PIONEER INSTITUTE
PUBLIC POLICY RESEARCH

POLICY BRIEF

Introduction to the Massachusetts Transportation Dashboard

by Steve Poftak

Introduction

Pioneer's Transportation Dashboard is intended to communicate the performance of the state's transportation system and inform the public about the effectiveness of the state's transportation leadership. As a single-page of primarily visual communication, it necessarily simplifies the complex nature of the transportation system. Pioneer developed the dashboard in partnership with Northeastern University's School of Engineering, led by Professor Ali Touran. We offer the dashboard as a starting point for the development of richer and deeper analysis of system performance.

Performance Measurement

The use of performance measurement is a technique adopted from the business world, where measures are selected and tracked to gauge the performance of an entity. By presenting top-level measures visually, we hope to provide an overview of performance that is understandable to both expert and non-expert viewers.

In transportation, the use of performance measurement and dashboards has been used in many states. The 2009 Transportation Reform Law in Massachusetts mandates yearly reporting of various performance measures. However, compliance with the law's provisions has been incomplete and poorly publicized. A notable departure from MassDOT's approach has been the MBTA's regular production of performance scorecards on a monthly basis.

Beyond various state efforts and specific direction in Massachusetts law, it is also likely that any future federal transportation reauthorization will require a system of performance measurement to be put in place.

Pioneer's Transportation Dashboard represents our attempt, using minimal resources and entirely public domain information, to present a workable dashboard. The selected measurements represent our best

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Check out the online dashboard at:
http://pioneerinstitute.org/programs_transportation_dashboard.php

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Steve Poftak is Pioneer's Director of Research and Director of the Center for Better Government. Previously, Steve worked at the Commonwealth's Executive Office for Administration and Finance. His prior experience includes service as Director of Corporate Finance for a privatization fund in Southeastern Europe. Steve holds an MBA from the Olin School at Babson College and a BA in Political Science from Middlebury College.

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judgment of what is important in analyzing the performance of our transportation, what was possible to measure, and what measures had available, public data.

It is our hope that the dashboard provides a launching point for the development (either by Pioneer, MassDOT, or other interested parties) of a more robust performance measurement system and a debate on the best indicators of service.

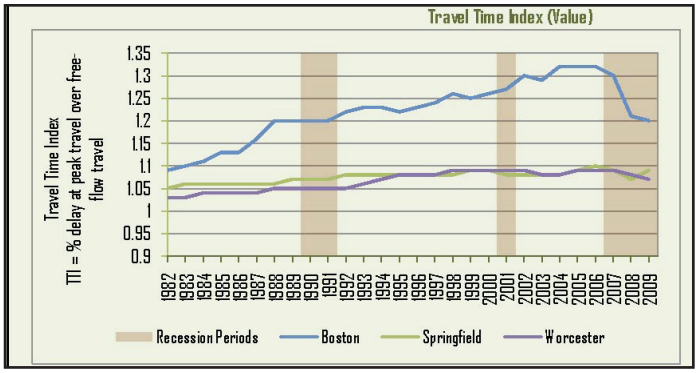
Selection of Measures

For our analysis, we looked for measures that covered the important aspects of MassDOT's operations and, where possible, were customer-facing. The categories selected were: Congestion, Throughput, Safety, Maintenance, Construction Management, and Environmental Stewardship. Given the limitations of space and a desire for the dashboard to be visually intelligible, other important categories were not included, and each category could only be visually represented on the dashboard by two to three measures.

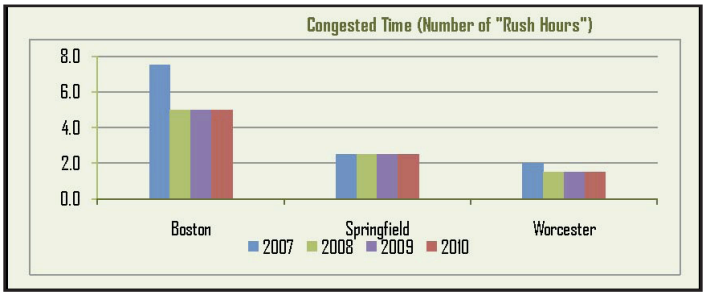
- Congestion: For Congestion, the Time Travel Index for Boston, Springfield, and Worcester was used. Time Travel Index is the percent of travel delay at peak travel time over free flow traffic.

For example, in 2007 Boston's value was 1.3. This would mean that a trip that normally took 20 minutes instead required 26 during rush hour.

