if nudges has a safety impact.
"Less clean":

1. Treatment is mixed - treatment 1 is nudges, treatment 2 is soft filtering
2. If the holdout is completely random, t & c have holdout randomly in balanced way
    a. Holdout just means no soft-filtering

Interaction between nudges and soft filtering is unclear:

3. With nudges, we plant a seed and it may have an effect on soft filtering (in an effect we cannot necessarily measure)

Doing both together in Mexico not recommended bc Mexico is too small.

Intervention from nudges takes effect over longer t; so with soft filtering, we are turning it on in a different context bc seed has been planted already…
We designed thresholds for nudges without soft filtering; the frequency of messages may change with soft filtering

ATTORNEY-CLIENT PRIVILEGED

S-RAD

Leadership Update

02.18.2022

Uber

ATTORNEY-CLIENT PRIVILEGED

Summary

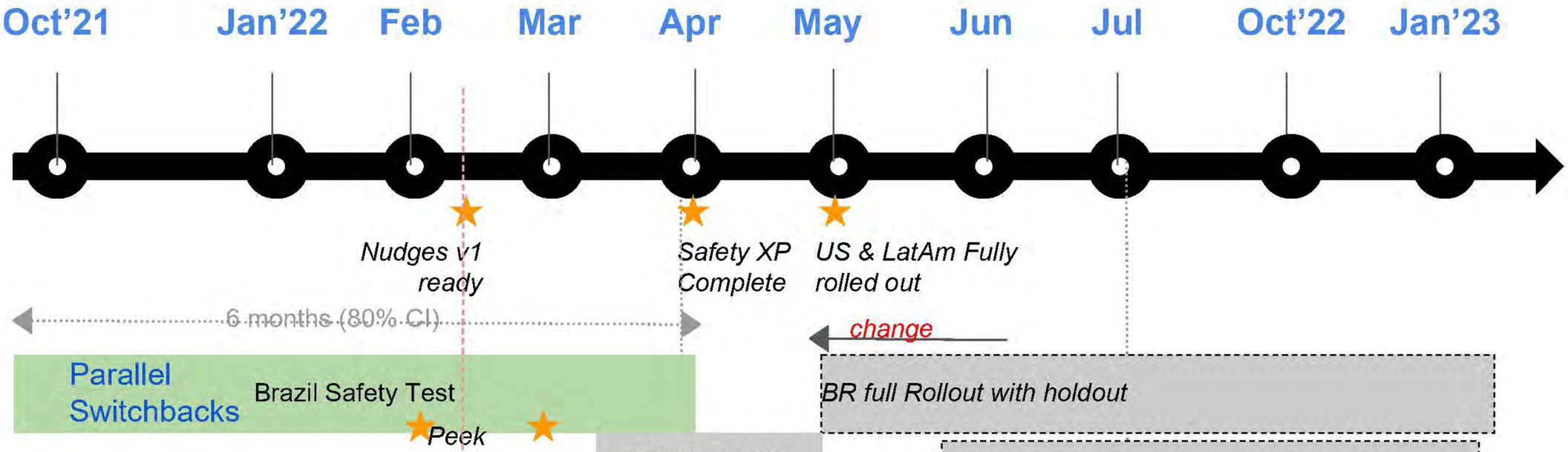
- **Roadmap (5 min)**
- **SRAD XP Safety Update (10 min)**
  - SRAD has been running for 130+ days in the **US & Brazil over the holidays**.
  - **Sneak peek** at results look promising.
  - **Marketplace impact** results are **in line with expectations, ~500 million trips in treatment**
- **Holdout strategy (10 min)**
  - Explore thru options considered for holdout strategy
- **Next steps**

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Tentative | Not started | Ongoing | Completed

2022 Roadmap



Brazil Experiments

Parallel Switchbacks

Brazil Safety Test

Peek

BR full Rollout with holdout

External stakeholder alignment

LatAm Full Rollout

US Experiments

Parallel Switchbacks

US Safety Test

Peek

US Full Rollout with holdout

Nudges

Nudges Definition
Design & Align

SRAD Nudges XP
Mexico

Holdout Infra

Nudges Iterations Brazil

Model / Infra

Features: Feedback tags

Features: Bounce ride

IPC Model development

Uber

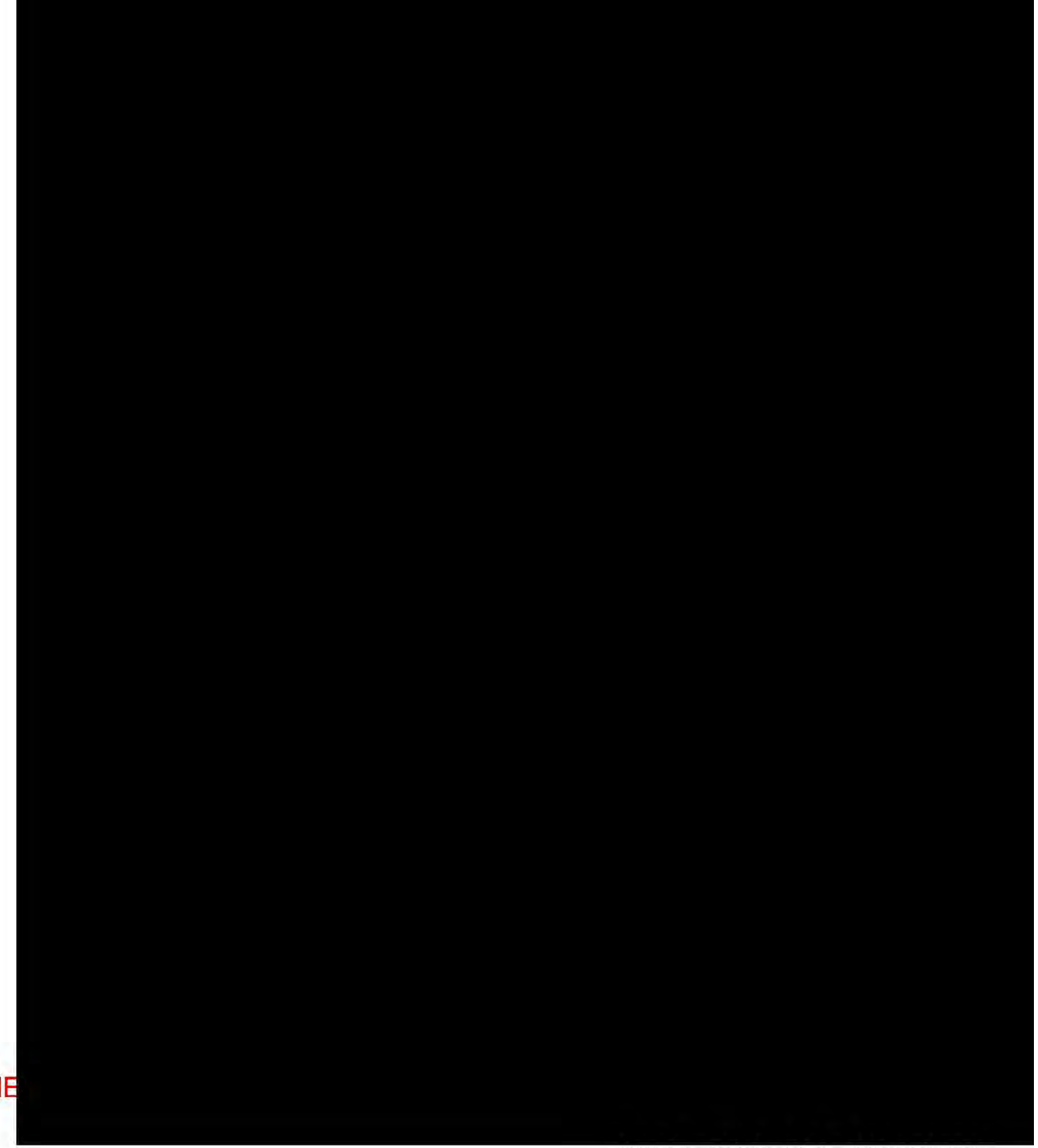
ATTORNEY-CLIENT PRIVILEGED

Slide 318 Notes

https://docs.google.com/presentation/d/19Sf917H6hwFixdWdOIpY_-GuKpjKeI3lI0XiNc_SQks/edit#slide=id.gdd02d22cfd_0_2

Safety Impact

Ben



ATTORNEY-CLIE

Results under review

S-RAD parallel switchback safety XP

Since the large-scale rollout (9/24-1/31), S-RAD has actioned trips for 130+ days

	Brazil*	**United States***
Number of active cities	110	196
Number of requests in treatment	351M	141M
Trigger rate in control	1.23%	1.21%
% treatment requests with scores > threshold	0.32%	0.39%
Control SASM rate per 1M requests* (#)	19.5 (6797)	40.0 (5561)
Control SASM rate per 1M flagged requests* (#)	192 (822)	589 (994)
Control serious SASM rate per 1M requests* (#)	4.05 (1411)	6.26 (871)
Control serious SASM rate per 1M flagged requests* (#)	55.0 (236)	74.1 (125)

*Data as of 2/04/22

ATTORNEY-CLIENT PRIVILEGED

Results under review

BR cumulative safety impact (9/24/21 - 1/31/22)*

Safety Impact	Time of Day		
Incident Type	Overall	Day 6 AM - 11 PM	Night 11 PM - 6 AM
Overall SASM rate (per 1M requests)	-5.95% (-8.82%, -3.08%) 19.5 → 18.3	-5.71% (-9.07%, -2.34%) 15.6 → 14.8	-6.13% (-11.7%, -0.60%) 58.0 → 53.2
Serious SASM rate (per 1M requests)	-10.5% (-16.5%, -4.38%) 4.05 → 3.64	-10.2% (-17.9%, -2.50%) 2.76 → 2.51	-10.5% (-20.5%, -0.46%) 16.7 → 14.6

Trip Distribution	Control	Treatment
Day (6 AM - 11 PM)	318M	318M
Night (11 PM - 6 AM)	32.4M	32.7M

*Notes
- Data as of 2/04/22
- Data for 130 out of 189 planned XP days
- 80% confidence intervals reported
- Point estimates and confidence intervals expected to be biased towards extremes
- Confidence intervals wider due to incomplete XP
- Spillover effects may be present and are unquantified
- No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

Results under review

US cumulative safety impact (9/24/21 - 1/31/22)*

Safety Impact	Time of Day		
Incident Type	Overall	Day 6 AM - 11 PM	Night 11 PM - 6 AM
Overall SASM rate (per 1M requests)	-5.42% (-8.59%, -2.24%) 40.0 → 37.7	-5.34% (-9.08%, -1.60%) 34.3 → 32.2	-5.53% (-11.6%, 0.50%) 69.6 → 66.5
Serious SASM rate (per 1M requests)	-14.7% (-22.1%, -7.29%) 6.26 → 5.39	-13.8% (-24.0%, -3.55%) 3.96 → 3.41	-15.7% (-26.5%, -4.90%) 18.2 → 15.8

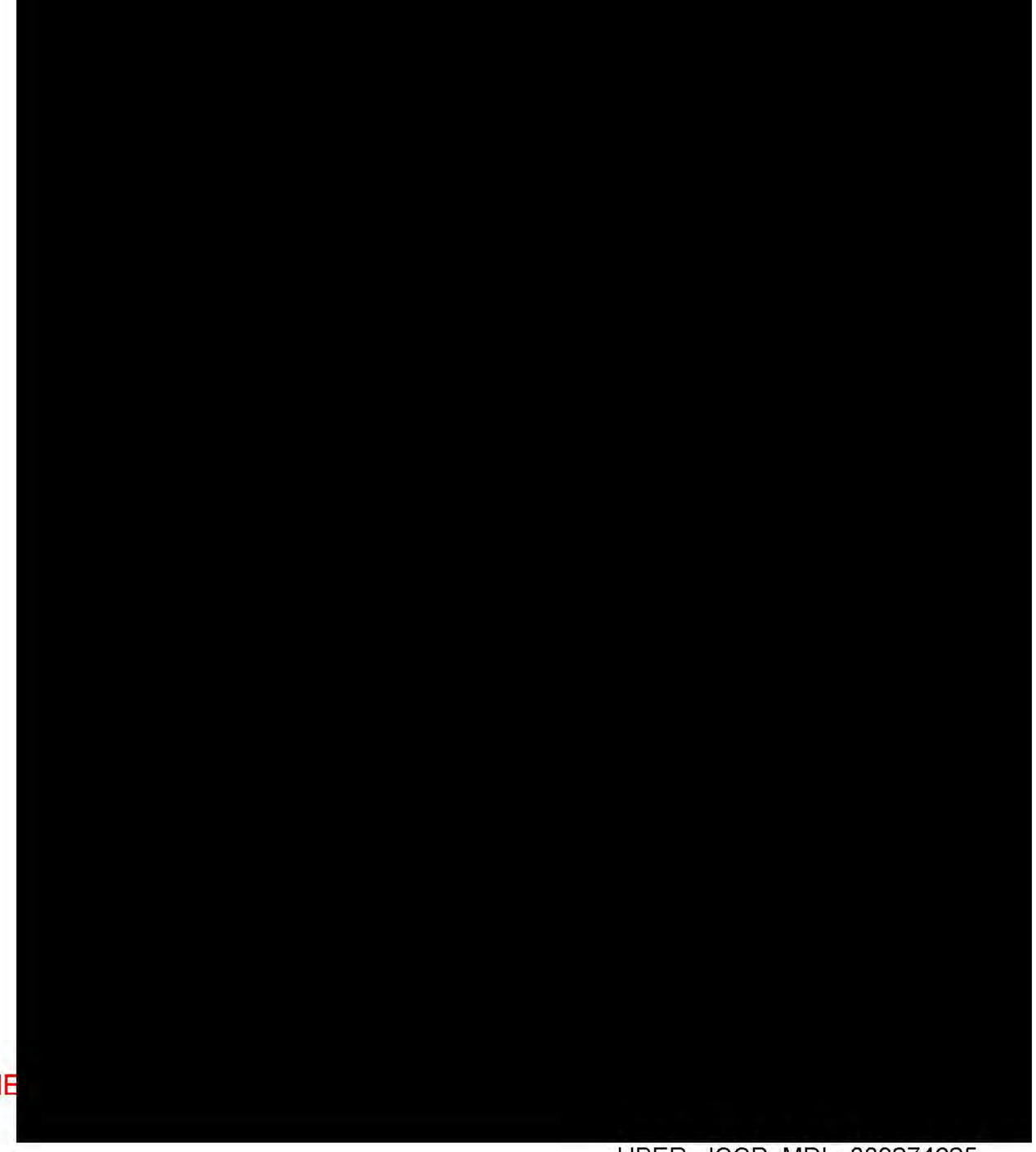
Trip Distribution	Control	Treatment
Day (6 AM - 11 PM)	118M	118M
Night (11 PM - 6 AM)	23.2M	23.2M

*Notes
- Data as of 2/04/22
- Data for 130 out of 189 planned XP days
- 80% confidence intervals reported
- Point estimates and confidence intervals expected to be biased towards extremes
- Confidence intervals wider due to incomplete XP
- Spillover effects may be present and are unquantified
- No corrections for multiple comparisons

ATTORNEY-CLIENT PRIVILEGED

Holdout Strategy

Ben/Gorkem



ATTORNEY-CLIE

Importance of maintaining a representative holdout

- Only way to truly track model performance and monitor potential drift
- Creates unadulterated population need for model retraining
- Provides cleanest mechanism for necessary ongoing threshold adjustments
- A holdout comes at the cost of not actioning trips with S-RAD part of the time

ATTORNEY-CLIENT PRIVILEGED

Ongoing holdout group options

Continuing existing parallel XP

- Convert existing 50%/50% T/C XP to be imbalanced to maintain a target holdout %
- **Pros**
  - Able to use some of the existing infra
  - Inference is more straightforward
  - S-RAD can be active in all cities
- **Cons**
  - Maintaining target imbalance will be challenging
    - Particularly for cities with many rides XPs
  - Removes the possibility of running parallel XPs in the future
  - Requires new schedule generation methodology

Rotating cities holdout

- Every X weeks, turn off S-RAD in a subset of cities
- **Pros**
  - Minimal interference with other XPs
  - Reduces transient effects from switching on/off
  - Limits spillover effects
- **Cons**
  - Safety impact appears strongly city specific
    - Complicates inference and may make synthetic control challenging (especially in the COVID era)
  - Requires new infra
  - For continuous periods, S-RAD will be off for entire cities

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274627

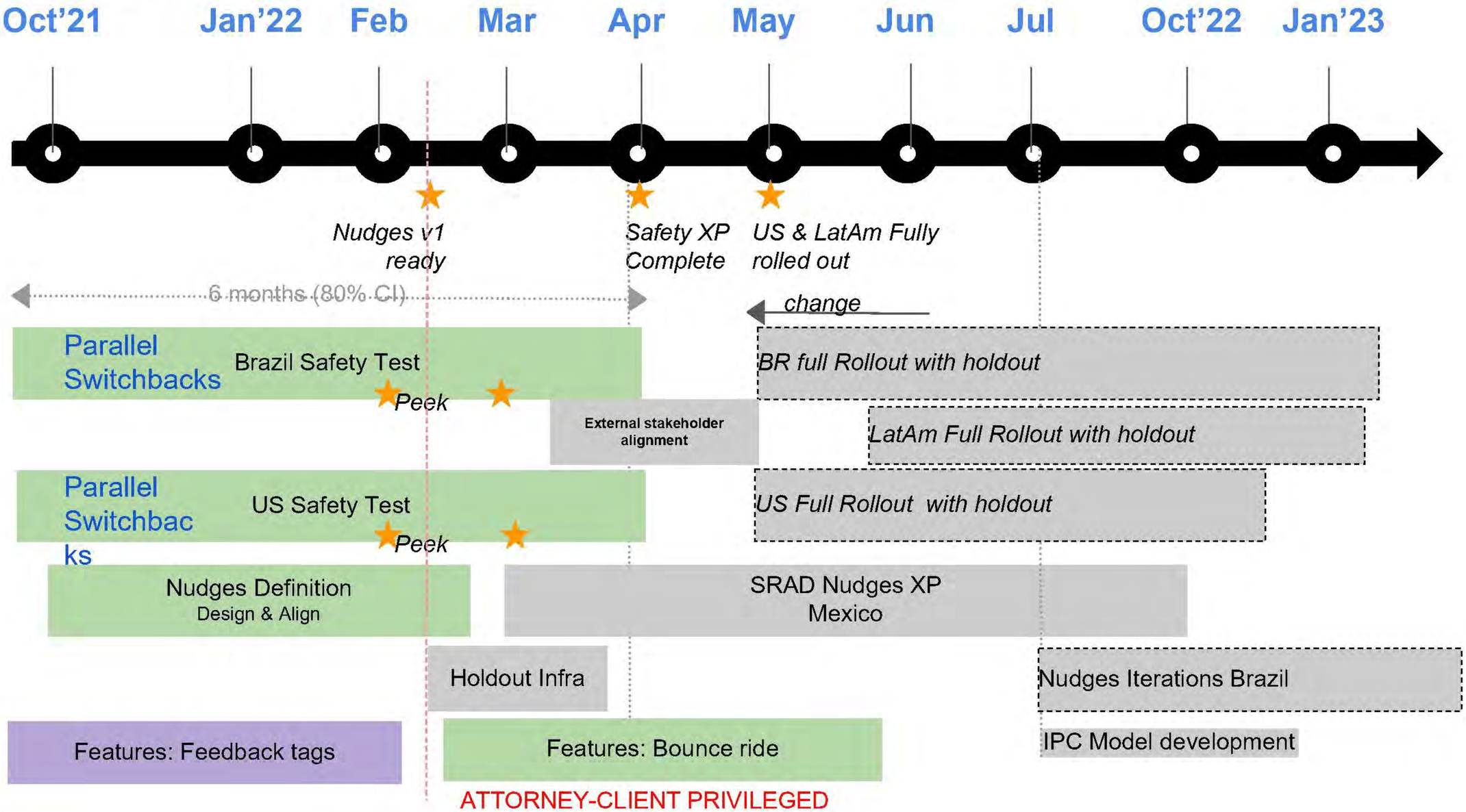
P-01366.00435

Slide 325 Notes

Rotating cities would also need to be dynamic to marketplace experiment
5 cities held out for two weeks, then rotate
We want the holdout period to be consistent if primary XP is running… if a primary XP is running… wait till the primary XP is over

Tentative | Not started | Ongoing | Completed

2022 Roadmap



ATTORNEY-CLIENT PRIVILEGED

Uber

Slide 326 Notes

https://docs.google.com/presentation/d/19Sf917H6hwFixdWdOIpY_-GuKpjKeI3lI0XiNc_SQks/edit#slide=id.gdd02d22cfd_0_2

Next steps

- Finalize holdout strategy & implement infra (Feb-March)
- Take a second peek in a month (March)
- Align with cross-func team on external engagements

  [Daniel/Andrew/Ana/Emily/Lizzie/Gabriela?/Adam?/Zoraida/Susan/Caro/Aldo]
  - ORCAA engagement - start early to help accelerate rollout.
  - Are we talking about this product publicly - No
  - Do we need to circle back with advocacy groups? If yes, which ones? [Ana/Emily]
    - Have we addressed the feedback provided by advocacy groups previously?
    - What will we do with feedback? How much time is need to socialize the results of XP and secure alignment with the groups?

Slide 327 Notes

- May need to complete a statement of work
- Turn over detailed results and fairness testing. Let them ask questions.

If not public, we may still need FAQ

Reactive comms

Privacy - are we covered

Legal - REDACTED - PRIVILEGED

ATTORNEY-CLIENT PRIVILEGED

S-RAD

Leadership Update

01.20.2021

Uber



ATTORNEY-CLIENT PRIVILEGED

Summary

- **XP Update**:
    - SRAD continued to run in the **US & Brazil over the holidays**. **Largely uneventful** with no oncall alerts.
    - **Marketplace impact** results over the past 3 months are **in line with expectations**
    - **Bug** in flpr config inadvertently paused the XP in 7 cities for 2-3 weeks. Issue was **mitigated quickly**. Expect very marginal impact on time to completion for the XP
- **Discussion:**
    - We have completed 68% out of the planned 168 days experiment. Should we peek into safety impact?
- **Model Improvements:**
    - Initial evaluation of **feedback tags** features shows a **15% lift in recall** at 1.1% TR (Brazil). Deep dive wip.

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

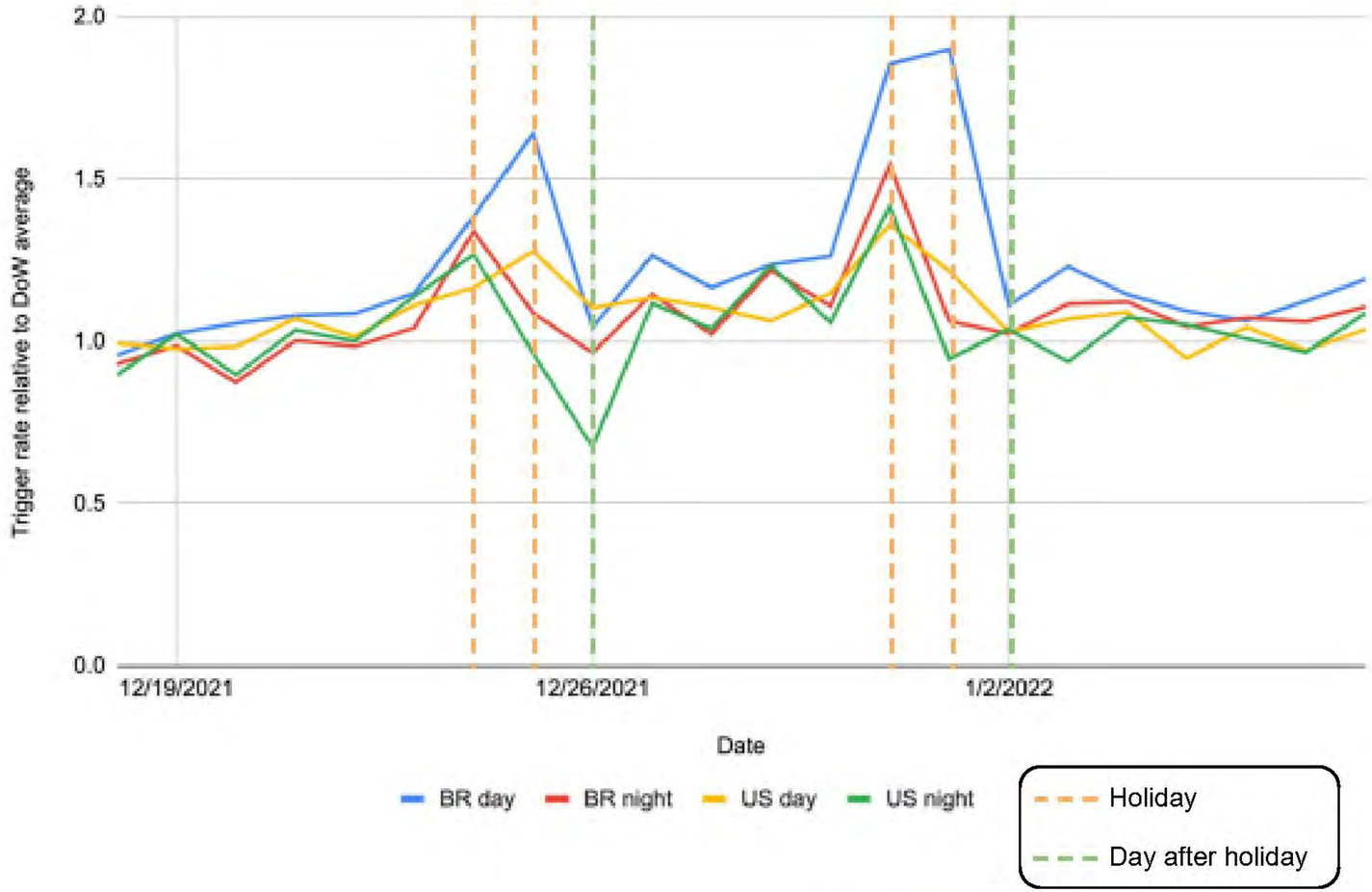
Parallel switchback update

Ben

[redacted]

ATTORNEY-CLIE

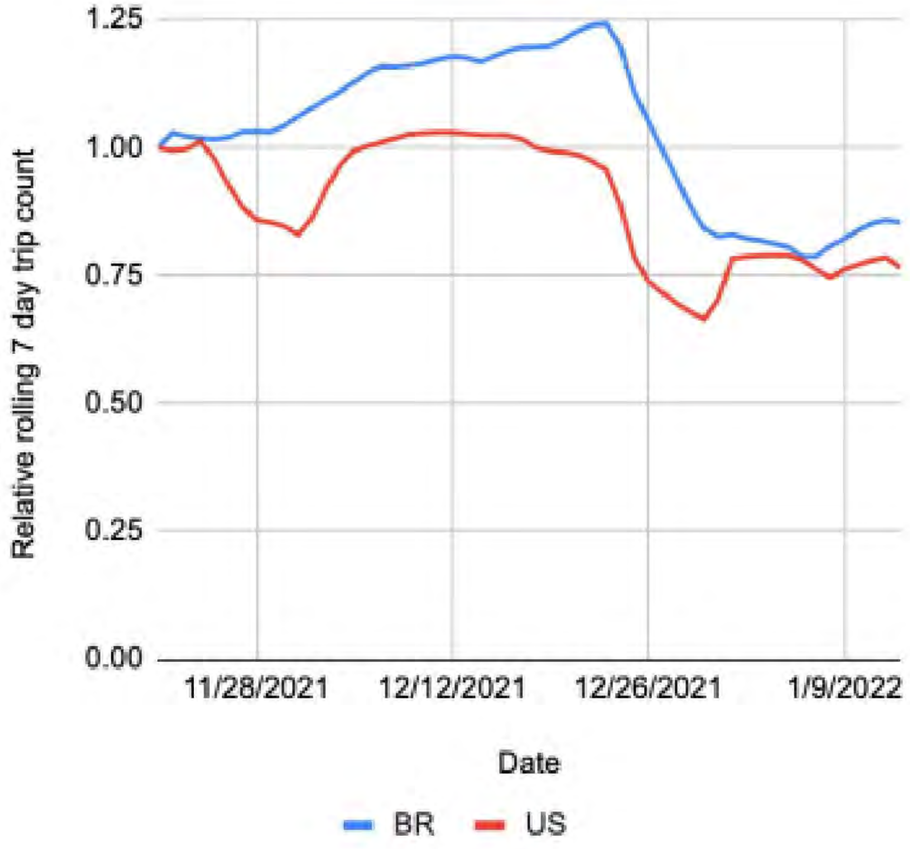
SRAD holiday behavior

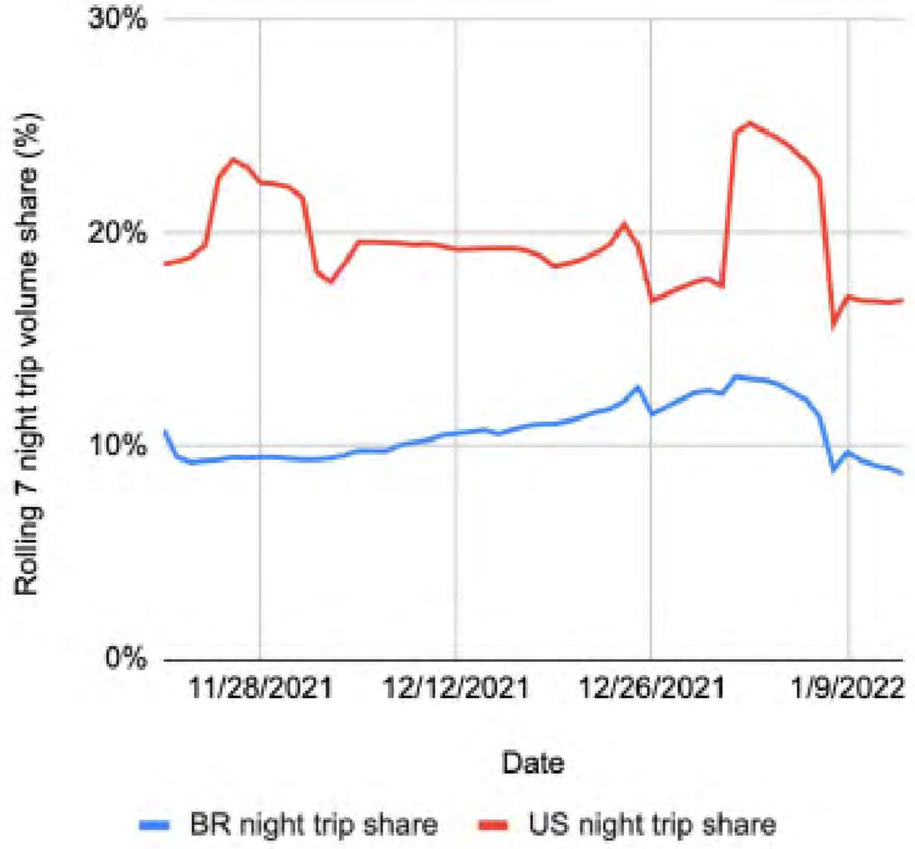


- Daily trigger rates on or prior to holidays tended to be higher compared to day of week averages
  - Daytime TRs in particular
- TRs returned to expected levels on the day following the holiday and have stabilized

ATTORNEY-CLIENT PRIVILEGED

Total and nighttime SRAD volumes are down





ATTORNEY-CLIENT PRIVILEGED

Ongoing marketplace impact analysis takeaways

- Accounting for holidays, but BR and US remained within TR alert thresholds
- Overall impacts largely attributed to behavior of XL cities during night
- Continued ETA impacts inline with earlier results and previous S-RAD XPs
  - Avg. post dispatch ETA relative overall impact - US: 0.35%; BR: 0.68%
  - P95 post dispatch ETA relative overall impact - US: 0.18%; BR: 1.04%
  - Completed/Requests relative overall impact - US: -0.06%; BR: -0.16%
- Almost no significant impact on any metrics in Medium and Small cities
- New definition for driver cancellation rate that mirrors regions Ops
  - New definition allows for repeated driver cancellations associated with individual trip_uuid's
  - BR XL and L cities exhibit elevated driver cancellation rates at night, little impact otherwise

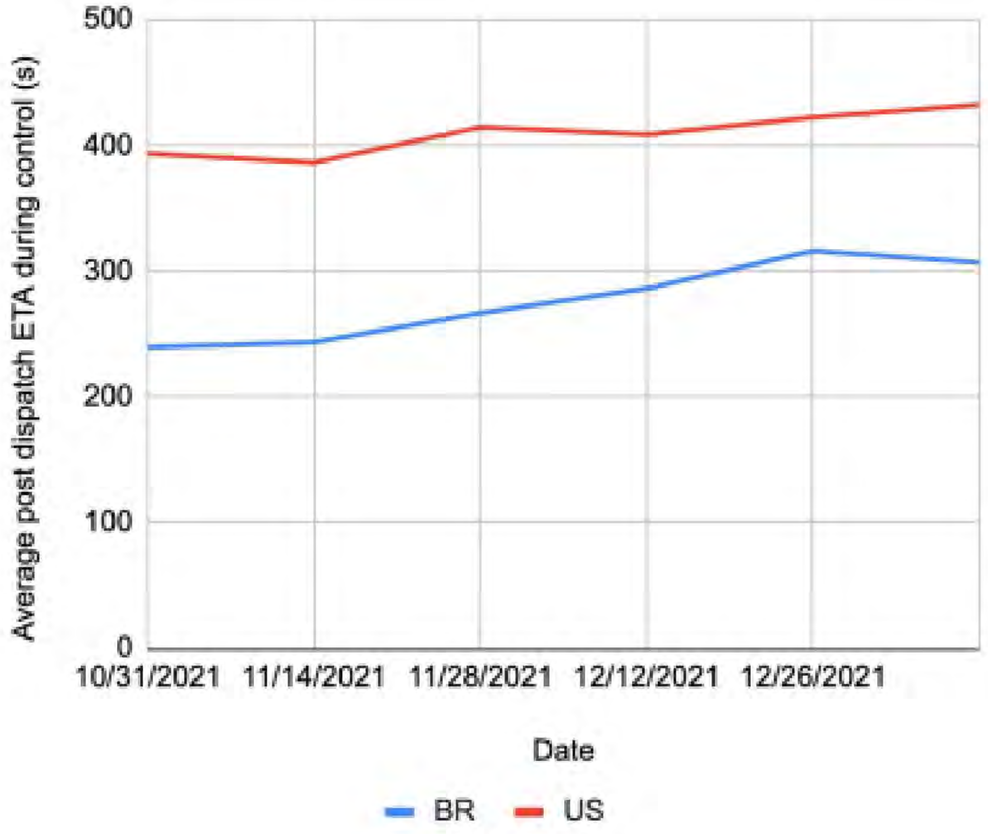
ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

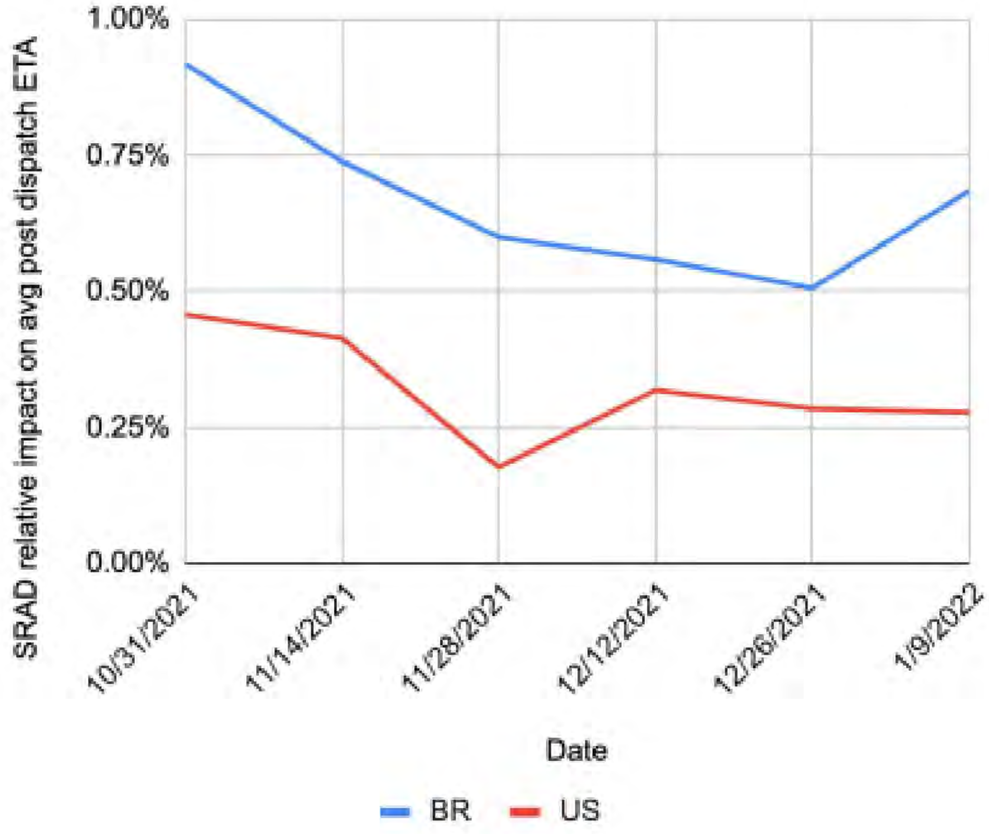
UBER_JCCP_MDL_003274638

P-01366.00446

Relative impact of SRAD on ETA has been trending down



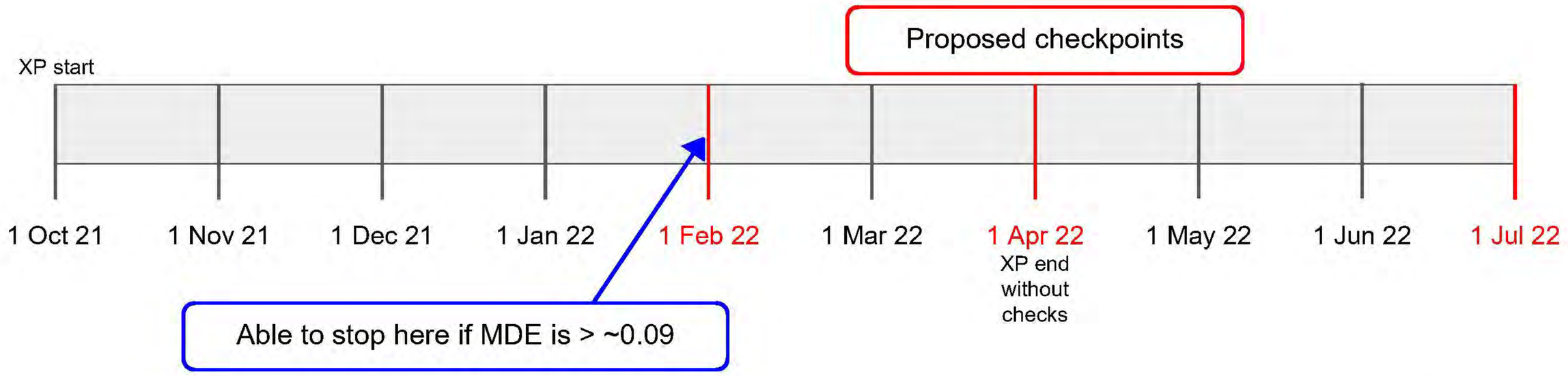
Control period avg. post dispatch ETA



Relative treatment effect on avg. post dispatch ETA

Discussion point - Checking XP impact prior to completion

- Looking early/repeatedly at XPs changes some critical statistical assumptions
  - Early stopping criteria are more stringent (i.e., assessing statistical significance)
  - Inferred safety impact magnitude and associated confidence intervals will be biased
- Provides more flexibility if the observed effect size is larger than expected
- Example: Brazil
  - Time to 80% confidence with MDE 0.05 → approx 6 months



