Dashboard Confessional

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Transit Techies NYCT #6

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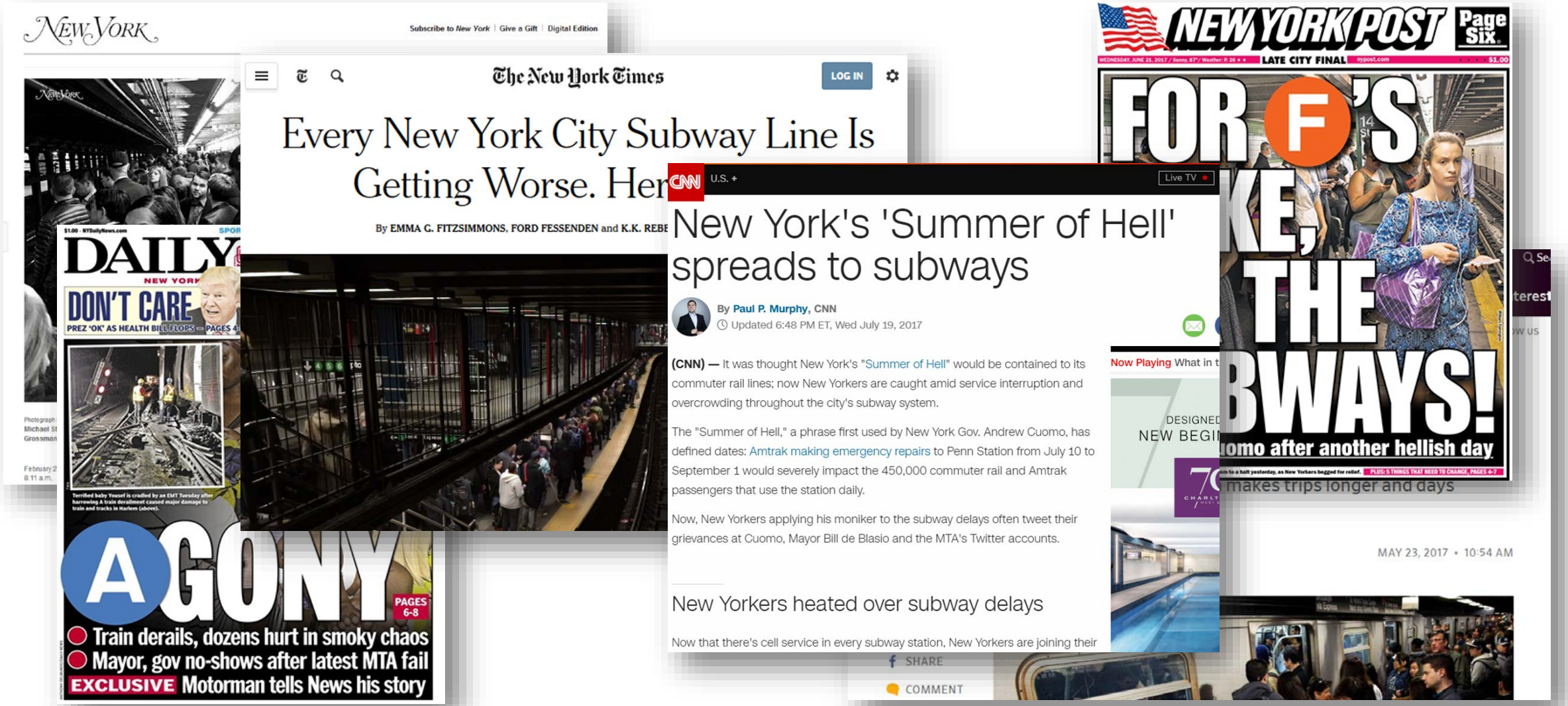
January 2019

What does it take to make a public dashboard happen?



What does it take to make a public dashboard happen?

- Need for greater public accountability

NEW YORK

The New York Times

Cuomo Declares a State of Emergency for New York City Subways

TransitCenter

Jul 11, 2017

Lhota to MTA: We Are Neither Efficient Nor Effective

TransitCenter has obtained a copy of a memo circulated last week to MTA staff by the agency's new chairman, Joe Lhota. The memo acknowledges that the agency faces a crisis and does not currently deserve the public's trust.

