An Open Source Approach to Calculating Accessibility

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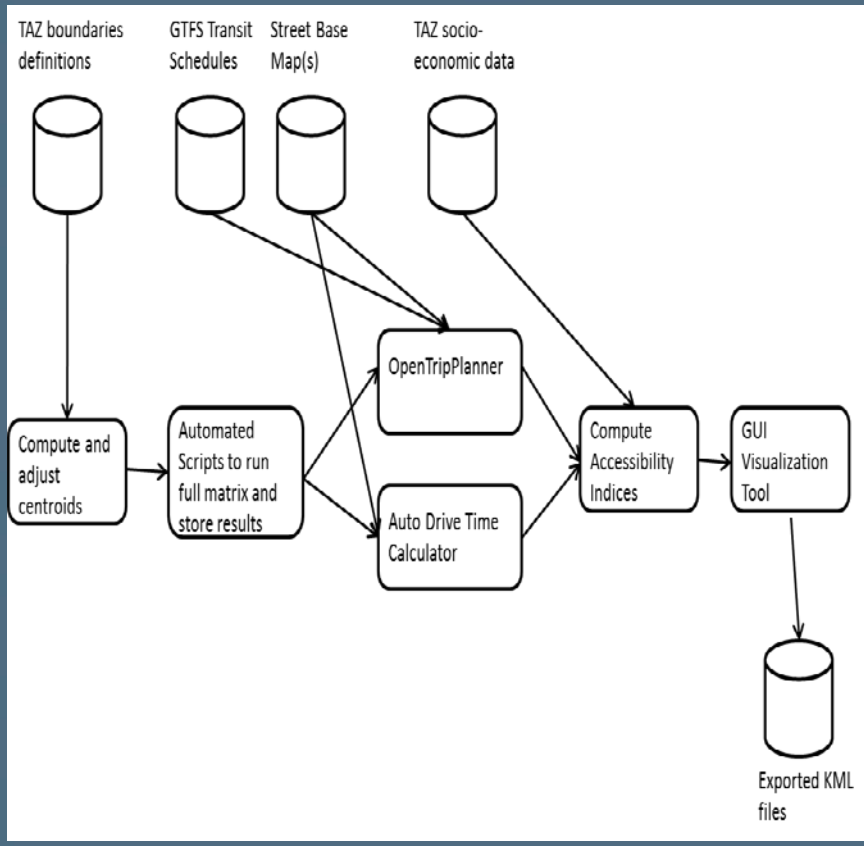
For the best of reasons

Transportation Accessibility

- Transportation (the movement of people and goods) is a means to an end, not an end in and of itself:
  - Supplying goods or services
  - Providing access to jobs
  - Reaching a vacation destination
- *Accessibility metrics* measure the ease of reaching the desired destinations
  - Measures transportation outcomes, rather than intermediate performance or problems (e.g., speed, delay, congestion)
  - Recommended by multiple organizations, e.g., the National Transportation Policy Project
  - Rigorous, quantifiable, transparent, and understandable
  - Previously difficult to analyze