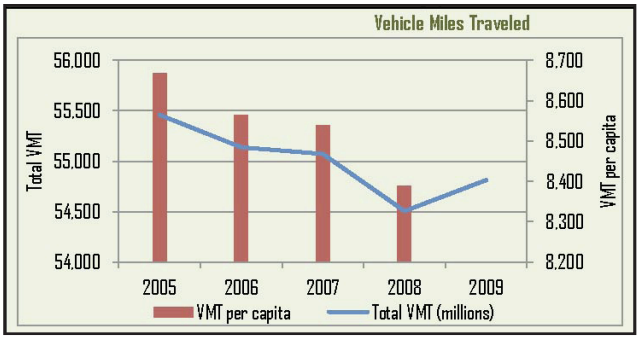
In addition, we added shaded bars to show periods of economic recession, which has a significant impact on traffic.



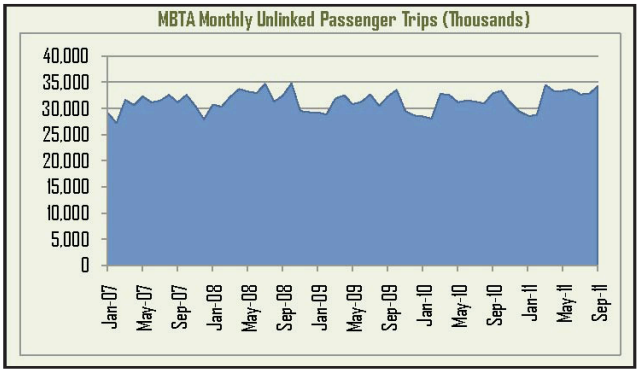
The next congestion measure was the total daily numbers of congested hours for Boston, Springfield and Worcester. Predictably, Boston's rush hour is by far the longest, totaling 5 hours per day.



- Throughput: The first chart focuses on Vehicle Miles Traveled (VMT), showing both total miles traveled in Massachusetts from 2005 to 2009 and VMT per capita. Both measures show a decline from 2005 to 2009, most likely driven by the recession.