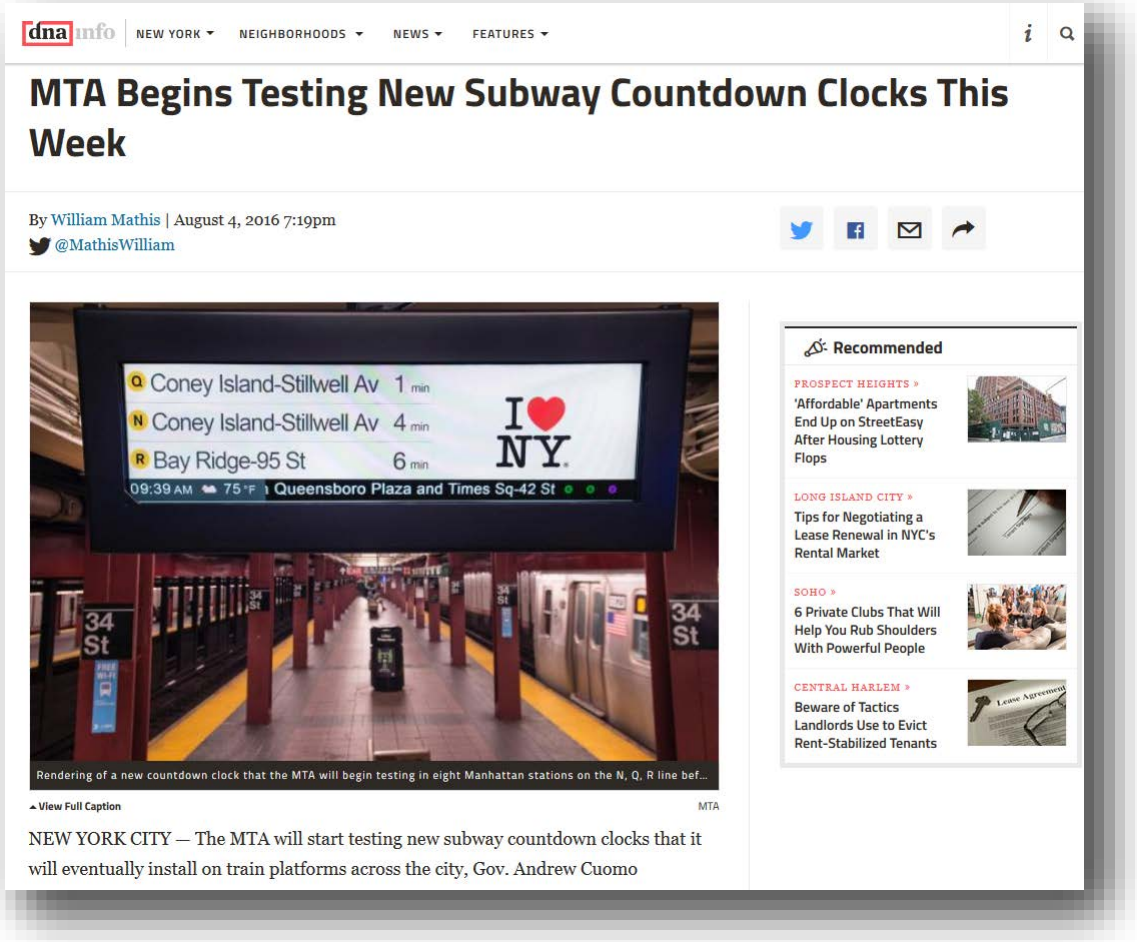
In the memo, Lhota affirms news reports that he will conduct a "top to bottom" audit of the agency's structure in the next 30 days. Lhota would do well to borrow liberally from the 10 point plan for organizational change we've laid out, as well as recognize that there are no silver bullets.

service, such as ongoing and pending signal projects, subway car procurement as well as elevator outages. The dashboard should rely on the kind of legible, rider-focused performance metrics we've championed, such as excess journey time. Additionally, the dashboard will be monumentally

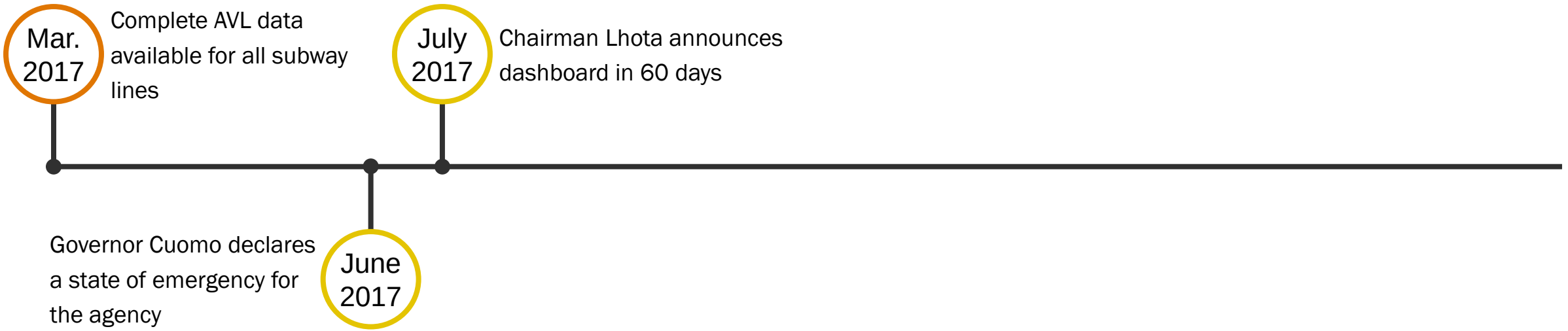
"Next, in 60 days, we will…build a dashboard that presents the metrics of how we are doing."

What does it take to make a public dashboard happen?

- Comprehensive automatic vehicle location (AVL) data for all trains at all stations



Timeline of key events



What does it take to make a public dashboard happen?

