

MOBILITY NEWSLETTER

**Research & reporting from California, the U.S.,
and around the world**

October 17, 2023



KPIs for public transport:

The shift from asset-focused to rider-oriented approaches

Key Performance Indicators: what are they, and how are they used by transit agencies worldwide?

What are KPIs?

Key Performance Indicators are benchmarks that organizations use to assess performance and measure success. KPIs are:

- mostly quantifiable, measurable estimates or evaluations
- metrics that track operations efficiency, alignment with policies, or key outcomes like customer satisfaction
- often used in contracts / agreements to set goals, focus delivery, and define what success looks like

How are KPIs used for transit?¹

Generally, transportation agencies use KPIs to:

- monitor the quality and efficiency of transportation systems
- ensure that progress is made on improvements and other initiatives
- benchmark diverse parts of their business and operations, including everything from financial performance to service coverage to passenger safety. On-time performance / punctuality are most common.² A study in the EU noted 228 different transportation-related KPIs in use across member states.³

Why is it important to pick the right transportation KPIs?

Demand for mobility is increasing across both urban and suburban regions – **we are constantly asking more and more from the transport system.**

Leveraging effective KPIs allows us to increase the efficiency of public transport, improve riders' quality of life, and reduce transportation-related environmental harm.¹

Picking the right KPIs can have an enormous impact, **enabling agencies, governments, and operating partners to work together to achieve common goals.**

Simply, a good set of KPIs ensures that everyone has the same "North Star" and can travel together in the same direction and speak the same language.

Agencies tend to pick KPIs that focus on **transit assets** instead of on **riders**.

Take one example - **punctuality** - a key success factor in the efficiency and reliability of transit service. Below is a comparison of asset versus rider-focused KPIs.



Asset-focused:

- Percentage of on-time vehicle departures
- Average time vehicles spend stationary at the station
- Time intervals between transit vehicles (headway)
- Average vehicle travel speed



Rider-focused:

- Average wait time for transfers
- Total door-to-door journey speed
- Average transit journey time compared to other available modes for the same trip
- Percentage of passengers arriving within a set time interval of the originally scheduled arrival

Depending on the KPI approach, agency and rider outcomes can **differ significantly**.

Prioritizing either assets or riders in KPIs means that the agency will optimize to deliver on these indicators, impacting important decisions and investments in transit service. The asset-focused approach is more intuitive for agencies and easier to implement, but rider-focused KPIs can help focus improvements on factors that most influence a rider's experience.



Asset-focused:

Agencies will ask: **“is the vehicle arriving or departing within the scheduled time window?”**

Because of this asset-oriented KPI approach, which has historically guided most agencies' thinking, operational improvements (and research) have focused on ensuring that vehicles run on time, regardless of what passengers do.²

While this approach is successful in helping run transit systems efficiently, it doesn't always optimize the rider experience.



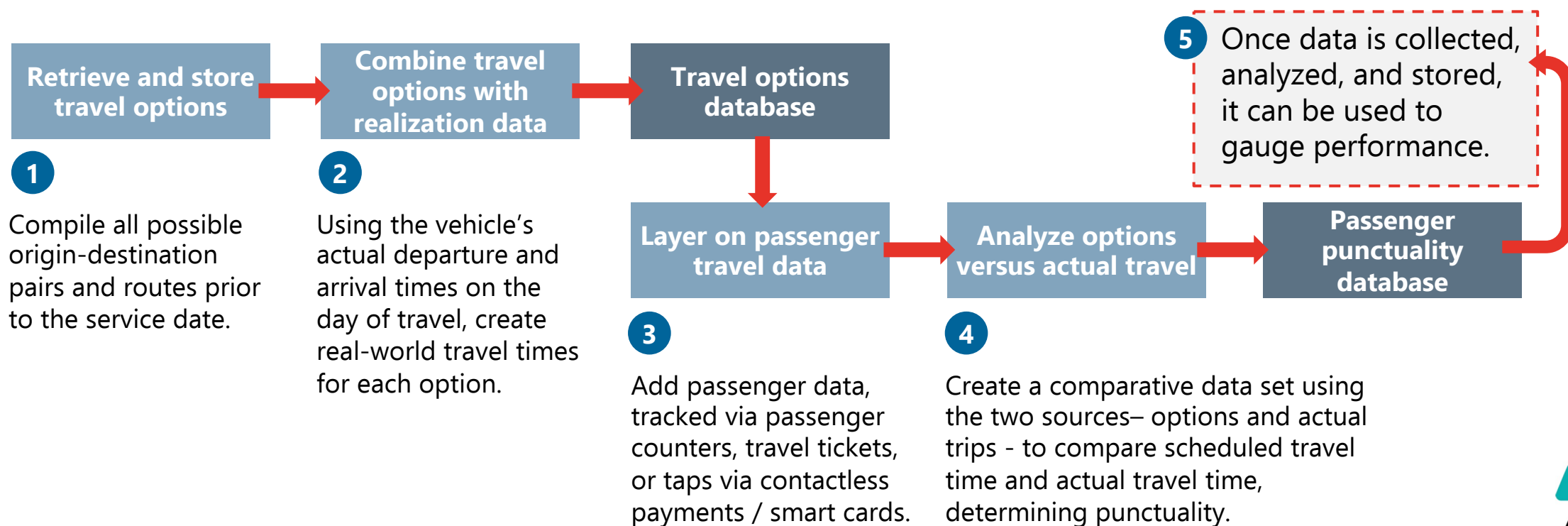
Rider-focused:

Agencies will ask: **“is my rider arriving at their destination during their expected time window?”**

Travel time and (un)reliability are critical factors for riders' choices about which transportation modes they take.¹ Travel certainty is even more important than travel time reductions.² As a result, choosing this rider-focused approach can optimize service to meet key rider demands, making transit a more viable, attractive option for them.

Good **ridership data** is necessary to develop and deploy effective **rider-focused KPIs**.

Data about **riders' travel plans** and **actual trip data** are both needed to use punctuality-related KPIs with a rider-focused approach. Making this data accessible requires agencies to **centralize, standardize, and formalize data collection** practices. A description of the data collection and analysis process for punctuality KPIs is provided below:



In the Netherlands, the national rail has **pioneered** rider punctuality KPIs using granular trip data.

The Dutch railway operator Nationale Spoorwegen (NS) has used passenger punctuality KPIs since 2011 and continues to hone their methodology and success criteria.

The NS currently employs two passenger punctuality KPIs on the main rail network:¹

- Percent of passengers arriving at their destination **within 5 minutes** of planned arrival.
- Percent arriving **within 15 minutes** of planned arrival.



In 2025, these benchmarks will become stricter, to 3 and 10 minutes, respectively.

At the start of 2011, the NS measured passenger punctuality with a combination of real travel data and travel forecasts to fill in the gaps. This methodology did not include transfers, and similar models are used in Switzerland by SBB and in Denmark by the Copenhagen Metro.²

After the introduction of the OV-chipkaart (the national travel card) in the Netherlands, more data became available to measure passenger punctuality comprehensively without relying on forecasts. The NS updated their methodology to incorporate this granular trip data in 2017.

In the two years after this update, **the overall delay of passengers dropped by over 12%, and the percentage of on time passengers increased from 91.6% to 92.6%.**¹

Let's look at examples of how these KPIs are applied... →

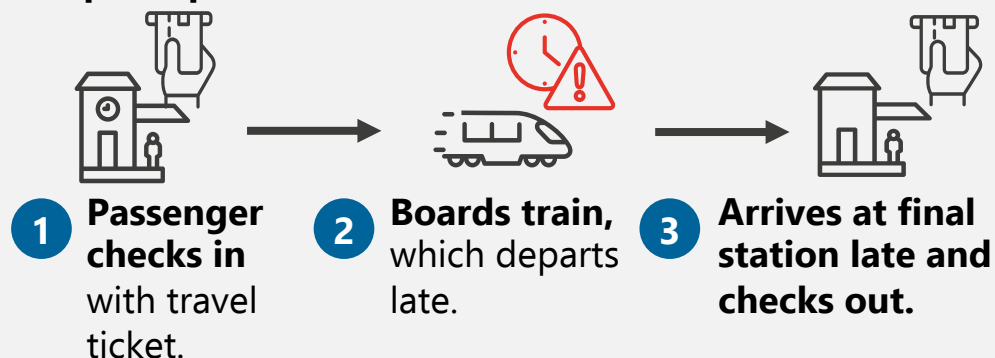
Even in the same service scenario, trips can be counted as punctual or late **depending on the rider.**

Example trip 1:



This example shows the key difference between asset and rider-focused approaches. **This trip was a success** from the rider's KPI perspective, even though the first train was late, because the rider arrived on time.