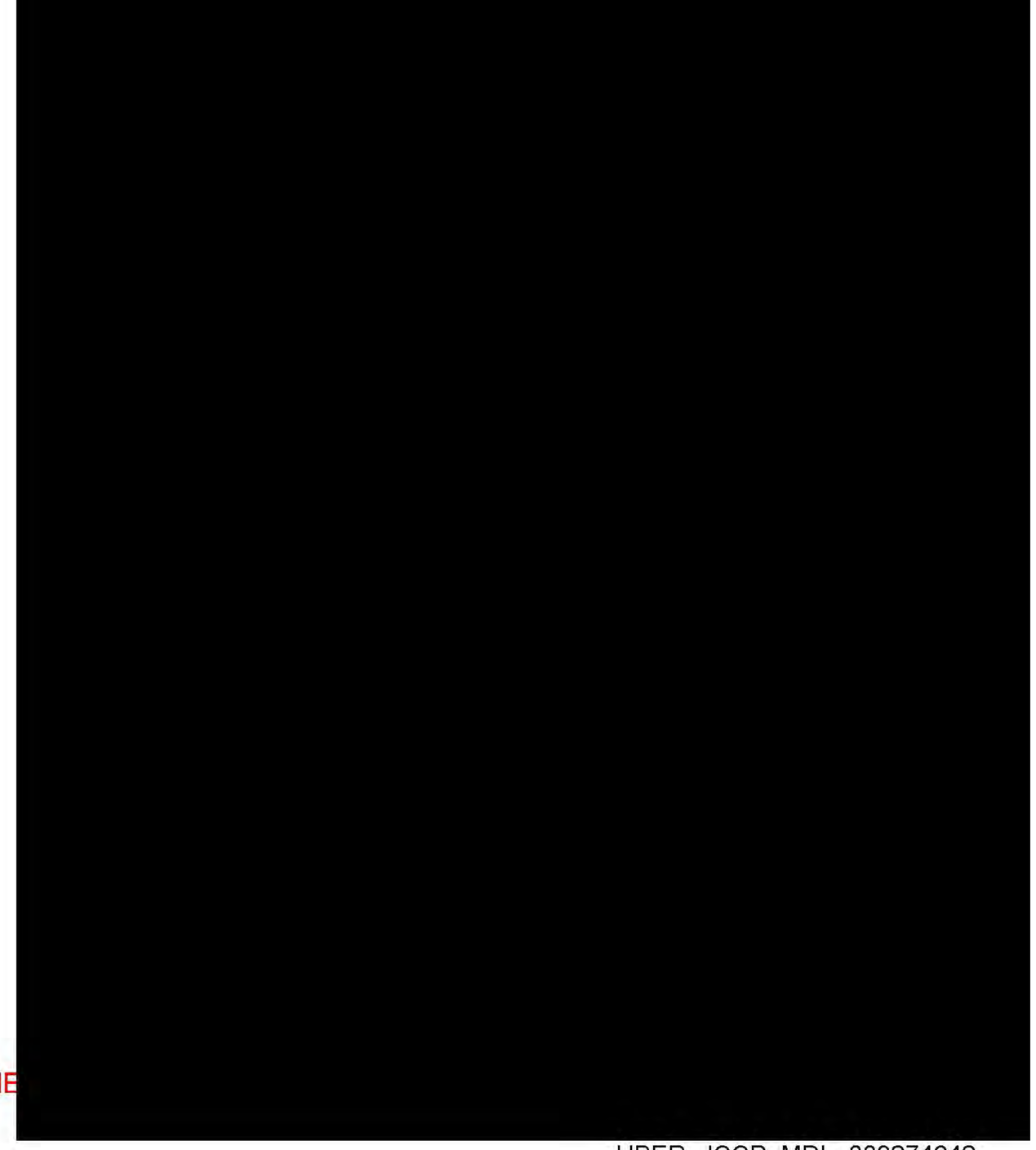
Slide 335 Notes

In order for us to stop the XP early, we have to see a larger effect (or much smaller standard error) than we were expecting. The easiest way to think about this part is, if we wanted 80% confidence in a no peek XP, we would need something like 99% confidence of an effect at the half way point to stop. So from a math point of view, the criteria we are using to determine statistical significance (which is required to stop the XP when analyzing sequentially) are different compared to a standard xp

Our estimates of safety impact and the associated confidence intervals will have some bias if we peek. The estimates will overestimate the true effect. There are methods to address this, but it will require some additional work on our end to ensure we are reporting good estimates. Similarly, confidence intervals will be biased (they also lose some of their original statistical meaning). I'm also pretty sure that they will be slightly larger, even after applying the correction methods

New feature evaluation

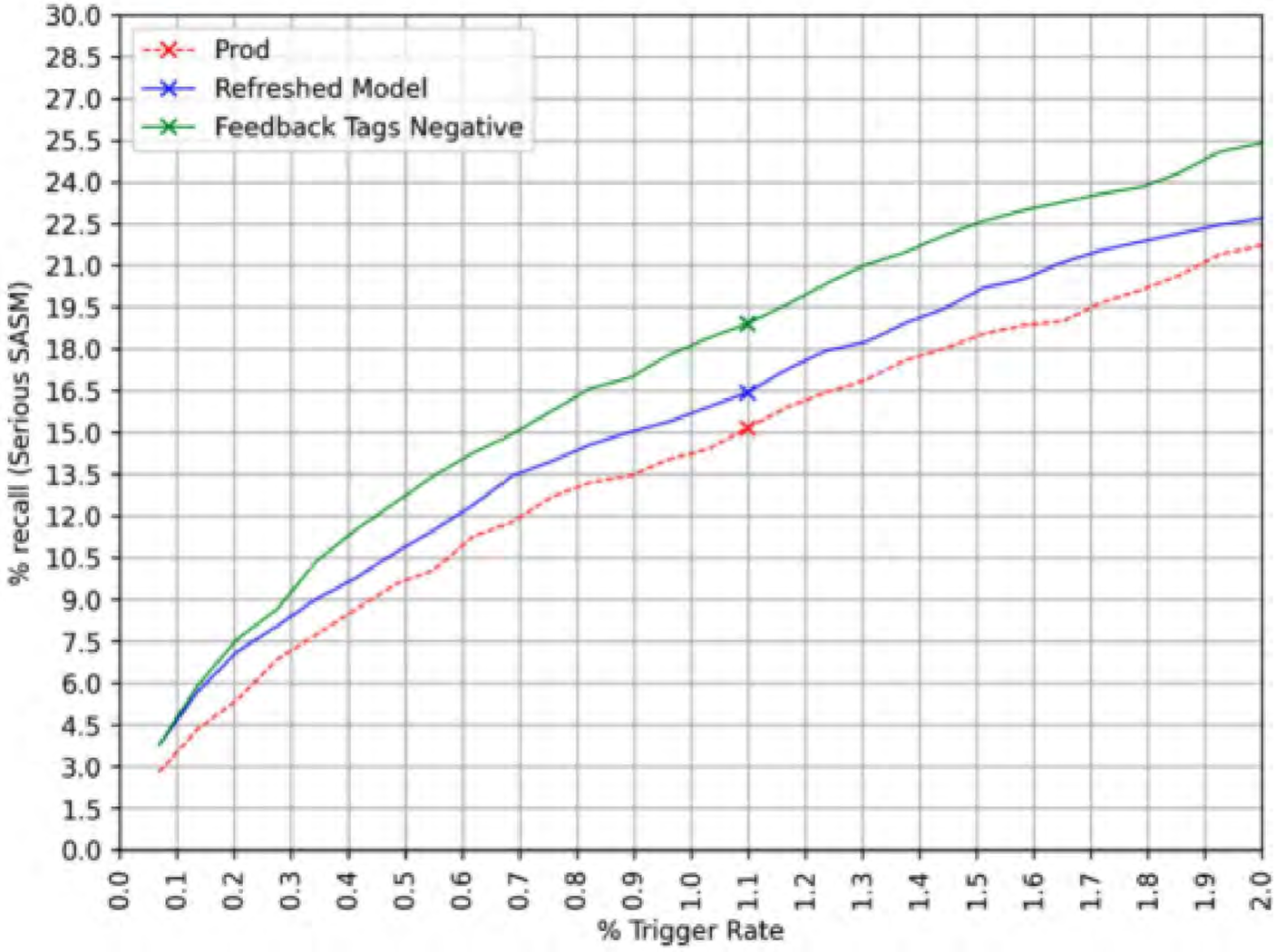
Mingxuan & Ben



ATTORNEY-CLIE

Deep dive work-in-progress

Feature Exploration (Offline)



Brazil Model Candidate =
Original Model
(+) Client as Reviewee Feedback Tag Rate
(+) Client as Reviewer Feedback Tag Rate
(+) Driver as Reviewee Feedback Tag Rate
(+) Driver as Reviewer Feedback Tag Rate

@1.10% TR	**% recall**
Production Model	15.16%
Before (Retrain Only)	16.44%
After (New Feature)	18.92%

*Evaluated on 2021/09/01 to 2021/11/30 trips All Brazil cities (all UberX trips)
*Trained on 2018/01 to 2021/08 trips
*Feedback Tags Feature is built on excluding latest **30** days of data to avoid data leakage (Feedback can be updated for trips taken in the last 30 days only)

ATTORNEY-CLIENT PRIVILEGED

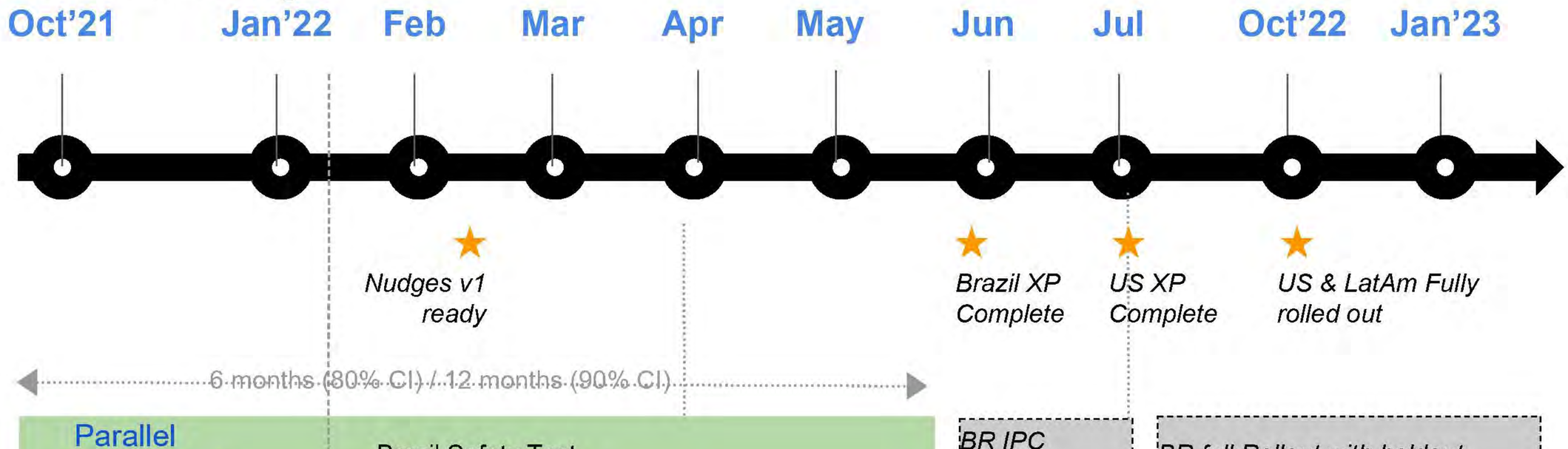
2022 Roadmap

[redacted]

ATTORNEY-CLIE

Tentative | Not started | Ongoing | Completed

2022 Roadmap



Brazil Experiments

Parallel Switchbacks

Brazil Safety Test

Peek *Peek*

BR IPC Mkpl Test

BR full Rollout with holdout

LatAm Full Rollout

US Experiments

Parallel Switchbacks

US Safety Test

US Full Rollout with holdout

Nudges

Nudges Definition
Design & Align

SRAD Nudges XP
Mexico

Nudges Iterations Brazil & US

Model / Infra

Feedback Tags Feature

Holdout Infra

IPC Model development

Uber

ATTORNEY-CLIENT PRIVILEGED

Slide 339 Notes

https://docs.google.com/presentation/d/19Sf917H6hwFixdWdOIpY_-GuKpjKeI3lI0XiNc_SQks/edit#slide=id.gdd02d22cfd_0_2

Backup

ATTORNEY-CLIENT PRIVILEGED

2022 H1 projects

Pri	Theme	Project	Description
P0	Ready for full rollout	SASM Safety XP	Complete US & Brazil XPs
P0		Hold out infra	Hold-out strategy & infra for S-RAD
P0		Threshold management	Automate threshold generation
P0		SASM Model rollout	Full rollout of SASM model in Brazil and US **(if ongoing XP succeeds)**
P0	Improve performance	features	**New batch features:** seasonality, bounce ride, ugraph, Mutombo failures, payment, id **New realtime features:** recent cancellation behavior, recent incident history
P0	Go Deep	Nudges - SRAD signal	Driver and Rider XP on High SRAD score trips + Periodic blast messages
P1		IPC Model	Launch IPC model in one market
P1		Beyond UberX	Expand to Low Cost trips in Brazil (8.24% SASM incidents) ***[along with full rollout}*** Expand to UberXL in US (2.82% SASM incidents)
P1	Expand geographically	LatAM	Marketplace XP in LatAm (after Brazil rollout)

Only after current XP succeeds

ATTORNEY-CLIENT PRIVILEGED

What is the relationship between confidence level and effect we can see?

- Higher confidence levels lead to longer XPs
- Smaller estimated effect sizes lead to longer XPs
- Hard to specifically compute given high uncertainty due to COVID

Brazil

MDE	confidence level	months
0.05	95%	11.7
0.05	90%	8.5
0.05	85%	6.7
0.05	80%	5.4
0.085	95%	4.1
0.085	90%	3.0
0.085	85%	2.3
0.085	80%	1.9

Serious SASM rate: 3.75 per million
TRIP/DAY = 3.6 M

US

MDE	confidence level	months
0.05	95%	13.4
0.05	90%	9.7
0.05	85%	7.6
0.05	80%	6.1
0.085	95%	4.6
0.085	90%	3.4
0.085	85%	2.6
0.085	80%	2.1

Serious SASM rate: 6.85 per million
TRIP/DAY = 1.8 M

ATTORNEY-CLIENT PRIVILEGED

Slide 342 Notes

Assuming parallel switchback framework is fully rolled out in both countries

2021-12-13 - 2022-01-09

Ongoing marketplace impact analysis

US parallel safety XP

- Overall TR: 1.20%
- Day TR: 0.80%
- Night TR: 3.27%
- 7 day rolling TR as of 2021-12-26: 1.16%
- # abnormal days: 4
  - 12/24/21
  - 12/25/21
  - 12/31/21
  - 01/01/22

- : Not Stat-sig
Level Effect: Absolute Difference
Analysis notes:
1. city_id not in (274,345,347,357,359,**1541**,1587)

Trip Distribution	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	24.1M	4.64M
Treatment	24.0M	4.62M

US (189 cities)	***All Day***		***Day Time***		***Night time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
Avg_post_dispatch_eta	**1.5**	428.8	**1.0**	411.2	**3.7**	520.8
p95_post_dispatch_eta	**1.9**	1060.4	-	1027.9	**4.7**	1143.6
p99_post_dispatch_eta	**2.4**	1234.6	-	1215.0	**5.1**	1284.6
request_to_begin_sec_avg	**1.1**	559.7	-	541.4	**4.1**	655.0
completed/requests	**-0.05%**	87.30%	-	88.88%	-	79.03%
unfulfilled/requests	-	0.78%	-	0.57%	-	1.94%
rider_cancellation_perc	**0.06%**	9.98%	-	8.92%	**0.16%**	15.51%
driver_cancellation_perc	-	7.81%	-	6.97%	-	12.30%

US parallel safety XP

Trip Distribution	XL Cities		L Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	18.6M	3.46M	3.99M	854k
Treatment	18.6M	3.45M	4.00M	849k

US (189 cities)	***XL Cities (26 cities)***						***L Cities (52 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	**1.7**	372.9	**-**	356.3	**3.9**	463.1	**1.7**	625.0	**-**	607.8	**4.8**	705.9
p95_post_dispatch_eta	**4.5**	968.7	**2.6**	888.1	**8.9**	1160.3	**-**	1202.2	**-**	1154.9	**-**	1314.6
p99_post_dispatch_eta	**3.9**	1235.3	**2.6**	1163.7	**7.4**	1406.3	**3.9**	1418.7	**3.3**	1384.6	**-**	1499.7
request_to_begin_sec_avg	**1.3**	503.0	**-**	486.1	**4.0**	594.1	**-**	761.6	**-**	743.0	**5.6**	849.4
completed/requests	**-**	89.27%	**-**	90.57%	**-**	82.18%	**-**	81.45%	**-**	83.69%	**-**	70.90%
unfulfilled/requests	**-**	0.28%	**-**	0.19%	**-**	0.84%	**-**	1.91%	**-**	1.44%	**-**	4.20%
rider_cancellation_perc	**0.07%**	8.58%	**-**	7.64%	**0.16%**	13.64%	**-**	14.48%	**-**	13.12%	**-**	20.91%
driver_cancellation_perc	**-**	7.45%	**-**	6.63%	**-**	11.93%	**-**	9.63%	**-**	8.70%	**-**	14.32%

- : Not Stat-sig; Level Effect: Absolute Difference; city_id not in (274,345,347,357,359,**1541**,1587)

CONFIDENTIAL

UBER_JCCP_MDL_003274653

US parallel safety XP

Trip Distribution	M Cities		S Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	971k	230k	447k	100k
Treatment	970k	225k	447k	100k

US (189 cities)	***M Cities (49 cities)***						***S Cities (62 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	-	605.1	-	592.4	-	658.8	-	546.2	-	532.7	-	607.6
p95_post_dispatch_eta	**2.7**	1084.2	-	1063.6	-	1134.4	-	950.6	-	948.8	-	955.7
p99_post_dispatch_eta	-	1252.9	-	1253.9	-	1250.1	-	1048.0	-	1058.0	-	1017.7
request_to_begin_sec_avg	**-2.5**	725.1	**-2.3**	709.4	-	792.4	-	683.2	**-3.2**	663.0	-	777.3
completed/requests	-	78.28%	-	80.88%	-	67.16%	-	80.54%	-	83.20%	-	68.13%
unfulfilled/requests	-	3.88%	-	3.06%	-	7.51%	-	3.58%	-	2.83%	-	7.15%
rider_cancellation_perc	-	15.73%	-	14.39%	-	21.45%	-	13.73%	-	12.34%	-	20.14%
driver_cancellation_perc	-	7.84%	-	7.06%	-	11.55%	-	6.44%	-	5.74%	-	10.12%

- : Not Stat-sig; Level Effect: Absolute Difference; city_id not in (274,345,347,357,359,**1541**,1587)

BR parallel safety XP

- Overall TR: 1.28%
- Day TR: 0.60%
- Night TR: 7.31%
- 7 day rolling TR as of 2022-01-09: 1.23%
- # abnormal days: 4
  - 12/24/21
  - 12/25/21
  - 12/31/21
  - 01/01/22

Trip Distribution	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	72.2M	8.17M
Treatment	72.2M	8.18M

BR (110 cities)	***All Day***		***Day Time***		***Night time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
Avg_post_dispatch_eta	**2.1**	306.9	-	299.5	**16.8**	369.2
p95_post_dispatch_eta	**8.1**	781.6	**3.1**	752.2	**22.6**	864.6
p99_post_dispatch_eta	**5.9**	991.9	**2.9**	974.0	**14.5**	1042.2
request_to_begin_sec_avg	**1.3**	480.9	-	473.6	**14.1**	542.6
completed/requests	**-0.12%**	73.49%	-	75.46%	**-0.96%**	56.39%
unfulfilled/requests	-	8.44%	-	7.43%	**0.21%**	17.40%
rider_cancellation_perc	**0.09%**	16.02%	-	15.18%	**0.72%**	23.26%
driver_cancellation_perc	-	25.64%	-	24.16%	**0.25%**	38.86%

- : Not Stat-sig
Level Effect: Absolute Difference

CONFIDENTIAL

UBER_JCCP_MDL_003274655

BR parallel safety XP

Trip Distribution	XL Cities		L Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	51.4M	5.85M	16.2M	1.85M
Treatment	51.4M	5.84M	16.2M	1.87M

BR (110 cities)	***XL Cities (15 cities)***						***L Cities (30 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	**2.3**	293.3	-	286.0	**19.0**	354.8	**2.2**	339.7	**0.7**	331.3	**14.3**	410.1
p95_post_dispatch_eta	**17.1**	698.1	-	628.8	**55.4**	860.2	**11.3**	813.1	**3.1**	748.2	**30.5**	966.6
p99_post_dispatch_eta	**12.4**	953.6	**4.6**	881.8	**31.5**	1122.7	**7.0**	1065.0	**2.2**	1021.1	**18.6**	1169.0
request_to_begin_sec_avg	**1.4**	473.5	-	465.9	**15.8**	536.2	**1.2**	501.6	-	493.9	**10.8**	566.4
completed/requests	**-0.14%**	76.69%	-	78.48%	**-1.07%**	61.23%	**-0.09%**	69.39%	-	71.88%	**-0.84%**	47.84%
unfulfilled/requests	-	6.34%	-	5.44%	**0.17%**	14.23%	-	11.90%	-	10.48%	**0.29%**	24.60%
rider_cancellation_perc	**0.11%**	14.90%	-	14.12%	**0.88%**	21.51%	**0.08%**	16.77%	-	15.81%	**0.53%**	24.98%
driver_cancellation_perc	-	25.56%	-	24.00%	**0.28%**	38.84%	-	24.58%	-	23.30%	**0.22%**	37.42%

- : Not Stat-sig; Level Effect: Absolute Difference

BR parallel safety XP

Trip Distribution	M Cities		S Cities	
	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)	Day (6 AM - 11 PM)	Night (11 PM - 6 AM)
Control	4.13M	425k	511k	47.5k
Treatment	4.12M	425k	508k	46.8k

BR (110 cities)	***M Cities (30 cities)***						***S Cities (35 cities)***					
	All Day		***Day Time***		***Night Time***		***All Day***		***Day Time***		***Night Time***	
Metric	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*	*Level effect*	*Baseline*
avg_post_dispatch_eta	**0.8**	333.9	-	328.6	**6.8**	385.6	-	423.5	-	423.4	-	424.0
p95_post_dispatch_eta	**4.0**	776.2	**3.1**	758.7	**6.5**	821.1	-	806.7	-	826.5	-	699.5
p99_post_dispatch_eta	-	985.7	-	992.0	-	969.0	-	921.0	-	950.3	-	763.8
request_to_begin_sec_avg	-	480.4	-	476.1	**6.8**	523.6	**6.9**	583.8	**6.3**	581.9	-	612.6
completed/requests	-	54.08%	-	56.50%	**-0.26%**	30.39%	-	35.41%	-	37.04%	-	16.89%
unfulfilled/requests	-	20.43%	-	19.45%	**0.38%**	30.36%	-	14.45%	-	14.04%	-	19.16%
rider_cancellation_perc	-	23.44%	-	22.07%	-	36.84%	-	47.95%	-	46.80%	-	60.93%
driver_cancellation_perc	-	30.92%	-	29.77%	-	46.00%	-	35.14%	-	34.59%	-	45.91%

- : Not Stat-sig; Level Effect: Absolute Difference

flpr config bug

- Found a bug in flpr config: XP in 7 cities stopped at some point
- All city XP configurations have been updated and are in the process of restarting

City name	City ID	City Size	Dates XP was off
Baton Rouge	274	Medium	2021-12-14 onwards
Asheville, NC	345	Medium	2021-12-14 onwards
Lansing	347	Medium	2021-12-14 onwards
Topeka	251	Small	2021-12-14 onwards
Lawrence	359	Small	2021-12-14 onwards
NYC Suburbs	1541	Extra Large	2022-01-11 onwards
Central Oregon	1587	Small	2022-01-12 onwards

ATTORNEY-CLIENT PRIVILEGED

S-RAD

Leadership Update

11.05.2021

Uber

ATTORNEY-CLIENT PRIVILEGED

Summary

- Safety XP update: Launched parallel switchback across 306 cities (196 US/110 BR)
  - Launched dashboard
  - Need occasional adjustments to address over/under triggering
  - Holidays need special treatment. We'll not adjust thresholds if the model overtriggers
- Nudges update: Recommend leveraging SRAD score for nudges
- 2022 plan: (1) Pause SASM/IPC model rollouts until ongoing XPs complete. (2) Launch Nudges XP in one market
- Future topics:
  - Parallel switchback: Ongoing safety & marketplace impact readout
  - IPC model deep dive

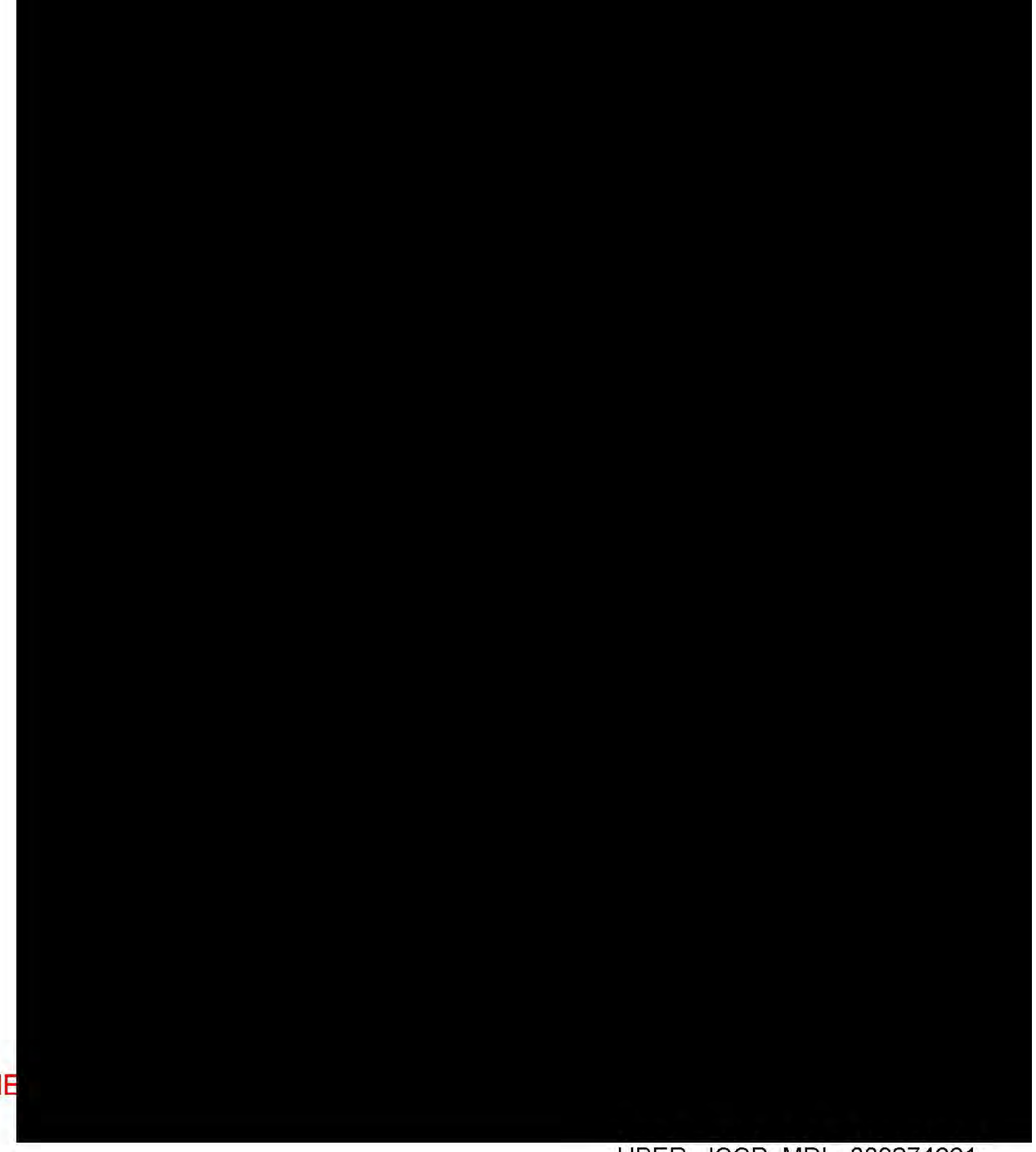
ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Parallel switchback update

Elva & Ben

(7 min)

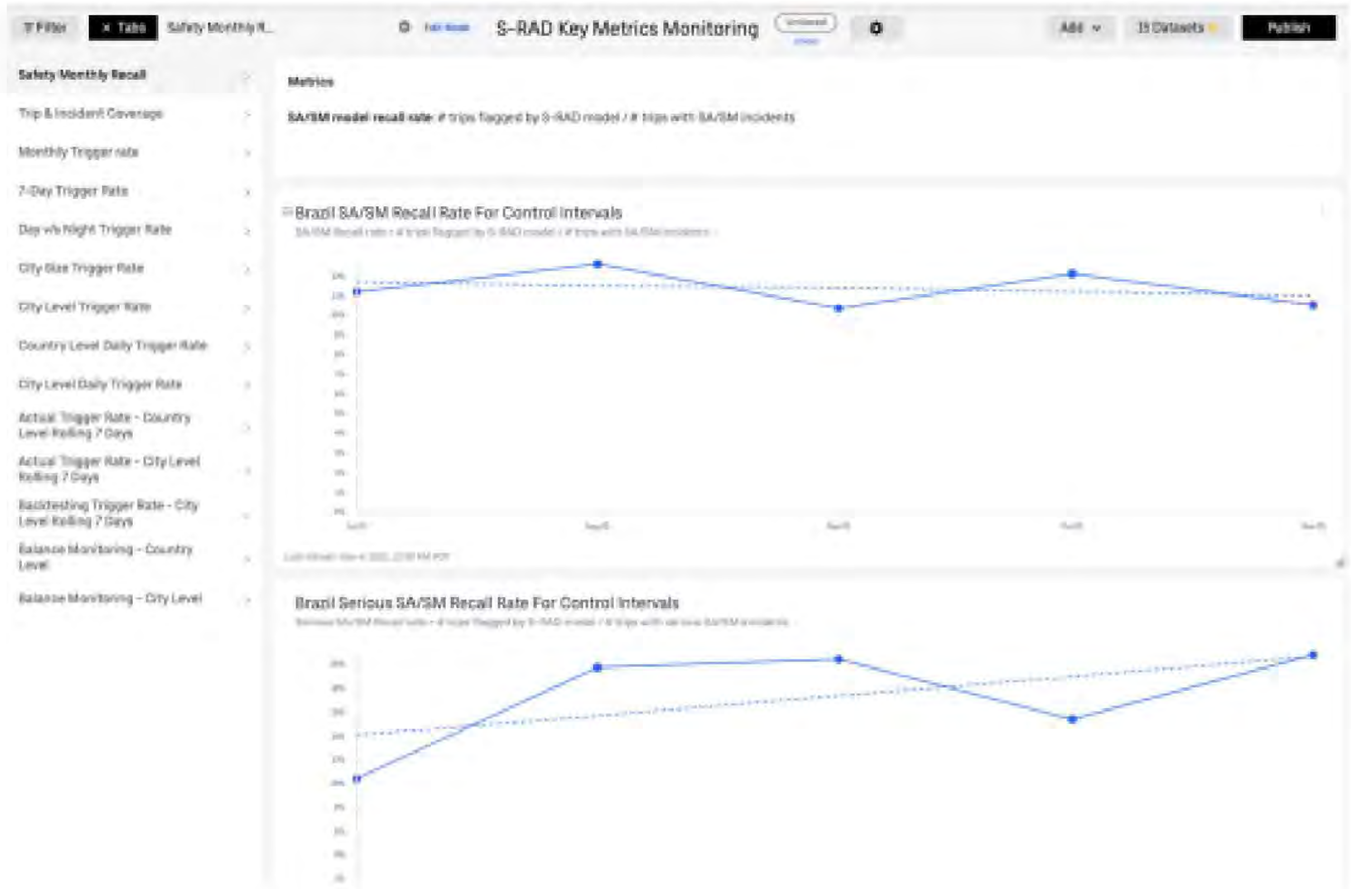


ATTORNEY-CLIE

New Dashboard

The new S-RAD dashboard was deployed recently to allow for better tracking of key metrics:

- Model Recall
- Trip and incident coverage
- Trigger Rates
- Balance of treatment/control in XP



ATTORNEY-CLIENT PRIVILEGED

Metrics

12.1%
Brazil SASM Recall

15.4%
Brazil Serious SASM Recall

16.6%
US SASM Recall

16.5%
US Serious SASM Recall

52.6%
Global SASM coverage

45.9%
Global Serious SASM coverage

ATTORNEY-CLIENT PRIVILEGED

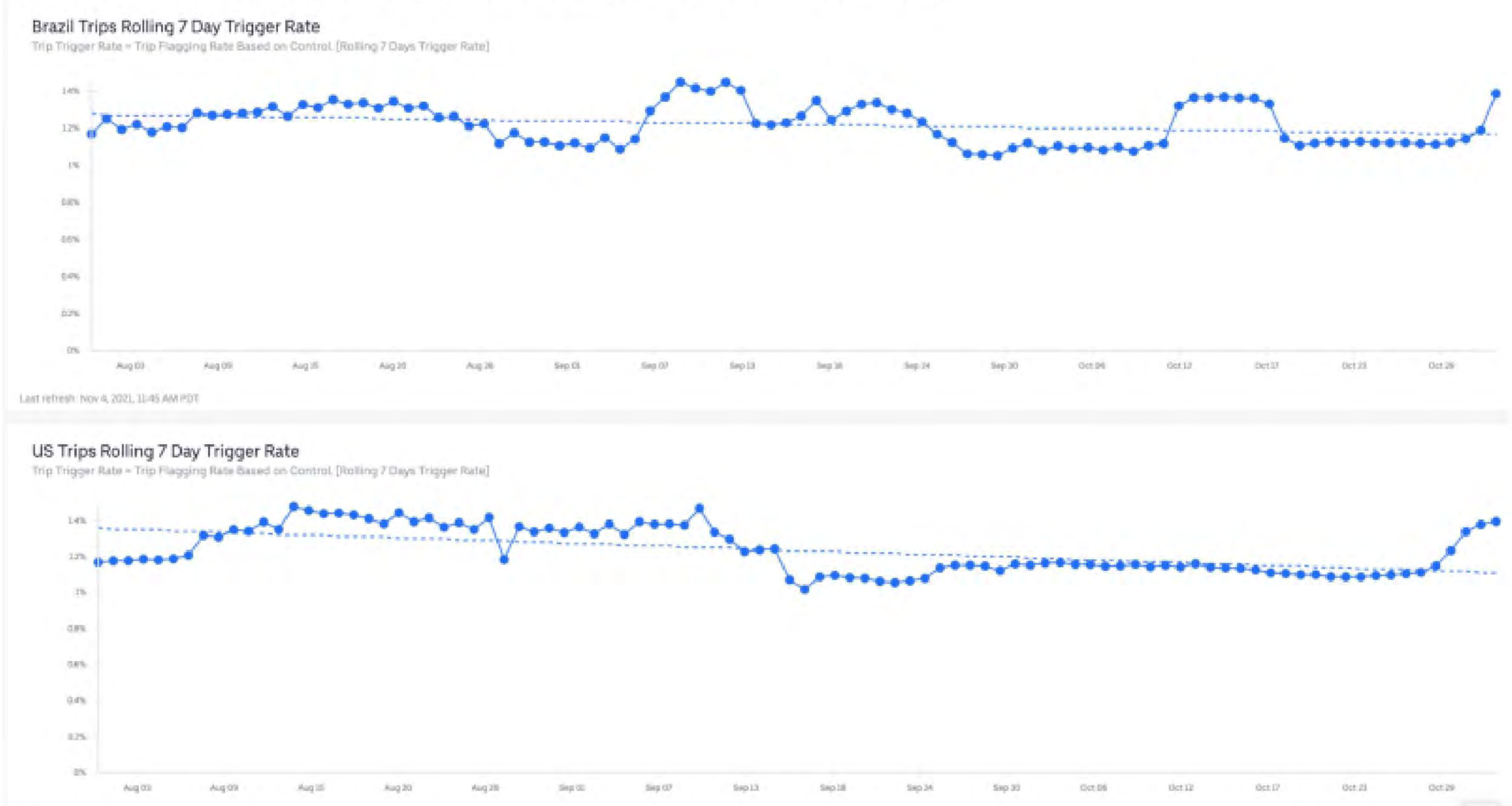
Note: October 2021 data

Slide 355 Notes

model recall rate: % trips with incidents that were flagged by S-RAD model
trip & incident coverage: we rolled out XP 100% in BR & US since Oct, S-RAD model is evaluating/covering 100% trips & 100% incidents there.