- Internal research

TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

Massachusetts Bay Transportation Authority

metro
Washington Metropolitan Area Transit Authority

IBBG | INTERNATIONAL BUS BENCHMARKING GROUP

PTRG PUBLIC TRANSPORT RESEARCH GROUP

MONASH University

- External pressure

TransitCenter

Memo to MTA Board: You're Measuring Performance Wrong. Here's What to Do Instead.

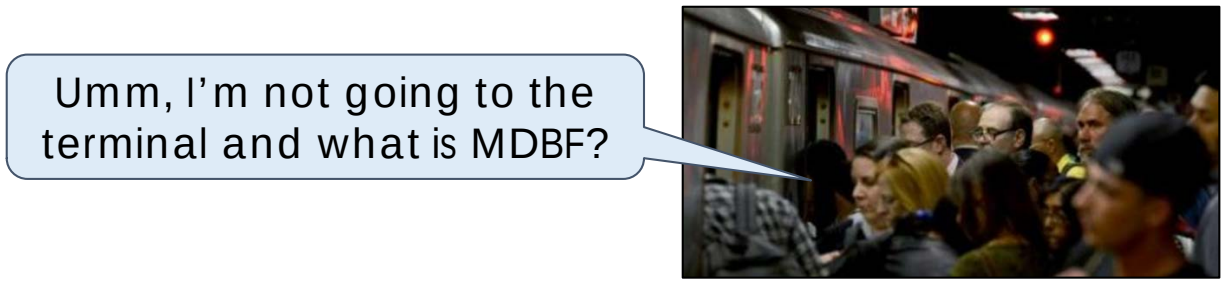
PCAC
PERMANENT CITIZENS ADVISORY COMMITTEE TO THE MTA

What makes a "good" performance metric?

Easier to interpret operationally ⟷ **Better reflects customer experience**

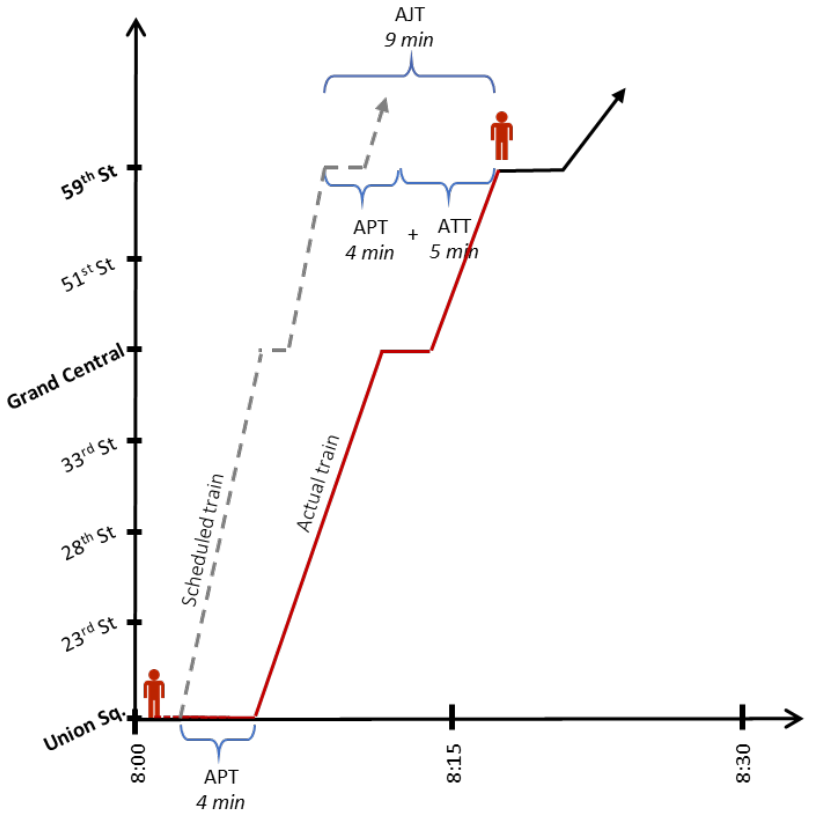
- Metrics should be clearly linked to causes and actions we can take to fix problems
  - Terminal On Time Performance
  - Delays
  - MBDF
- "What does my department needs to do?"

- Metrics should reflect our customers' daily experience
- "Am I getting where I need to go in the time it's supposed to take?"



