King County Metro Bus On-Time Reliability

Are we using the right metrics?

2018 system performance evaluation

Route	All-Day % Late	PM % Late	Saturday % Late	Sunday % Late
8	21%	33%	24%	22%
44	11%	13%	15%	8%
48	12%	24%	16%	11%
70	19%	35%	23%	13%
241	12%	16%	12%	16%

- KCM publishes reliability metrics per route.
- https://kingcounty.gov/depts/transportation/metro/about/accountability-center/performance/route-performance.aspx

Evaluation metrics

King County Metro KPI

- < 20% late stops, all-day
- < 35% late stops, weekday PM
- (When's PM peak period?)

On-time if:

- Arrive from 1.5 min earlier to 5.5 min later than scheduled

Sound Transit KPI

- < 15% late ***trips***, overall

On-time if:

- < 3 min late from start
- < 5 min late from mid-point
- < 7 min late to terminus
- Never depart early

Human centred questions

- What should “on-time” be?
- Does changing the evaluation method change the reported performance?
- Are we using the right metrics?

Plan

- General Transit Feed Specification (GTFS) is designed for use by apps to get status of what is happening now.
- Azure Function that queried GTFS real-time trip updates regularly (≈ refresh OneBusAway every minute for delays)
- For 14 days from 21 Nov 2018 to 4 Dec 2018
- Save the last reported “delay” field for each stop.

Results – KCM lateness condition

- Caveat: Very short (2 week) measurement period!
- Calculate according to KCM metrics:

Route	Weekday	Saturday	Sunday
8	32%	31%	32%
44	18%	23%	21%
48	26%	26%	20%
70	23%	25%	20%
241	23%	22%	16%

Results – no early departure allowed

- Let's redefine the on-time requirement to disallow bus leaving early, similar to Sound Transit's requirements.
- Drivers today might deliberately depart early if they know it's OK to be up to 1.5min earlier than scheduled (metrics affect behaviour)

Route	Weekday	Saturday	Sunday	(All days)
8	~~32%~~ 41%	~~31%~~ 38%	~~32%~~ 38%	~~32%~~ 40%
44	~~18%~~ 30%	~~23%~~ 37%	~~21%~~ 38%	~~19%~~ 32%
48	~~26%~~ 37%	~~26%~~ 38%	~~20%~~ 33%	~~25%~~ 37%
70	~~23%~~ 36%	~~25%~~ 38%	~~20%~~ 32%	~~23%~~ 36%
241	~~23%~~ 34%	~~22%~~ 33%	~~16%~~ 27%	~~22%~~ 33%

Future work

- Make use of the calendar from static GTFS data, to know if trips are cancelled or added.
- For this project I only use the “delay” field in GTFS real-time data.
- Measure real-time data over a longer period
- Try other evaluation metrics, such as calculating timeliness of trips instead of stops