Actual Trigger rate (Rolling 7 days)

Trip Trigger Rate = Trip Flagging Rate Based on Control. [Rolling 7 Days Trigger Rate]



Slide 356 Notes

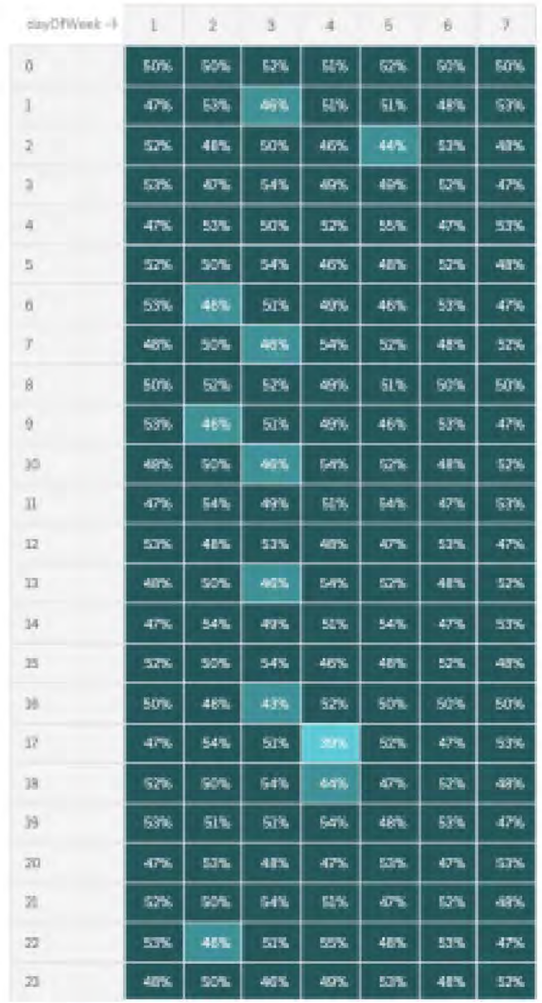
Trip trigger rate: % trips got flagged from total trips
The rolling 7-day smooths out the fluctuation of daily trigger rate.

XP Balance Monitor

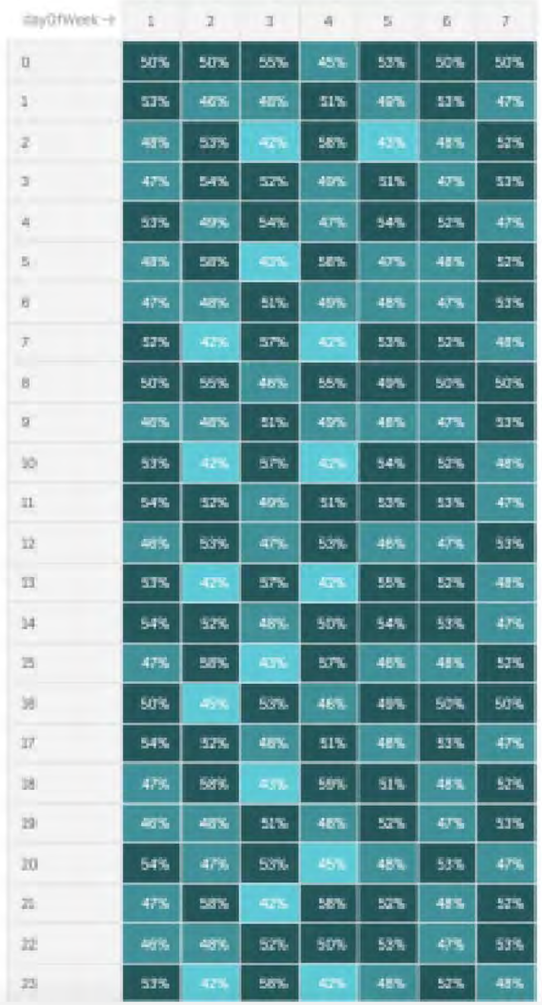
Percentage of treatment groups by day of week, hour of day

Country	Balance
Brazil	50.00%
US	49.99%

Brazil



United States



ATTORNEY-CLIENT PRIVILEGED

Slide 357 Notes

Now that XP is running in a combined mode (standalone and parallel switchback), balance monitor is to see if # control and treatment groups are equal **overtime**.
We monitor the **balance** (pct of treatment group) by time of day, day of week.
so far good balance on a country level
More parallel switchbacks running in US than in BR lead to more volatility.

Two tier alerting strategy for updating thresholds

- **Tier 1: Overall trigger rate alert**
  - Count the number of times the **overall 7 day rolling trigger rate** across all cities is 15% in either direction of the target trigger rate.
  - If 2 over/under triggering days within 14 days, **warn**
  - If 3 over/under triggering days within 14 days, **recompute and update all thresholds**
- **Tier 2: City-level trigger rate alert**
  - Current plan is to only monitor XL cities (smaller cities exhibit too much variability)
  - At the city level, count the number of times the overall 7 day rolling trigger rate is 25% in either direction of the target trigger rate
  - If 2 over/under triggering days within 14 days, warn
  - If 3 over/under triggering days within 14 days, recompute and update city's thresholds

ATTORNEY-CLIENT PRIVILEGED

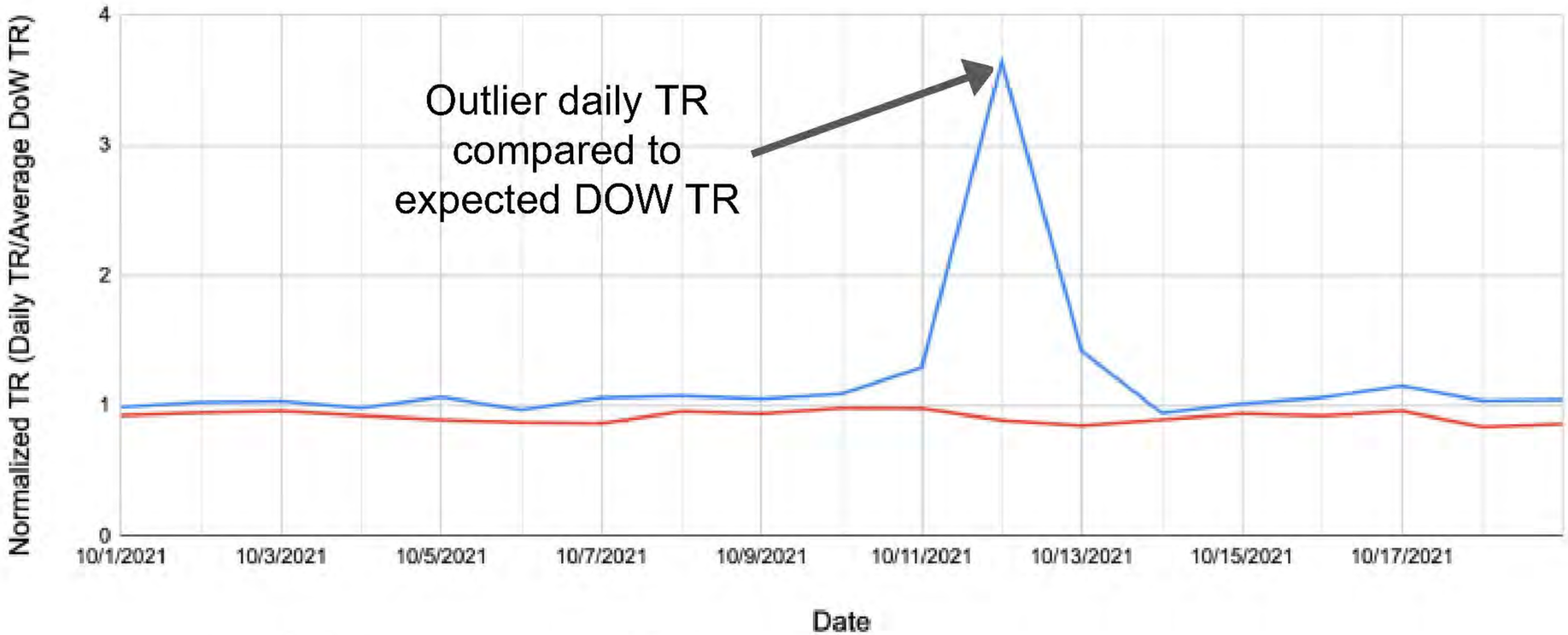
Trigger rate changes

- Alerting strategy has successfully identified 7 XL cities with deviating TRs, resulting in day/night threshold adjustments
  - 3 over triggering BR cities (Curitiba, Fortaleza, and Brasilia)
  - 3 under triggering US cities (Baltimore-Maryland, San Diego, New Jersey)
  - 2 over triggering US cities (Austin, San Diego)
- Country-level alert in US for under triggering resulted in all thresholds to be adjusted on 10/28/21
- Country-level alert in BR was active for 7 days starting on 10/12/21
  - Despite alert, all BR thresholds were not updated due to national holiday

ATTORNEY-CLIENT PRIVILEGED

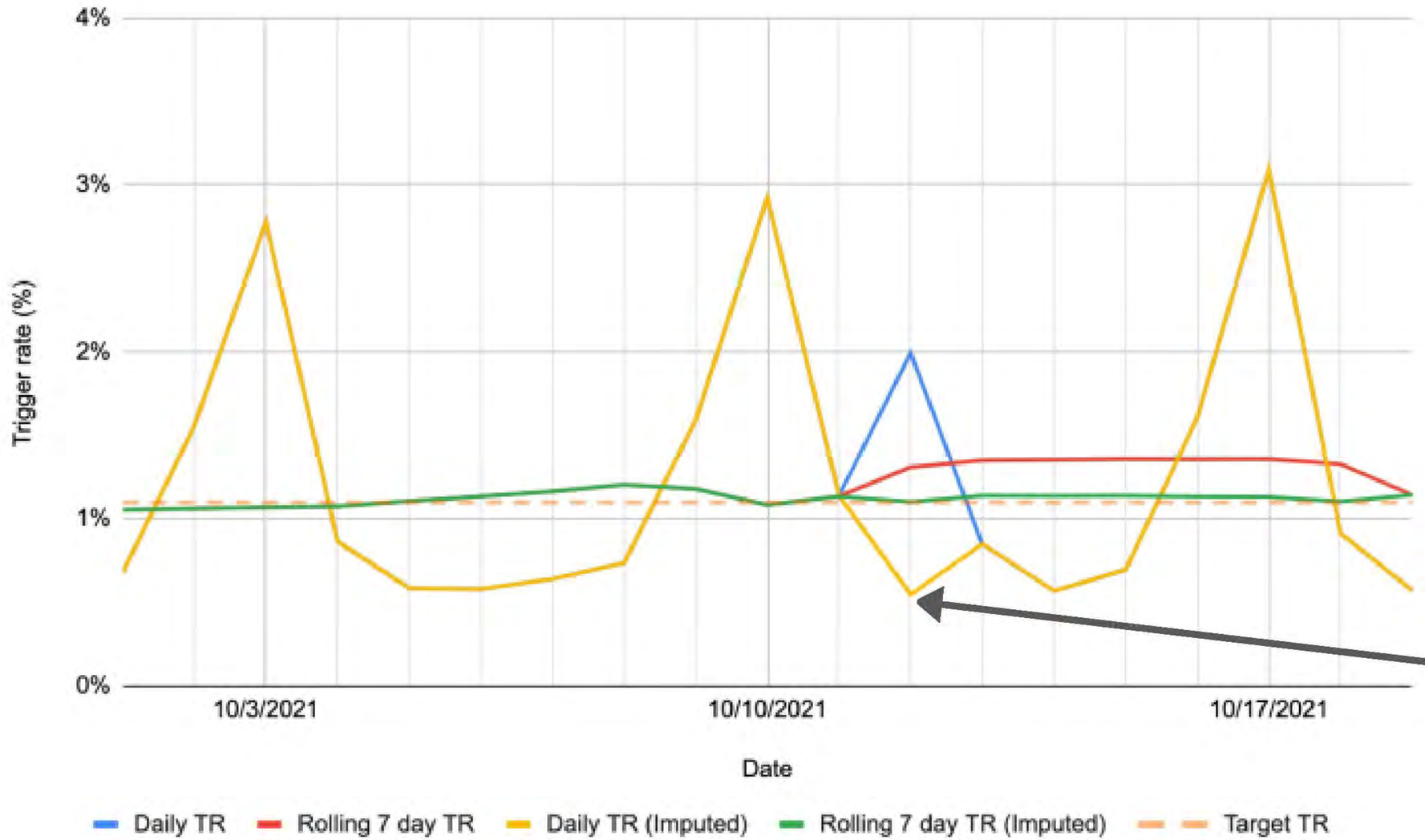
Handling Holidays

- Country-level alerting in BR starting on 10/15/21 highlights how holidays can have a pronounced and lasting impact on our metrics



TR ratio = Daily TR / Average DoW TR

Handling Holidays - BR



Imputing anomalous daily TRs with historic averages produces more consistent alerting

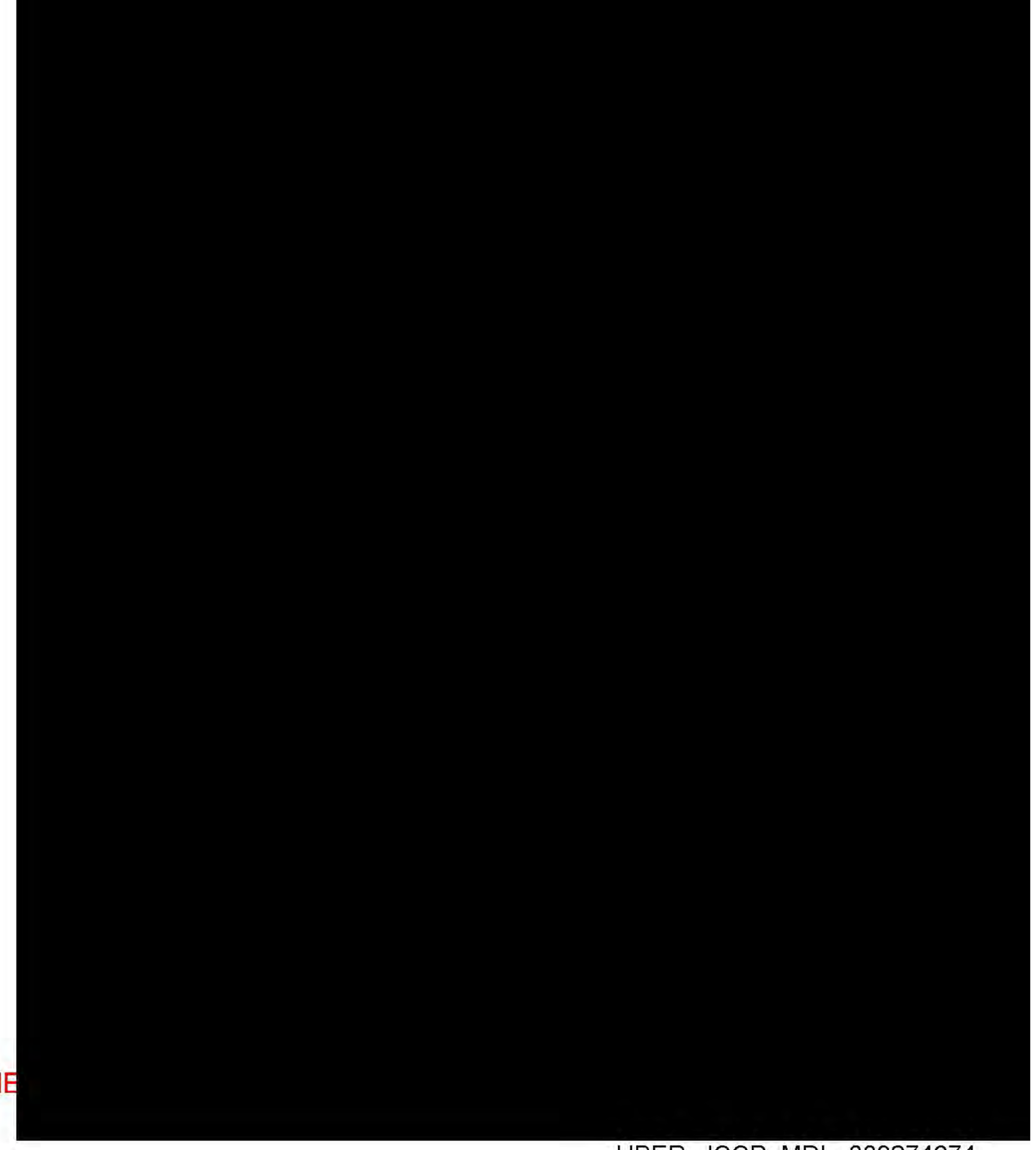
XP plan: Continue as normal during holidays

- Daily trigger rates will likely be elevated compared to day of week baselines
- We have the ability to isolate the impacts of holidays on our alerting metrics
- Observing SRAD behavior is important to build intuition for post XP rollout

ATTORNEY-CLIENT PRIVILEGED

SRAD Nudges

(8 min)



ATTORNEY-CLIE

Why SRAD Nudges?

0.4%

of Trips have SRAD score above the threshold*

These trips represent

5-7%

of SASM incidents*

These incidents have a higher frequency of occurrence on leaked SRAD trips

- Soliciting Sexual Act
- Non-Consensual Touching - Non-Sexual Body Part
- Comments or Gestures
  - Asking personal questions
  - Staring or Leering
  - Explicit Comments
  - Comments About Appearance
- Flirting

<u>Hypothesis</u>: We can nudge the users just-in-time to deter these behaviors

ATTORNEY-CLIENT PRIVILEGED

*Data from SRAD XP in the US and BR

REDACTED - PRIVILEGED

ATTORNEY-CLIENT PRIVILEGED

REDACTED - PRIVILEGED

We want to nudge the users just in time to reinforce good behavior

A/B Experiment:

- **Risk trigger**: Trips with SRAD score higher than the threshold
- **Users**: drivers and riders
- **Content:** Messaging based on Behavioral Economics principles *[examples on next slide]*
- **Channel:** Push + Actionable alert for drivers (if we have eng bandwidth). Push for riders.
- **When:** "Arriving state"
- **Frequency: "N"** messages per week (month) (TBD) *[initial proposal: 1/day, 3/week]*
- **Where:** Mexico

Umbrella Messaging: every 6 weeks send message to all drivers and riders taking a trip in Mexico between 11pm - 5am

Content - Messages

CONTENT JAM to be scheduled

	1st message **Channel: Push** ***Behavioral Prescription, loss aversion***	**2nd message** **Channel: Actionable alert** ***Priming, Tools awareness***	**3rd message** **Channel: Push/Actionable alert** ***Priming***
DRIVER & RIDER	A pro tip for **higher star ratings**: Be polite and respect riders' (drivers') personal space. A pro tip for **higher star ratings:** Be polite and respect riders' (drivers') personal space.	Tools for your peace of mind: You can turn on **Follow My Ride** to let your loved ones know where you are during your trip. Tools for your peace of mind: You can now **record audio** in your app and send to Uber, if you are uncomfortable in your ride	Your safety is our priority: We investigate all safety incident reports, and cooperate with law enforcement when necessary

Plan is to cycle through several such messages to keep the drumbeat going.
Messages would likely be customized for each market

ATTORNEY-CLIENT PRIVILEGED

Slide 367 Notes

Safety Tip:
We recommend that drivers record audio and have others follow their rides

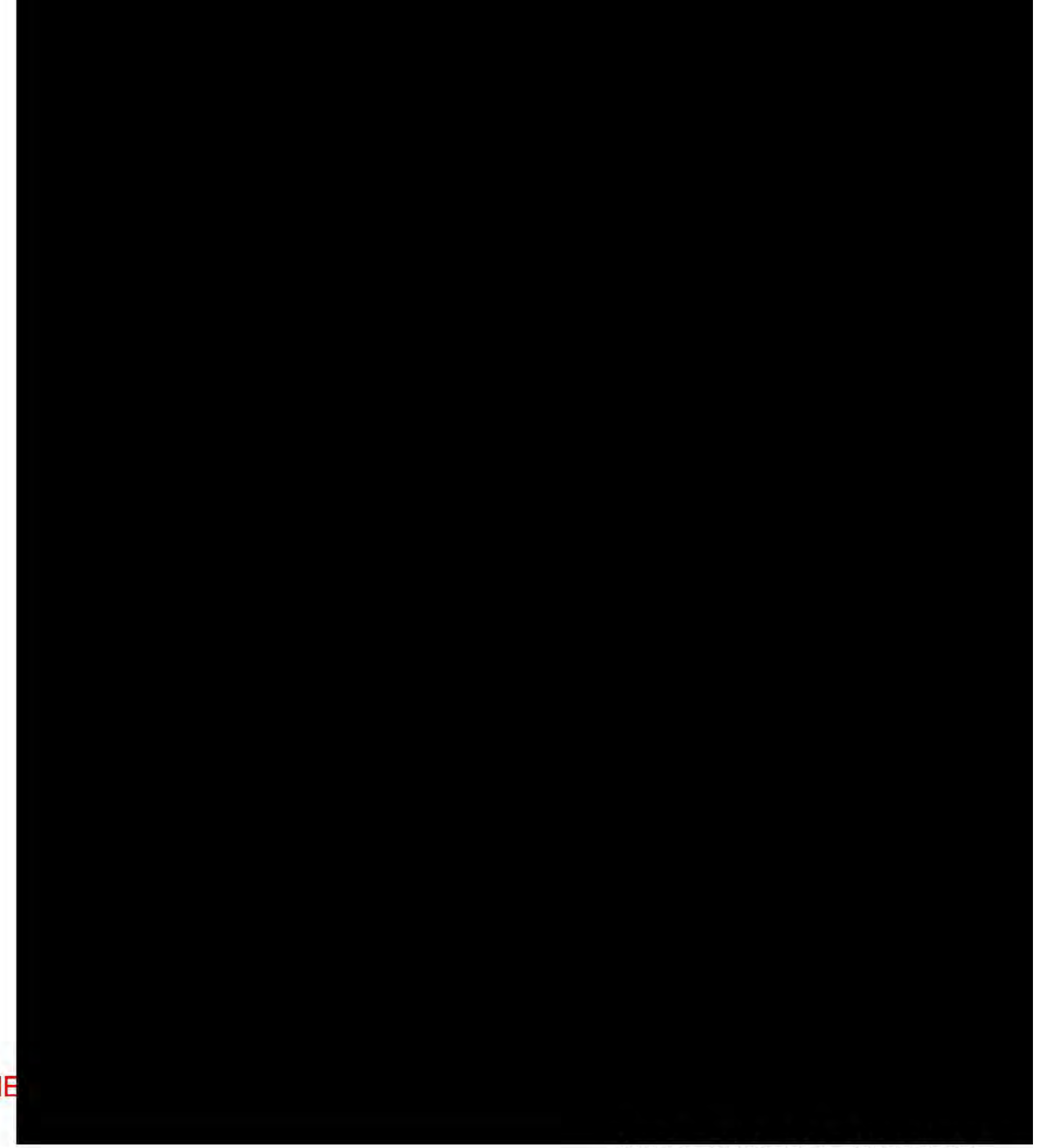
Next steps

- Finalize content, channel and frequency
    - Jam with global and local legal, policy and comms teams
- Plan XP launch with regional Ops
- Configure actionable alerts and flow campaigns
- Leadership approval (Dec 2021)
- Launch XP (ETA Jan 2022)

ATTORNEY-CLIENT PRIVILEGED

2022 H1 Plan

(10 min)



ATTORNEY-CLIE

2022 Approach

- Complete
  - Safety XPs in Brazil & US
  - IPC model development (H2'21)
- Launch
  - SRAD based Nudges XP in 1 market where S-RAD XP is not running (Mexico)
- Tentative
  - If Brazil XP succeeds, full roll out in Brazil. Explore expansion to LatAm.
  - If US XP succeeds, full roll out in US. Explore expansion to other developed countries.
  - If Nudges XP succeeds, explore testing in Brazil & US.

ATTORNEY-CLIENT PRIVILEGED

2022 H1 projects

Pri	Theme	Project	Description
P0	Ready for full rollout	SASM Safety XP	Complete US & Brazil XPs
P0		Hold out infra	Hold-out strategy & infra for S-RAD
P0		Threshold management	Automate threshold generation
P0		SASM Model rollout	Full rollout of SASM model in Brazil and US **(if ongoing XP succeeds)**
P0	Improve performance	features	**New batch features:** seasonality, bounce ride, ugraph, Mutombo failures, payment, id **New realtime features:** recent cancellation behavior, recent incident history
P0	Go Deep	Nudges - SRAD signal	Driver and Rider XP on High SRAD score trips + Periodic blast messages
P1		IPC Model	Launch IPC model in one market
P1		Beyond UberX	Expand to Low Cost trips in Brazil (8.24% SASM incidents) ***[along with full rollout}*** Expand to UberXL in US (2.82% SASM incidents)
P1	Expand geographically	LatAM	Marketplace XP in LatAm (after Brazil rollout)

Only after current XP succeeds

ATTORNEY-CLIENT PRIVILEGED

Tentative | Not started | Ongoing | Completed

2022 Roadmap

Q4'21 | Q1'22 | Q2'22 | Q3'22 | Q4'22 | 2023

★ *Nudges v1 ready*

★ *IPC model ready*

★ *Brazil XP Results*

★ *US XP Results*

6 months (80% CI) / 12 months (95% CI)

Brazil Experiments

Parallel Switchbacks

Brazil Safety Test

BR IPC Mkpl Test

BR full Rollout with holdout

LatAm Marketplace XPs

LatAm Full Rollout

US Experiments

Parallel Switchbacks

US Safety Test

US Full Rollout with holdout

Nudges

Nudges Definition
Design & Align

SRAD Nudges XP
Mexico

Model / Infra

IPC Model development

Holdout Infra

Uber

ATTORNEY-CLIENT PRIVILEGED

Slide 372 Notes

https://docs.google.com/presentation/d/19Sf917H6hwFixdWdOIpY_-GuKpjKeI3lI0XiNc_SQks/edit#slide=id.gdd02d22cfd_0_2

Appendix

[redacted]

ATTORNEY-CLIE

S-RAD

Leadership Update

09.16.2021

Uber

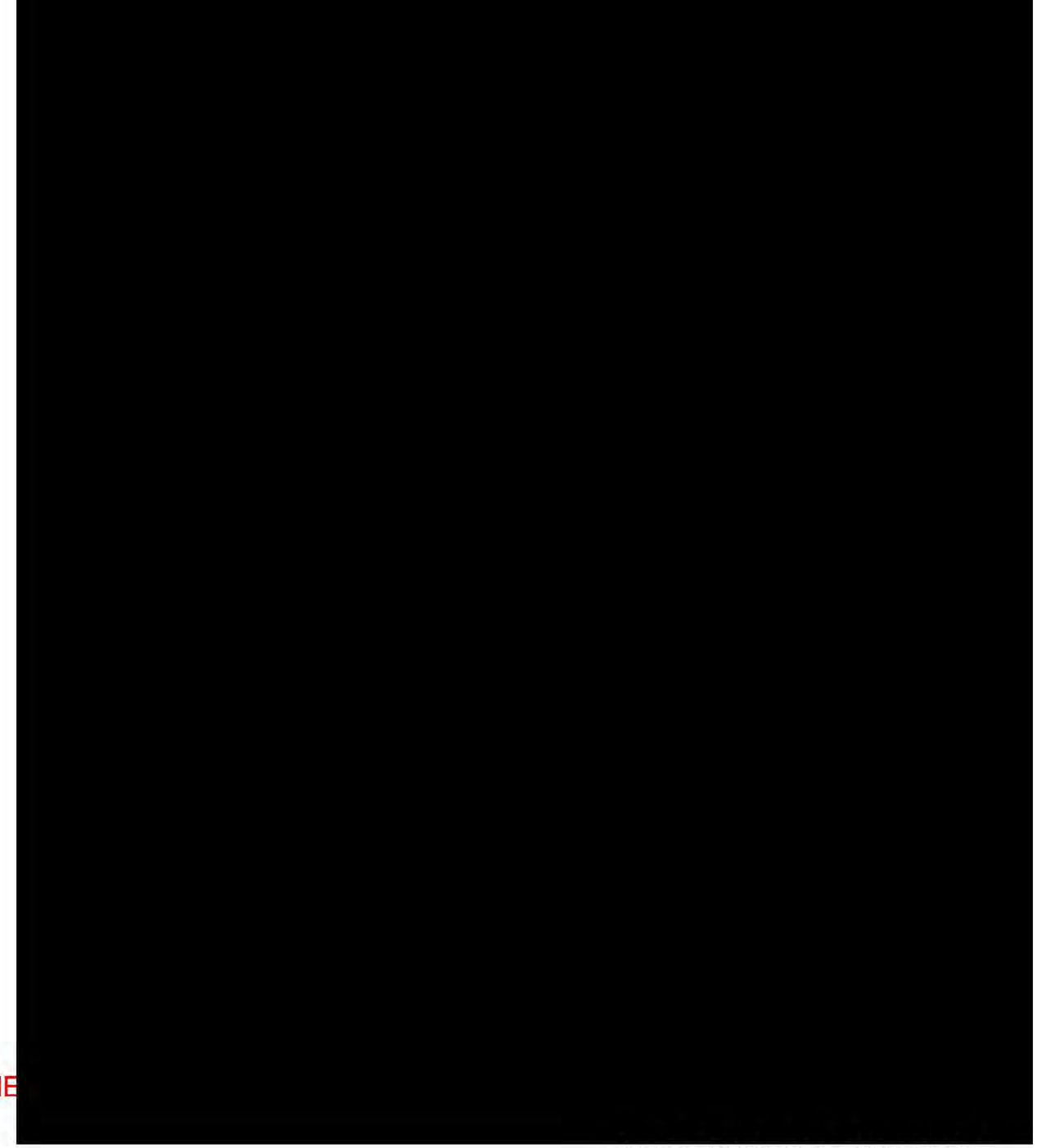
ATTORNEY-CLIENT PRIVILEGED

Summary

- **Monitoring marketplace metrics will be a challenge with parallel switchback.**
  - **Switchback frequency changed as a mitigation.**
  - **Tools & reporting cadence agreed to with regional Ops.**
- **Parallel switchback in 25 cities across US & Brazil over triggered.**
  - **We're trying to root-cause before we scale over the next two weeks.**
- **Future topics:**
  - **S-RAD nudges jam (slides in the appendix)**
  - **IPC model**

ATTORNEY-CLIENT PRIVILEGED

Marketplace metric monitoring

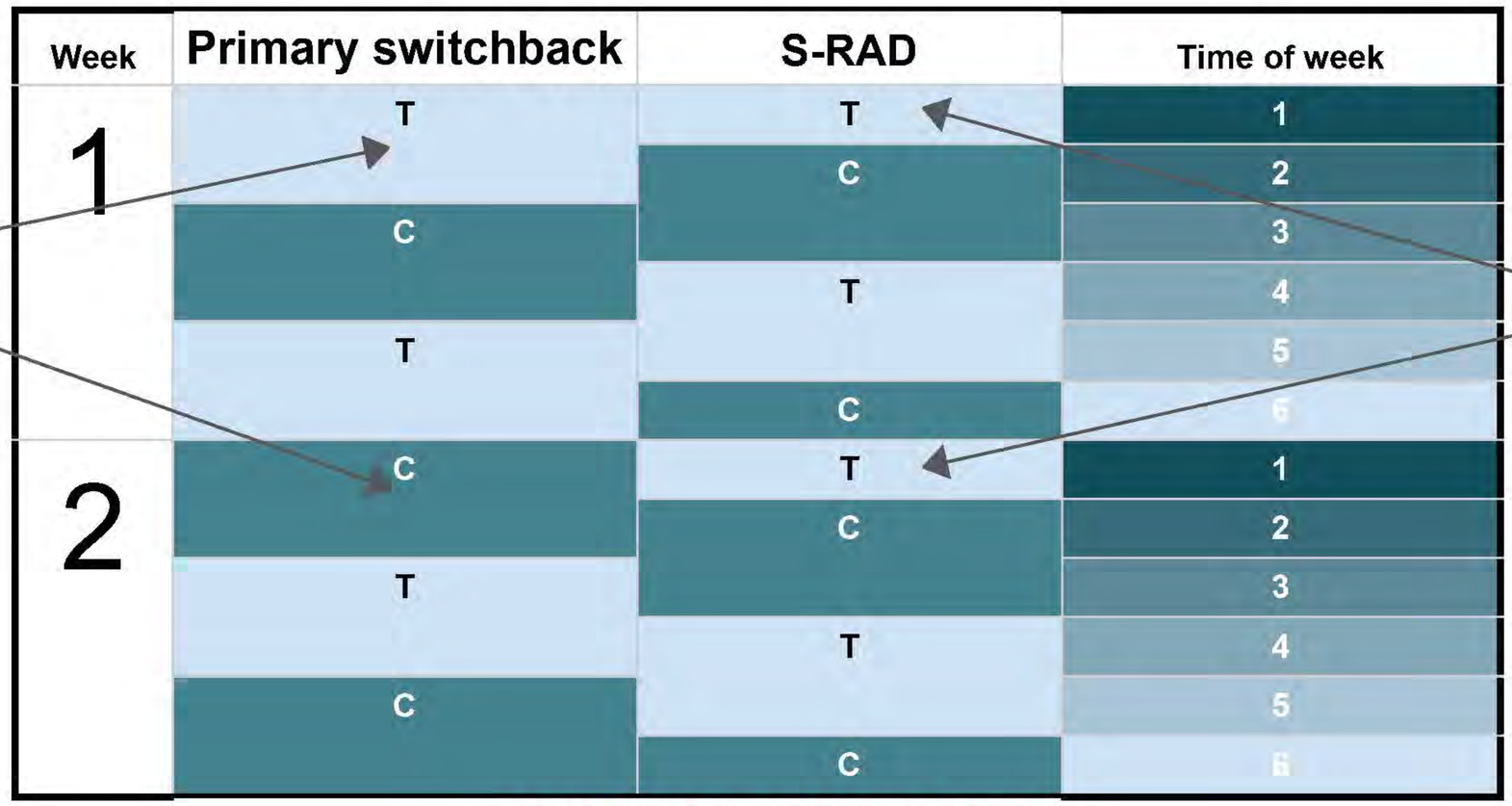


ATTORNEY-CLIE

Parallel switchbacks pose marketplace impact reporting challenges

No balance for S-RAD over two week period

Typical switchback schedule allows us to measure Treatment effects



Lack of balance doesn't allow us to measure treatment effects

ATTORNEY-CLIENT PRIVILEGED

How do we monitor marketplace impact during long running safety experiment?

Monitor	How it works
Real-time Trigger rate monitor	• If S-RAD triggers a lot higher than historically observed, raise alerts
Weekly Trigger rate monitor	• If S-RAD triggers higher than the target weekly trigger rate (+/- 0.1%) for 3 consecutive weeks, raise an alert. City specific guard-rails will be larger.
T&C balance monitor	• T&C balance monitor that can highlight what parts of the day/hour do not have balance b/w treatment and control for the lifetime of the safety XP

4-week Marketplace Impact	• Rolling 4-week impact, reported bi-weekly
	  ○ p99/p95/Avg post dispatch ETA, C/R, Acceptance Rate, Unfulfilled %, Rider cancel %, Driver cancel %
	  ○ Report % night time trips in treatment vs control

ATTORNEY-CLIENT PRIVILEGED

How will we handle alerts?

Issue Type	Action
Transient Real-time alert	• DS/DA will debug and provide recommendations to avoid future alerts • PM to share findings with Regional Ops and determine next steps
Recurring real-time trigger rate alert	• DS to recommend a threshold update to lower trigger rate
Trigger rate Beyond guardrails	• DS to recommend a threshold update to lower trigger rate
Marketplace metric degradation	• Regional Ops can recommend updating thresholds • DS to define new thresholds • Use RAPID to resolve any misalignment

Alert Response Team (Brazil)

Decision to be made:

Do we lower the trigger rate? Do we adjust/remove “N”?

Response Team:

Recommend	Dharmin Parikh, Gorkem Ozkaya
Agree	Mike Akamine, Frank Chang
Perform	Gorkem Ozkaya, Giovani Demartini, Andre Hahn, Ben Marchi
Input	Wayne Zhang, Daniel Kolta, Giovani Demartini, Carolina Corral, Aldo Parra, Rafael Thosi
Decide	Gus Fuldner, George Gordon

ATTORNEY-CLIENT PRIVILEGED

Alert Response Team (US)

Decision to be made:

Do we lower the trigger rate? Do we adjust/remove “N”?