Three new metrics were introduced for the dashboard

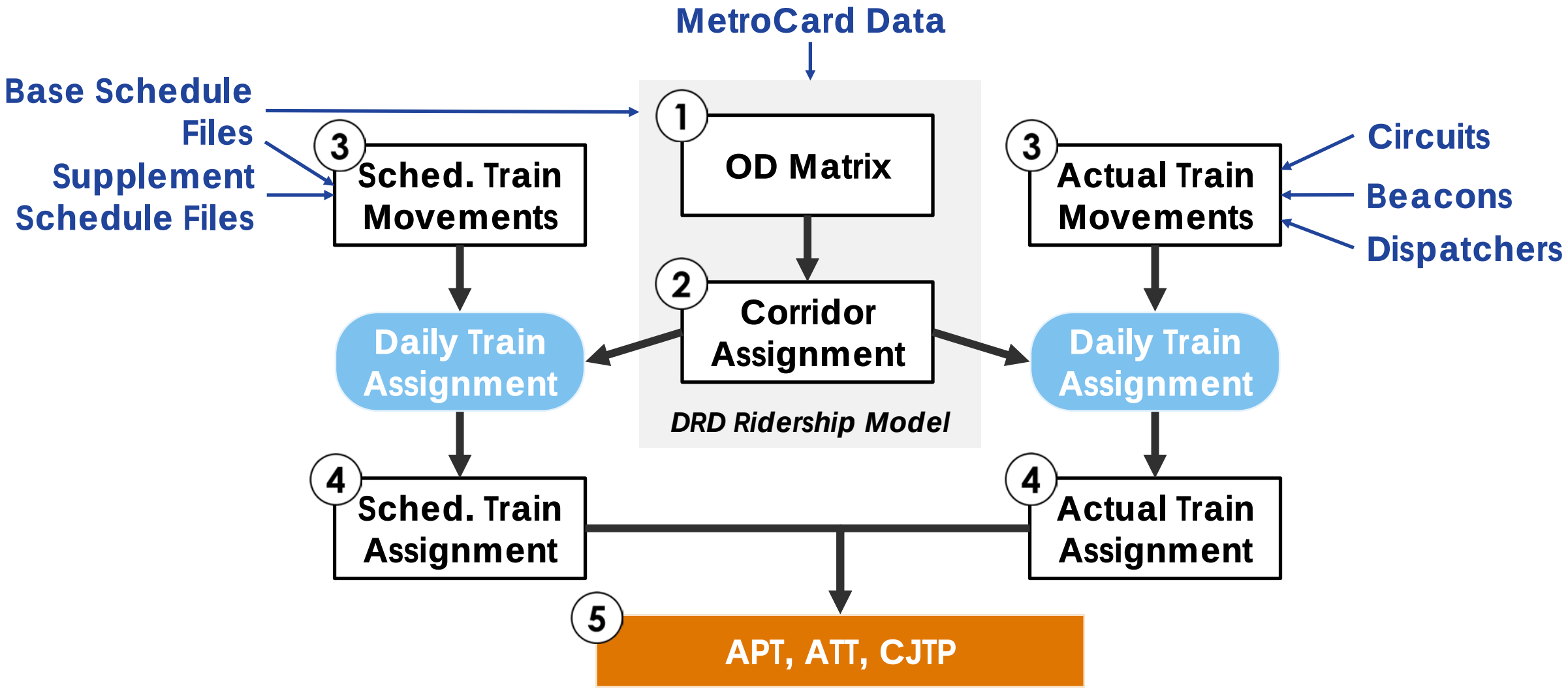
- **Additional Platform Time (APT):** Difference between customer's wait time for actual and scheduled trains
- **Additional Train Time (ATT):** Difference between customer's time on board bus for actual and scheduled trains
- **Customer Journey Time Performance (CJTP):** Percentage of customer trips that are completed within 5 minutes of the scheduled time



Finally, you are measuring how late I will be!

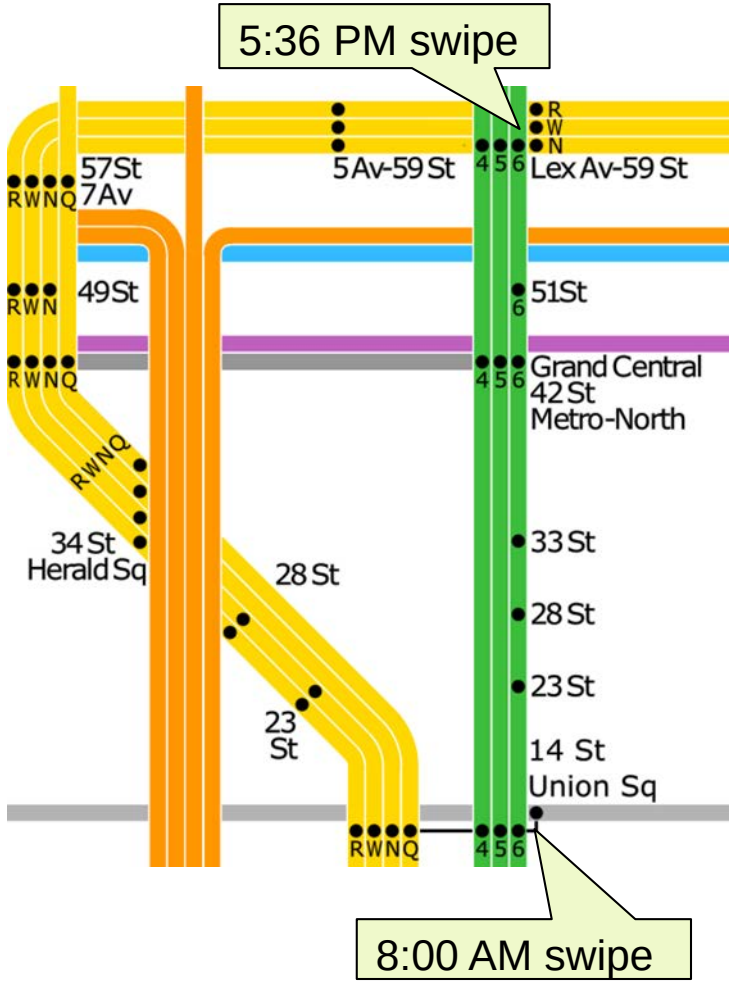
	Scheduled Time	Actual Time	Additional Time
Passenger Arrival at Origin	8:00	8:00	
Train Departure from Origin	8:02	8:06	APT = 4 min
Travel Time	7 min	12 min	ATT = 5 min
Train Arrival at Destination	8:09	8:18	AJT = 9 min

