Utah's Joint Goals and Performance Measures for Guiding Transportation Investments

A Good-Faith Partnership Agreement Between:

- Utah Department of Transportation
- Utah Transit Authority
- Utah's Metropolitan Planning Organizations:
  - Wasatch Front Regional Council
  - Mountainland Association of Governments
  - Cache MPO
  - Dixie MPO

Draft Final Report

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Prepared and Submitted by

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Executive Summary, Joint Goals & Performance Measures

To ensure that Utah's transportation system will meet the future needs of the state's residents and businesses, the partnering agencies (UDOT, UTA, WFRC, MAG, CMPO, DMPO) have agreed during four half-day workshops on joint goals and performance measures to facilitate continuing, comprehensive, and cooperative planning for our multi-modal transportation network. Each agency will develop individual goals and measures as required by MAP-21, but the partners hope to voluntarily work toward a more integrated system with joint goals, objectives, and measures valued by all. This multi-agency pilot program is unique in the nation, and will be adjusted as it progresses.

Summary of Five Selected Joint Goals

The partners sought a minimum number of goals that could be easily remembered and create focus for their unified mission. After extensive deliberation, the partners agreed that they all value the following five goals, and that these were broad enough to cover their unified mission.

1. Safety
2. State of Good Repair / Preservation of Infrastructure
3. Mobility and Accessibility
4. Economic Vitality
5. Air Quality

Key Objectives and Performance Measures

The partners agreed to six key objectives, and the primary performance measures by which progress in those objectives would be measured. These objectives and measures usually support more than one of the five goals.

Key Objectives	Key Performance Measures
1. Reduce the number of fatal and serious injuries on the transportation system	Fatalities + Serious Injuries per capita
2. Extend the useful life of transportation assets	Percent of useful life remaining
3. Reduce emissions that adversely affect health, quality of life, and the economy	Total key emissions: mobile source ozone and PM-2.5
4. Improve access to jobs and higher education	Jobs/colleges that can be reached within a certain peak time by the average household, by mode.
5. Increase the share of trips using non-SOV modes	Commute Mode Split Percentages
6. Reduce likelihood of driving long distances daily	Vehicle Miles Traveled per capita

Measure Selection Criteria

With hundreds of potential performance measures, seven basic criteria helped narrow options:

1. **Commonality**: Something all partners care about and can influence. Not mode-specific.
2. **Understandable**: Is it easy to explain the measure and its value to citizens?
3. **Value of Measure**: Is it a good top-level measure? Is it measuring the right thing?
4. **Level of Control**: How strongly is the measure affected by project and policy choices?
5. **Trackable:** Is there data available for tracking? Will calculations have complications?
6. **Predictable**: Are there good ways to forecast outcomes of projects and policies?
7. **Connection to Goals**: Great measures will support several goals.

Action Plan & Next Steps

Key steps to organize the transportation industry around joint goals, objectives, and measures.

1. Gain buy-in from leadership in each agency.
2. Advertise joint goals in each agency's annual report/strategic plans (no stats, just goals)
3. Elaborate on goals and the simplest to compute measures in the 2015 Unified Plan
4. Retain consultant aid to develop protocols, tools, algorithms for tracking/forecasting.
5. Coordinate internal experts within UDOT, UTA, etc. to work with consultants.
6. Encourage use of joint goals, objectives, measures in project studies (I-15/FR, etc.)
7. In 2016, start annual reporting
8. Prepare to use in project prioritization for 2019 plans.

Joint Goals and Performance Measures Consensus Memo

Intended/Potential Uses for Joint Goals and Measures

Joint goals are important to ensure the transportation network functions as an integrated network, rather than independent road, transit, bicycle, and pedestrian networks.

UDOT, UTA, CMPO, DMPO, WFRC, and MAG have agreed on joint goals and performance measures to facilitate continuing, comprehensive, and cooperative planning for the multi-modal transportation network in Utah. For information about the process for selecting Goals, Objectives, and Performance Measures, consult the Appendices.

