An Evolution in Open Source Interactive Freight Data Visualization

RSG the science of insight

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EXECUTIVE SUMMARY

- Visualization of freight flows makes our data and model results more understandable and relevant
- Traditional analysis of freight data and models has focused on static tables and charts which are not especially successful in stakeholder outreach, building shared ownership, and increasing the impact of our work
- Interactive data visualization dashboards help improve the interpretation of freight data and freight model outputs
- We developed an open source and available online interactive visualization toolkit for this purpose (1, 2)

1 PREVIOUS EFFORTS

- Developed data visualizations dashboards as a final reporting step to a data processing exercise or modeling system
- For example, for the Piedmont Triad's Tour-Based Freight Model (3), we developed an R-based dashboard that is export upon completion of a model run
- This dashboard includes various innovative interactive visuals that the user can explore on their course
- Feedback on the dashboard has been excellent, but because the dashboard is tightly coupled to the model implementation and design, it is not straightforward to adapt to a new region/data set/exercise
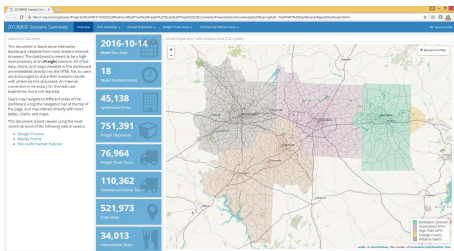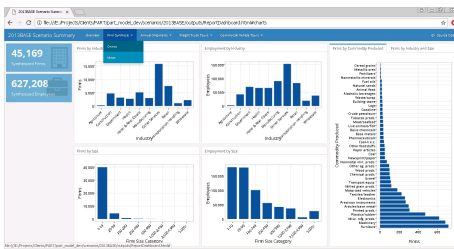
FIGURE 1. PART Freight Model Dashboard Example

FIGURE 2. PART Freight Model Dashboard Example – *continued*

2 REUSABLE VISUALIZATION TOOLKIT

- In an effort to develop a more truly open source freight data and model visualization toolkit – not just in sprit but also in use
- RSG, in conjunction with others, has developed ActivityViz (1, 2)
- ActivityViz is a more general-purpose open source travel and activity data visualization dashboard
  - Used for interactive data analysis, exploration, and storytelling
  - In use by numerous transportation planning agencies for both data and model visualization
  - Is highly customizable, and includes example implementations for multiple types of data and agency case studies
  - Features several innovative interactive visualizations for exploring data, including:
    - Visualizations of tours
    - O-D flows using chord diagrams
    - Goods and persons in time and space throughout the day
    - Animated bubble maps for trips by purpose, etc.

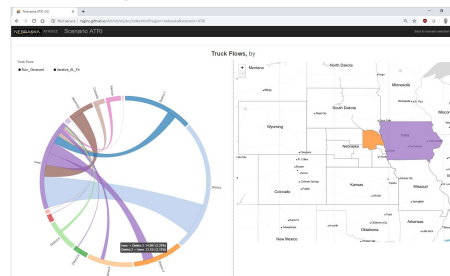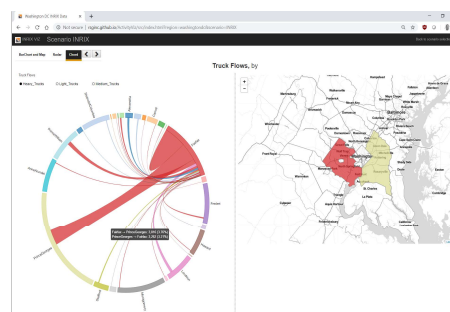**FIGURE 3. ActivityViz Nebraska DOT Passive Truck ODs Example**

FIGURE 4. ActivityViz Washington DC Passive Truck ODs Example

3 TECHNOLOGY

- The tool is implemented in the latest JavaScript technologies
- Is highly customizable without any software coding
- Published using GitHub pages which eliminates most of the administrative backend in traditional web-based technologies (2)
  - Complete instructions for configuring the tool are also available online (1)
  - Improved deployment strategy makes setup and maintenance much easier for freight data analysts and modelers

FIGURE 5. ActivityViz Source, Examples, and Instructions
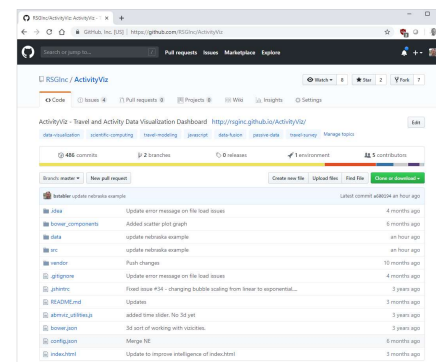
4 CONTRIBUTION AND COLLABORATION

- Online project includes instructions and technology for collaborating using Git workflow (4)
- Toolkit has been used by Atlanta Regional Commission, Oregon Metro, San Diego Association of Governments, Sacramento Area Council of Governments, Nebraska DOT, and others

FIGURE 6. Contribution and Collaboration Guidelines
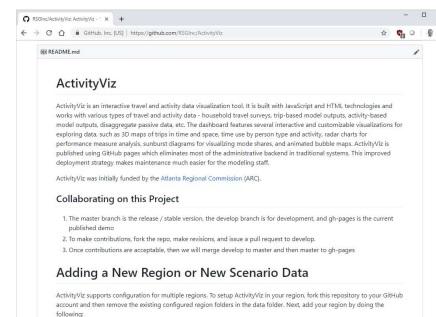
5 CONCLUSIONS

- We believe the open source ActivityViz visualization toolkit is especially useful for visualizing freight data and model results
- Using this tool helps improve the interpretation of freight data, supports the freight model calibration and validation process, and supports freight modeling and planning in general
- The toolkit provides a very flexible addition to the freight data analysis and modeling toolbox and is part of an overall attempt to improve the interpretation of outputs from disaggregate freight models where many elements of the outputs change from scenario to scenario
- We believe data visualization makes our data and model results more understandable and relevant to our stakeholder community

FIGURE 7. ActivityViz Washington DC Truck VMT Example
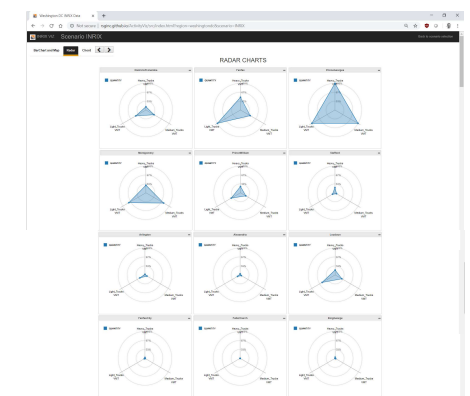
6 REFERENCES

1. ActivityViz source, https://github.com/RSGInc/ActivityViz
2. ActivityViz website, http://rsginc.github.io/ActivityViz
3. Visualization Dashboard for the Piedmont Triad's Tour-Based Freight Model. 2017 TRB Planning Applications Conference, https://www.trbappcon.org/oldsite/2017conf/PresentationDetails8446.html?abstractid=276
4. Git Workflow, https://www.atlassian.com/git/tutorials/comparing-workflows