Response Team:

Recommend	Dharmin Parikh, Gorkem Ozkaya
Agree	Mike Akamine, Frank Chang
Perform	Gorkem Ozkaya, Giovani Demartini, Andre Hahn, Ben Marchi
Input	Wayne Zhang, Daniel Kolta, Giovani Demartini, Susan Muehrcke, Victor Brailoiu
Decide	Gus Fuldner, Dennis Cinelli

ATTORNEY-CLIENT PRIVILEGED

Parallel switchback over-triggering

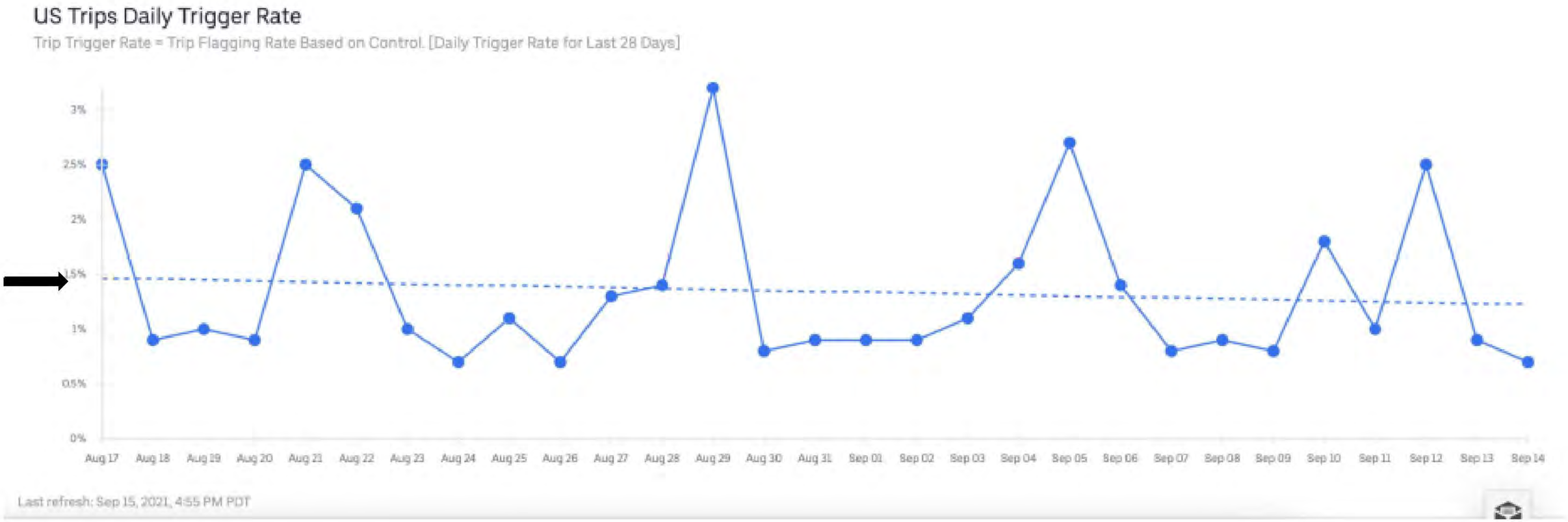
[redacted]

ATTORNEY-CLIE

Dashboard under peer review - results may change

US Safety XP - Parallel switchback over-triggered

10 cities, Target Trigger Rate 1.25%



ATTORNEY-CLIENT PRIVILEGED

Note: Trigger rate monitor for parallel switchbacks was launched on Tuesday

Dashboard under peer review - results may change

Brazil Safety XP - Parallel switchback over-triggered

15 cities, Target Trigger Rate 1.1%

Brazil Trips Daily Trigger Rate

Trip Trigger Rate = Trip Flagging Rate Based on Control. [Daily Trigger Rate for Last 28 Days]



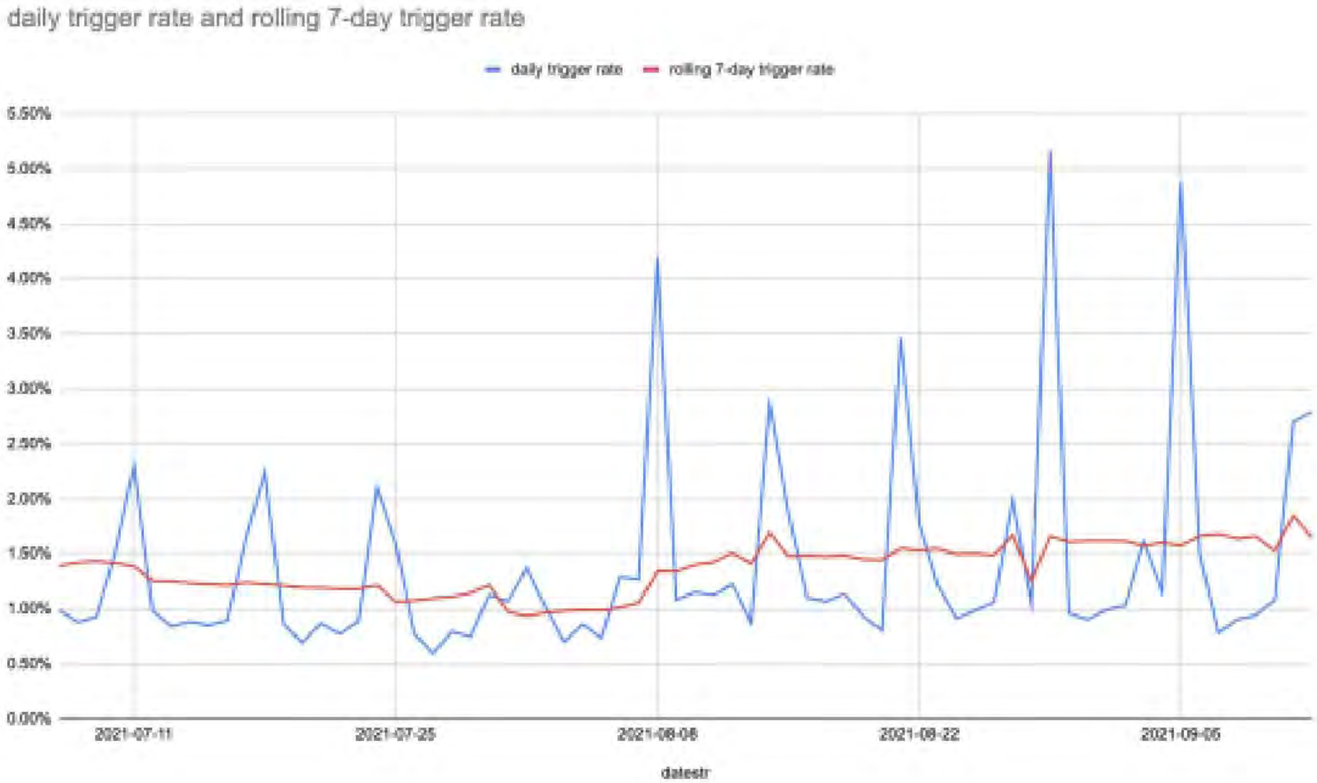
Last refresh: Sep 15, 2021, 4:55 PM PDT

ATTORNEY-CLIENT PRIVILEGED

Dashboard under peer review - results may change

Parallel switchbacks also pose trigger-rate measurement challenges

Boston Trigger Rates



- Thresholds determined based on 07-2021
- Graph shows an over-triggering in August/September 2021
- Shift is partly due to the imbalanced treatment/control sequence
- Switch frequency changed from **288** minutes to **96** minutes as a mitigation measure

ATTORNEY-CLIENT PRIVILEGED

Slide 385 Notes

The Boston example is added to illustrate the trigger rate measurement challenge

Next steps

- Understand the causes behind trigger rate changes & determine process to update thresholds periodically

- Scale out the XP in **two tranches** over next two weeks (assuming trigger rates within bounds for the first tranche)



	Sept 20th	Sept 27th	Oct 4th
Brazil	50 cities		+60 cities
US	50 cities		+146 cities

ATTORNEY-CLIENT PRIVILEGED

H2'21 Roadmap

Not started | Ongoing | Completed

Jul | Aug | Sep | Oct | Nov | 2022

★ Lock Trigger rates

★ 25 cities

★ ★ ★ 33% 66% 99%

Parallel switchback coverage

★ Full Rollout

6 months (80% CI) / 12 months (95% CI)

Brazil Experiments	Parallel Switchbacks	Gender based model, LR25 Intervention Phase 7 - *Safety Tests*	
US Experiments	Gender agnostic model Phase 6c - *Marketplace Test*	Parallel Switchbacks	Gender agnostic model, LR25 Intervention Phase 7 - *Safety Test*
Nudges	**PoC** SRAD Signal & Flow Trigger event	**Nudges Definition** Design & Align	**Nudges XP** Market TBD
Model / Infra	**IPC Model Development**		Holdout Infra

Uber

ATTORNEY-CLIENT PRIVILEGED

Slide 387 Notes

https://docs.google.com/presentation/d/19Sf917H6hwFixdWdOIpY_-GuKpjKeI3lI0XiNc_SQks/edit#slide=id.gdd02d22cfd_0_2

Appendix

ATTORNEY-CLIENT PRIVILEGED

S-RAD Nudges

[redacted]

ATTORNEY-CLIE

S-RAD experiments: Key Insights

- **S-RAD's Serious SASM recall is ~15%. However, it loses ~6-7% efficacy.**
  - ~6-7% of SASM incidents in Brazil and the U.S. occurred on dispatches with high S-RAD scores (even though S-RAD flagged such trips as risky, they were dispatched and an incident occurred)
- **~64-70%** of **serious SASM** incidents in the BR/U.S. experiment were **reported by riders.**
- Most frequent SASM issues:
  - Soliciting Sexual Act *(most frequent in Brazil)*
  - Non-Consensual Touching - Non-Sexual Body Part *(Most frequent Serious SASM in Brazil & US)*
  - Comments or Gestures *(most frequent in US)*
    - Asking personal questions
    - Staring or Leering
    - Explicit Comments
    - Comments About Appearance
  - Flirting

Should we explore ways to reduce the efficacy loss?

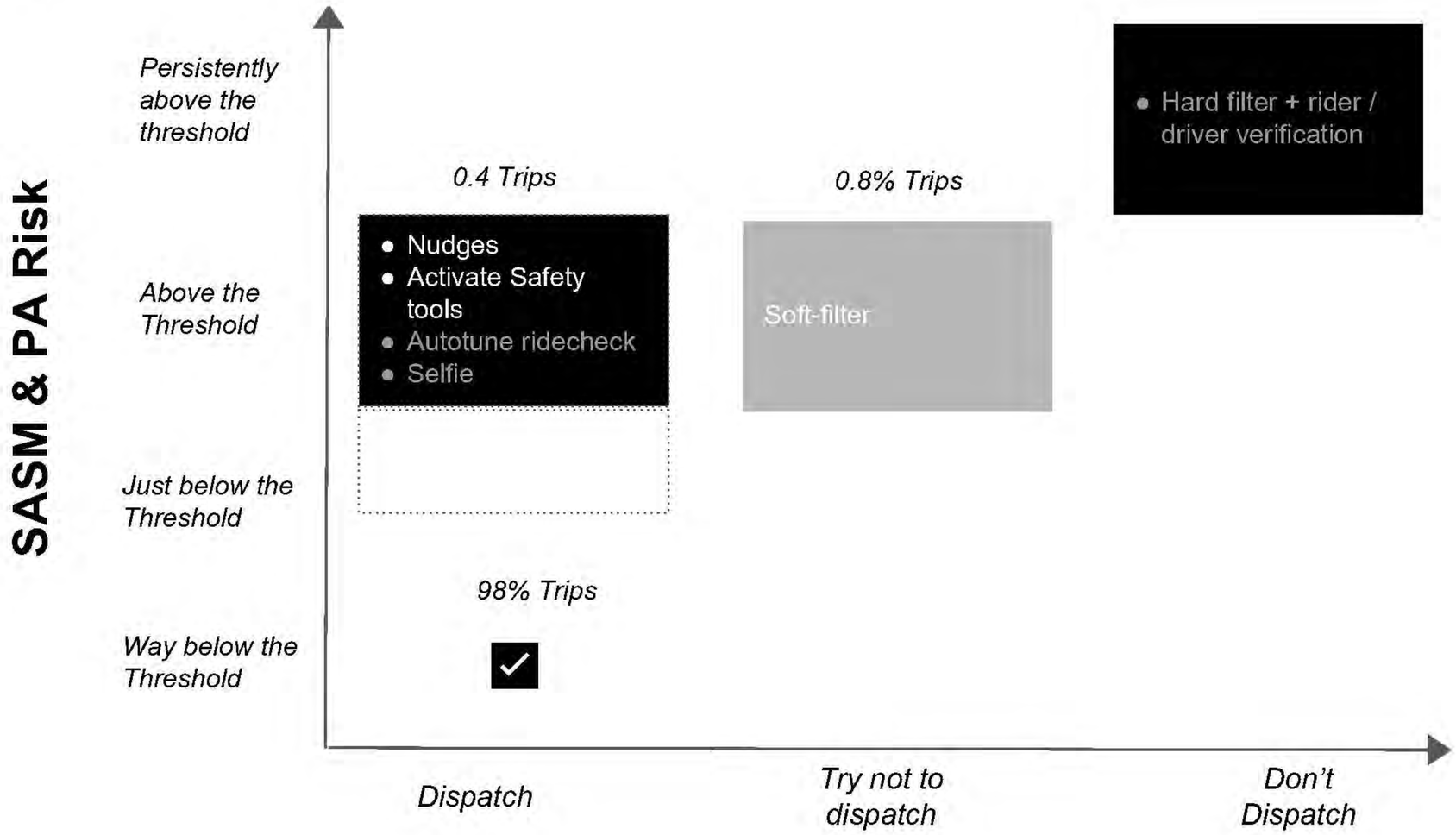
ATTORNEY-CLIENT PRIVILEGED

*Data from SRAD XP in the US and BR

Slide 390 Notes

Still collecting data on driver/rider distribution of trips flagged per day, etc

Opportunities



ATTORNEY-CLIENT PRIVILEGED

Slide 391 Notes

Focus on the left side - still figuring out the right side

Proposed Approach

Option 1 **Generic Nudges**	Send generic messages to riders and drivers on **trips with high score**
Option 2 **Targeted Nudges**	Send targeted messages **on high score trips and based on salient features** (user has a previous SM incident, user has low ratings, etc.)
Option 3 **Activate Safety Tools**	**Automatic opt-in of safety features** ("safe mode") messaging the users which features are / will be turned on. (e.g. You can activate audio recording and share both yours and your rider trip for extra safety. Button: "Yes, activate")

Phase 1 - project's risk questions/concerns

- S-RAD nudges may pose a policy/comms/legal challenge
  - Alternative: Nudges on all night time trips regardless of S-RAD scores (10% of all trips → sustainable long term?)
- Are Nudges too soft to make an impact?
  - Alternative: Activate safety tools
  - Alternative: Hard filter + verification

ATTORNEY-CLIENT PRIVILEGED

Slide 392 Notes

Policy view: Concern is that if in the future, we have to disclose information on this, how we explain or justify we had the information that it was a high-risk trip but we still match it and we even send a nudge to those involved, and a very bad incident happened. From my perspective, it will be how to explain that to the public, gov officials, etc.
Legal view:

SRAD NUDGES: Generic Messages

Phase 1 XP

ATTORNEY-CLIENT PRIVILEGED

Nudges XP: Key Questions

- When should we send a nudge?
- What channels should we use?
- How often can a user receive nudges?
- What would be the right content?

ATTORNEY-CLIENT PRIVILEGED

BRAINSTORMING DECK

Hypothesis	If we send just-in-time **nudges** highlighting safety features and good behavior practices to users on dispatches with high S-RAD risk, we can encourage positive behavior in the platform, decreasing the SA/SM rate
Goal	**Decrease SASM IR on High SRAD score trips**

Nudge theory is a concept in behavioral economics, political theory, and behavioral sciences that proposes positive reinforcement and indirect suggestions as ways to influence the behavior and decision-making of groups or individuals.

ATTORNEY-CLIENT PRIVILEGED

Slide 395 Notes

"A nudge, as we will use the term, is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not " (Thaler, Richard, and Cass Sunstein (2008)

When should we send a nudge to drivers?

Driver accepts a trip

Why not:
- He might be already driving another person (consecutive dispatch)
- He might be in a hurry to check the map and go to the rider pick-up point

En-route

Why not:
- If he is on the move it's not good to send something on his way to remove his attention from traffic

Why yes:
Can we use our technologies to send a message when we sense a breaks/stopped at a light?

Arrived at pick-up

Why not:
- Lot going on at the pick-up. It might be overwhelming (looking for rider+parking+nudge)

Why yes:
-To take into account cancellations after acceptance this could be a good time
- He is stopped while he waits the rider

Starts a trip

Why not:
- He would have to read while rider is already in the car waiting for him to move

Driver is offline

Why not:
- We're trying to intervene real time/on that trip. If we send offline messages we'll be trying to educate the driver in the platform as a whole, which is not the goal of this experiment.

What channels should we use?

Push

Why not:
- Low reliability. We should combine with another channel

Why yes:
- Easy to configure
- Good message size
- Amplifies the chance driver will be impacted if we use +2 channels

Carbon actionable alert

Why yes:
- We've never used this media before for safety
- It seems the most impactful (right on the driver's face/app)
- Amplifies the chance driver will be impacted if we use +2 different channels

One-pager/Safety Check-up

Why not:
- Too complicated for a first experiment
- More friction to drivers
- It requires a hyperlink on app to open a one-pager, we don't want drivers spending a lot of time on this. We want short messages

Voice Message

Why not:
- It's not built yet
-Riders may listen to it and car vibe can get weird

Why yes:
-Listening is easier than reading while driving/waiting for rider

CONFIDENTIAL

How often should a driver see a nudge?

Every high-score trip	Cap n times a day	Cap n time a week
We're depending on trigger frequency data per driver to make this decision	We're depending on trigger frequency data per driver to make this decision	We're depending on trigger frequency data per driver to make this decision

What we really want to measure in the XP (drivers and riders)

Channel Message	Time message received	Content Message	Who gets the message
Why not: Multiple variables for this experiment, we need to focus on one only to measure its effectiveness. We'll explore the most simple channels first	**Why not:** Multiple variables for this experiment, we need to focus on one only to measure its effectiveness. After we know which messages work, we'll explore when the message is better received (better conversion time for drivers and riders)	**Why yes:** Given the purpose of the experiment is to find a message that will deliver exactly what we want to drivers and riders (disrupt motivation, disrupt the sense of ease with which the offender feels they can offend with positive messages), we;d like to play with different content	**Why not:** Multiple variables for this experiment, we need to focus on one only to measure its effectiveness. We'll try messaging booth given there is no predominant offender (reported against is ~50/50)

When should we send a nudge to riders?

Right after driver match	**En-route**	**On-trip**	Home screen
Why not: - Rider might request and go ahead do other things not interacting with phone (get ready, say goodbye)	**Why not:** - Rider already gets lots of messages (ride info, etc) **Why yes:** Moments before pick-up we believe there is a higher chance the rider will pick-up the phone to check where the driver is and see the message, since he is expecting something from Uber	**Why not:** - He might not open the Uber app after entered the car **Why yes:** -Rider is probably using the phone while on trip which increases the chance to see the message -We generally impact riders less during the trip	**Why not:** - We're trying to intervene real time/on that trip. If we send offline messages we'll be trying to educate the rider in the platform as a whole, which is not the goal of this experiment.

What channels should we use?

Push	**Ring**	Email
Why not: - Low reliability. We should combine with another channel **Why yes:** - Easy to configure - Good message size - Amplifies the chance rider will be impacted if we use +2 channels	**Why yes:** - We have the capability of having a ring on-trip which is showing promise in experiments like ads and rider early lifecycle - Amplifies the chance driver will be impacted if we use +2 different channels	**Why not:** - Very low chance riders will see an email before or during their trip - We need something more "in the rider's face" and in the moment

How often should a rider see a nudge?

Every high-score trip	Cap n times a day	Cap n time a week
Riders frequency in the Uber app is much lower than driver's frequency. If they're impacted every high-score trip, there's a high chance it will be less than 1x/week. We're depending on trigger frequency data per rider to make this decision	We're depending on trigger frequency data per rider to make this decision	We're depending on trigger frequency data per rider to make this decision

Principles of messaging

Messaging Options	
Reciprocity Bias: responding to a positive action with another positive action. Create social norms and give salience to correct behaviors	**Behavioral Prescription:** provide clear set of guidelines for desired behaviour making it clear what is and isn't acceptable.
Power of Now: Focus on events today, as opposed to in the future. Give salience to negative outcomes of poor behavior.	**Priming**: Emphasise idea of being watched to prime good behaviour. Given salience to greater sense of risk in being caught
Authority Bias: When beliefs are swayed by authority. Anchor people to authority of the police, for example.	**Availability Bias:** people predict the probability of an event based on how easily it can be brought to mind. Dispel negative myths about non-reporting.
Anchoring: Look for a point of familiarity for decision-making. Anchor to potential worst outcomes of poor behaviour.	**Loss aversion:** Losses feel worse than gains feel good. Dial up what drivers stand to lose through poor behaviour (criminal charges, etc)

Behavioral Economics principles

Given that SRAD is a low precision model ("good actors" will also be receiving the nudge), we will uses **Reciprocity Bias** and **Behavioural Prescription** principles to guide our message content creation. We want:

- **Reinforce positive actions versus negative actions and consequences**
- **Empower users versus triggering fear**
- **Minimize annoyance and friction**
- **Align the message with driver/rider goal in the platform** (e.g. driver wants more earnings/ratings/trips)
- **Focus on deterring the key SA/SM issue types identified in the model**:
  - Soliciting Sexual Act
  - Non-Consensual Touching
  - Asking personal questions
  - Staring or Leering
  - Explicit Comments
  - Comments About Appearance
  - Flirting

ATTORNEY-CLIENT PRIVILEGED

Slide 400 Notes

We want:
Reinforce positive actions versus negative actions and consequences
Empower users versus triggering fear
Minimize friction & annoyance

1st Experiment - **Driver** Messages

- **Goal**: experiment with **message content** only to identify which type of message works best, Message content should: a) reinforce positive actions versus negative actions and consequences; b) empower users versus triggering fear; c)minimize friction & annoyance; d)align with driver's goal (nudge him to the right direction)
- **How:** 2 treatments: each one based on one behavioral economics principle
- **Channel:** Multiple touchpoints to increase impact (same channels for every treatment)
- **When:** en-route to pick-up when we identify a stop

Treatment 1 - Behavioral prescription	Treatment 3 - Reciprocity Bias
Channels: 1st message:1 actionable alert 2nd message: 1 push 3rd message: 1 actionable alert **Message type:** ● 3 different messages ● After receiving all 3 messages, drivers re-enter the cycle and start getting the messages again until the end of the XP	**Channels:** 1st message:1 actionable alert 2nd message: 1 push 3rd message: 1 actionable alert **Message type:** ● 3 different messages ● After receiving all 3 messages, drivers re-enter the cycle and start getting the messages again until the end of the XP

ATTORNEY-CLIENT PRIVILEGED

Brazil XP - **Driver** Messages

	Ingredients of the message	1st message - Actionable alert	2nd message - Push	3rd message - Actionable alert
Treatment 1 Behavioral prescription	Describe to drivers what is acceptable behavior in the platform (respect personal space, polite conversation) Describe to drivers safety tools that make the ride safer (turn on audio recording, share your trip, awareness on ride check, etc)	Keep up the high ratings you're receiving! Maintain your {4.9} respecting riders personal space and having polite conversation	Audio Recording allows Uber to monitor all trips Riders and Drivers can turn the feature on for added safety (use any other tool)	Thank you for your {#trips} with Uber! Now riders and drivers can record the audio of the trip for extra safety! (button: Turn on audio) (use any other tool)
Treatment 2 Reciprocity Bias	Thank drivers for getting riders home safely; make sure they feel appreciated Cater to their desire for higher ratings Cater their desire to be respected	Rider and driver safety is our priority. Thank you to all the drivers who respect riders and get them home safe at night.	5 stars works both ways. Thank you for your hard work on getting {4.8}!	Something with tools

CONTENT IS NOT FINAL. COPYWRITER TEAM WILL RE-CREATE

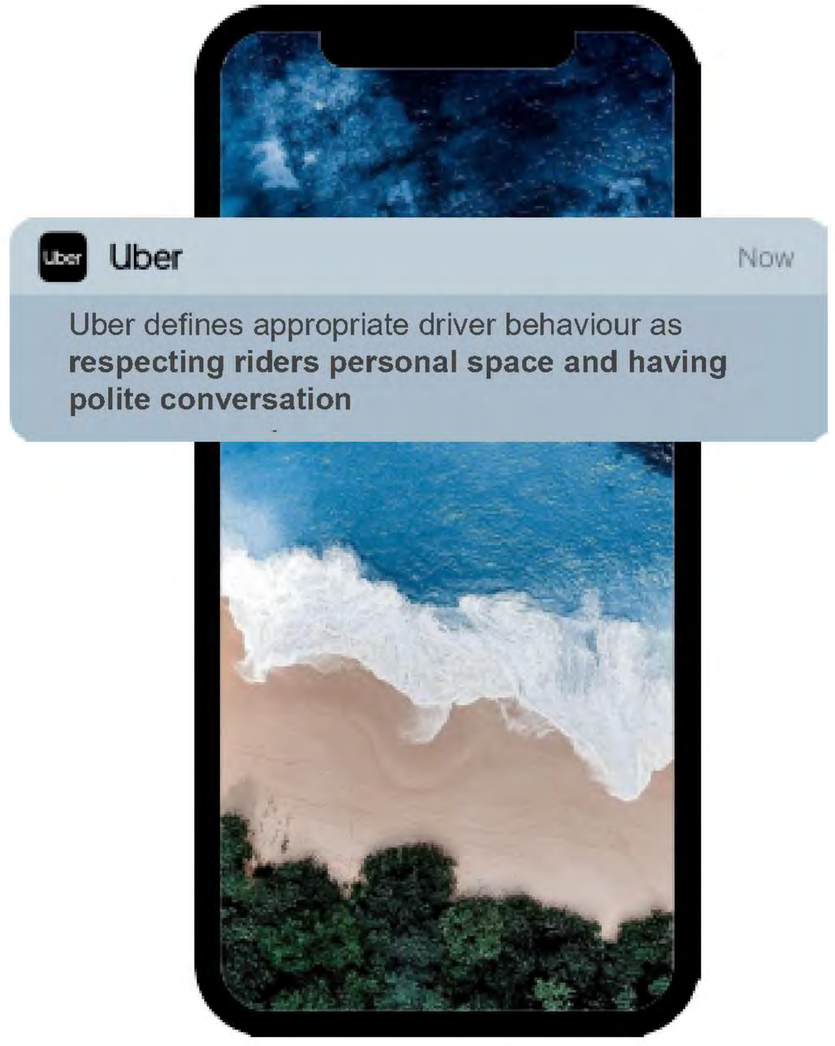
US XP - **Driver** Messages

	Ingredients of the message	1st message - Actionable alert	2nd message - Push	3rd message - Actionable alert
Treatment 1 Behavioral prescription: provide behavioural prescription around the desired behaviours to make it clear to drivers what is/isn't acceptable	Describe to drivers what is acceptable behavior in the platform (respect personal space, polite conversation) Describe to drivers safety tools that make the ride safer (turn on audio recording, share your trip, awareness on ride check, etc)	Keep up the high ratings you're receiving! Maintain your {4.9} respecting riders personal space and having polite conversation	Thank you for your {#trips} with Uber! Our RideCheck technology live monitors a trip and intervenes when we identify possible unsafe situations	Trips can be shared live for safe monitoring. Share your trip and know that Uber works with the police in case there's need to identify and charge criminal behaviour.
Treatment 3 Reciprocity Bias: Engender feelings of reciprocity by thanking drivers for getting riders home safe at night and stating that rider/driver safety is important to Uber to encourage drivers to continue to do so.	Thank drivers for getting riders home safely; make sure they feel appreciated Cater to their desire for higher ratings Cater their desire to be respected	Rider and driver safety is our priority. Thank you to all the drivers who respect riders and get them home safe at night.	5 stars works both ways. Thank you for your hard work on getting {4.8}!	Everyone can share their trip for live monitoring. (button: Share my trip)

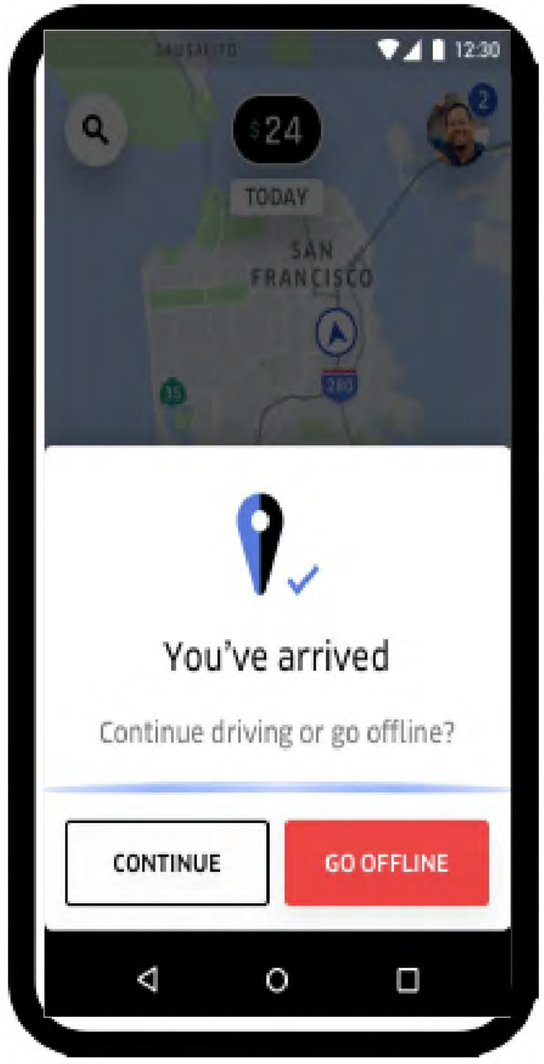
CONTENT IS NOT FINAL. COPYWRITER TEAM WILL RE-CREATE

BRAINSTORMING DECK

Push notification



Actionable alert



1st Experiment - **Rider** Messages

- **Goal**: experiment with **message content** only to identify which type of message works best, Message content should: a) reinforce positive actions versus negative actions and consequences; b) empower users versus triggering fear; c)minimize friction & annoyance;
- **How:** 2 treatments: each one based on one behavioral economics principle
- **Channel:** Multiple touchpoints to increase impact (same channels for every treatment)
- **When:** waiting with driver en-route and on-trip

Treatment 1 - Behavioral prescription	Treatment 3 - Reciprocity Bias
Channels: 1st message:1 push 2nd message: 1 on-trip ring **Message type:** • 2 different messages • After receiving all 2 messages, riders re-enter the cycle and start getting the messages again until the end of the XP	**Channels**: 1st message:1 push 2nd message: 1 on-trip ring **Message type:** • 2 different messages • After receiving all 2 messages, riders re-enter the cycle and start getting the messages again until the end of the XP

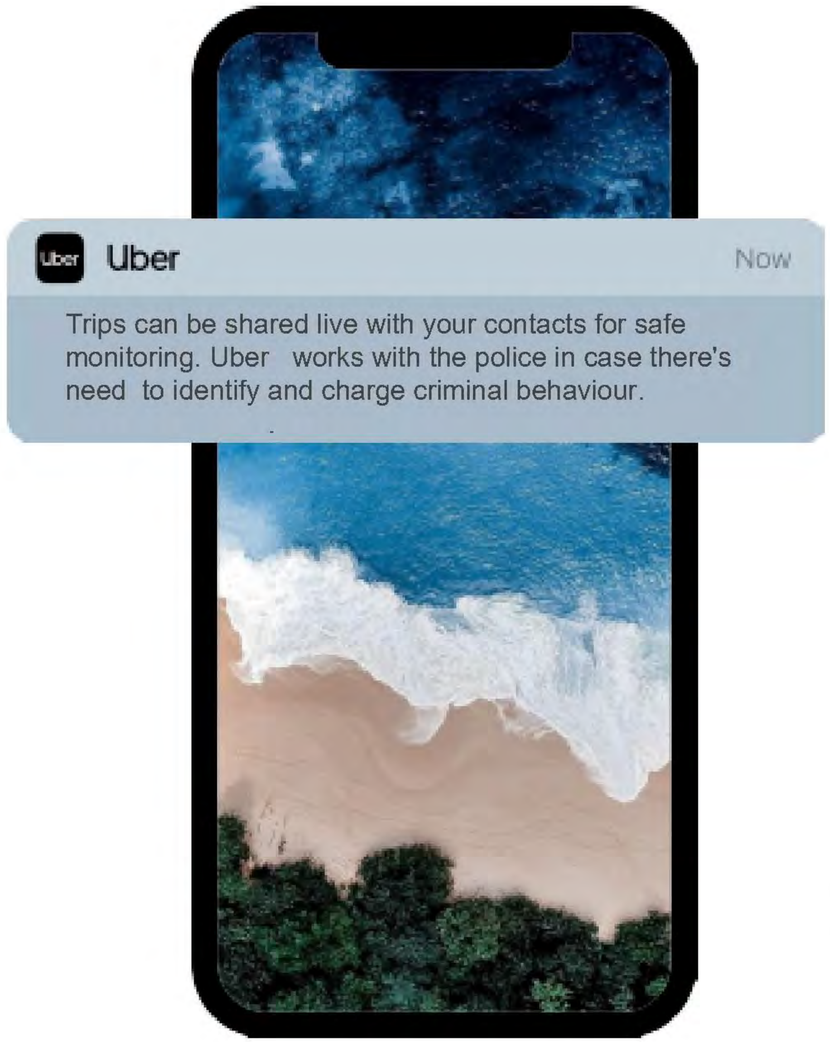
ATTORNEY-CLIENT PRIVILEGED

Brazil XP - **Rider** Messages

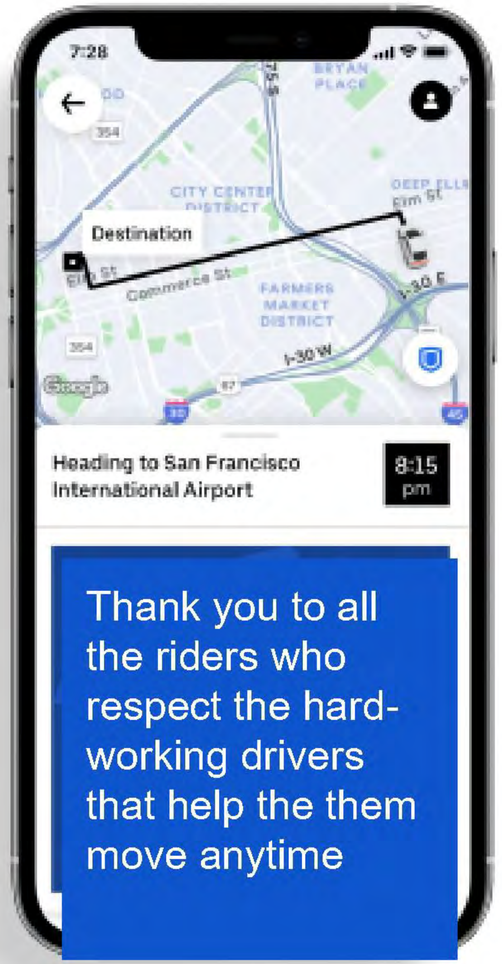
	Ingredients of the message	1st message - Push	2nd message - On-trip ring
Treatment 1 Behavioral prescription: provide behavioural prription around the desired behaviours to make it clear to riders what is/isn't acceptable	Describe to riders what is acceptable behavior in the platform (respect personal space, polite conversation) Describe to riders safety tools that make the ride safer (turn on audio recording, share your trip, awareness on ride check, etc)	Safety tips: Turn on audio recording and share your trip in the app. Peace of mind for you and your driver	Uber defines appropriate behavior as respecting driver's personal space and having polite conversation
Treatment 3 Reciprocity Bias: Engender feelings of reciprocity by thanking riders for respecting drivers and create empathy showing how hard a driver's job is to encourage rider to continue to be respectful	Leverage with riders to try to put them on driver's shoes understanding how hard drivers work to move people around, create empathy and that they're in this together Cater to rider desire of safety	Drivers work really hard to get you home safe. This driver already helped more than {trip number} move. Be respectful!	Thank you to all the riders who respect the hard-working drivers that help the them move anytime

CONTENT IS NOT FINAL. COPYWRITER TEAM WILL RE-CREATE

Push notification



On-trip ring



Success metrics

- Reduce Incident rates by ~3-5 p.p. on high-score trips flagged by SRAD
  - SASM rate
  - Serious SASM rate

- Guardrail metric
  - No stat sig impact on rider and driver cancellation rates

Where should we implement the experiment?