These goals build on the collaboration currently occurring in Utah, an approach that is unique in the nation. This effort is considered a pilot program and will be adjusted as it progresses. The joint goals and performance measures do not represent all the goals or objectives of the Unified Plan Partners. Unified Plan partners undertake much of their planning process on and independent basis. Consequently, each agency has additional performance measures of its own. Finally, each agency is bound by different sets of the MAP-21 mandatory measures.

Since its creation, the Unified Plan has been primarily a convenient way for UDOT, UTA, and Utah's MPOs to publish their individual plans in a single place. In the past, there has been no coordination in the way that different agencies engaged in performance reporting or project selection. While not currently mandated by MAP-21, doing so is strongly encouraged.

Initial Benchmarking

Partners will engage in a good-faith effort to try out the 'Tracking' performance measures. This will help establish 'benchmark' initial conditions to compare future performance against.

The 2015 Unified Plan

The agencies hope to calculate the present status of each measure, how each measure would change by 2040 under No-Build conditions, and how measures would change if the Unified Plan is completed by 2040. It is recognized that project selection for the 2015 plan occurred prior to the adoption of Joint Goals and Performance Measures, and so were not guided by them.

Annual Reporting

Following the 2015 Unified Plan, the Joint Goals and Performance Measures will be used as reporting metrics. Regular reporting is important, as tracking on a regular basis creates a time series, making it possible to extrapolate a forecast.

At some future time, the consultants strongly recommend moving to a more frequent reporting cycle than annually. Peer agencies typically report quarterly. More frequent reporting will aid tracking, better inform policy makers on the effects of policy, and abet more effective policy

making. It will also ensure that the technical know-how to process the joint measures is maintained and developed.

2019 Unified Plan

Between 2015 and 2019, the agencies intend to improve their ability to track and forecast these measures. They also have agreed to pursue a good-faith effort to use the joint measures for rating investment scenarios and potential projects as they develop their respective portion of the 2019 Unified Plan, but all recognize that no agency is obligated to use these measures for final project selection. A preliminary schedule and plan is shown below.

Application			Notes on Application	
SAFETY	Tracking	Forecasting	Tracking	Forecasting
Unified Plan, 2015+	Yes	No	Already occurs	Forecasting the safety effects of specific projects is controversial
Annual Reporting, 2016+	Yes	No		

State of Good Repair	Tracking	Forecasting	Tracking	Forecasting
Unified Plan, 2015+	Yes	Yes	Initially for Transit, UDOT roads over 1,000 AADT and local primary arterials.	For 'Percent Useful Life Remaining'; simple to forecast
Annual Reporting, 2016+	Yes	No		

Air Quality	Tracking	Forecasting	Tracking	Forecasting
Unified Plan, 2015+	Yes	Yes	MOVES 6.1 Output	May not be possible to forecast in Dixie.
Annual Reporting, 2016+	Yes	No		

Access to Jobs	Tracking	Forecasting	Tracking	Forecasting
Unified Plan, 2015+	Yes	Yes	Can be tracked using a base year data-set in a travel model	Forecasting accessibility is currently in Unified Plan.
Annual Reporting, 2016+	Yes	No		

Mode Share	Tracking	Forecasting	Tracking	Forecasting
Unified Plan, 2015+	Yes	Yes	Available from American Community Survey	MPO models have sophisticated mode~~l~~ choice models
Annual Reporting, 2016+	Yes	Yes		

VMT	Tracking	Forecasting	Tracking	Forecasting
Unified Plan, 2015+	Yes	Yes	Estimated from Traffic on Utah Highways~~.~~	Standard Travel Model Output
Annual Reporting, 2016+	Yes	Yes		

Key Objectives and Performance Measures

The partners agreed to six key objectives, and the primary performance measures by which progress in those objectives would be measured. These objectives and measures usually support more than one of the five goals.