NYCT's new methodology for these metrics is flexible and transferable



Full ridership model run monthly to generate trips and corridors

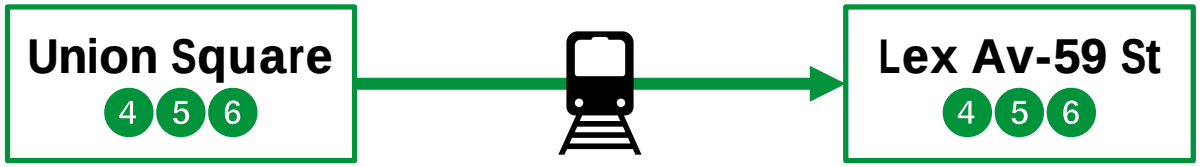
- NYCT only has entry records, so destinations are inferred by using the next location where a card is used
- Using first stage model to establish corridors of choice allows daily model to be **run in ~45 minutes instead of two days**
- Trips get assigned to a particular corridor, and daily model assumes they will adjust within only within those lines (e.g. local vs. express)



Daily train assignment selects best option on corridor

Daily Train Assignment

Passenger Trip with Corridor:



Train Options: (includes service changes)

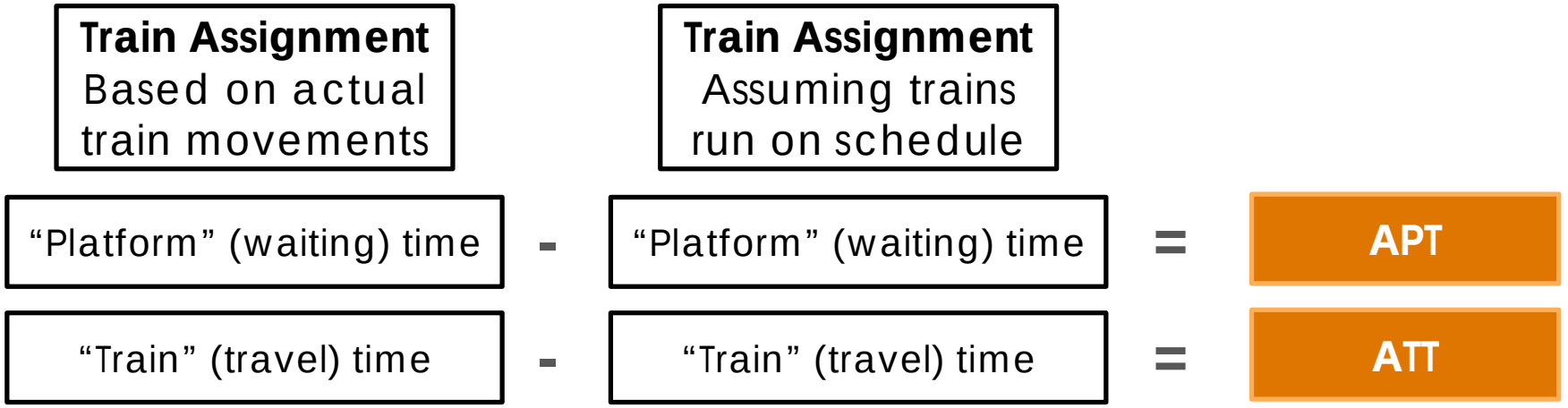
	Wait Time	Schd. Travel Time	Est. Journey Time	
4	5 min	6.5 min	11.5 min	✓
6	1.5 min	11.5 min	13 min	✗

- Daily assignment model assigns each trip to the train on its specific corridor that is **estimated** to be fastest
  - Assume people know arrival time but always base travel time on schedule
  - Trips on other corridors are not considered, even if they could be faster
- Process run twice: once using schedule data and once using actual train movements