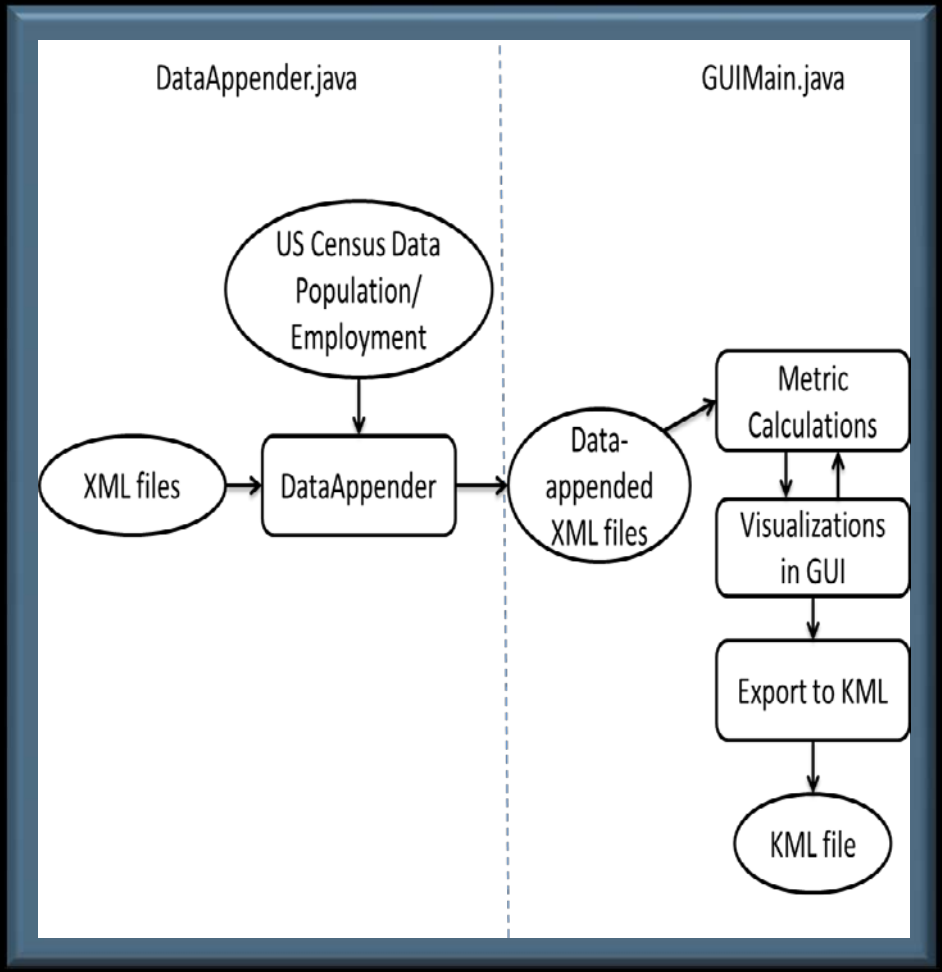
New Approach to Accessibility Analysis

Utilize growing set of open government data and open source software to develop simple low-cost analysis tools and visualizations