Key Objectives	Key Performance Measures
1. Reduce the number of fatal and serious injuries on the transportation system	Fatalities + Serious Injuries per capita
2. Extend the useful life of transportation assets	Percent of useful life remaining
3. Reduce emissions that adversely affect health, quality of life, and the economy	Total key emissions: mobile source ozone and PM-2.5
4. Improve access to jobs and higher education	Jobs/colleges that can be reached within a certain peak time by the average household, by mode.
5. Increase the share of trips using non-SOV modes	Commute Mode Split Percentages
6. Reduce likelihood of driving long distances daily	Vehicle Miles Traveled per capita

This section contains detailed information about each of the above performance measures. Each measure contains the following headings:

- **Related Objective:** Relates Performance Measure to Objective.
- **Tracking:** Concise statement of how things are measured.
- **Initial Method:** Detailed description of measure calculations.
- **Data-sources:** Which data sources will be used.
- **Next Step:** Next steps in implementing each measure
- **Illustrative Graphic**: A picture being worth a thousand words, these represent possible visualizations of the performance measures. (Visualization is discussed in further detail in the appendices.)

1. Fatalities & Serious Injuries

Related Objective: Reduce the number of fatal and serious injuries on the transportation system

Tracking: Five year rolling average per 100,000 residents, as per MAP-21.

Initial Method: Five-year rolling average of fatalities/serious injuries on UDOT roads for which data currently exists. Then expand to all National Highway System (NHS) routes, as well as MAP-21 eligible arterials.

Data-sources: Federal Accident Reporting System (FARS), State Highway Accident Reporting Program (SHARP); National Transit Database (NTD), National Transportation Safety Board.

Next Step: Compile data on past five years of crash statistics with relevant data, on monthly basis.

Forecasting: Extrapolate multiple trend lines into the future to get a range.

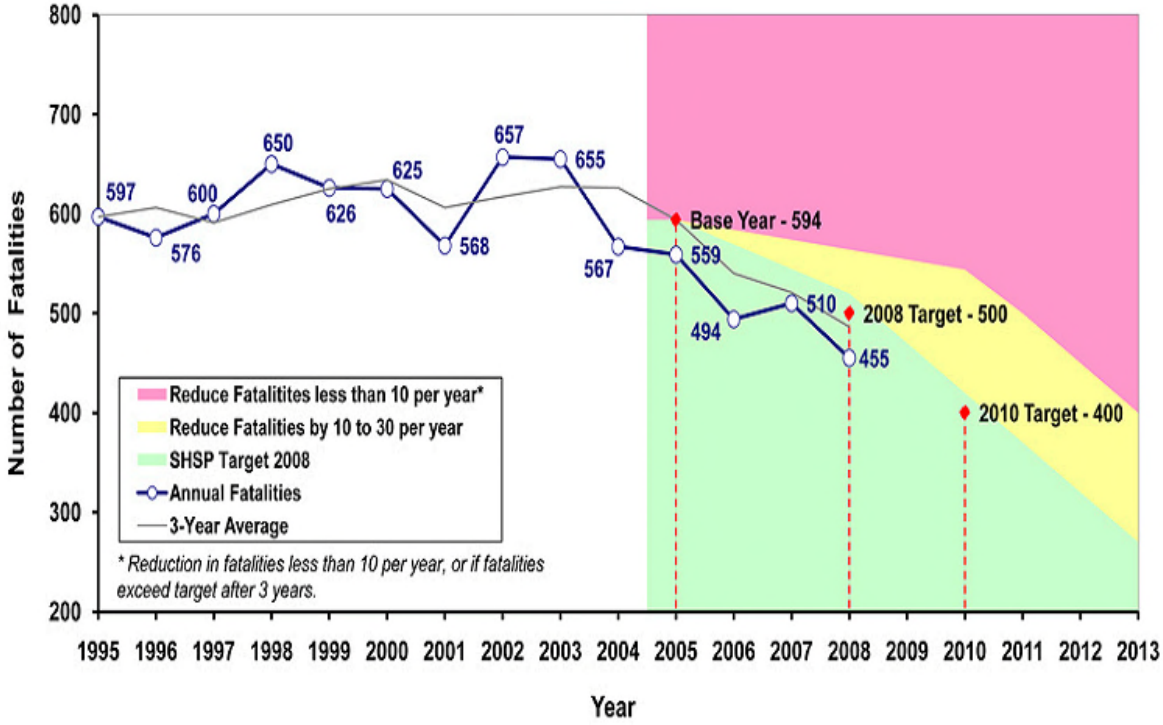
Method: Use 3 trend lines: The 5-year rolling average, the 3-year rolling average, and a simple linear regression for all data available. Include an ARMA (Auto Regressive Moving Average) forecast as well.