Option A: Add nudges XP to the current SRAD intervention in US and Brazil's cities
Cons: experiment will take longer

Option B: Add nudges XP to a country where SRAD is not live and test Nudges alone. Suggestion: a country in LatAm where the model is already trained for.
Cons: if we choose another region outside U.S. and LatAm, the model will have to be trained and it'll take longer

Option C: Add nudges XP to both SRAD and no SRAD cities

S-RAD

Leadership Update

08.06.2021

Uber

Agenda

- Status summary
- US Marketplace test results
- Infra enhancements
- Parallel switchbacks
- Roadmap

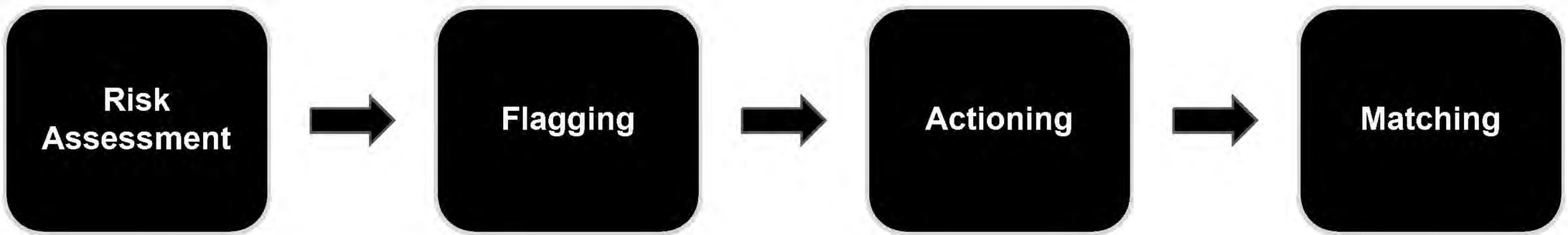
- Backup slides
  - US Model (Features, P/R curve, Trigger rate/recall curve)
  - Brazil Model (Features, P/R curve, Trigger rate/recall curve, Safety Test progress)

Summary

- **Conducted 3 marketplace tests in the US (gender agnostic model)**
  - Trigger rates 1.0% (Phase 6a) → 1.25% (Phase 6b) → 1.40% (Phase 6c)
  - ***Key Decision***: ***Agree to launch safety test at 1.25% Trigger rate***
- **Resolving infrastructure challenges**
  - Score "caching" to accommodate increase in JIT streaming traffic. **>80% compute savings!**
  - Reviewing impact of PolySolve, JobBoard. Enhancing Data Model to automate XP analysis.
- **Started scaling parallel switchbacks**
  - Received Marketplace DS approval to scale. Testing in 25 cities
  - Targeting scale out to all cities (excl NY) by 09/01
  - ***Discussion:*** ***Do we need 95% confidence level or is 80% confidence okay?***
- **S-RAD as a signal - Very early stages**
  - Use for SRAD nudges in PRD/UX/PoC phase
  - Use for ridecheck sensitivity

ATTORNEY-CLIENT PRIVILEGED

How S-RAD works



Assess risk of each plan

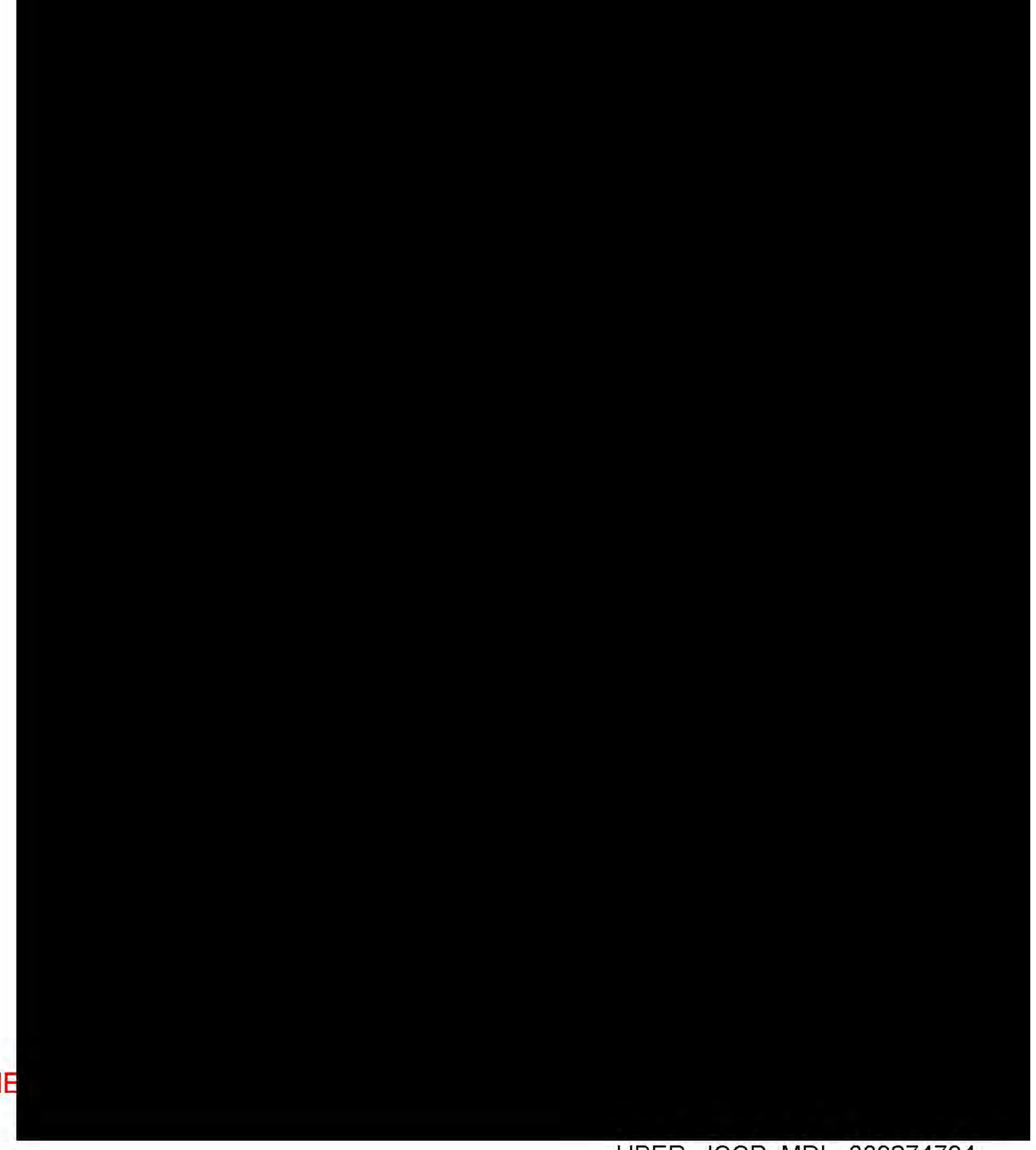
***Plans** with scores **above threshold** are flagged*

***Soft-filtering:** Cost added to all flagged plans*

***Least-N intervention:** When all plans on a request are flagged, No cost added to least **25%** risky plans*

Marketplace engine dispatches plans to optimize for overall market

SRAD US



ATTORNEY-CLIE

US Launch Progress till date (post covid)

Data in the following slides

Phases	6a	6b	6c	7
Goal	**Marketplace Test. Lock Trigger rates**			**Scale out Safety Test**
Timeframe	May	June	July	Aug-Dec
Overall Trigger Rate **Day Time** **Night Time**	1.00% 0.45% 3.65%	1.25% **0.8%** 3.6%	1.40% **1.00%** 3.80%	TBD
Least-N intervention	25%	25%	25%	25%
# cities	Total:29 XL: 2 L:2 M:2 S:23	Total:32 XL:5 L:1 M:2 S:24	Total:36 XL:6 L:2 M:3 S:25	Most cities

Uber

ATTORNEY-CLIENT PRIVILEGED

Slide 414 Notes

Cities reference

Phase 6a: No disparate impact on male/female cohorts, ethnicity cohorts

- No statistically significant disparities
- Sample size is (mostly) big enough to reject disparities that have practical meaning

Phase 6b Results

Slide 416 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook

Phase 6b: Driver cancellation rate within guardrails. No sig impact on ETAs or C/R.

- **1.25% Trip trigger rate**
  - 3.6% night time trigger rate
  - 0.8% day time trigger rate

Trip Distribution	Control	Treatment
Night (11pm-05:59am)	299k	298k
Day (6am-10:59pm)	1.35M	1.35M

Phase 6b	All Day		Day Time		Night time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg_post_dispatch_eta	-	632.88	-	592.69	-	713.34
p95_post_dispatch_eta	-	1181.94	-	1126.11	-	1293.26
p99_post_dispatch_eta	-	1442.03	-	1402.89	-	1522.20
request_to_begin_sec_avg	-	732.79	-	699.57	-	799.78
completed/requests	-	85.75	-	87.85	-	77.16
unfulfilled rate	-	1.2	-	0.7	-	3.11
rider_cancellation_perc	-	10.97	-	9.68	-	16.39
driver_cancellation_perc	-	2.09	-	1.77	0.1	3.30

"-" means Not Stat-sig

Slide 417 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook

Phase 6b: Some night time impact in XL cities. Some metrics improved*

Phase 6b	XL Cities						L Cities					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
avg_post_dispatch_eta	-	612.53	-	557.65	7.82	722.30	11.20	778.11	-	759.23	-	815.89
p95_post_dispatch_eta	-	1170.96	-	1088.00	15.71	1336.87	-	1406.54	-	1358.06	-	1503.51
p99_post_dispatch_eta	-	1441.02	-	1349.49	-21.98	1621.75	-	1772.75	-	1703.87	-	1910.51
request_to_begin_sec_avg	-	741.53	-	691.41	7.41	843.03	-	843.47	-	834.21	-	861.97
completed/requests	-	87.72	0.57	89.66	-	80.17	-	77.80	-	80.31	-	69.47
unfulfilled_perc	-	0.66	-	0.29	-	2.15	-	1.69	-	1.23	-	3.21
rider_cancellation_perc	-	9.54	-0.48	8.23	-	14.55	-	18.29	-	16.76	-	23.40
driver_cancellation_perc	-	2.10	-	1.83	0.16	3.13	-0.12	2.19	-	1.71	-	3.82

*Can be result of false positive as two weeks is not enough power for city size segments

"-" means Not Stat-sig

ATTORNEY-CLIENT PRIVILEGED

Slide 418 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook

Phase 6b: No sig impact in small & medium cities

Phase 6b	M Cities						S Cities					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
avg_post_dispatch_eta	-	660.95	-	613.55	-	755.76	-	628.53	-	591.19	-	703.72
p95_post_dispatch_eta	-	1240.01	-	1173.23	-	1372.76	-	1170.17	-	1120.45	-	1269.45
p99_post_dispatch_eta	-	1507.54	-	1432.02	-	1659.37	-	1423.16	-	1398.81	-	1474.15
request_to_begin_sec_avg	-	755.65	-	723.04	-	820.87	-	724.35	-	693.70	-	786.70
completed/requests	-	81.78	-	84.16	-	73.99	-	82.85	-	85.63	-	72.22
unfulfilled_perc	-	1.48	-	0.91	-	3.29	-	2.34	-	1.56	-	5.34
rider_cancellation_perc	-	14.45	-	13.08	-	18.92	-	12.78	-	11.17	-	18.91
driver_cancellation_perc	-	2.31	-	1.86	-	3.79	-	2.02	-	1.64	-	3.50

"-" means Not Stat-sig

ATTORNEY-CLIENT PRIVILEGED

Slide 419 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook

Phase 6c Results

1.4% Trigger rate

Phase 6c: Increase in driver cancellation rate (all day) at 1.4% TR. No C/R impact seen

- 1.4% overall trigger rate
  - 3.8% night time trigger rate
  - 1% day time trigger rate
- **No significant impact on Overall ETA/ rider cancellation rate**

Trip Distribution	Control	Treatment
Night (11pm-05:59am)	507k	507k
Day (6am-10:59pm)	2.38M	2.37M

Phase 6c	All Day		Day Time		Night time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg_post_dispatch_eta		607.81		576.35		696.72
p95_post_dispatch_eta		1139.15		1095.39		1262.22
p99_post_dispatch_eta		1393.35		1354.57		1500.08
request_to_begin_sec_avg		694.14		669.09		765.38
completed/requests		0.84618		85.88%		76.60%
rider_cancellation_perc		12.45%		11.68%		17.32%
driver_cancellation_perc**	0.03%	2.07%	0.03%	1.80%		3.70%

** No specific pattern seen in driver cancellation reasons

"-" means Not Stat-sig

ATTORNEY-CLIENT PRIVILEGED

Slide 421 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook
Cancellation reasons

1.4% Trigger rate

Phase 6c: Increase in driver cancellation rates in L cities, with some C/R impact

Phase 6c	XL Cities						L Cities					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
avg_post_dispatch_eta		576.66		537.96	12.55	684.63		790.60		787.37		802.04
p95_post_dispatch_eta	9.58	1149.85	7.60	1083.52		1335.36		1417.57		1378.71		1514.38
p99_post_dispatch_eta	-8.51	1455.42		1381.40		1663.59		1730.02		1662.32		1916.20
request_to_begin_sec_avg	3.43	683.65		654.25	12.23	765.06		845.14		846.88	-13.76	840.36
completed/requests		84.26%		85.60%		75.51%	-0.23%	80.58%		81.14%		77.60%
unfulfilled_perc		0.85%		0.58%		2.63%		0.87%		0.83%		1.01%
rider_cancellation_perc		12.86%		12.04%		18.34%		16.13%		15.87%		17.52%
driver_cancellation_perc	0.03%	2.01%	0.04%	1.77%		3.52%	0.10%	2.43%		2.16%	0.28%	3.87%

Caveats:

Behaviour can be result of false positive as two weeks is not enough power for city size segments

"-" means Not Stat-sig

ATTORNEY-C PRIVILEGED

Slide 422 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook

1.4% Trigger rate

Phase 6c: High unfulfilled rate impact in med/small cities; No other metric impacted

Phase 6c	M Cities						S Cities					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline
avg_post_dispatch_eta		465.35	-4.99	428.60		566.39		617.66		585.69		706.90
p95_post_dispatch_eta		964.24		902.85		1133.07		1135.53		1097.38		1240.12
p99_post_dispatch_eta		1272.91		1219.68		1418.83		1365.81		1340.01		1438.36
request_to_begin_sec_avg		583.76		554.15		664.68		698.13		671.67		771.64
completed/requests		90.10%		91.46%		83.82%		85.94%		87.77%		74.74%
unfulfilled_perc**	0.09%	0.27%	0.06%	0.19%		0.65%		1.28%		0.86%	0.33%	3.87%
rider_cancellation_perc		7.59%		6.75%		11.51%		10.75%		9.65%		17.50%
driver_cancellation_perc		2.02%		1.58%		4.03%		2.04%		1.73%		3.91%

Caveats:

- Behaviour can be result of false positive as two weeks is not enough power for city size segments

"-" means Not Stat-sig

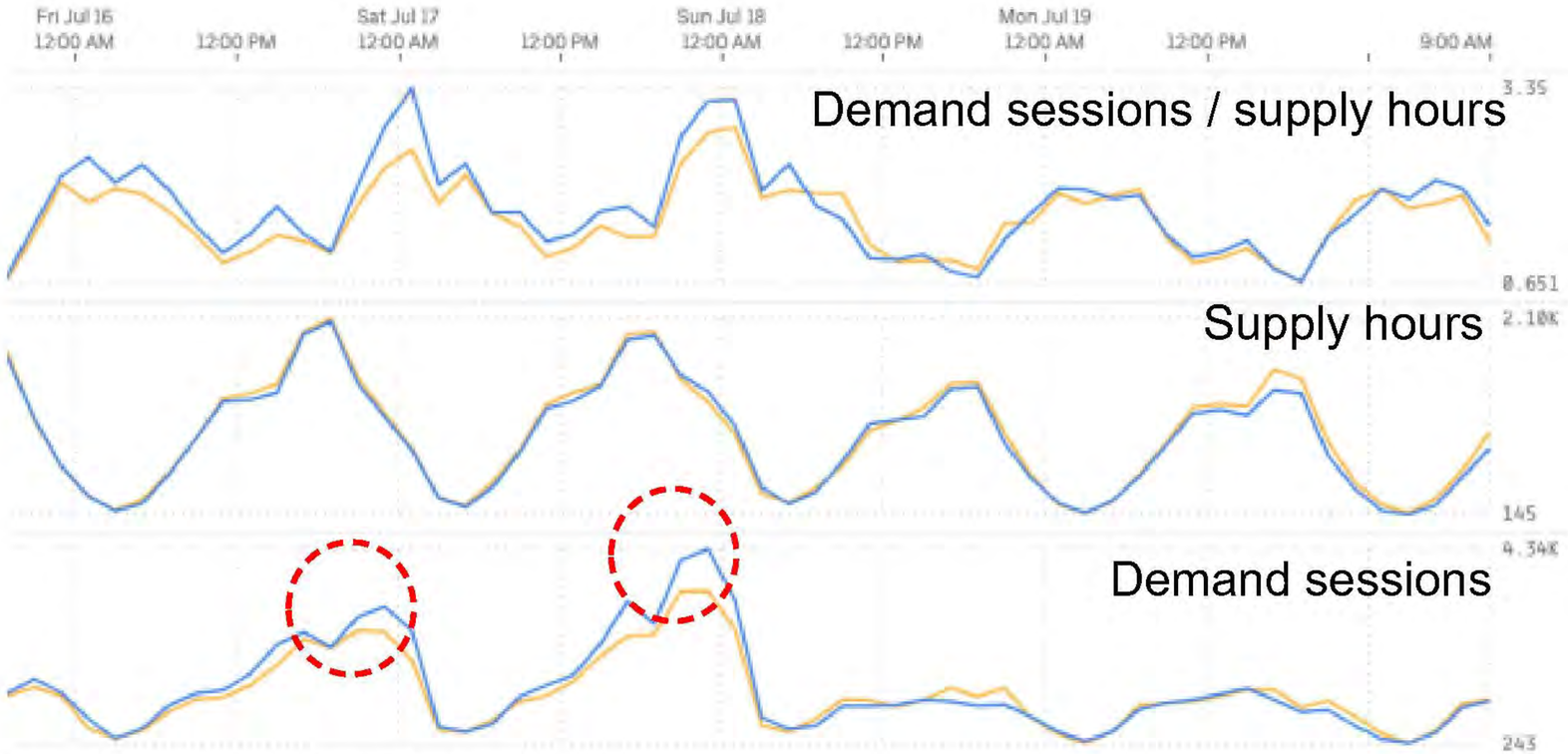
ATTORNEY-CLIENT PRIVILEGED

Slide 423 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook
Medium cities: Austin, Columbus, Cincinnati

1.4% Trigger rate

How can we explain impact on unfulfilled?



*Real time data for Columbus

- **XPs were run for a small number of medium cities** and a short amount of time, making it hard to identify real marketplace impact
- Spikes in unfulfilled driven by late night, high demand periods
- During these periods supply appears inelastic
- These high demand periods are sporadic and transient

ATTORNEY-CLIENT PRIVILEGED

Need leadership input

Decision: What should the trigger rate be for the long running Safety Test?

recommendation

	Option #1 **1.25%**	**Option #2** **1.4%**	**Option #3** **1.4% (XL/L)** **1.25% (M/S)**
Pros	- Minimal marketplace impact	- Higher daytime safety impact	- Higher daytime impact in XL/L cities
Cons	- Leaves daytime safety impact on the table	- Unfulfilled rate in M/S cities is concerning - Slight impact on driver cancellation rate and C/R in L cities	- Slight impact on driver cancellation rate (+1%) and C/R (-0.2%) in L

ATTORNEY-CLIENT PRIVILEGED

Infrastructure enhancements

[redacted]

ATTORNEY-CLIE

Infra/operational challenges & mitigation

1. Increased load generated from JIT Streaming
    - ~1.7x volume increase since April
    - Performance pressure added to all layers in the stack
    - Bottlenecks were hit and capacity had to be increased
    - Turned off shadow scoring in Brazil

Caching solution for S-RAD scores

2. Marketplace products rollouts
    - PolySolve - Optimizations for ETA vs GB
    - JobBoards - Drivers can choose from top N offers

Enhancing analytics data models to evaluate any impact on S-RAD

3. Slow experiment data processing 1-2 weeks

Automation to reduce to 1-2 days

ATTORNEY-CLIENT PRIVILEGED

Caching

- Model is executed only on the 1st time a driver is evaluated for a job
- The decision (flag vs not flag) is cached for subsequent scans



- Savings of $400k / year in capacity cost for US+BR
  - Up to $1M / year when scaled globally

ATTORNEY-CLIENT PRIVILEGED

Data Model updates

- Experiments Data Processing is automated now.
  - The time to set up dashboard and perform stat sig analysis post-experiment is **1-2 days** now compared to **1-2 weeks** before
- Upstream Marketplace changes are incorporated into data models, with full backfill.
- New Data Model built to enable the team for deeper analytics on PAU(persistent actioned users) and parallel switchbacks.

ATTORNEY-CLIENT PRIVILEGED

Scaling parallel switchbacks

[redacted]

ATTORNEY-CLIE

Parallel Switchback (Recap + some changes)

- Maintains balance for primary switchbacks
  - Automatically adjusts when changes occur to primary switchbacks
  - Avoids disturbing the balance of the other XP as promised
  - Edge cases carefully considered

- Start phase determined based on a metric that maximizes balance for S-RAD
  - Chooses the initial phase (treatment vs. control) in a way to optimize historical balance

- Switches to standalone mode when no parallel switchback running
  - Re-balances every 7 days

ATTORNEY-CLIENT PRIVILEGED

Pre-read

Automated 10 out of 12 scenarios

- [x] #1: Happy Path

	Primary switchback	S-RAD in parallel mode	S-RAD in standalone mode

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Primary XP	XP1															XP2														
S-RAD	Reset sequence															Reset sequence														

- [x] #2: Pause & restart

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Primary XP	XP1		Paused		XP1 restarted														XP2											
S-RAD	Reset				Reset sequence																									

- [x] #3: Stopped midway

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Primary XP	XP1		Paused																XP2											
S-RAD	Reset																		Reset sequence											

- [x] #4: Extended by N days

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Primary XP	XP1 started				XP1 extended by 4 days															XP2										
S-RAD	Reset sequence														Identical sequence					Reset sequence										

Uber

ATTORNEY-CLIENT PRIVILEGED

Pre-read

Automation: Scenarios 5-8

- [x] *manual*

Primary switchback | S-RAD in parallel mode | S-RAD in standalone mode

#5: Extended twice by N{=1,2,3}, M={1, 7} days

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Primary XP	XP1 started			XP1 extended by 3 days							XP1 extended by 7 days																	
S-RAD	Reset sequence														Identical sequence													

#6: S-RAD bug

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Primary XP	XP1														XP2													
S-RAD	Reset sequence				Bug found in S-RAD. Continue till End of XP1										Disable													

- [x] *manual*

#7: S-RAD configuration change (e.g. trigger rate)

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Primary XP	XP1														XP2													
S-RAD	Reset sequence				Want to increase trigger rate, but hold										Increased trigger rate													

#8: 4-week primary XP

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Primary XP	XP1																											
S-RAD	S	R	A	D (switches schedule 2 weeks)																								

- [x]

Uber

ATTORNEY-CLIENT PRIVILEGED

Pre-read

Automation: Scenarios 9-12

- [x] #9: 4-week primary XP extended

	Primary switchback	S-RAD in parallel mode	S-RAD in standalone mode

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Primary XP	XP1			XP1 extended by 3 days																								
S-RAD	S	R	A	D (switches schedule 2 weeks, Repeats first week sequence in the 5th week)																								

- [x] #10: Concurrent switchback (primary)

Day	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Primary XP	Concurrent Switchback															XP2												
S-RAD	Disabled															S	R	A	D									

- [x] #11: Quickback (primary)

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Primary XP	Quickback															XP2												
S-RAD	Disabled															S	R	A	D									

- [x] #12: Synthetic (primary)

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Primary XP	Synthetic control																											
S-RAD	Keep SRAD schedule as is																											

Uber

ATTORNEY-CLIENT PRIVILEGED

Path to scaling parallel switchbacks

- Need MX approval to scale and run in parallel with other ongoing switchbacks **(Done - 7/13)**

- Battle test MVP
  - Need 30 days with 30 cities to increase confidence **(Launched in 25 cities - 7/20)**
  - Fix any issues we see in the next 30 days

- **Gradually scale out to other US & Brazil cities (Goal: 9/01)**
  - **Pending Ops alignment**

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

Need leadership input

What confidence level do we need to achieve? Does 80% work?

Brazil

MDE	confidence level	months
0.05	95%	11.7
0.05	90%	8.5
0.05	85%	6.7
0.05	80%	5.4
0.085	95%	4.1
0.085	90%	3.0
0.085	85%	2.3
0.085	80%	1.9

Serious SASM rate: 3.75 per million
TRIP/DAY = 3.6 M
2.8 months effectively completed in tranches 7a -> 7f

US

MDE	confidence level	months
0.05	95%	13.4
0.05	90%	9.7
0.05	85%	7.6
0.05	80%	6.1
0.085	95%	4.6
0.085	90%	3.4
0.085	85%	2.6
0.085	80%	2.1

Serious SASM rate: 6.85 per million
TRIP/DAY = 1.8 M

Uber

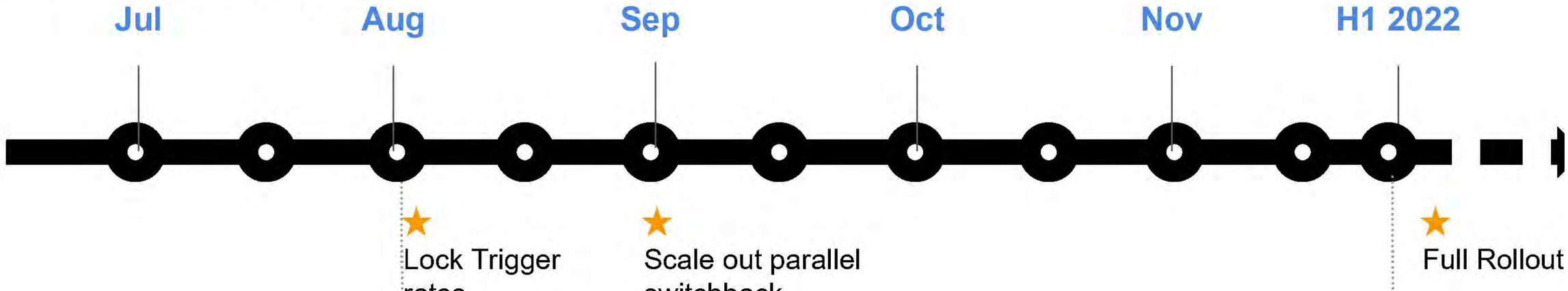
ATTORNEY-CLIENT PRIVILEGED

Slide 436 Notes

Assuming parallel switchback framework is fully rolled out in both countries

Not started | Ongoing | Completed

H2'21 Roadmap



Uber

ATTORNEY-CLIENT PRIVILEGED

Slide 437 Notes

https://docs.google.com/presentation/d/19Sf917H6hwFixdWdOIpY_-GuKpjKeI3lI0XiNc_SQks/edit#slide=id.gdd02d22cfd_0_2

Pre-read

SRAD Brazil

[redacted]

ATTORNEY-CLIE

Pre-read

Brazil Launch Progress till date

Completed Phases

Scheduled Phases

	5	6	7a	7b	7c	7d	7e		Parallel
Events					Carnival	Covid	Covid	Covid + mkpl changes	
Dates		10.16-10.30	12.03-12.17	01.06-01.20		02.26-03.12	04.01-04.14		Aug-
Overall Trigger Rate	0.9 %	0.58% 0.26%	1.2% 0.4%	1.3% 0.6%		1.1% 0.6%	1.1% 0.6%		1.1% 0.6%
Day Time	N/A	4.53%	9.7%	9.4%		8.9%	9.0%		9.0%
Night Time	N/A								
Least-N intervention	0	3	1	1		max(1,25%)	max{1,25%}		max(1,25%)
Cities		54	54	62		51	57		all

*City size mix is different across tranches

Slide 439 Notes

7a impact: -12.2% Serious SASM rate, **-11.5%** SASM rate
7b impact: **-17.09%** Serious SASM rate, **-4.1%** SASM rate

Pre-read

Phase 7a-7e cumulative safety impact [Ex Phase 7c]

8 weeks

*Safety Impact****	Time of Day		
Incident Type	Overall	Day 6am-10:59pm	Night 11pm-5:59am
Serious SA/SM rate (per mil trips)	-5.2% 4.39 → 4.16 308 → 289	-5.1% 3.31 → 3.14	-5.6% 22.53 → 21.27
Overall SA/SM rate (per mil trips)	-4.8% 20.15 → 19.18 1413 → 1334	-1.6% 16.22 → 15.96	-14.9% 86.07 → 73.28

Incident Type	IR Efficacy Loss***
Serious SA/SM efficacy loss	**7%**
Overall SA/SM efficacy loss	**5%**

Trip Distribution	Control	Treatment
Night (11pm-05:59am)	5.9M	5.9M
Day (6am-10:59pm)	76.2M	75.6M

Trip Distribution	Control	Treatment
Extra Large	51.0M	50.7M
Large	19.7M	19.5M
Medium	8.7M	8.7M
Small	2.7M	2.7M

Caveats:

- Excluding Phase-7c due to carnival
- Cities across phases are different

Results are not statistically significant

Slide 440 Notes

Efficacy loss includes -

- Incidents occurring on trips that were flagged by S-RAD, but dispatched by the marketplace engine
- Incidents occurring on trips that had least risky intervention

Treatment Recall
query

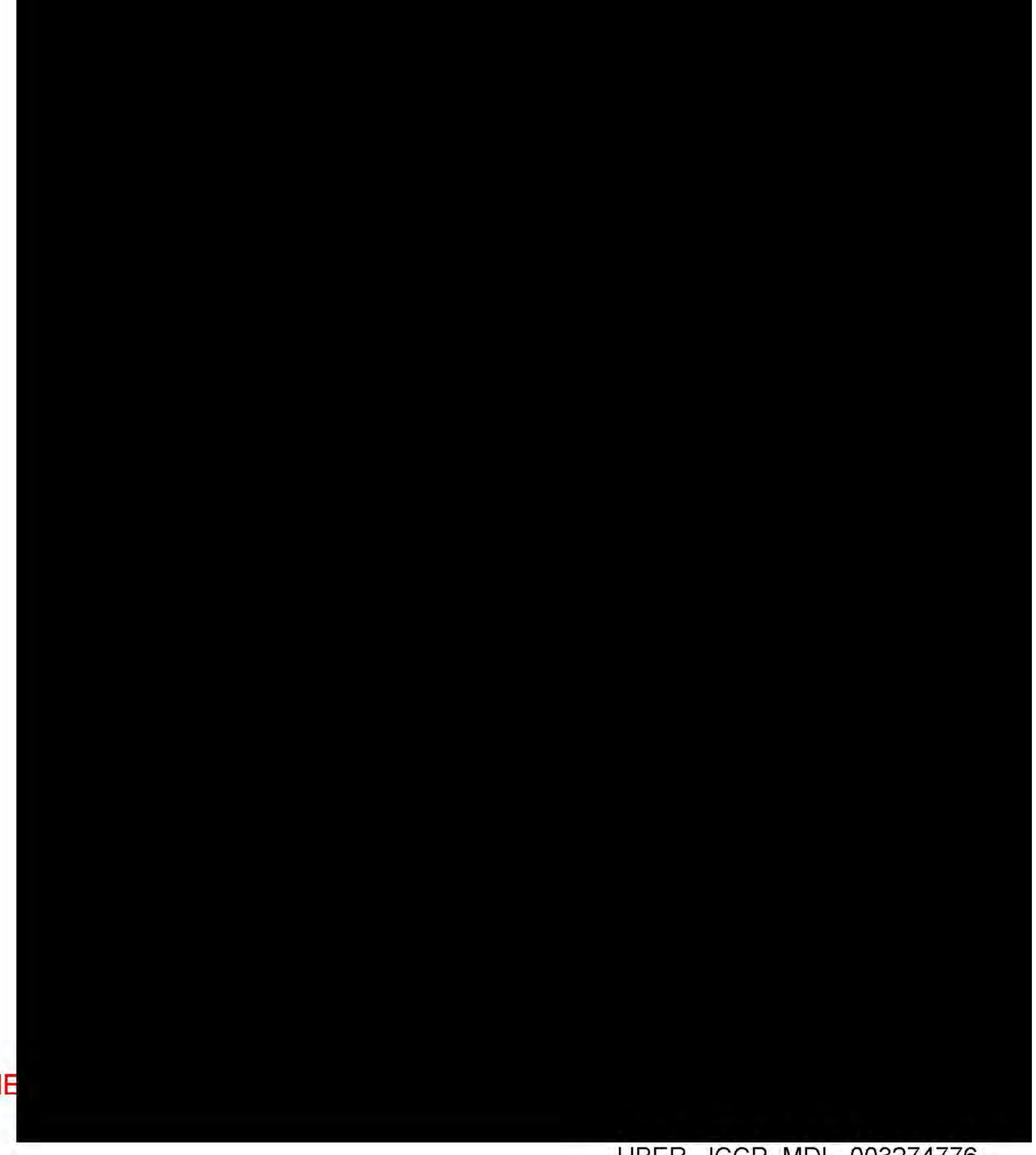
Backup

- Weekly slides
- US Model (Features, P/R curve, Trigger rate/recall curve)
- Brazil Model (Features, P/R curve, Trigger rate/recall curve, Safety Test progress)

H2’21 Weekly Slides

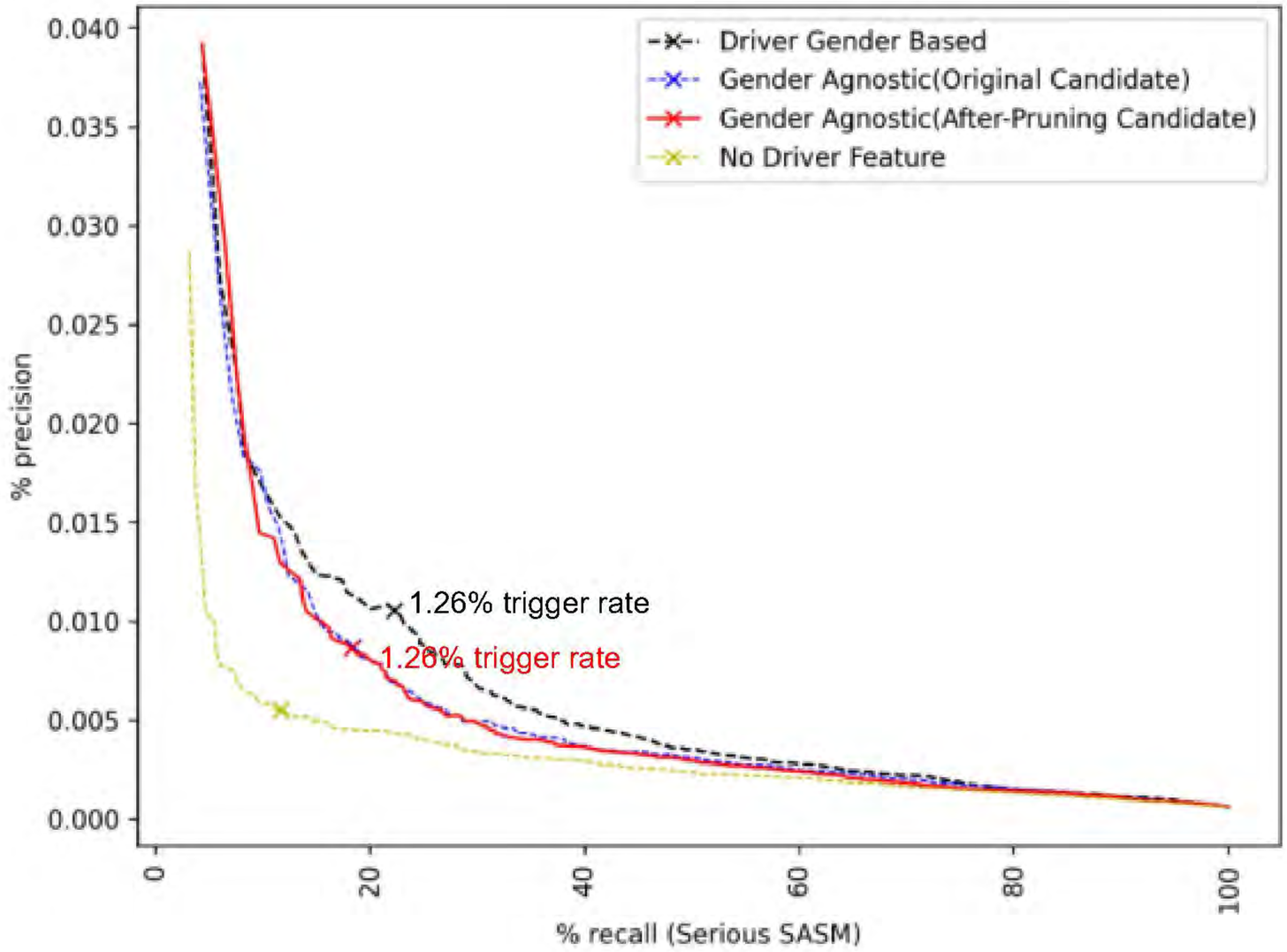
H1’21 Weekly Slides

S-RAD US model details



ATTORNEY-CLIE

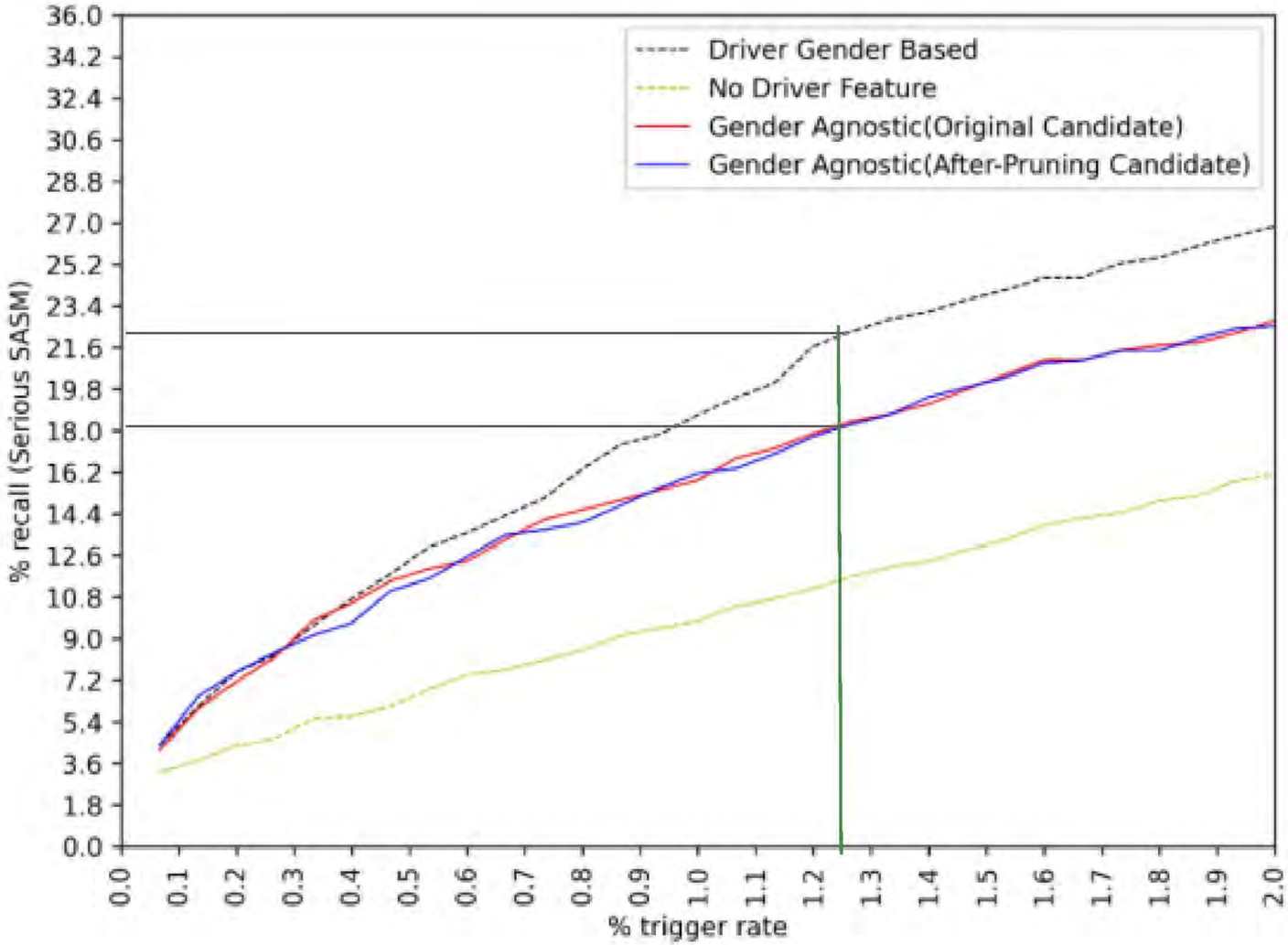
Completed feature pruning exercise towards robustness