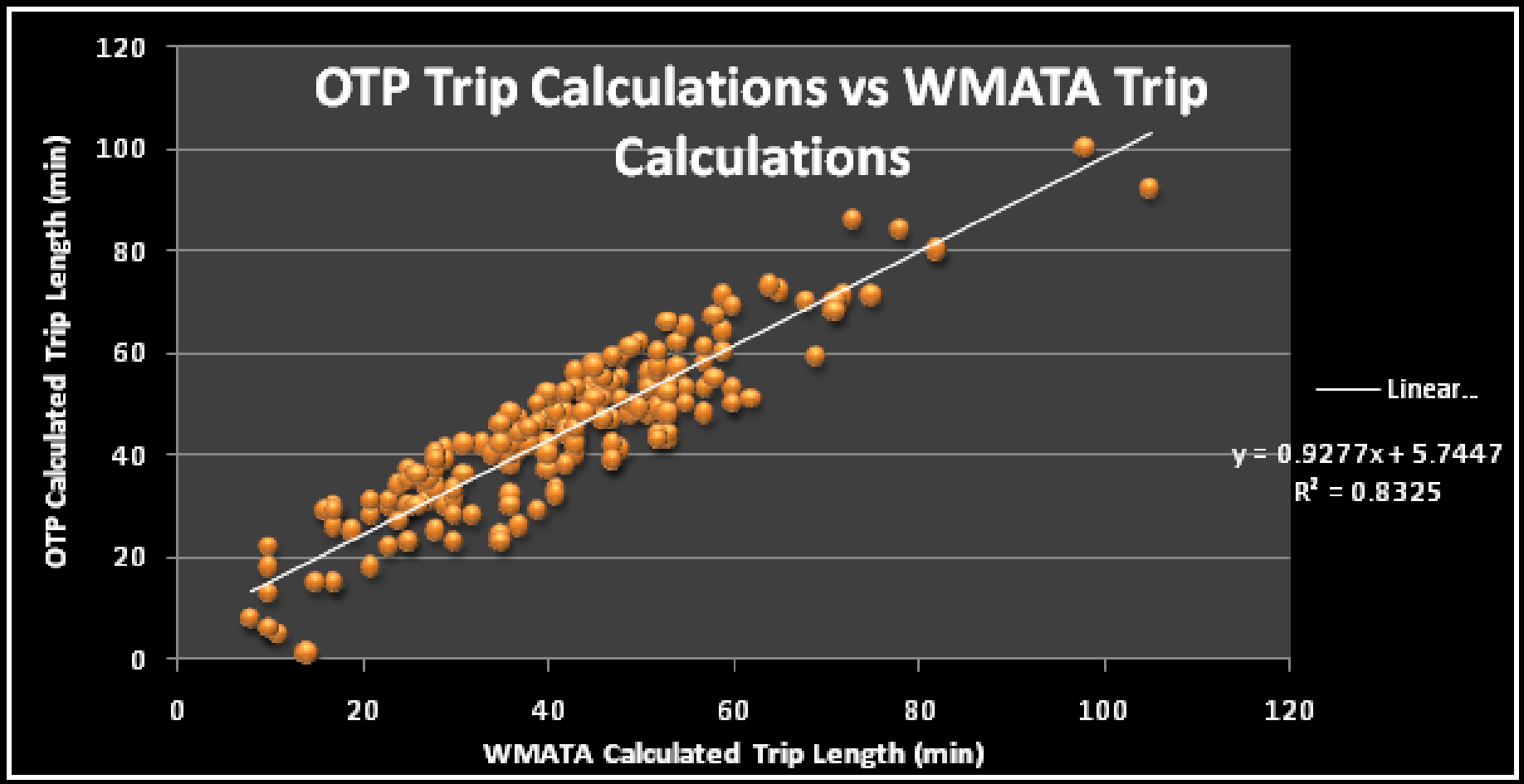


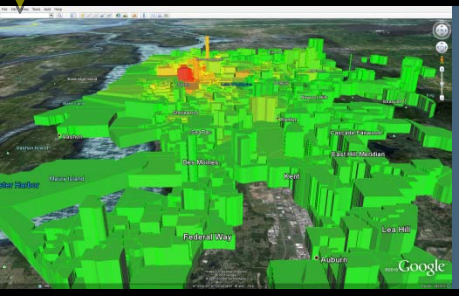
Approach (Concluded)

- Data appender and/or visualization tools can be used as stand-alone tools to visualize results
  - Input is simple XML-based files.



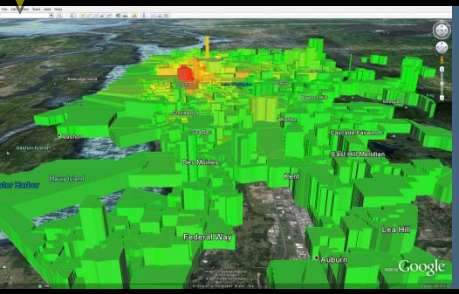
Comparison of OTP Travel Times with WMATA Trip Planner