Example trip 2:



For a different passenger, this same trip on the same train **was not a success**, because they arrived at their final destination late. This demonstrates the complexity of accounting for transfers.

To accommodate the fact that the same vehicle facilitates many trips which are counted differently, the NS counts every complete passenger trip once, and weights them all equally regardless of distance, transfers, or direction.

Since shifting to rider-focused KPIs, the NS has markedly improved punctuality.

After successful implementation at the NS, passenger punctuality KPIs are now also embedded in the operating requirements set by the Dutch Ministry of Infrastructure. Underperformance on the requirements is enforced by a fine imposed on NS.¹ As a result, the NS is **committed** and **incentivized** to improve services for passengers.²

While an asset-focused approach would cause the NS to prioritize timely departures for every vehicle, they now realize that more passengers arrive on-time if they **postpone departures to wait for delayed trains** at important transfer stations or **give priority to busy trains during rush hour**, delaying less busy trains marginally since each passenger journey (and not each train departure) is weighted equally.

Outside this rider-focused approach, investing in more reliable assets and a more robust timetable could still benefit both passenger punctuality and asset punctuality.

Despite the success of this model, there are still weaknesses:



Only the service provided by the NS can be measured.

Other parts of passenger trips (eg. first and last mile by bike, car, or another transit service) are out of scope. Incorporating this additional data could also inform more integrated transport design in cities across the country.



The model assumes passengers prioritize travel time only, and that passengers always opt for the quickest route when multiple options are available. This isn't always true, for example with origin-destination pairs connected by one faster route with multiple transfers and a slower, direct route.



The model relies on data from card readers at stations, which only includes those using a travel card, debit/credit cards, or paying with mobile devices. A small percentage of trips taken by riders using classic paper tickets are not captured in the data.

What can other operators learn from this example?

Passenger-oriented KPIs directly incentivize public transport operators to improve services, and help them shift away from 'logistic' performance to focus on the passenger experience. The key tenets of the rider-focused approach to KPIs include:



Capture as much of the journey as possible, using transfer / multimodal data if available.



Optimize for rider experience, and prioritize what matters to them, not just travel efficiency.



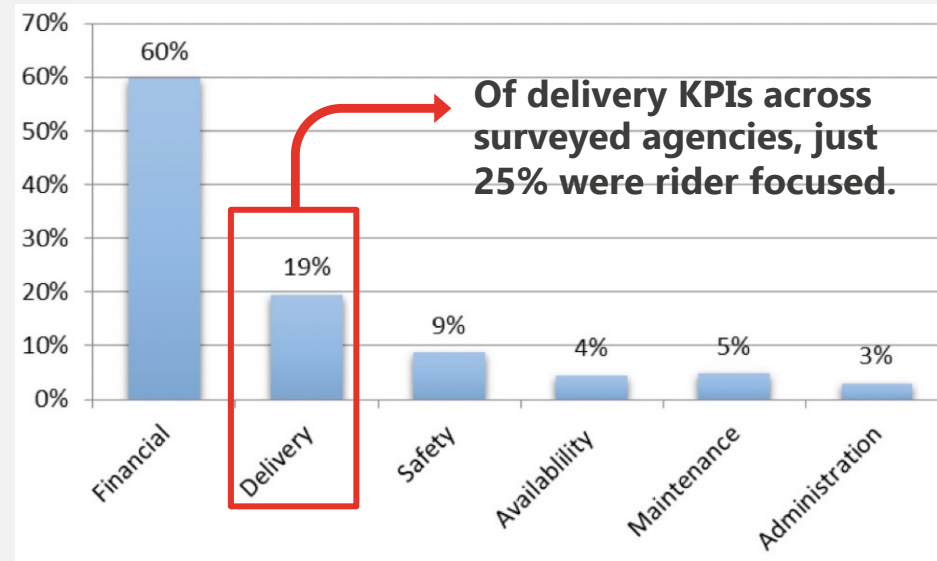
Value each passenger trip strategically, to appropriately weigh decisions based on passenger impact.



Integrate novel sources of data, including check in / check out information and real-time service data.

Sources: 1: [Mineta Transportation Institute](#)

A study of KPIs in use across California transit agency found few rider-focused KPIs in use.¹



There is room for more agencies to start implementing rider-focused indicators, especially as new data sources from modern payment systems and fleet management technology become available.