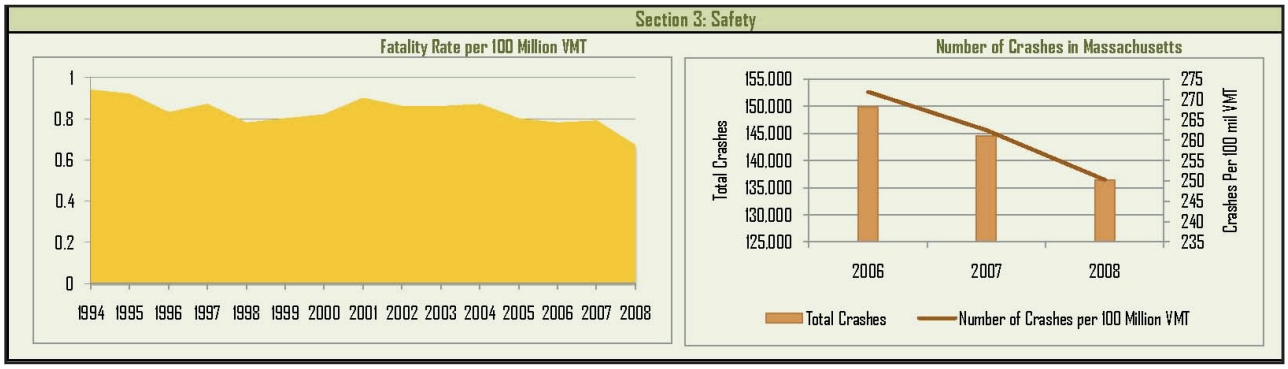


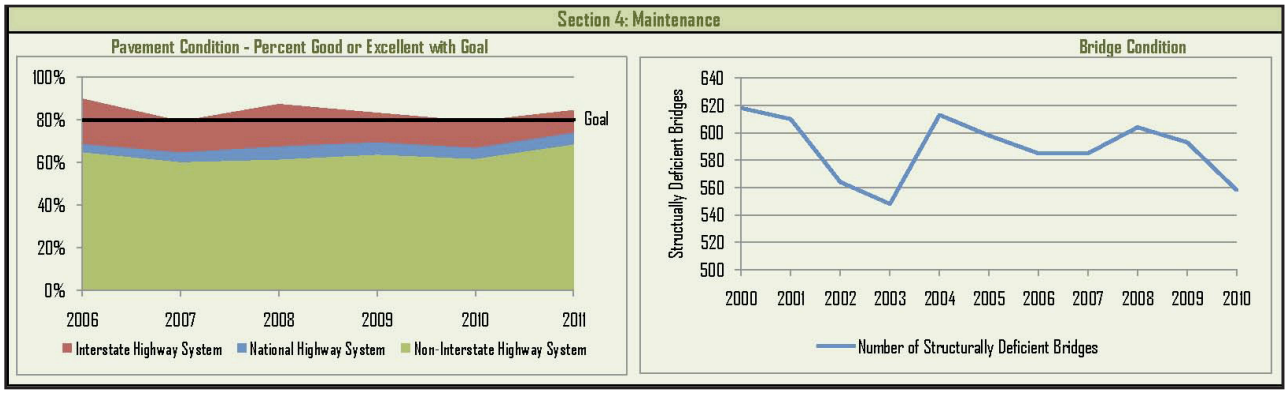
- Next, in recognition of transit's important role, we show the number of unlinked passenger trips on the MBTA. This chart shows the seasonal variation over each year, as well as a slight overall uptick in ridership in 2011.



- Safety: The two safety measures involve fatalities and crashes. The first chart shows the fatality rate per 100 million VMT. The next chart shows the absolute number of crashes per year and the number of crashes per 100 million VMT. With the exception of an increase in fatality rates from 1998 to 2001, all safety measures have improved.

- Maintenance: Chosen measures are the pavement condition level for various portions of the highway system and the absolute number of structurally deficient bridges in the state. Pavement conditions measures show some improvement for the non-interstate highway system and level performance for other highways. The number of structurally deficient bridges drops over time, reflecting increased spending under the previous administration and the Accelerated Bridge Program of the current administration. (N.B. The number of structurally deficient bridges is affected by bridge repairs and the deterioration of existing bridges).





- Construction Management: The measures are the number of projects completed, project completion status on the basis of time, and the project completion status on the basis of budget. The chart shows general improvement in timely and on-budget completion of projects.

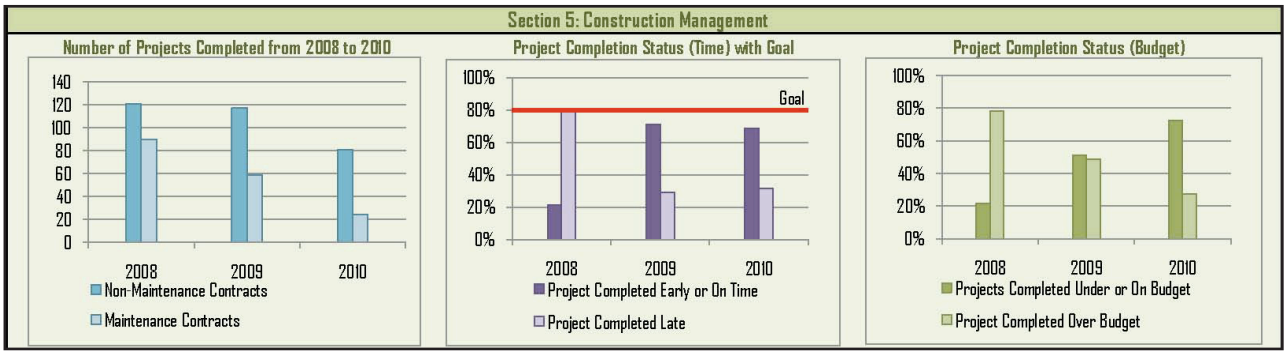
- Environmental Stewardship: The measures include total CO2 emissions from transportation, ozone standard exceedance days, and tones of CO2 emitted per million VMT. While ozone levels have shown strong improvement (not wholly due to transportation activities), CO2 emission levels are more ambiguous.