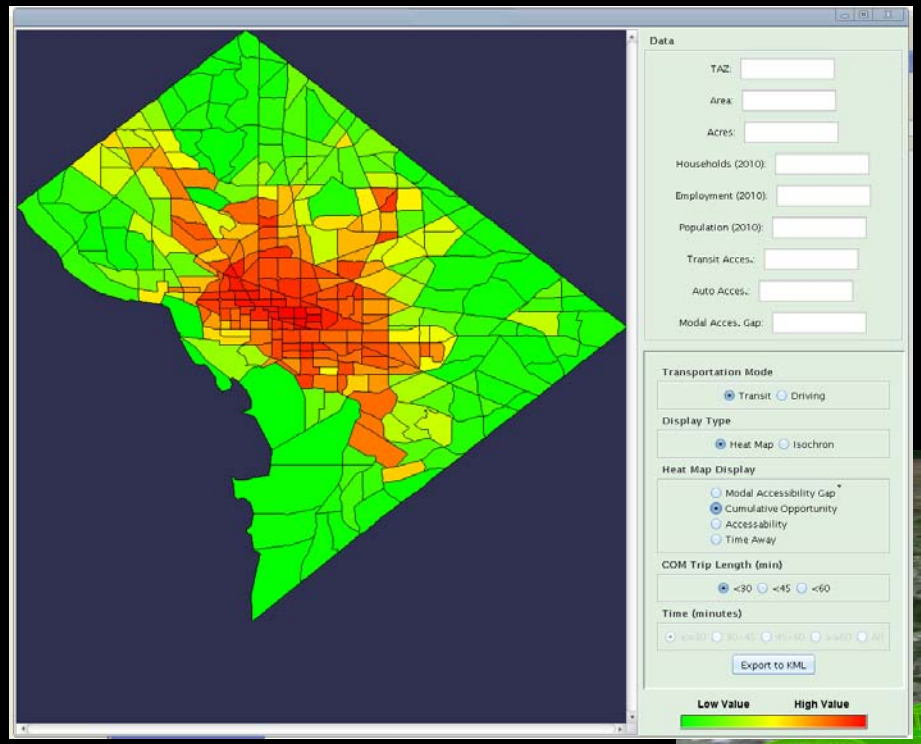


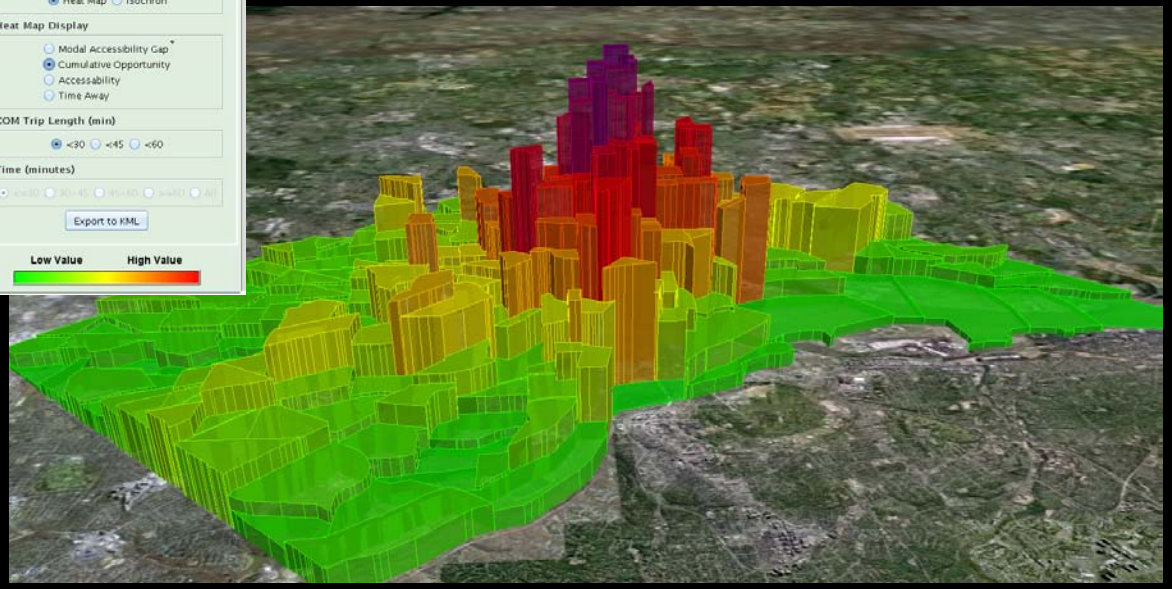
Visualizations

3D Visualization:
color depicts cumulative opportunity, height depicts population



Visualizations





Challenges and Next Steps

- Long run times on single processor:

Number of regions	Trip calculations	Total runtime
500	250,000	2 days
1000	1,000,000	8 days
4000	16,000,000	128 days

  - Potential solutions:
    - Separate out walk time calculations
      - Avoid huge duplicative effort
      - Greatly simplifies remaining graph and travel time analysis
    - Parallel processing: problem ideally suited for splitting over multiple processors

Challenges and Next Steps (Concluded)

- Many agencies do not publish transit schedules in GTFS
  - E.g., WMATA, Arlington County, DC Connector do, Fairfax and Loudon Counties do not
  - Some may be available upon special request
  - Labor intensive, but can create GTFS from other formats (see, for example, Brookings study: *Missed Opportunity: Transit and Jobs in Metropolitan America*)
- No open data on auto travel times
  - Imagine the potential opportunity of connected vehicles: *anonymous, crowd-sourced open travel time data*
  - Would open up traveler information applications in the same way GTFS opened up transit information applications

Summary

- Reduced time and cost for analyses:
  - New approach reduces the investment costs and level of effort required to conduct such analyses
  - Still dependent upon having the necessary data
    - E.g., in Washington area, WMATA and Arlington provide public GTFS transit files, Fairfax and Loudon counties do not – manual entry required
  - Further work needed to reduce run-times for large networks
- Provide easily used and understood visualizations to communicate results
- Source code available as open source:
  - Open Source Accessibility Toolkit (OSAT): https://github.com/Noblis/OSAT
  - Source code, example data, sample outputs, and documentation