Data Sources: As per tracking

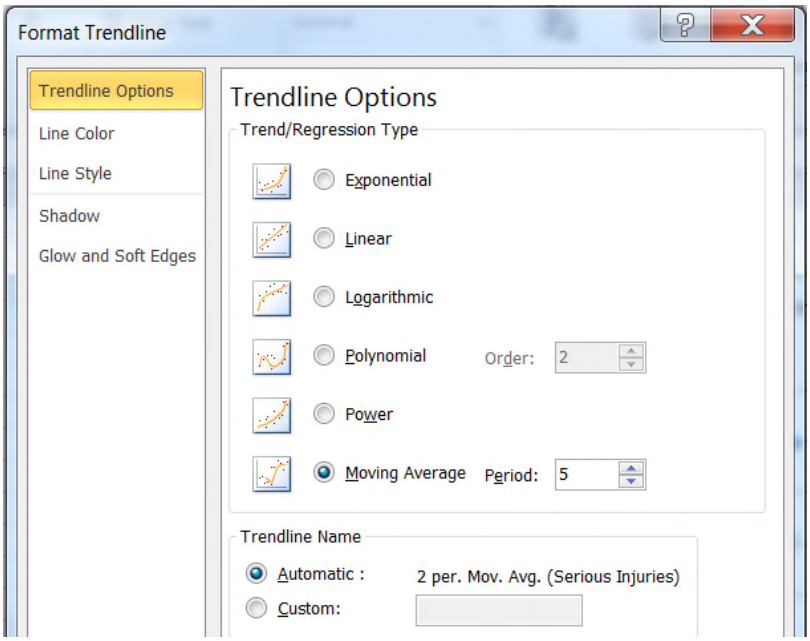
Notes and caveats: While most of the forecasts can be done using Excel, ARMA requires additional effort/expertise.

Next Step: Provide instruction memo on how to forecast in Excel.

Illustrative Graphic:[1]



[1] http://www.dot.state.mn.us/planning/stateplan/Final%20Plan%20Documents/Policy%20Plan/PDF/7P1Safety.pdf


Format Trendline
Trendline Options
Line Color
Line Style
Shadow
Glow and Soft Edges
Trendline Options
Trend/Regression Type
Exponential
Linear
Logarithmic
Polynomial
Order:
2
Power
Moving Average
Period:
5
Trendline Name
Automatic :
2 per. Mov. Avg. (Serious Injuries)
Custom:

2. Percent of Useful Life

Related Objective: Extend the useful life of our current transportation assets

Tracking: For each transportation asset, compare its age to the number of years of expected useful life. For the system, weight percent useful life by replacement value of asset, then sum for all transportation infrastructure.

> **Method:** The age of an asset gets steadily older. Maintenance extends the years of useful life of an asset, adding to the base years of useful life. Calculate the percent useful life by: summing the original useful life and the additional years of useful life added by maintenance. Divide the age by this number. Subtract the resulting number from 1 to get the percent useful life. Rolling up the Percent Useful Life for all assets requires that they be weighted. Short-term, weight assets by base years of useful life (presuming that longer-lasting infrastructure is more expensive). Later, improve weighting by using asset replacement costs rather than base year of useful life.
>
> **Data Sources**: Only existing data will be initially used. Near-term, this will occur for only UDOT roads currently being tracked (over 1000 ADT), but will be extended to the roads on the NHS (National Highway System) under MAP-21: Interstates, Highways, and Principal Arterials. Tracking will occur for all transit assets. MAP-21 data will have to be collected from scratch, or developed from existing agency-specific databases. Ideally, most of the data will be compiled either during, or as a result of the MAP-21 mandated asset management plan.
>
> **Notes and Caveats:** Using naïve estimates of replacement cost will bias estimates of current conditions.
>
> **Next Step:** Consult agency asset managers and begin compiling a database of assets. Consult with the AGRC about hosting said database.