Other factors considered in Daily Assignment Model

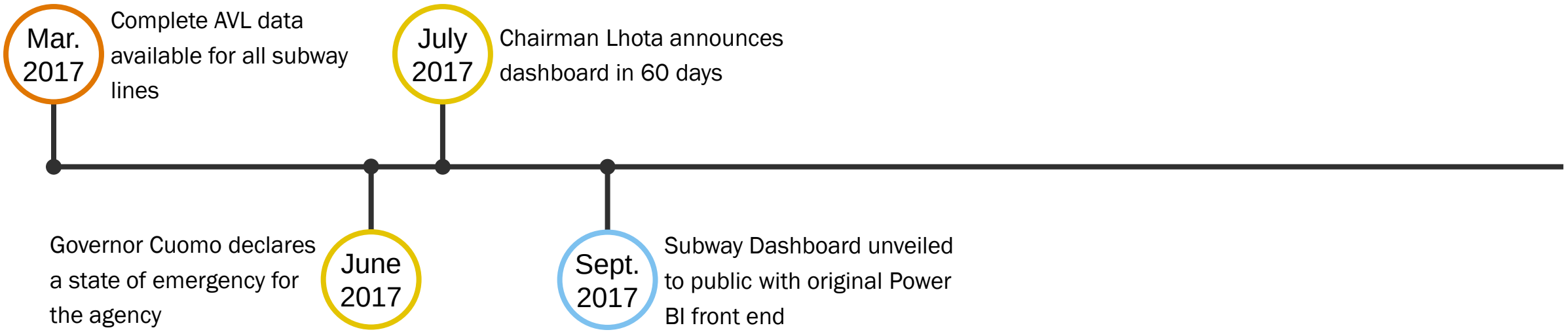
- **Denied Boardings**: Train loads are monitored by the model, and if a train arrives with insufficient capacity, passengers are “denied boarding”, and must wait for next train.
- **Unplanned transfers:** If a passenger would have to wait an excessive time (15+ min) for a direct train, or no direct train is available, model looks for a transfer along the line that will get passenger to destination faster
- **Reroutes:** If trains are rerouted, they can be used by passengers on new route
- **Exclusions:** Closed stations/directions are excluded in OD generation, lookup tables to exclude bad lines/days/stops

Passenger metrics compare time to actually complete each trip with schedule



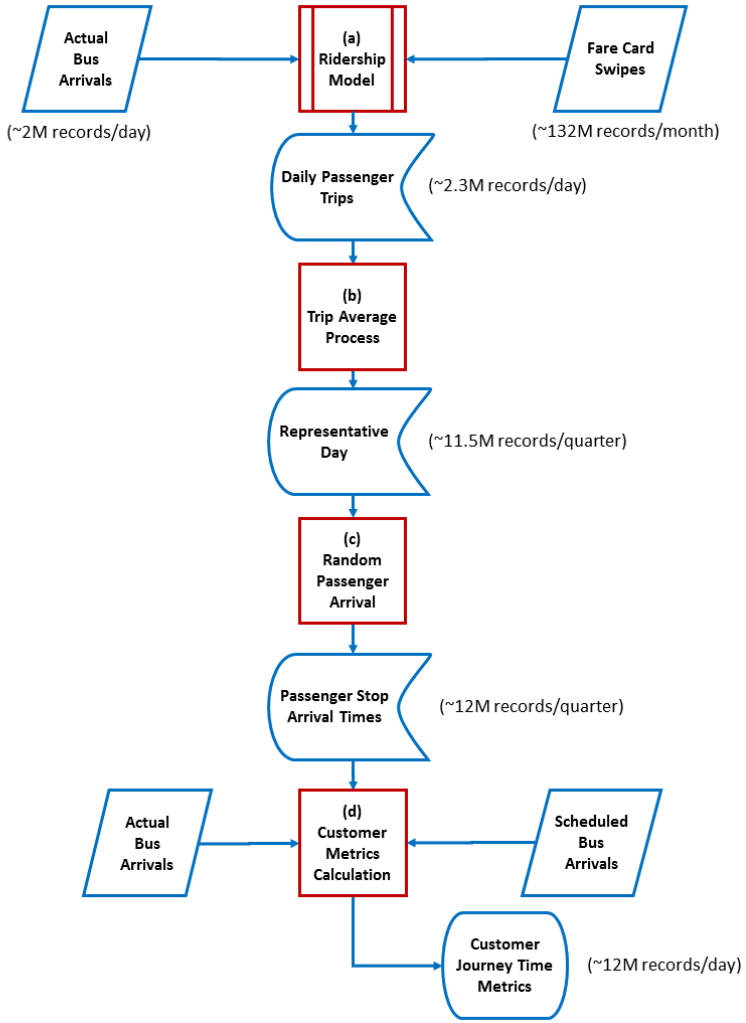
- Passengers assigned to trains based on **scheduled and actual train movements**, and the difference in time to complete each trip is used to calculate customers' "additional" time
  - Metrics can be positive or negative
  - Metrics can be aggregated by averaging subset of **trips**, e.g. particular stations/lines or particular hour/day/month

