

General Access to Destinations

A Unified Metric of Transportation Performance



“General access-to-destinations” metrics measure the convenience of travel by all modes, to all places, for all people. These metrics capture the value of transportation in a single, unified measurement. They can be used for funding allocations, strategic planning, or project analysis.

The Need to Replace Conventional Metrics

The metrics we currently use in transportation and land-use planning often deliver undesirable results because they measure speed and traffic capacity rather than overall travel convenience.

- Travel time metrics were developed in the 1950s and ‘60s for siting interstate highways. At the time, they were a meaningful proxy for overall travel convenience.
- Travel time metrics disproportionately value long trips at the expense of short ones, leading to infrastructure investments that subsidize longer commutes.
- Performance metrics and travel demand models are related but separate issues. Conventional 4-step or activity-based models, as well as new lightweight tools, can be used to calculate general access-to-destinations metrics instead of travel time metrics.
- Many recent attempts to reform performance metrics have focused on minimizing harm by measuring safety, emissions, and other externalities. These are important, but they fail to provide a positive vision for the benefits of transportation.

Issues with ‘Specific’ Access-to-Destinations Metrics

Access-based metrics measure the ability of people to reach destinations. Until now, these metrics have been hamstrung by the limitation of only measuring a single mode of transportation (e.g., access to jobs in 30 minutes by transit). Generalized access metrics overcome this limitation.

- There is no methodologically sound way of evaluating “X% change in access by transit” against “Y% change in access by car”. If we only measure access-to-destinations by a single mode, we will only be able to compare projects that affect that mode. We will have no way of deciding between widening a highway or building a train line, nor of evaluating a project that affects more than one mode.
- By including all modes available when measuring each person’s access to each destination (that is, by including a trip-level user-choice function), we can calculate a single unified metric of general access-to-destinations for transport and land-use projects.
- For a complete analysis, we can also include many categories of destinations; we can include varying demographics’ levels of income, car ownership, and physical ability; and we can use a decay curve that captures the relative value of trips of different lengths.

Ways of Using General Access-to-Destinations Metrics

General access-to-destinations metrics are practical and can be used for budget allocation, strategic transportation planning, and project planning.

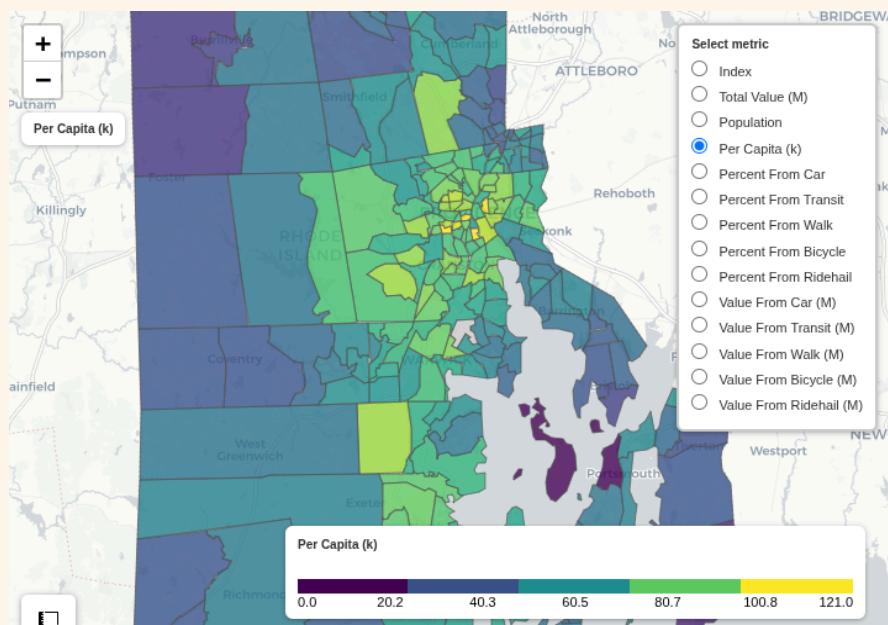
- General access metrics allow us to measure the overall transportation benefit of any transportation or land-use intervention. All kinds of projects across an entire state can be evaluated, normalized to their costs, and ranked on a single transparent, unified metric.

- General access can also be measured distributionally, evaluating the equity of access across geographies or demographic groups, for existing conditions or potential projects.
- Because general access metrics capture the network effects and interplay between different modes of travel, they can evaluate scenarios even for radically reimagined cities.
- Because general access metrics are often much quicker to compute than a full travel demand model, they can be used for iterative analytical planning at the project level.
- General access metrics only measure the inherent good of transportation. They should be used together with performance metrics of emissions, safety, noise, etc., following the judgement of decision-makers.

Measuring General Access in Practice

It is possible to calculate general access-to-destinations metrics today, using data that most cities and states/provinces already have.

- Ives Street's [Connectome](#) software is a constantly-improving tool for general access-to-destinations measurements. It's freely available for governments, nonprofits, and researchers. Ives Street welcomes contributions to the codebase.
- Most commercial travel demand models could be reconfigured to expose general access measurements using existing travel-time 'skim' matrices.
- There are many technical details to further investigate, including the appropriate use of different value decay functions, the relative values of various destinations, or the best way of measuring access across different times of day. This ambiguity is not a reason to avoid general access metrics: even the simplest approach will provide useful insights. Rather, it is an opportunity to share in the development of a new paradigm.



This map from Connectome shows the per-capita value of general access-to-destinations across Rhode Island. The highest-scoring locations have a combination of central locations, high car ownership, and/or effective transit service.