Model Candidate After Pruning = Original Model
(-) Driver Cancellation Rate Feature
(-) Client Signup DOW Feature
(-) Client Signup Hour Feature
(-) Device Battery Level Feature
(-) Wifi Connected Feature
(-) Geohash7 Features

@1.26% TR	% precision	% recall
Before Pruning	0.008695%	18.40%
After Pruning	0.008645%	18.27%

Removing 8 features



Model Candidate After Pruning = Original Model
(-) Driver Cancellation Rate Feature
(-) Client Signup DOW Feature
(-) Client Signup Hour Feature
(-) Device Battery Level Feature
(-) Wifi Connected Feature
(-) Geohash7 Features

@1.26% TR	% precision	% recall
Before Pruning	0.008695%	18.40%
After Pruning	0.008645%	18.27%

Gender agnostic model features

Driver + Rider Gender

~~driver_rider_different_gender~~

Trip Context

geohash6_latenight_trip_rate_6mo
geohash6_client_1star_rate_6mo
geohash6_driver_cancellation_rate_6mo
geohash6_log_trip_count_6mo
geohash6_trip_count_6mo
geohash6_cash_trip_rate_6mo
geohash7_bar_count
geohash7_restaurant_count
~~geohash7_client_1star_rate_6mo~~
~~geohash7_driver_cancellation_rate_6mo~~
trip_global_product_name
trip_sub_region
trip_hour_local
trip_dow_local
city_trip_count_6mo
is_pool_matched
~~wifi_connected~~
~~device_data_battery_level~~
trip_country_id

Driver + Rider Safety History

driver_sexual_rate_driver_ao_total
driver_bliss_l1234_rate_all_ao
driver_ipc_incident_rate_driver_ao

client_bliss_l1234_rate_all_ao_total
client_bliss_l1234_count_all_ao_total

Environment safety history

geohash6_flack_ipc_rate_all_ao_6mo
geohash6_jira_sexual_rate_all_ao_6mo
~~geohash7_flack_ipc_rate_all_ao_6mo~~
city_sexual_assault_l1234_rate_6mo
trip_dow_hour_sexual_assault_l1234_rate_6mo

Driver + Rider Ratings

driver_1star_rate_given
driver_1star_rate_received
client_1star_rate_given
client_1star_rate_received
driver_2star_rate_given
driver_2star_rate_received
client_2star_rate_given
client_2star_rate_received

Driver + Rider Trip History

log_driver_lifetime_trip_count
log_driver_trip_duration_seconds_sum_total
driver_canceled_on_rate_total
~~driver_cancellation_rate_total~~
driver_latenight_request_rate_total
driver_trip_duration_seconds_sum_total
driver_weekend_request_rate_total

log_client_ltd_completed_count
client_cancellation_rate_total
client_canceled_on_rate_total
client_latenight_request_rate_total
client_weekend_request_rate_total
client_request_to_begin_distance_miles_sum_total
client_avg_ata
client_days_since_signup
client_confirmed_mobile
client_cash_rate
client_first_token_type
~~client_signup_dow~~
~~client_signup_hour~~
client_trip_completion_rate

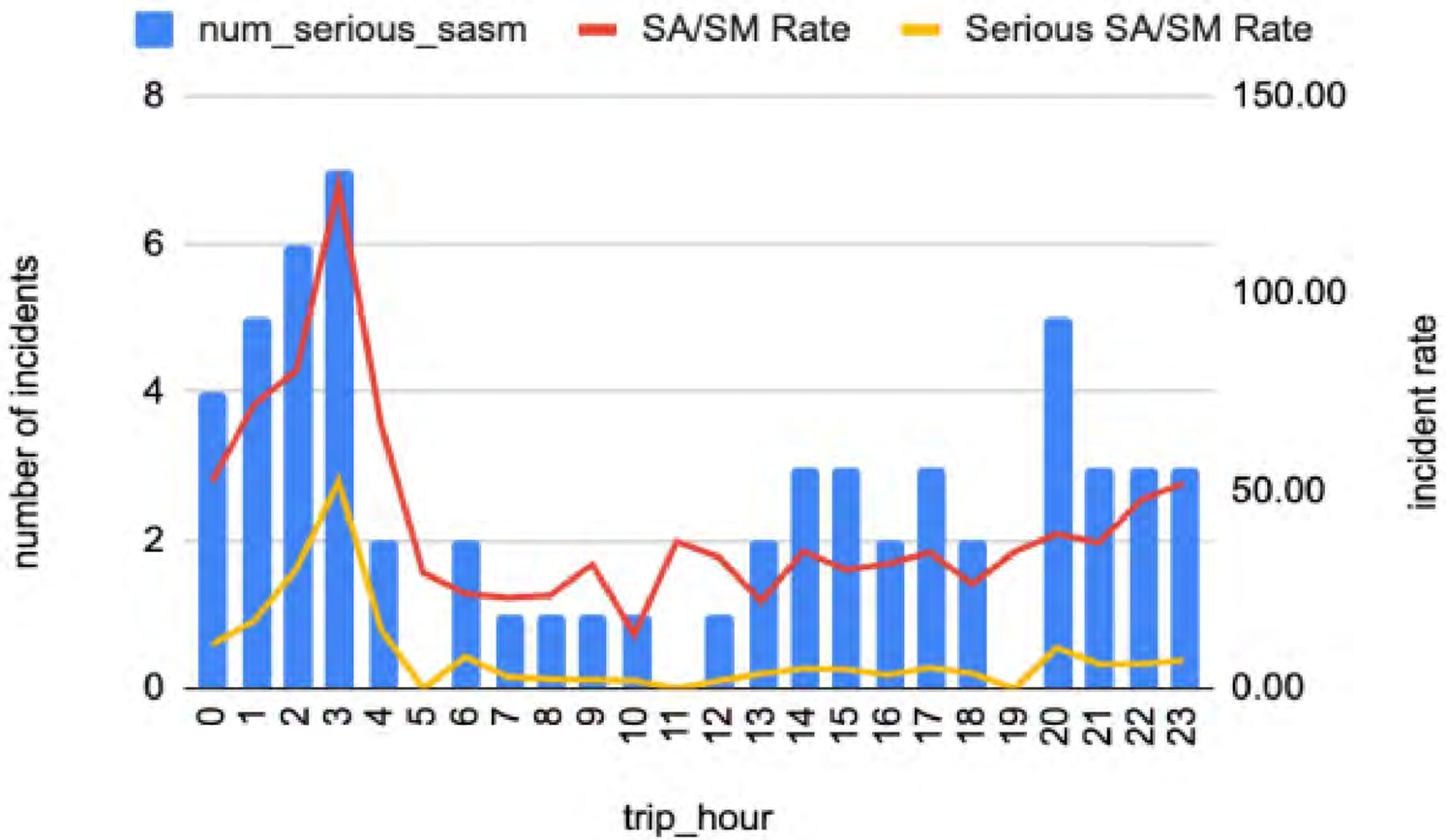
ATTORNEY-CLIENT PRIVILEGED

Link to full list of features
***Model development is still active and feature list may change*

Pre-read

1.25% Trigger rate

Opportunity to increase recall during 8-11PM



- **Current Setting:**
  - Day Time: 6AM-10:59PM
  - Night Time: 11PM-5:59AM
- 10-11PM has relatively higher incident rate compared to other day time hours, but 8-9pm covers majority of day time incidents

*Data Considering 6b thresholds extended to a month

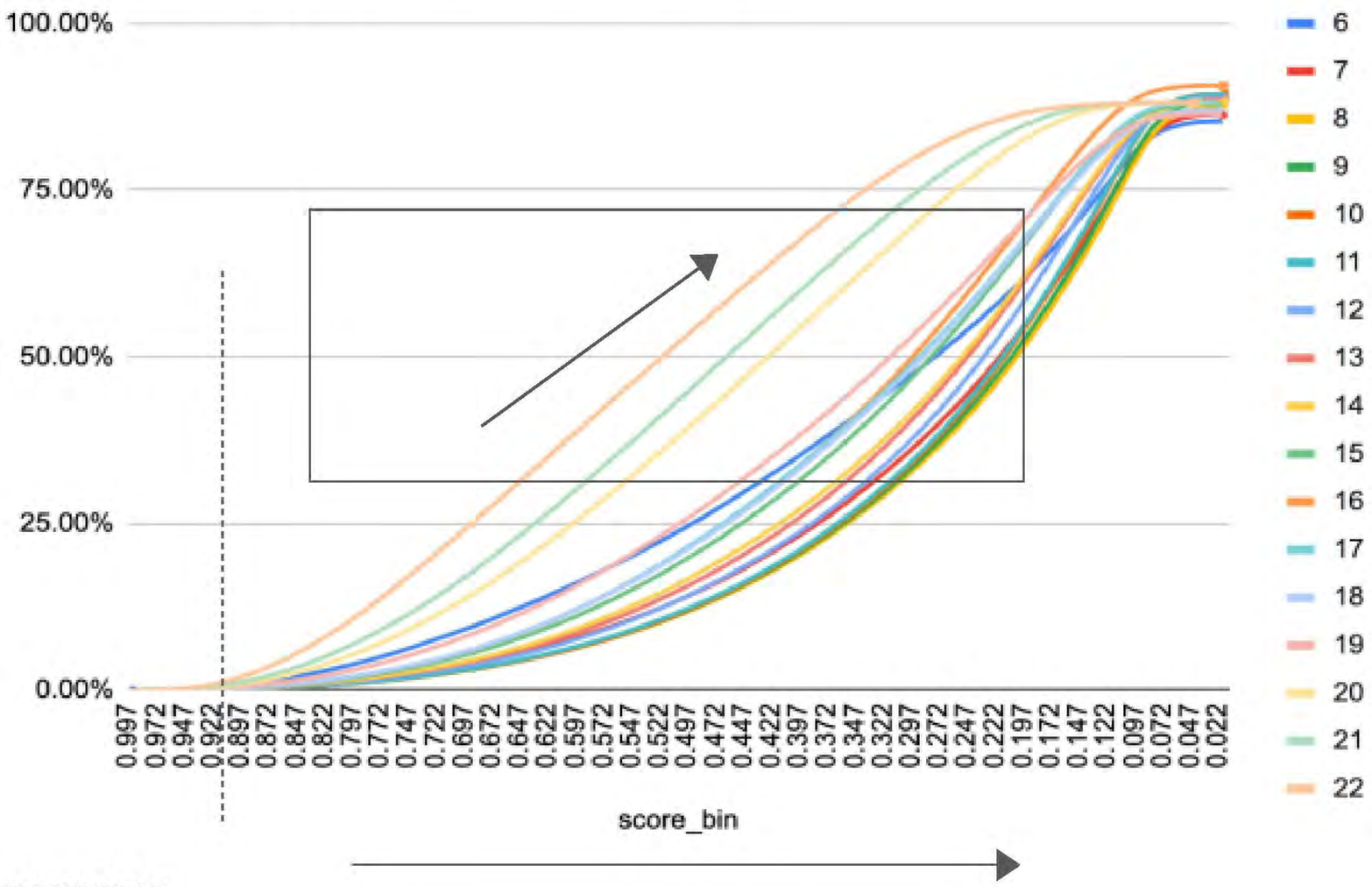
Slide 447 Notes

https://docs.google.com/spreadsheets/d/1tKv854yzXLRz425MUGvuYM97Cpa4uCP7P_kt1XCRfc0/edit#gid=2047250088

Pre-read

1.25% Trigger rate

Increasing Threshold Boundary Covers More Trips from 8-11PM



- By Increasing threshold boundary, will cover more trips from 8-11 PM as during that hour scores are relatively higher compared to other hours

*Data Considering 6b thresholds extended to a month

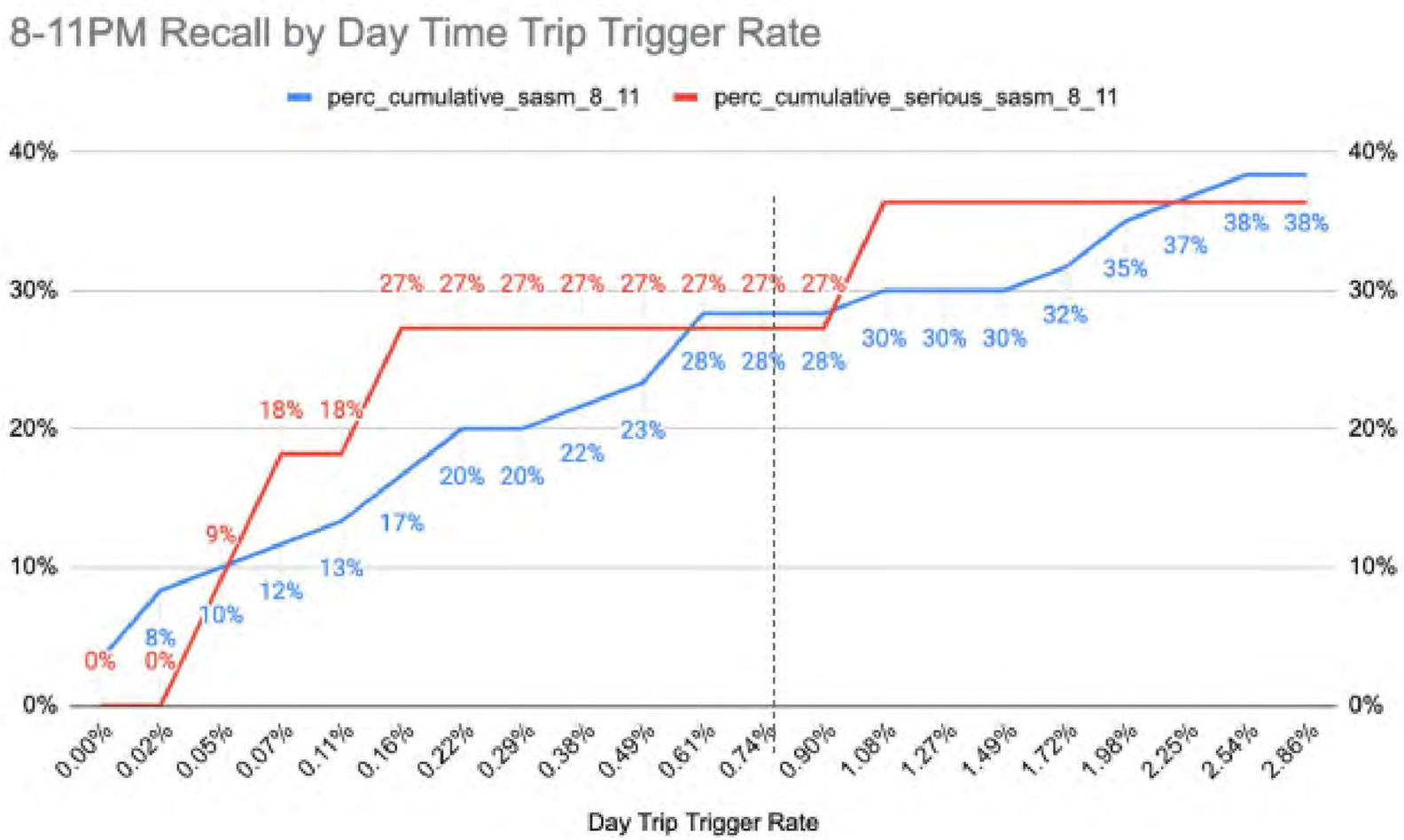
Slide 448 Notes

https://docs.google.com/spreadsheets/d/1tKv854yzXLRz425MUGvuYM97Cpa4uCP7P_kt1XCRfc0/edit#gid=2019657465

Pre-read

1.25% Trigger rate

8-11PM Incident Coverage by Day Trigger Rate



8-11PM % of incidents coverage	
SA/SM	23.1% (60)
Serious SA/SM	33% (11)

- Current day time trigger rate is 0.8%

*Data Considering 6b thresholds extended to a month

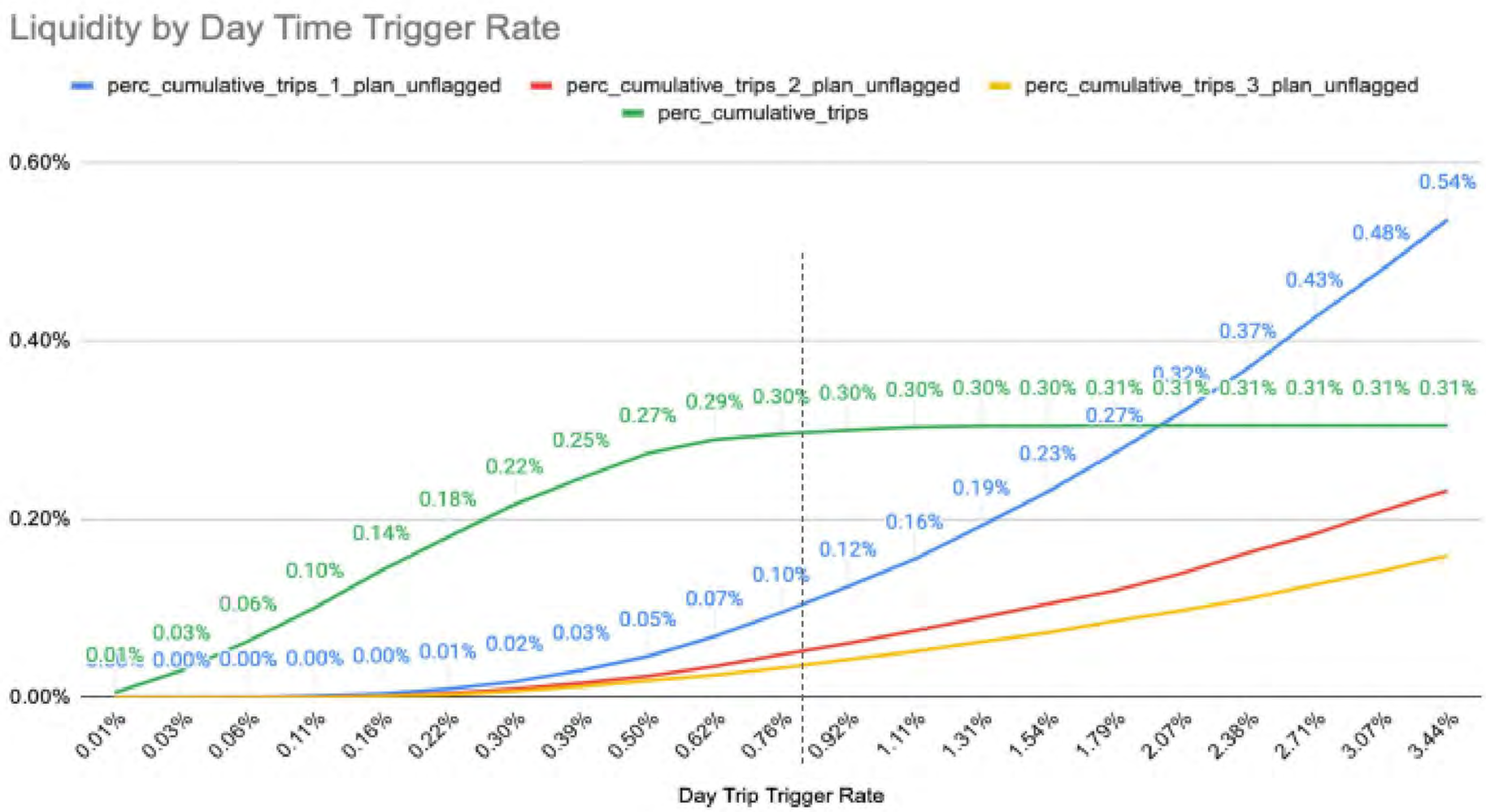
Slide 449 Notes

https://docs.google.com/spreadsheets/d/1tKv854yzXLRz425MUGvuYM97Cpa4uCP7P_kt1XCRfc0/edit#gid=89382982

Pre-read

1.25% Trigger rate

Keeping Day Trigger Rate <1% will have minimal impact on trips with <=3 plans available



*Data Considering 6b thresholds extended to a month

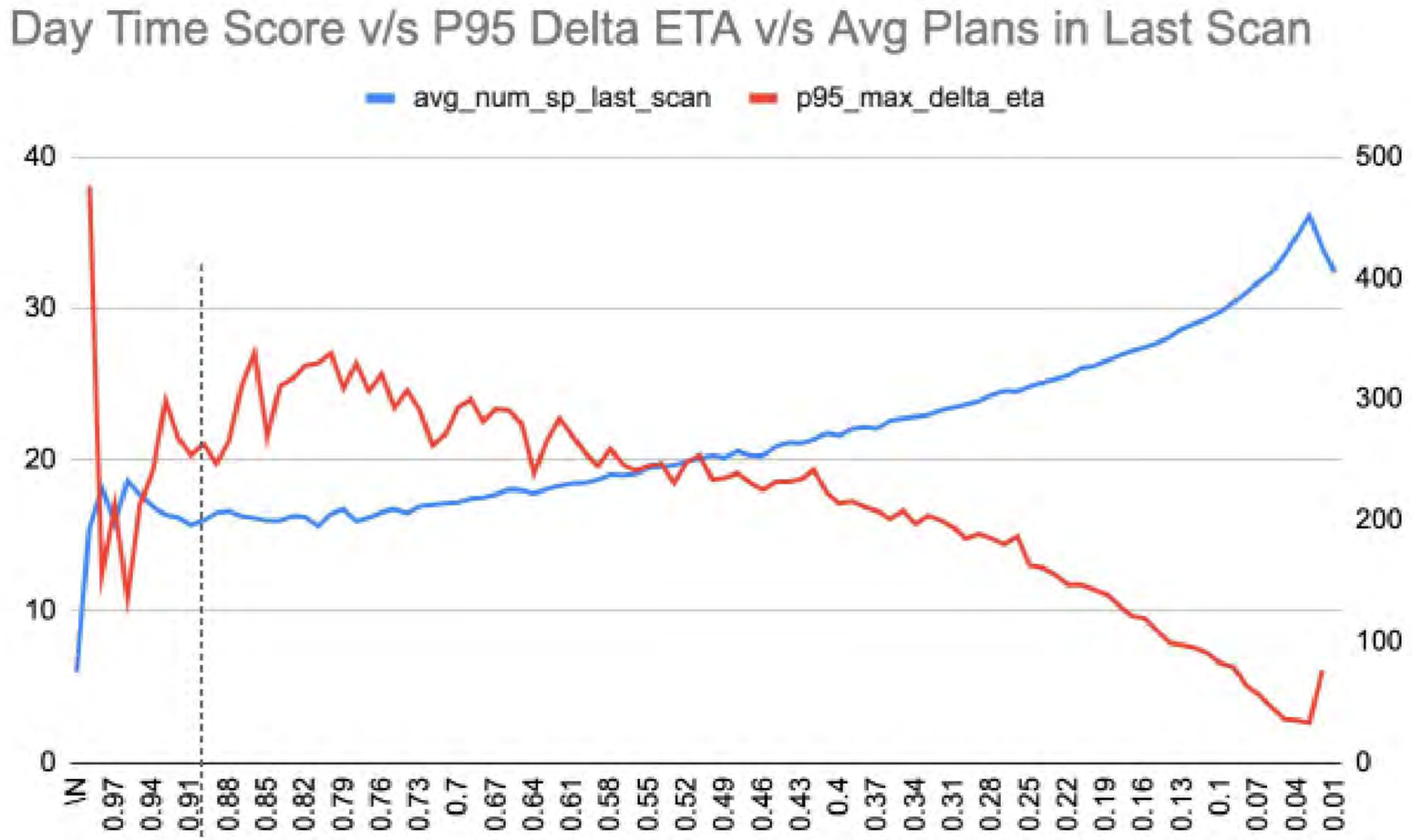
Slide 450 Notes

https://docs.google.com/spreadsheets/d/1tKv854yzXLRz425MUGvuYM97Cpa4uCP7P_kt1XCRfc0/edit#gid=89382982

Pre-read

1.25% Trigger rate

No Major Directional Delta ETA Impact for Scores >= 0.76



- Delta ETA is approximately same for scores>0.76.
- ** Delta ETA is only added for directional purposes and value is not comparable to actual ETA impact

*Data Considering 6b

Slide 451 Notes

https://docs.google.com/spreadsheets/d/1tKv854yzXLRz425MUGvuYM97Cpa4uCP7P_kt1XCRfc0/edit#gid=930657519

Phase 6a: Minimal marketplace impact observed

- **Night trips were ~10.7% of all trips**
- 96 min switch time with 1% trigger rate
- 3.7% night time trigger rate, 0.4% day time trigger rate
- No significant impact on rider cancellation rate

Trip Distribution	Control	Treatment
Night (11pm-05:59am)	519k	516k
Day (6am-10:59pm)	2.47M	2.47M

Phase 6a	All Day		Day Time		Night time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg_post_dispatch_eta	4.06	684.31	Not sig	662.19	Not sig	744.38
p95_post_dispatch_eta	7.45	1244.58	Not sig	1218.01	19.59	1317.91
p99_post_dispatch_eta	Not sig	1534.54	Not sig	1527.10	Not sig	1554.81
request_to_begin_sec_avg	Not sig	778.39	Not sig	755.59	Not sig	839.70
completed/requests	Not sig	79.43	Not sig	81.51	Not sig	66.65
rider_cancellation_perc	Not sig	13.87	Not sig	12.83	Not sig	20.35
driver_cancellation_perc	-0.02	1.98	Not sig	1.76	-0.09	3.34

ATTORNEY-CLIENT PRIVILEGED

Slide 452 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook

Phase 6a: Metrics well within guardrails in XL/L cities

- 15s night time p95 post dispatch ETA impact on 1193s baseline (XL cities)
- +33s night time p95 post dispatch ETA impact on a 1407s baseline (large cities)

Phase 6a	XL Cities						L Cities					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline
avg_post_dispatch_eta	5.00	495.56	Not sig	472.85	7.82	558.02	Not sig	674.70	Not sig	642.47	11.62	763.34
p95_post_dispatch_eta	9.05	1042.45	Not sig	987.40	15.71	1193.86	Not sig	1266.71	Not sig	1215.39	33.25	1407.86
p99_post_dispatch_eta	Not sig	1337.18	Not sig	1283.28	-21.98	1482.77	Not sig	1585.14	Not sig	1498.94	Not sig	1825.18
request_to_begin_sec_avg	4.14	653.74	Not sig	637.60	7.41	698.13	Not sig	799.41	Not sig	769.31	Not sig	882.20
completed/requests	Not sig	78.15	Not sig	80.14	Not sig	66.80	Not sig	81.15	Not sig	84.10	Not sig	63.40
unfulfilled_perc	Not sig	6.18	Not sig	5.34	Not sig	10.96	Not sig	2.42	Not sig	1.10	Not sig	9.73
rider_cancellation_perc	0.14	13.66	Not sig	12.73	Not sig	19.26	Not sig	14.67	Not sig	13.01	Not sig	23.38
driver_cancellation_perc	Not sig	1.93	Not sig	1.77	Not sig	2.99	-0.05	2.02	Not sig	1.75	-0.26	3.48

ATTORNEY-CLIENT PRIVILEGED

Slide 453 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook

S/M cities: metrics well within guardrails

- No stat sig impact on p99 post dispatch ETA, C/R, unfulfilled %, rider cancellation rate, driver cancellation rate
- +44s night time p95 post dispatch ETA impact on a 1280s baseline (medium cities)

Phase 6a	M Cities						S Cities					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline
avg_post_dispatch_eta	Not sig	572.08	Not sig	525.08	Not sig	702.80	Not sig	711.33	Not sig	692.47	Not sig	763.27
p95_post_dispatch_eta	19.93	1078.39	Not sig	1004.96	44.27	1280.30	6.43	1275.92	Not sig	1257.05	Not sig	1325.12
p99_post_dispatch_eta	Not sig	1367.95	Not sig	1279.79	Not sig	1608.46	Not sig	1561.59	Not sig	1571.40	Not sig	1533.14
request_to_begin_sec_avg	Not sig	675.20	Not sig	638.75	Not sig	777.00	Not sig	795.83	Not sig	774.97	Not sig	853.84
completed/requests	Not sig	88.65	Not sig	89.98	Not sig	81.47	Not sig	79.34	Not sig	81.49	Not sig	66.49
unfulfilled_perc	Not sig	0.23	Not sig	0.18	Not sig	0.48	Not sig	3.45	Not sig	2.82	Not sig	7.26
rider_cancellation_perc	Not sig	9.20	Not sig	8.30	Not sig	14.04	Not sig	15.02	Not sig	13.89	Not sig	21.94
driver_cancellation_perc	Not sig	1.92	Not sig	1.54	Not sig	4.01	-0.07	2.16	Not sig	1.80	Not sig	4.34

ATTORNEY-CLIENT PRIVILEGED

Slide 454 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook

Guardrail metrics (US)

- Need stat sig results to raise alerts. Likely to occur after two weeks of XP.

	Metrics & Thresholds (grouped by XL/L/M/S city sizes)	Actions
	Δ Night time completed/requests > -5% Δ Night time rider cancellation rate > +5% Δ Unfulfilled rate > +3% Δ p99 Night time ETA > 5%	• Email stakeholders • DS/DA Investigation • Determine next steps
	Δ Night time completed/requests > -10% Δ Night time rider cancellation rate > +10% Δ Unfulfilled rate > +5% Δ p99 Night time ETA > 10%	• Call RAPID team meeting to evaluate lowering trigger rate in one or more cities

No disparate impact on male/female cohorts, ethnicity cohorts

- No statistically significant disparities
- Sample size is (mostly) big enough to reject disparities that have practical meaning