Timeline of key events

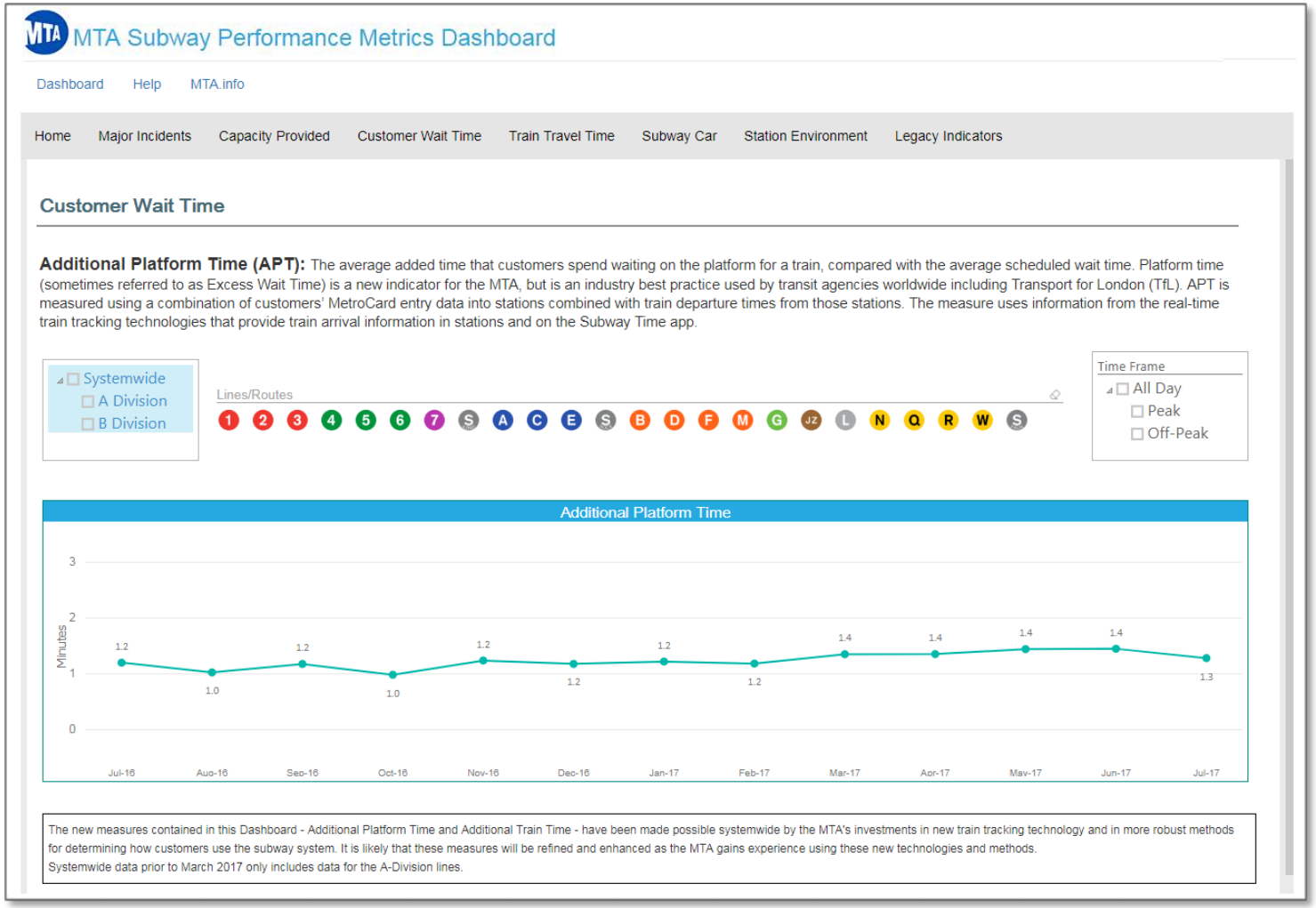


Bus metrics process is similar, but must handle additional complexity of bus network

- Separate bus ridership used to generate ridership, then several days are averaged to get a representative day
- Assignment Model must capture a number of bus-specific characteristics:
  - **Identical Arrival Times**: Passengers are assigned randomly to buses arriving at the same time
  - **Out-of-Service Buses**: Customers assigned to a bus that goes out of service before reaching their destination are assumed to wait for the next bus
  - **Choosing Local versus Limited:** Passengers assigned to local buses assumed to take either, those assigned to limited assumed to wait for limited