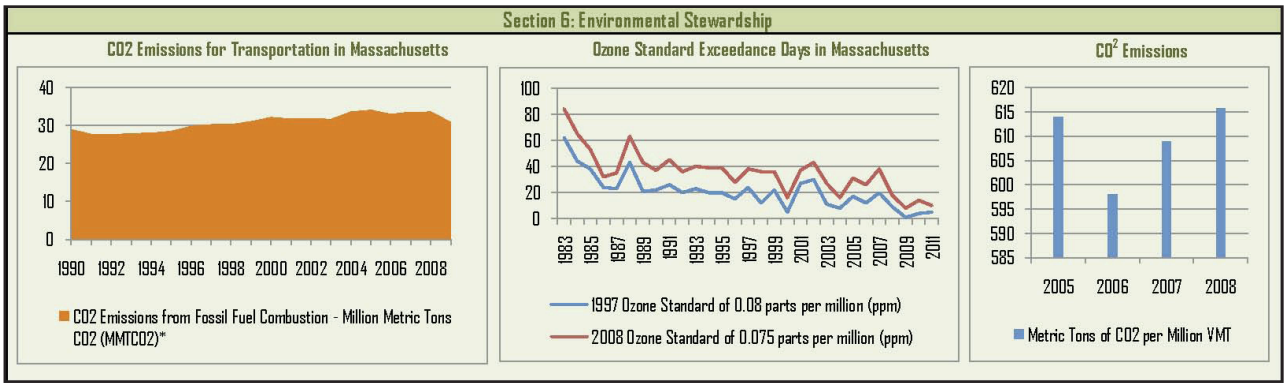
Limitations

The use of a dashboard requires simplification in order for the product to be visually intelligible. Similarly, with limited resources, this dashboard relies on publicly available data. Without the ability to use internal data and develop independent sources of information, there are shortcomings to the presentation.

First, there were certain broad categories that were not included. In particular, important concepts like "mobility" and "access" were suggested by reviewers but appropriate, specific measures with available data could not be found.

In the categories that were included, additional measures would be useful if they could be presented within the dashboard format (or within a sub-dashboard). For example, the current Maintenance category only has roadway data. Maintenance measures within public transit, which correlate closely with system reliability (and eventually ridership, we believe), would be important to add in the future.





Another issue of concern was data quality. Pioneer firmly believes that congestion is an important measure of data, particularly for a dashboard intended to provide customer-facing data. The Texas Transportation Institute's yearly compilation of data provides the most consistent yearly data for this measure. However, it should be noted that their methodology has been questioned by some but it is the only consistent measure of congestion available over an extended period of time.

Lastly, the measures on the dashboard are intended to provide information about the performance of the Massachusetts transportation system and, by extension, inform an assessment of MassDOT's performance. But, users should be cautious about ascribing causation to MassDOT actions and variation in the data. For example, congestion and throughput are influenced by MassDOT decisions about roadway and transit expansion but the strength of the economy is a much bigger driver. Similarly, the overall decrease in traffic fatalities and crashes may be due to improved road design by MassDOT but it would also be important to disentangle changes in vehicle design, demographic changes, and driver safety laws before drawing that conclusion.

Next Steps

This Transportation Dashboard is intended to serve as a proof of concept and a jumping off point to further discussion and development. With additional resources, there are several dimensions along which the project might be expanded:

- Improved Measures – increasing the number of measures either by gaining access to internal data from state agencies or private entities (e.g. INRIX), or developing measures such as customer satisfaction by mode from surveys.
- Customization/Interactivity – utilize a more advanced dashboard technology (the current dashboard is a highly formatted MS Excel spreadsheet) to allow users to customize a dashboard based on their choice of measures and to 'drill' into specific measures to see related and more detailed information on chosen measures.
- Multi-State/Comparative – allowing users to switch the dashboard to measure other states or compare two states on a single dashboard.
- Pack-and-Play – creating a freely-available software product that could be used by other states or entities as their performance measurement dashboard.

Conclusion

The Massachusetts Transportation Dashboard provides easily understood data on the performance of the transportation system. In an environment where transportation funding and system performance is constantly in the news, Pioneer believes that data provides a foundation for an informed discussion of our transportation needs and resources. It puts forward this dashboard as the beginning of a much more involved conversation on what to measure, how to present that data, and what policy outcomes should come as a result of the data.

Previous Transportation Publications

- *Our Legacy of Neglect: The Longfellow Bridge and the Cost of Deferred Maintenance*, July 2007
- *Fixing Maintenance in Massachusetts*, July 2007
- *Lessons Learned: An Assessment of Select Public-Private Partnerships in Massachusetts*, December 2008
- *Life Cycle Delivery of Public Infrastructure: Precedents and Opportunities for the Commonwealth*, December 2008
- *Additional Reforms for the Governor's Accelerated Bridge Repair Proposal*, June 2008
- *Beyond the Gas Tax: Defining Transportation Needs, Emphasizing Economic Growth, and Maintaining Our Assets*, February 2009
- *Getting There: Transportation Reform in 2009*, February 2009

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85 Devonshire Street, 8th Floor, Boston, MA 02109 |
T: 617.723.2277 F: 617.723.1880 |
www.pioneerinstitute.org