No stat sig disparities in Driver Earnings

May 1 - May 15

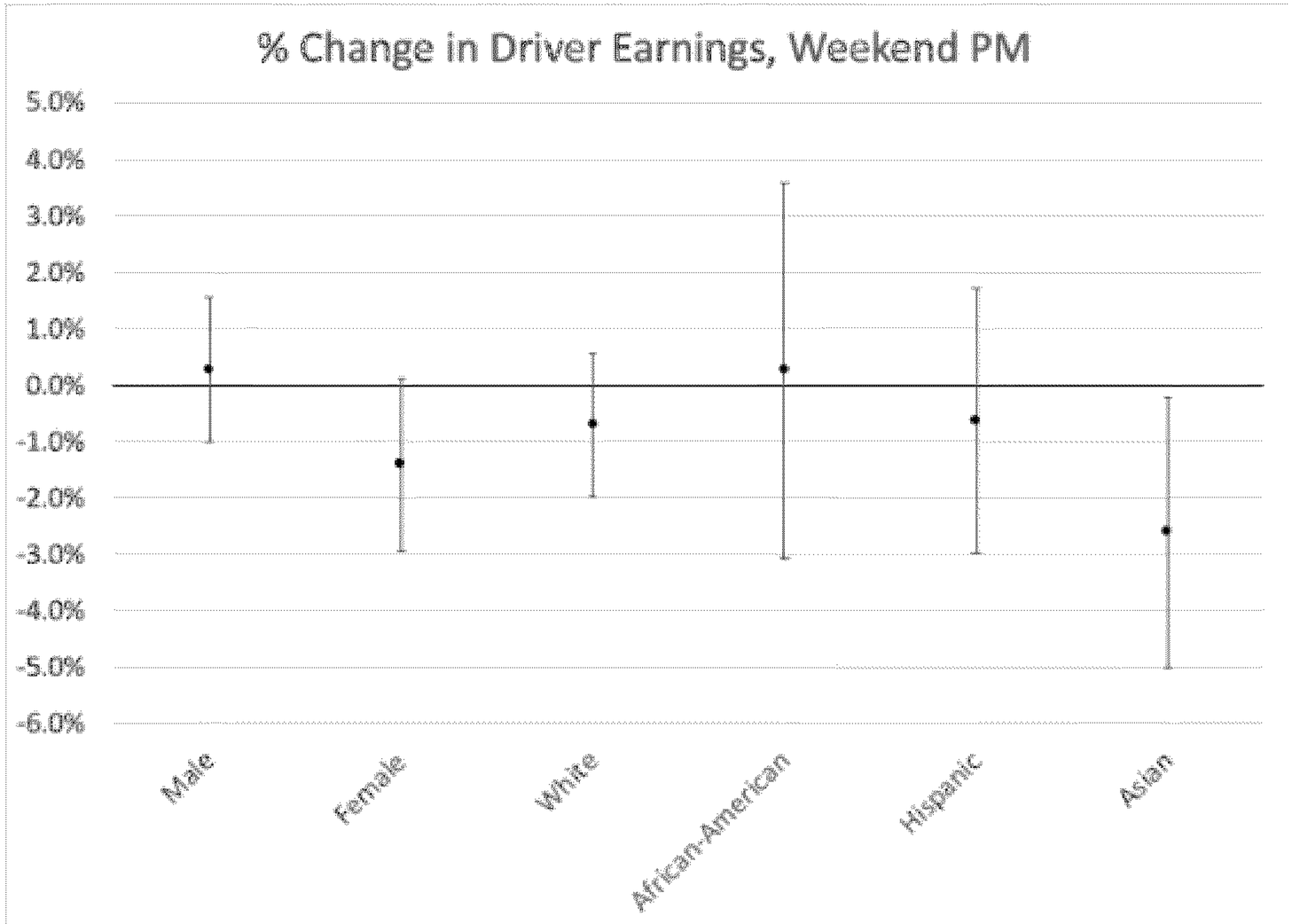
Driver Earnings



No stat sig disparities in Driver Earnings

May 1 - May 15

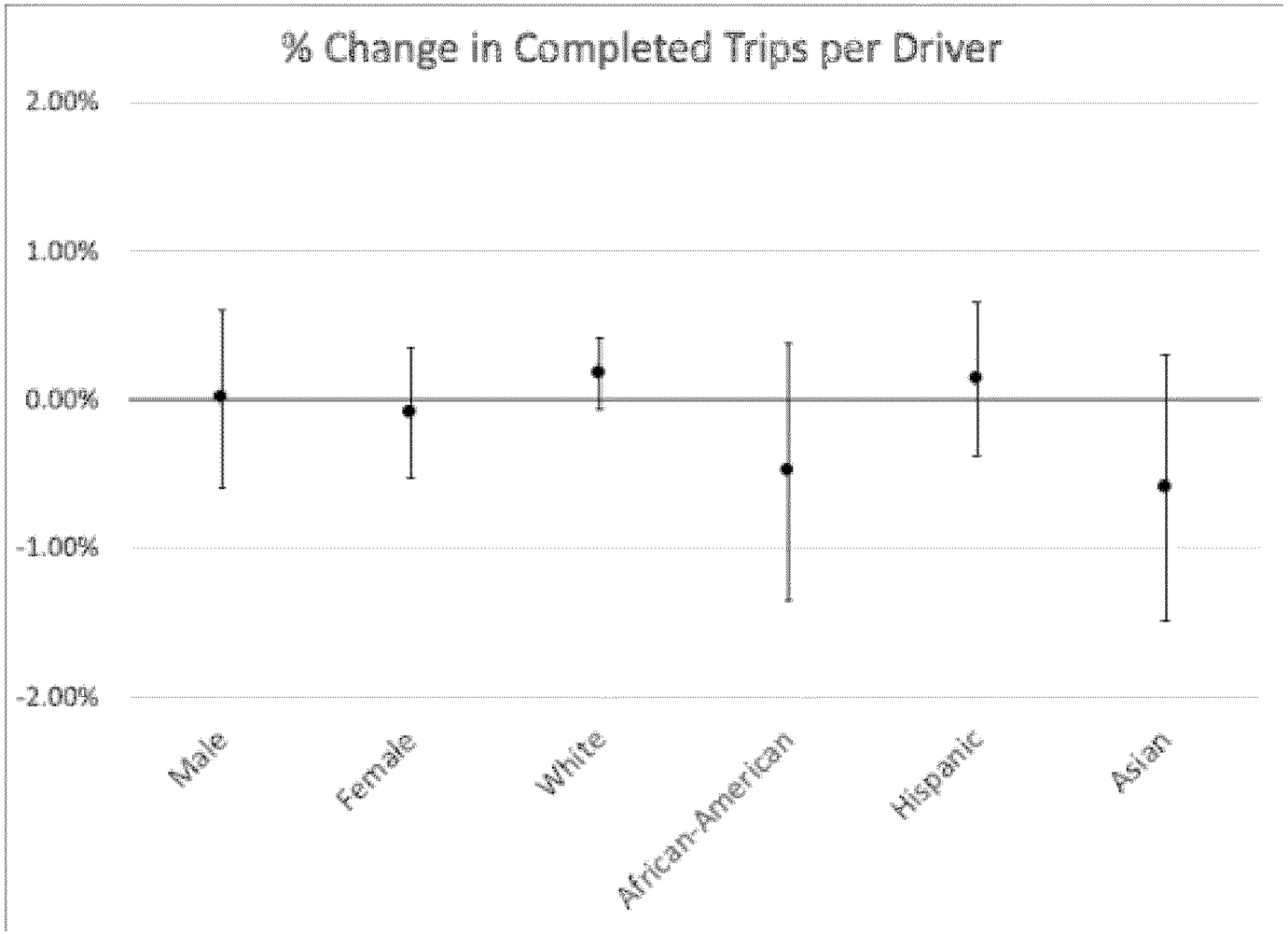
Driver Earnings Weekend Nights



No stat sig disparities in Completed Trips

May 1 - May 15

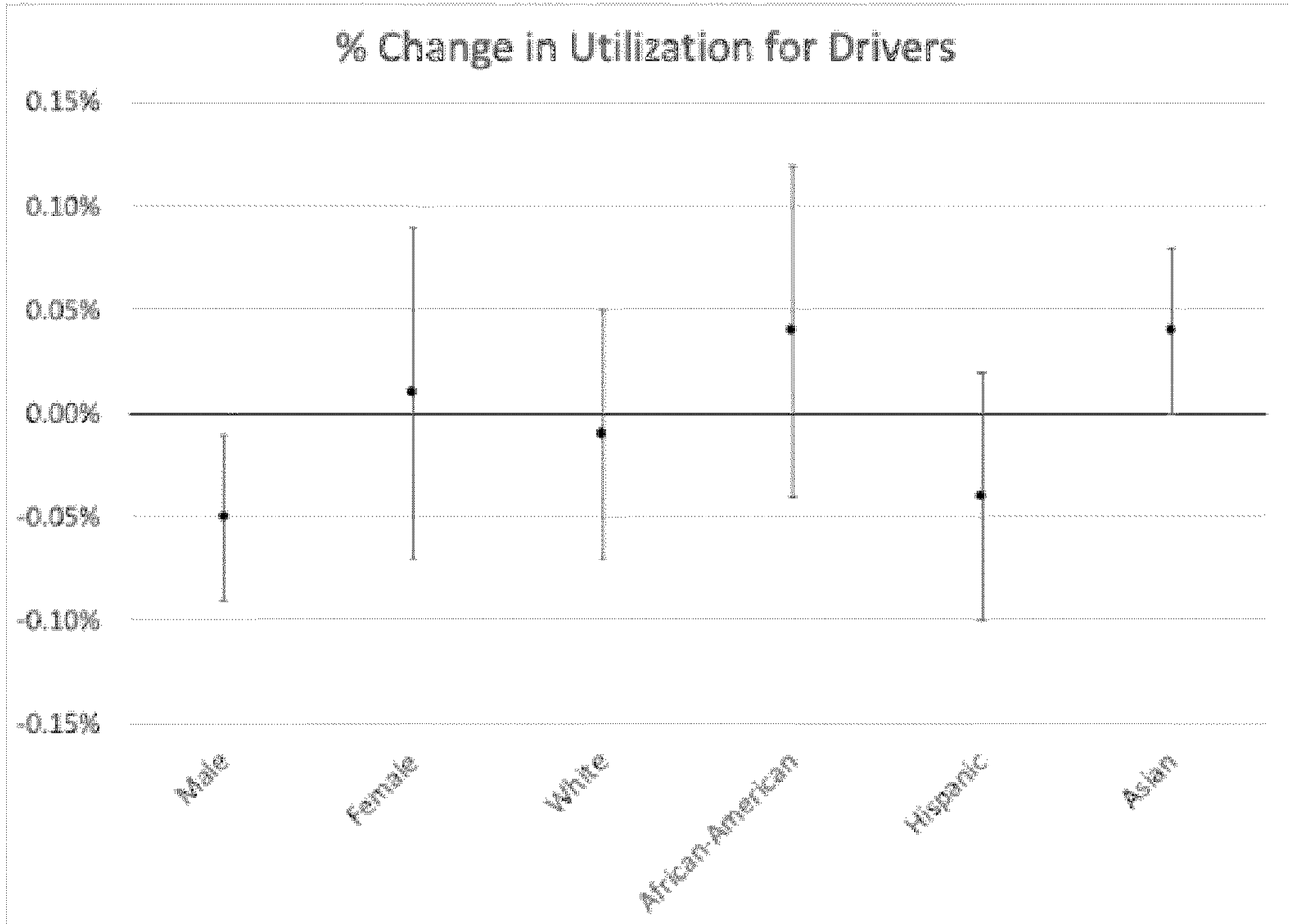
Completed Trips



No stat sig disparities in Utilization

May 1 - May 15

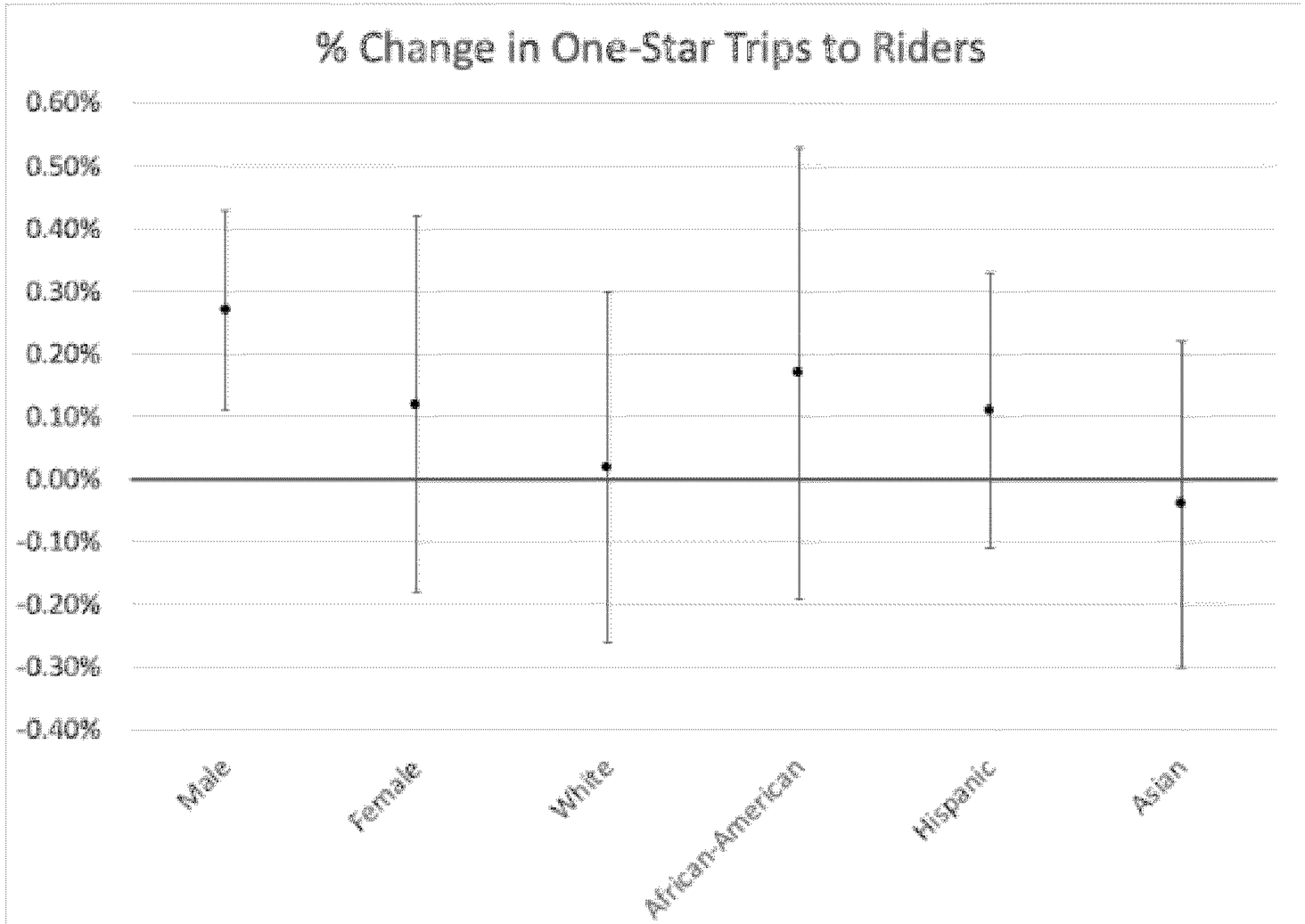
Utilization



No stat sig disparities in 1-star trips

May 1 - May 15

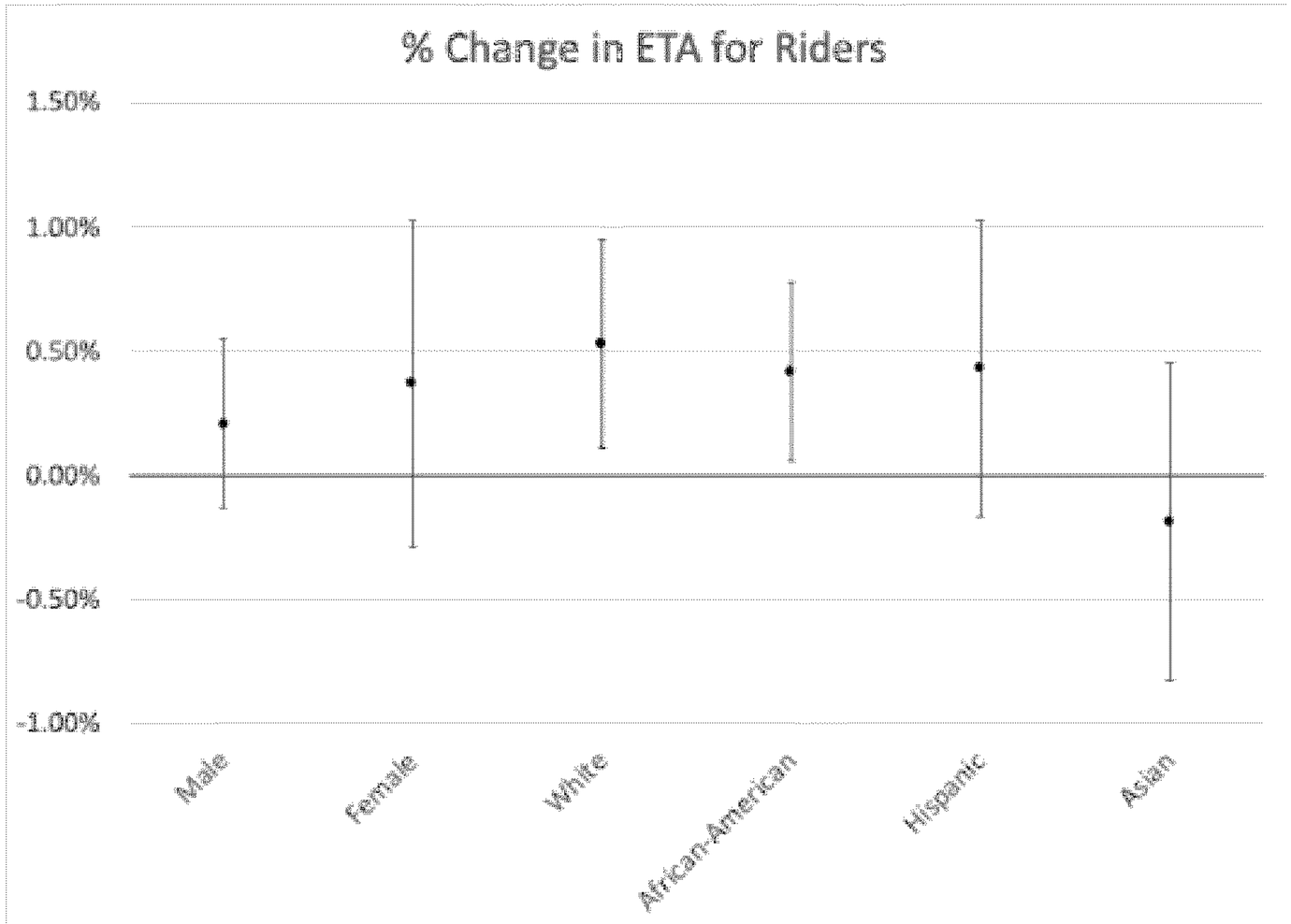
One-Star Trips (to Riders)



No stat sig disparities in ETAs

May 1 - May 15

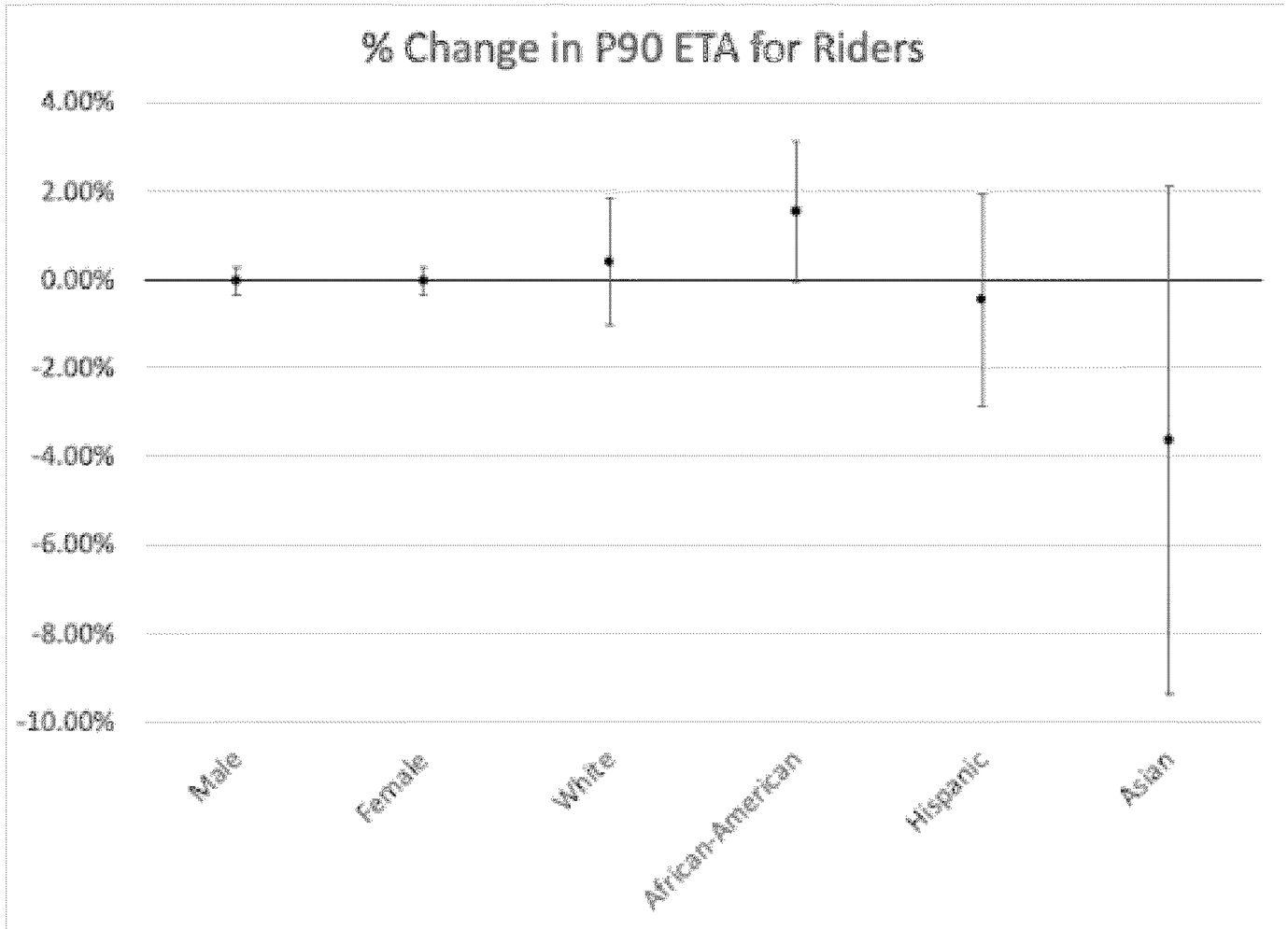
ETAs



No stat sig disparities in p90 ETAs

May 1 - May 15

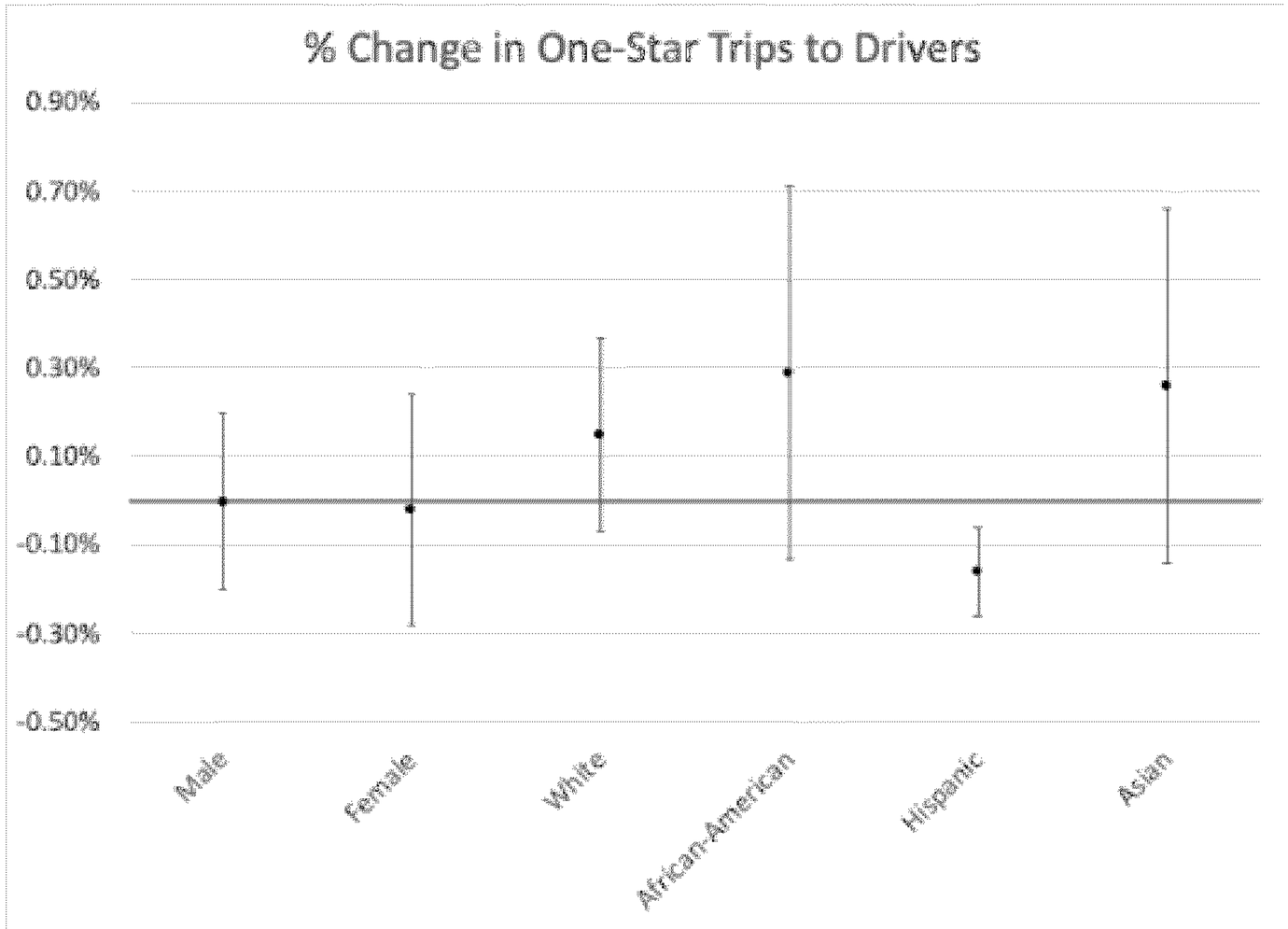
P90 ETAs



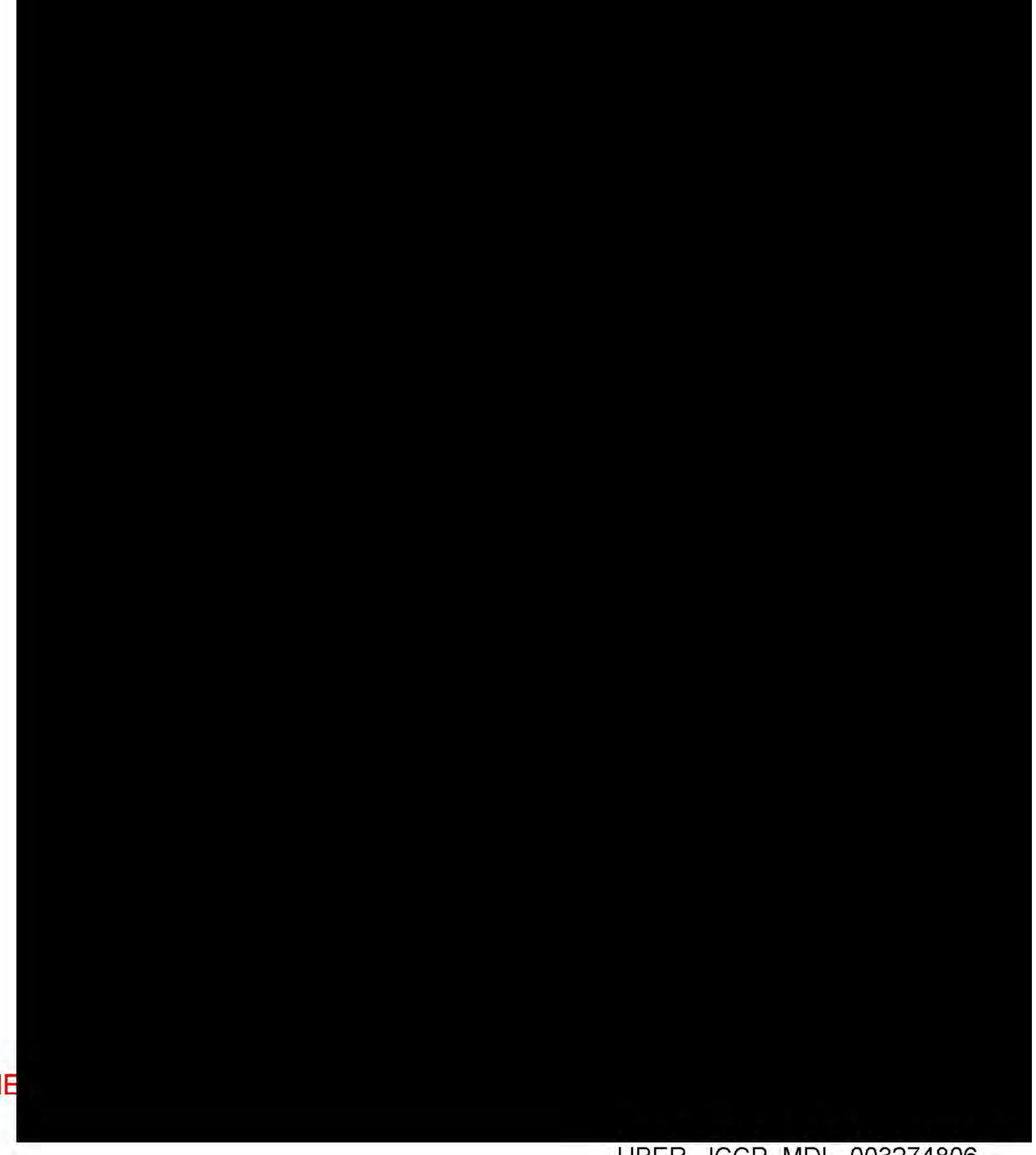
No stat sig disparities in 1-star trips

May 1 - May 15

One-Star Trips (to Drivers)



S-RAD Brazil model details



ATTORNEY-CLIE

Brazil model updated with new features

Driver + Rider Gender

driver_rider_different_gender

Trip Context

geohash6_cash_trip_rate_6mo
geohash6_latenight_trip_rate_6mo
geohash6_log_trip_count_6mo
trip_country_id
trip_dow_local
trip_global_product_name
trip_sub_region
trip_hour_local

Environment safety history

geohash6_flack_ipc_rate_all_ao_6mo
city_sexual_assault_l1234_rate_6mo

Driver + Rider Safety History

client_bliss_l1234_count_all_ao_total
client_bliss_l1234_rate_all_ao_total
client_ipc_incident_count_rider_ao
client_sexual_count_rider_ao
client_ipc_incident_count_driver_ao
client_sexual_count_driver_ao

driver_bliss_l1234_rate_all_ao
driver_ipc_incident_rate_driver_ao
driver_sexual_rate_driver_ao_total

Driver + Rider Ratings

client_1star_rate_from_opposite_gender
client_1star_rate_to_opposite_gender
driver_1star_rate_from_opposite_gender
driver_1star_rate_to_opposite_gender
client_1star_rate_total
driver_1star_rate_total
client_2star_rate_total
client_2star_given_rate_total
driver_2star_rate_total
driver_2star_given_rate_total

Driver + Rider Trip History

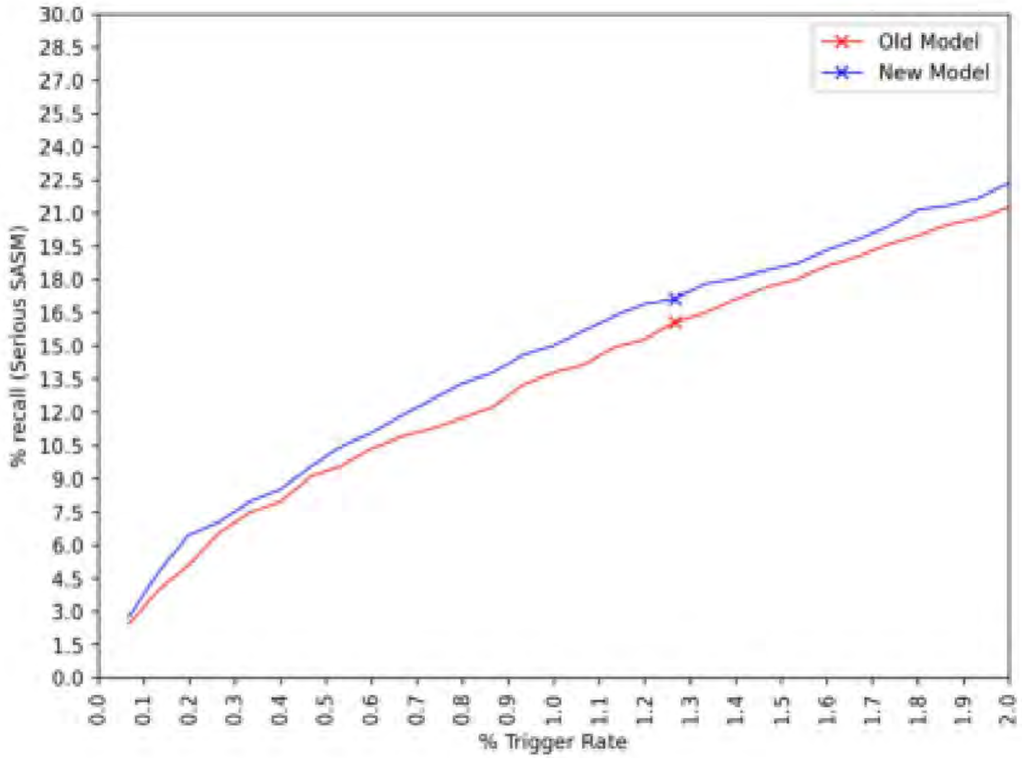
log_driver_lifetime_trip_count
log_driver_trip_duration_seconds_sum_total
driver_canceled_on_rate_total
driver_cancellation_rate_total
driver_latenight_request_rate_total
driver_weekend_request_rate_total

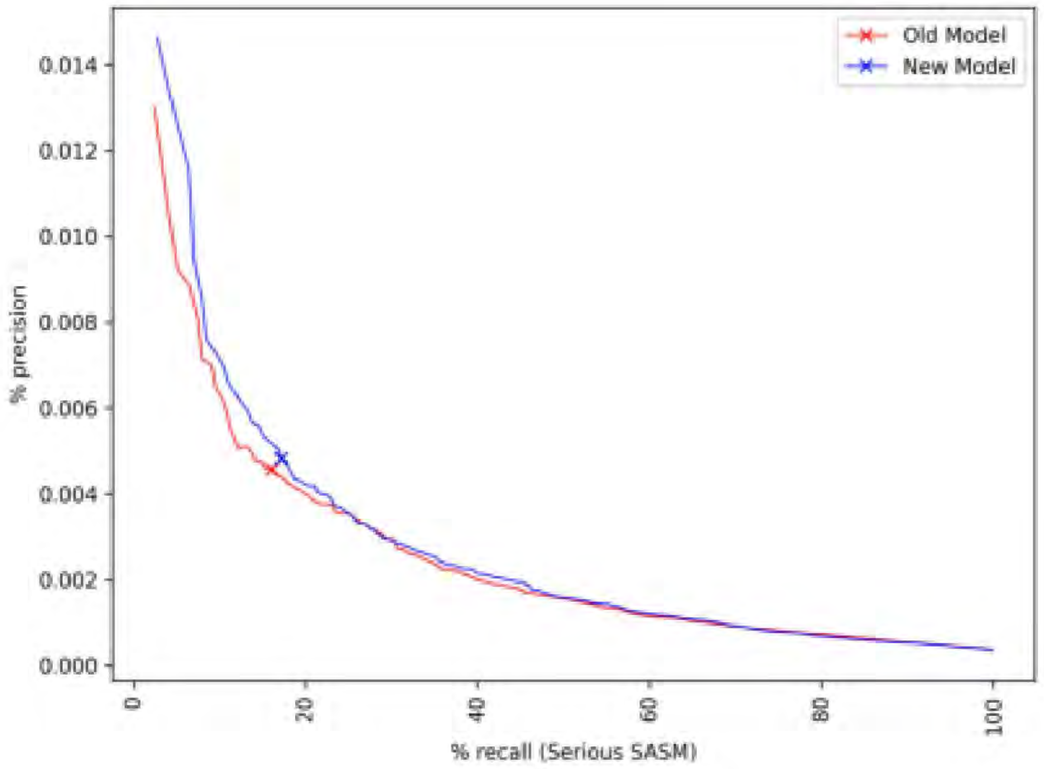
log_client_ltd_completed_count
client_cancellation_rate_total
client_canceled_on_rate_total
client_latenight_request_rate_total
client_weekend_request_rate_total
client_cash_rate
client_first_token_type
client_signup_dow
client_signup_hour
client_trip_completion_rate

ATTORNEY-CLIENT PRIVILEGED

Link to full list of features
***Model development is still active and feature list may change*

Adding more features increased recall from 15.95% to 17.13% @1.25% trigger rate

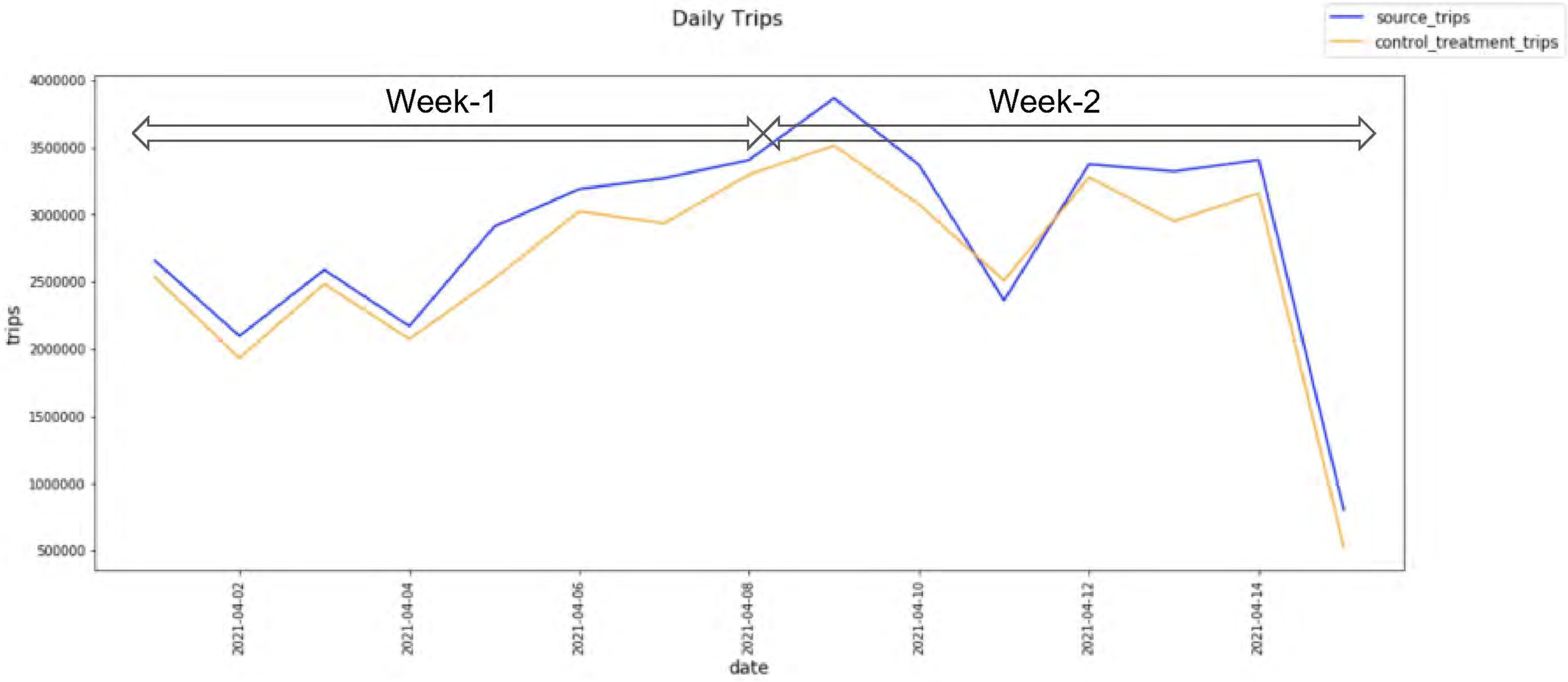




ATTORNEY-CLIENT PRIVILEGED

Evaluated on 2020/12/01 to 2021/03/31 trips
All cities (all UberX trips excl treatment group)
Trained on 2017/12 to 2020/10 trips

Phase 7e: Trip Volume Imbalance Between Week 1 v/s 2 led to 3.7% less trips in treatment vs control



Slide 468 Notes

notebook

Pre-read

Brazil Launch Progress till date

Completed Phases

Scheduled Phases

	5	6	7a	7b	7c	7d	7e		Parallel
Events					Carnival	Covid	Covid	Covid + mkpl changes	
Dates		10.16-10.30	12.03-12.17	01.06-01.20		02.26-03.12	04.01-04.14		Aug-
Overall Trigger Rate	0.9 %	0.58% 0.26%	1.2% 0.4%	1.3% 0.6%		1.1% 0.6%	1.1% 0.6%		1.1% 0.6%
Day Time	N/A	4.53%	9.7%	9.4%		8.9%	9.0%		9.0%
Night Time	N/A								
Least-N intervention	0	3	1	1		max(1,25%)	max{1,25%}		max(1,25%)
Cities		54	54	62		51	57		all

*City size mix is different across tranches

Slide 469 Notes

7a impact: -12.2% Serious SASM rate, **-11.5%** SASM rate
7b impact: **-17.09%** Serious SASM rate, **-4.1%** SASM rate

Pre-read

Phase 7a-7e cumulative safety impact [Ex Phase 7c]

8 weeks

*Safety Impact****	Time of Day		
Incident Type	Overall	Day 6am-10:59pm	Night 11pm-5:59am
Serious SA/SM rate (per mil trips)	-5.2% 4.39 → 4.16 308 → 289	-5.1% 3.31 → 3.14	-5.6% 22.53 → 21.27
Overall SA/SM rate (per mil trips)	-4.8% 20.15 → 19.18 1413 → 1334	-1.6% 16.22 → 15.96	-14.9% 86.07 → 73.28

Incident Type	IR Efficacy Loss***
Serious SA/SM efficacy loss	**7%**
Overall SA/SM efficacy loss	**5%**

Trip Distribution	Control	Treatment
Night (11pm-05:59am)	5.9M	5.9M
Day (6am-10:59pm)	76.2M	75.6M

Trip Distribution	Control	Treatment
Extra Large	51.0M	50.7M
Large	19.7M	19.5M
Medium	8.7M	8.7M
Small	2.7M	2.7M

Caveats:

- Excluding Phase-7c due to carnival
- Cities across phases are different

Results are not statistically significant

Slide 470 Notes

Efficacy loss includes -

- Incidents occurring on trips that were flagged by S-RAD, but dispatched by the marketplace engine
- Incidents occurring on trips that had least risky intervention

Treatment Recall
query

Phase 7e - Overall Marketplace Impact

- **Night trips were ~5.4% of all trips**
- No significant impact on rider cancellation rate compared to previous phases
- ETA Impacted by week 1 and week 2 overall trip unbalance

Trip Distribution	Control	Treatment
Night (11pm-05:59am)	747k	736k
Day (6am-10:59pm)	12.9M	12.4M

Phase 7e	All Day		Day Time		Night time	
Metric	Level effect	Baseline	Level effect	Baseline	Level effect	Baseline
Avg_post_dispatch_eta	2.8	269.1	-4.5	227.1	14.4	332.15
p95_post_dispatch_eta	6.8	626.1	-8.4	530.3	29.7	769.9
p99_post_dispatch_eta	6.6	878.1	-5.4	794.4	24.3	1003.7
request_to_begin_sec_avg	2.2	425.1	-4.3	385.3	12.9	484.8
completed/requests	-	87.5	Not sig	86.9	-0.869	86.2
rider_cancellation_perc	-	9.6	Not sig	9.5	0.645	9.99
driver_cancellation_perc	-	1.6	Not sig	1.66	Not sig	1.37