Original front end: Microsoft Power BI

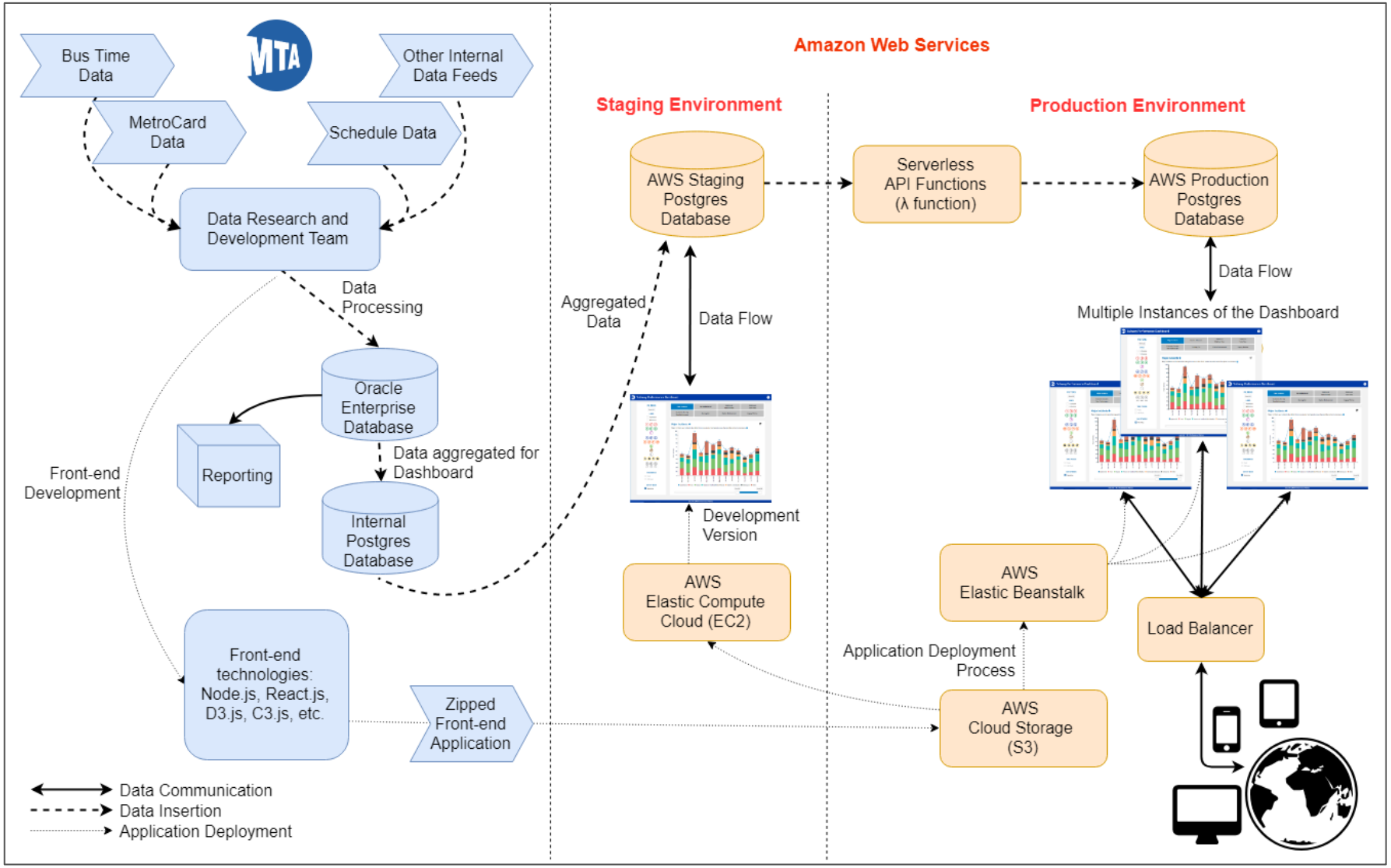


- Pros:
  - Existing license
  - No programming experience needed
  - Quick deployment
- Cons:
  - Design flexibility
  - Mobile compatibility
  - Communication

New & improved front end: custom build

- Designed and developed entirely in-house
- Agile development process
- All open-source software: Node.js, React.js, D3, C3

System Architecture



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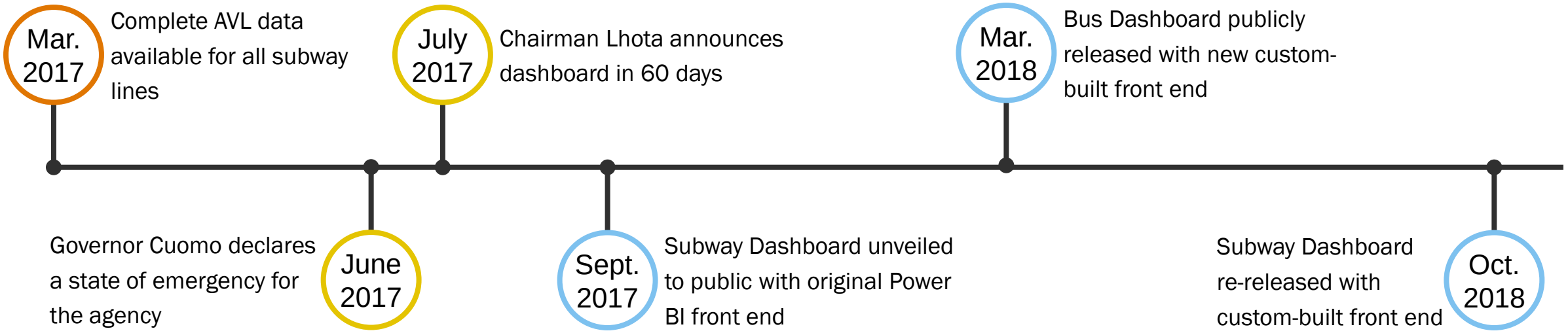

…and this is just what we've done so far!

Thank You!

dashboard.mta.info

busdashboard.mta.info