Slide 471 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook

Phase 7e - XL/L cities

Phase 7e	XL Cities						L Cities					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline
avg_post_dispatch_eta	10.5	242.2	Not sig	211.6	27.4	288.2	3.90789	262.8	-5.9595	222.2	20.1	323.7
p95_post_dispatch_eta	24.1	531.1	Not sig	456.9	62.1	6422.2	8.45137	609.8	-9.9341	516.3	37.2	7501
p99_post_dispatch_eta	23.6	750.9	Not sig	657.8	57.9	890.6	8.20897	875.1	Not sig	799	32.7	989.25
request_to_begin_sec_avg	5.4	414.4	Not sig	386.1	16.04	456.7	Not sig	419.7	-7.2956	380.9	17.00	477.8
completed/requests	-0.27	88.2	Not sig	88.2	-0.83	88	Not sig	84.8	Not sig	85.1	-0.898	83.1
unfulfilled_perc	0.088	1.28	Not sig	1.22	0.217	1.47	Not sig	3.15	Not sig	2.976	Not sig	3.71
rider_cancellation_perc	0.189	9.0	Not sig	8.97	0.622	8.99	Not sig	10.26	-0.22	10.1	0.577	10.82
driver_cancellation_perc	Not sig	1.49	Not sig	1.56	Not sig	1.25	Not sig	1.76	Not sig	1.823	Not sig	1.55

Slide 472 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook

Phase 7e - S/M cities

Phase 7e	M Cities						S Cities					
	All Day		Day Time		Night Time		All Day		Day Time		Night Time	
Metric	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline	Impact	Baseline
avg_post_dispatch_eta	Not sig	280.8	-4.5	231.6	10.3	354.5	Not sig	281.4	-4.6	238.7	Not sig	345.4
p95_post_dispatch_eta	Not sig	667.4	-11.8	559.6	25.1	829.2	Not sig	661.9	Not sig	563.1	Not sig	810.1
p99_post_dispatch_eta	Not sig	931.1	Not sig	846.9	Not sig	1057.4	Not sig	902.6	Not sig	815.4	Not sig	1033.3
request_to_begin_sec_avg	Not sig	430.6	-4.1	381.8	Not sig	502.9	Not sig	433.5	Not sig	395.2	12.2851	490.9
completed/requests	Not sig	84.9	Not sig	85.1	-0.863	83.8	Not sig	82.1	0.568	83.1	-1.256	79.2
unfulfilled_perc	Not sig	2.9	Not sig	2.8	Not sig	3.1	Not sig	4.4	Not sig	4.1	0.431	5.1
rider_cancellation_perc	Not sig	10.6	Not sig	10.2	0.921	11.6	Not sig	11.6	-0.313	10.9	0.807	14.1
driver_cancellation_perc	Not sig	1.6	Not sig	1.7	Not sig	1.4	Not sig	1.8	Not sig	1.9	Not sig	1.6

Slide 473 Notes

Dashboard
Overall MX Notebook
Segment MX Notebook

LR-Max(1,25%) Impact

1.10% *of trips were affected due to S-RAD*

0.3% *of trips had all supply plans flagged. S-RAD offered Least Risky plan to marketplace engine.*

0.28% *of trips had a Least Risky plan dispatched*

0.02% *of trips, the engine ignored Least Risky plan and dispatched an actioned plan*

Directional *impact observed on SASM rate and s-rad average risk score*

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274821

P-01366.00629

Slide 474 Notes

Analysis

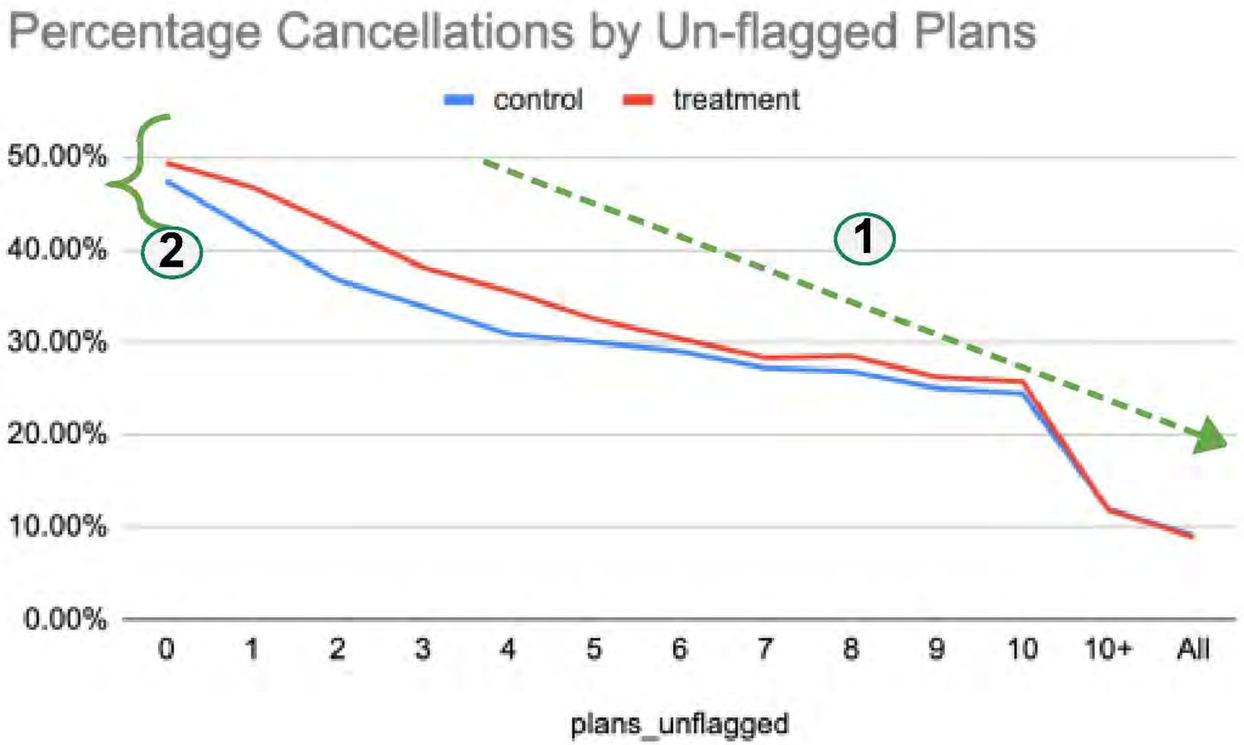
+1.9 pp Cancellation Rate Difference

- Considering Trips with All Plans Flagged

① More unflagged plans equals lower impact

② +1.9 pp difference in cancellation rates between treatment and control when **all plans flagged** compared to +8 pp difference observed in Phase-7b,

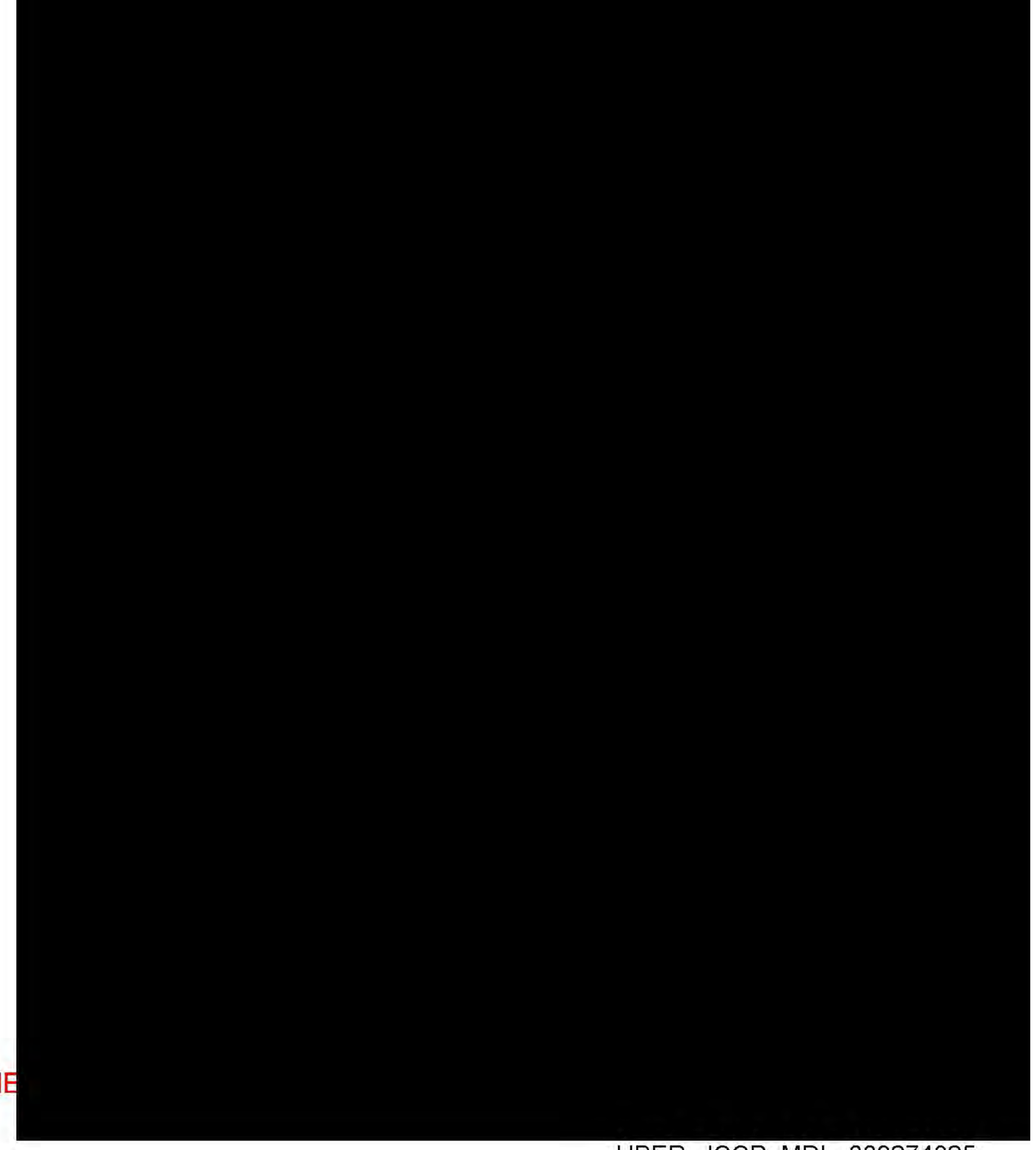
Phase-7e impacted by lockdowns / Less XL cities/ Least-risky intervention changes



Slide 475 Notes

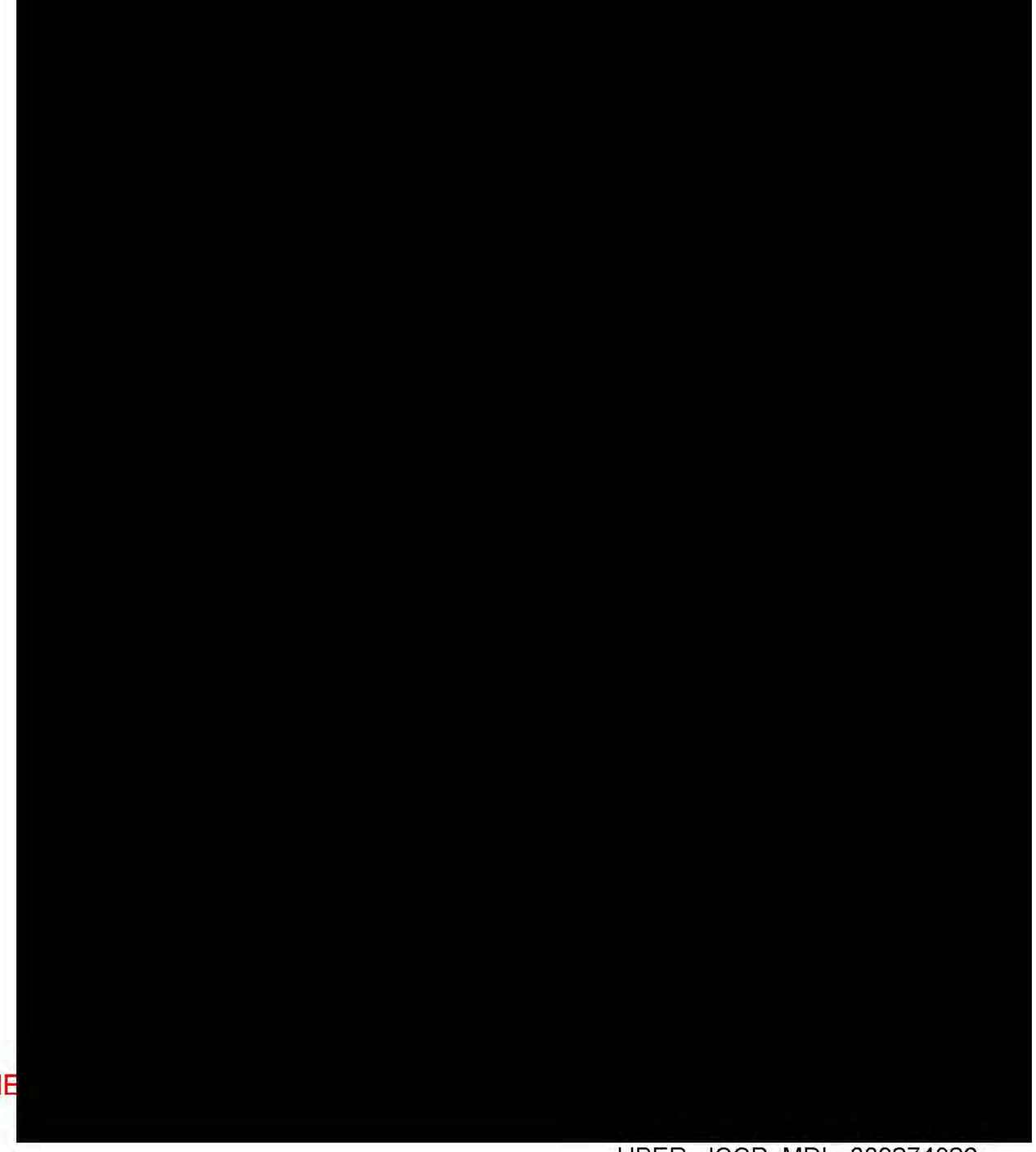
Analysis

LR Intervention details



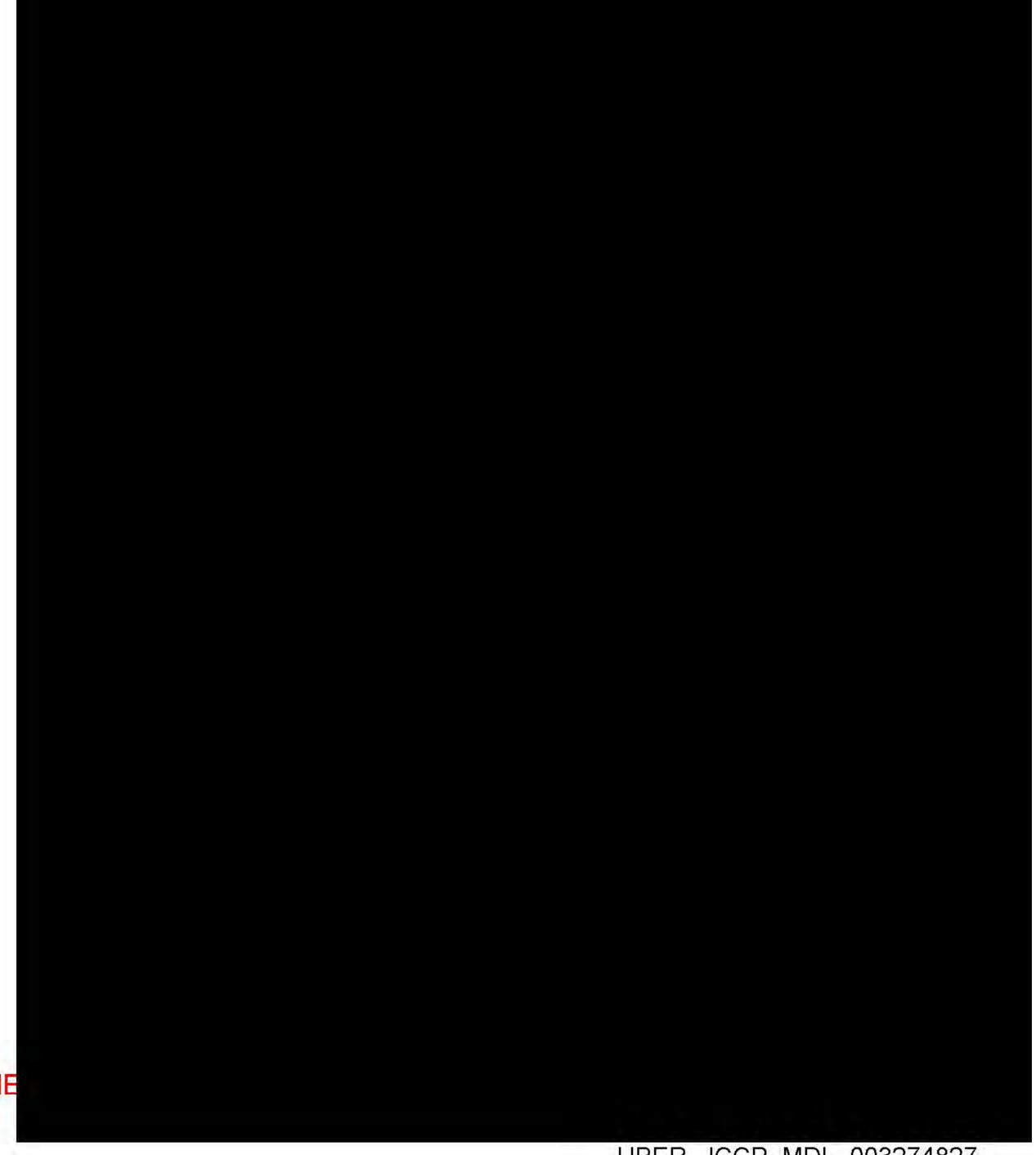
ATTORNEY-CLIE

Parallel Switchback details



ATTORNEY-CLIE

Parallel switchbacks



ATTORNEY-CLIE

Graveyard

[redacted]

ATTORNEY-CLIE

Other ongoing activities

- Building a PoC for SRAD nudges
- Deepdive into past XP data
  - persistently actioned users
  - incidents on high score trips (to inform SRAD Nudges)
- Data model extensions
  - parallel switchbacks, Job Boards, persistently actioned users
- Kicking off IPC model development (LatAm, US)

ATTORNEY-CLIENT PRIVILEGED

Monitoring Daily Status

Safety Parallel Switchbacks <no-reply@uber.com>
to me, gorkem, safety-marketplace-eng

Parallel switchback status report.

There are currently **25 parallel experiments** set-up.
Of these, **0** are scheduled to start and **0** are ending soon.
7 are running in standalone mode, **18** in parallel mode and **0** are currently disabled.

In the cities where parallel experiments are set-up, there are **16** experiments running and **0** scheduled to start.

Parallel experiments status:
Experiment: srad_parallel_switchback_porto_alegre. Start time (local time): 2021-07-22T11:12:00. End time (local time): 2021-10-14T11:12:00.
Experiment: srad_parallel_switchback_manaus. Start time (local time): 2021-07-21T11:12:00. End time (local time): 2021-10-13T11:12:00.
Experiment: srad_parallel_switchback_nashville. Start time (local time): 2021-07-24T04:48:00. End time (local time): 2021-10-15T04:48:00.
Experiment: srad_parallel_switchback_ribeirao_preto. Start time (local time): 2021-07-21T11:12:00. End time (local time): 2021-10-13T11:12:00.
Experiment: srad_parallel_switchback_rio_de_janeiro. Start time (local time): 2021-07-22T11:12:00. End time (local time): 2021-10-14T11:12:00.
Experiment: srad_parallel_switchback_belo_horizonte. Start time (local time): 2021-07-22T11:12:00. End time (local time): 2021-10-14T11:12:00.
Experiment: srad_parallel_switchback_honolulu. Start time (local time): 2021-07-23T19:12:00. End time (local time): 2021-10-15T19:12:00.
Experiment: srad_parallel_switchback_raleigh. Start time (local time): 2021-07-24T09:36:00. End time (local time): 2021-10-16T09:36:00.
Experiment: srad_parallel_switchback_tampa. Start time (local time): 2021-07-24T04:48:00. End time (local time): 2021-10-15T04:48:00.
Experiment: srad_parallel_switchback_baltimore. Start time (local time): 2021-07-24T04:48:00. End time (local time): 2021-10-15T04:48:00.
Experiment: srad_parallel_switchback_cincinnati. Start time (local time): 2021-07-23T19:12:00. End time (local time): 2021-10-15T19:12:00.
Experiment: srad_parallel_switchback_florianopolis. Start time (local time): 2021-07-22T11:12:00. End time (local time): 2021-10-14T11:12:00.
Experiment: srad_parallel_switchback_kansas_city. Start time (local time): 2021-07-24T04:48:00. End time (local time): 2021-10-15T04:48:00.
Experiment: srad_parallel_switchback_sorocaba. Start time (local time): 2021-07-21T11:12:00. End time (local time): 2021-10-13T11:12:00.
Experiment: srad_parallel_switchback_recife. Start time (local time): 2021-07-22T11:12:00. End time (local time): 2021-10-14T11:12:00.
Experiment: srad_parallel_switchback_boston. Start time (local time): 2021-07-24T04:48:00. End time (local time): 2021-10-15T04:48:00.
Experiment: srad_parallel_switchback_curitiba. Start time (local time): 2021-07-21T11:12:00. End time (local time): 2021-10-13T11:12:00.
Experiment: srad_parallel_switchback_belem. Start time (local time): 2021-07-22T11:12:00. End time (local time): 2021-10-14T11:12:00.
Experiment: srad_parallel_switchback_goiania. Start time (local time): 2021-07-22T11:12:00. End time (local time): 2021-10-14T11:12:00.
Experiment: srad_parallel_switchback_campinas. Start time (local time): 2021-07-22T11:12:00. End time (local time): 2021-10-14T11:12:00.
Experiment: srad_parallel_switchback_brasilia. Start time (local time): 2021-07-22T11:12:00. End time (local time): 2021-10-14T11:12:00.
Experiment: srad_parallel_switchback_jacksonville. Start time (local time): 2021-07-24T09:36:00. End time (local time): 2021-10-16T09:36:00.

Tracking every schedule change

[Parallel switchbacks] Experiments changed in Fortaleza Inbox ×

Safety Parallel Switchbacks <no-reply@uber.com>
to me, gorkem, safety-marketplace-eng

Parallel switchback experiment in **Fortaleza** has been updated to reflect the experiment changes.

Link to the parallel experiment
Previous scheduled resets:
Start Phase: treatment, Time (local time): 2021-07-22T11:12:00, Reason: experiment_begin, Experiment: srad_parallel_switchback_fortaleza, Schedule type: standalone
Start Phase: treatment, Time (local time): 2021-07-28T20:48:00, Reason: experiment_begin, Experiment: additive_laminor_latam_set1, Schedule type: parallel
Start Phase: treatment, Time (local time): 2021-08-11T20:48:00, Reason: experiment_end, Experiment: additive_laminor_latam_set1, Schedule type: standalone
Start Phase: disabled, Time (local time): 2021-10-14T11:12:00, Reason: experiment_end, Experiment: srad_parallel_switchback_fortaleza

New scheduled resets:
Start Phase: treatment, Time (local time): 2021-07-22T11:12:00, Reason: experiment_begin, Experiment: srad_parallel_switchback_fortaleza, Schedule type: standalone
Start Phase: treatment, Time (local time): 2021-07-28T20:48:00, Reason: experiment_begin, Experiment: additive_laminor_latam_set1, Schedule type: parallel
Start Phase: treatment, Time (local time): 2021-08-12T20:48:00, Reason: experiment_end, Experiment: additive_laminor_latam_set1, Schedule type: standalone
Start Phase: disabled, Time (local time): 2021-10-14T11:12:00, Reason: experiment_end, Experiment: srad_parallel_switchback_fortaleza

ATTORNEY-CLIENT PRIVILEGED

CONFIDENTIAL

UBER_JCCP_MDL_003274831

P-01366.00639

Current list of cities (As of July 29)

Brazil (15)
Aracaju
Goiania
porto alegre
ribeirao preto
fortaleza
sorocaba
campinas
belo horizonte
rio de janeiro
brasilia
curitiba
sao jose dos campos
florianopolis
belem
manaus

US (10)
Boston
Cincinnati
Honolulu
Jacksonville
Raleigh-Durham
Kansas City
Detroit
Baltimore-Maryland
Nashville
Tampa Bay

ATTORNEY-CLIENT PRIVILEGED

H1'21 Roadmap

Launched

Mar | Jun | Sep | Jan 2022

★ Day/Night Trigger rate

★ LR25 Intervention

★ Gender agnostic model

★ Evening Trigger Rate

★ Scale parallel switchback

★ Full Rollout

Brazil Experiments

Gender based model, LR25 Intervention
Phase 7 - *Safety Tests*

US Experiments

Model Selection

Feature improvements

Gender agnostic model
Phase 6 - *Marketplace Test*

Gender agnostic model
Phase 7 - *Safety Test*

SRAD Signal & Flow Trigger event

Nudges XP

IPC Model XPs

Infrastructure

Parallel switchback infra

Caching infra

Holdout Infra

Uber

ATTORNEY-CLIENT PRIVILEGED

Slide 484 Notes

https://docs.google.com/presentation/d/19Sf917H6hwFixdWdOIpY_-GuKpjKeI3lI0XiNc_SQks/edit#slide=id.gdd02d22cfd_0_2

Near final Copy

Nudges will rotate through a set of messages to riders & drivers on flagged trips



Audio Recording	Follow My Ride	RideCheck	5-Star Rating	Safety tip on Respect
If Audio recording is already setup, riders/earners can start the recording with 2 taps.	Earner is displayed the contact previously selected in the Settings to share trip with.	Riders/Earners can learn more about RideCheck triggers on the landing page	Motivate good behavior by tying it to ratings	Reinforcing specific positive actions to encourage a sense of social norm when using the app.

ATTORNEY-CLIENT PRIVILEGED

User flow details for setting up vs turning on various tools are in the backup (here)

Slide 485 Notes

The How?

Priming - what is priming and what are we seeking to achieve with priming messages?

Priming

Presenting someone with a communication that prepares them to be more receptive to a particular point of view or take a specific action.

Tactic

Emphasize idea of being watched to prime good behavior. Given salience to greater sense of risk in being caught.

What messages are we using here?

Explain Audio recording

Explain Follow my Ride

Explain Ride Check

1. Behavioral prescription - what is that and what are we trying to achieve with those types of messages?

Behavioral Prescription

Articulation of recommended action(s) to be taken by specific people under appropriate circumstances.

Tactic

Provide clear set of guidelines for desired behavior, making it clear what is and isn't acceptable.

What messages are we using here>
5-Star Rating

Explain 5-star rating - checklists work (evidence?)

2. Reciprocity

Once they know that they are being watched and what is good behavior/good actions, let's push the user to feel that their positive action can lead to a great good/collective of positive actions.

Reciprocity
People feel an obligation to do something for someone who's done something for them.

Tactic
Respond to a positive action with another positive action. Create social norms and give salience to correct behaviors.

Screenshot thanks to simulating trip on: https://studio.uberinternal.com/simulator

Near final Copy

Nudges will rotate through a set of messages to riders & drivers on flagged trips



Audio Recording	Follow My Ride	RideCheck	5-Star Rating	Safety tip on Respect
If Audio recording is already setup, riders/earners can start the recording with 2 taps.	Earner is displayed the contact previously selected in the Settings to share trip with.	Riders/Earners can learn more about RideCheck triggers on the landing page	Motivate good behavior by tying it to ratings	Reinforcing specific positive actions to encourage a sense of social norm when using the app.

ATTORNEY-CLIENT PRIVILEGED

User flow details for setting up vs turning on various tools are in the backup (here)

Slide 486 Notes

The How?

Priming - what is priming and what are we seeking to achieve with priming messages?

Priming

Presenting someone with a communication that prepares them to be more receptive to a particular point of view or take a specific action.

Tactic

Emphasize idea of being watched to prime good behavior. Given salience to greater sense of risk in being caught.

What messages are we using here?

Explain Audio recording

Explain Follow my Ride

Explain Ride Check

1. Behavioral prescription - what is that and what are we trying to achieve with those types of messages?

Behavioral Prescription

Articulation of recommended action(s) to be taken by specific people under appropriate circumstances.

Tactic

Provide clear set of guidelines for desired behavior, making it clear what is and isn't acceptable.

What messages are we using here>
5-Star Rating

Explain 5-star rating - checklists work (evidence?)

2. Reciprocity

Once they know that they are being watched and what is good behavior/good actions, let's push the user to feel that their positive action can lead to a great good/collective of positive actions.

Reciprocity
People feel an obligation to do something for someone who's done something for them.

Tactic
Respond to a positive action with another positive action. Create social norms and give salience to correct behaviors.

Screenshot thanks to simulating trip on: https://studio.uberinternal.com/simulator

US & Brazil [WIP]

Market Context (today)

Overview: S-RAD will be rolled out in xx cities in the US and yy cities in Brazil by end-May

When we first launched the xp, we communicated the xp in US to x, y, z groups and in BR to a, b c groups

In US: Based on feedback from stakeholders, we took several actions, such as a, b, c , among other in order to meet the minimum launch requirements.

Furthermore, we excluded gender from US,

In BR: We included gender in BR. Today, the public discussions regarding ethics behind algorithms are …

And privacy concerns in the BR are ….there is a new law…

Approach, Strategy & Tactics

Initiative	Description	Rationale / Objective(s)	Operational details
Any preventative work?	[tbc]	If we delay doing this work, it will create inevitable risk [tbc]	[tbc]
Any preemptive work for Brazil only?			
Small scale outreach	Reach out to 2019/2020 sessions (Upturn, NYU Law, NNEDV, RALIANCE)	Maintain relationship	Hold event Share ORCAA paper?
Messaging on Privacy Policy, What Moves Us	Updating 2 main sites that serve purpose of….	Drivers report disconnect w/ Uber	Update sections a and b
Academic work on demographic measurement	Continue working with Professor Max Bazerman on….	Builds credibility in the industry	
Policy/Comms FAQ		If information leaks to press	
ORCAA memo			
Ethics memo			

Preventative Preemptive / proactive Reactionary

1 Put first footnote here
2 Put second footnote here

SOURCE: put source of cited data here

CONFIDENTIAL

UBER_JCCP_MDL_003274841

Long Term

US & Brazil [WIP]

Market Context (today)

We expect that in 1-2 years time, after product having been rolled out and being so effective, we may want to communicate publicly.

We also expect that engagements with newer academic stakeholders/researchers may want to go public as well with their papers.

Potential leak may have occurred by this time period

Public debate regarding the ethics of algorithms will have become heightened, so public response will be industry standard

Approach, Strategy & Tactics

Initiative	Description	Rationale / Objective(s)	Operational details
Any preventative work?	[tbc]	If we delay doing this work, it will create inevitable risk [tbc]	[tbc]
Large scale outreach	Reach out to State AGs, ACLU Racial Justice Project)	Out of respect	tbc
Peer Reviewed Analysis	Academic paper conducted by a renown professor/researcher	Build trust & credibility	tbc
Any reactive work?			

1 Put first footnote here
2 Put second footnote here

Preventative Preemptive / proactive Reactionary

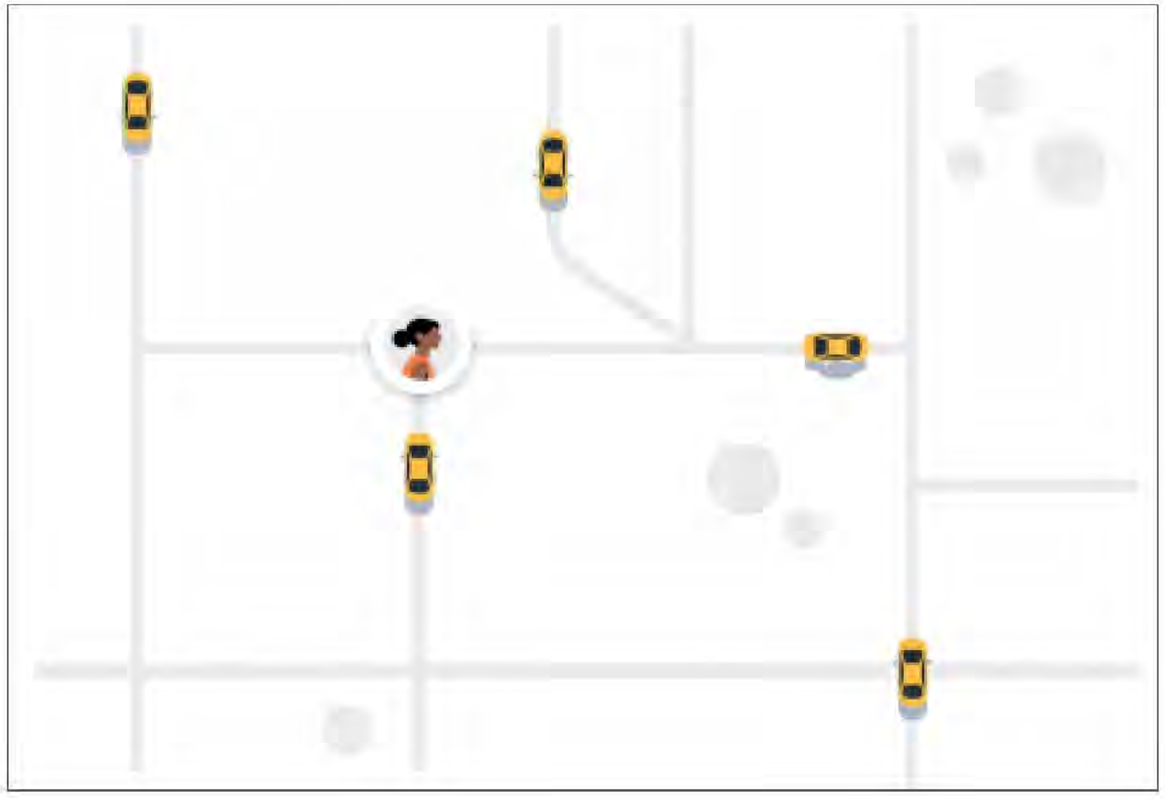
SOURCE: put source of cited data here

CONFIDENTIAL

UBER_JCCP_MDL_003274842

P-01366.00650

Comms Strategy: Questions



What are the best ML/AI venues to talk about SRAD?

What academic journal is the right fit?

When is the right time to talk about SRAD in its entirety?

What would a leak actually show?

CONFIDENTIAL

Latam Expansion

H2 2022

India, EMEA (ex EU & UKI) Expansion

H1 2023

EU + UKI Expansion

H1 2024



+ **Global Model Development**

H2 2022

+ **Safety Impact xp**

H1 2023 /H2 2023

+ **Academic Paper**

H1 2024

Latam Expansion

H2 2022

India, EMEA (ex EU & UKI) Expansion

H1 2023

EU + UKI Expansion

H1 2023 /H2 2023



– **Global Model Development**

H2 2022

– **Safety Impact xp**

H1 2023 /H2 2023

Academic Paper

H1 2023 /H2 2023

Slide 490 Notes

Could we look into accelerating the roadmap? India/ANZ/MEA in H1..

Essentially anything that legal/policy framework allows and we see good recall, we launch marketplace XPs in H1.

Should we assume that we are not going to have a safety xp in rest of world?
Can we assume retrained models will work and just use holdout for model performance?

Do TL;DR
Talk about risks alongside the timeline

1. Show this schedule today.
2. Opportunity to compress timeline
   a. Show risks
   b. Show tradeoffs where we can compress
   c. Call out EU transparency - pushing up comms plan (ie academic paper)

Downranking Global Expansion Roadmap

Unplanned | Ongoing | Planned
Complete | Developing

Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun

SSL Latam

- Marketplace xps
- Stakeholder Approval for MX xps
- Eng solution to operate multiple models in the same location
- Market-place impact readout
- Fairness Testing
- Final Sign-Offs
- 80/20 Launch in SSL Latam
- Set guardrail metrics

EMEA (ex UKI + EU)

- Align on Features
- PLC feasibility/risk assessment
- Build Global Model
- Final Sign-Offs
- Run safety & marketplace xp, 50/50 parallel switchback
  OR
  Rollout US model

UKI + EU

- Align on Gender inclusion
- Build Gender inference Data India
- PLC feasibility/risk assessment

India

- Build Gender inference Data India
- Align on Gender Inclusion
- PLC feasibility/risk assessment
- Run 50/50 Parallel switchback xp

ATTORNEY-CLIENT PRIVILEGED

Strategy for S-RAD Downranking Global Expansion

Expansion Goals

- Focus specifically on serious SA/SM incident prevention
- Mobility only
- Increase S-RAD coverage globally

Expansion Criteria

- Model readiness:
  - Train Regional/Global models with decent performance
    - Alignment on Features included
    - Gender inference
  - Run XPs to validate 1) negligible Marketplace impact; 2)Robust safety impact
- PLC alignment:
  - Evaluate feasibility and risks
  - Assess Fairness results
- Operation availability:
  - Reserve city capacities for XP and launch
  - Check for multiple safety marketplace products live

Expansion Plan (Mobility)

P0: LatAm in H2 2022

- ➢ Latam Model is ready; running Marketplace XP
- ➢ PLC approved
- ➢ Eng solution to operate multiple models in the same location

P1: EMEA&India in 2023

- ➢ Building a Global model in H2 2022
- ➢ Scoping requirements with PLC; Lower risk
- ➢ To create XP and operation plans

P2: EU in 2024

- ➢ Pending on the Global model
- ➢ To be scoped with PLC; high risk: Academic paper* as a