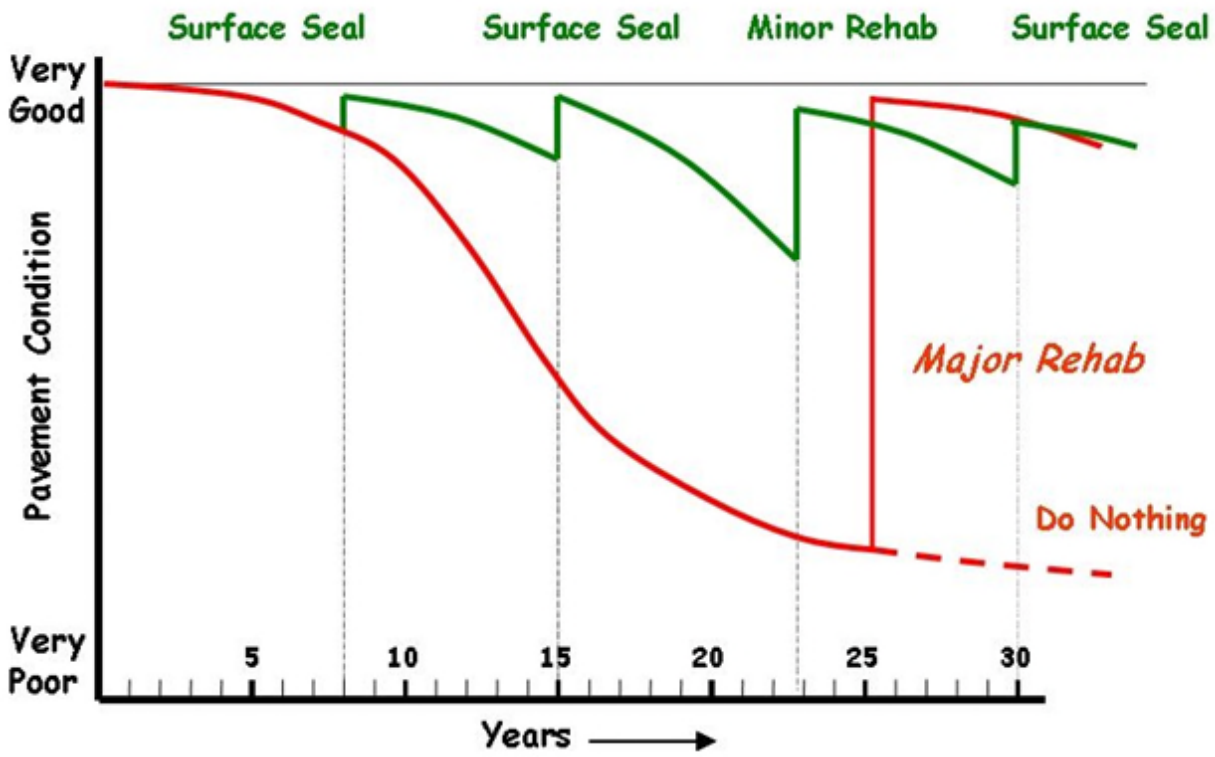
Forecasting: In ten years, everything will be ten years older. Add 10 years to the age of all assets, and then calculate Percent Useful Life Remaining.

> **Method:** Forecast future Percent Future Life Remaining by increasing the age of all assets. Do so for both 10 year increments, and for annual increments. Use the former to create a table and the latter to create a graph.
>
> **Data Sources:** As per tracking.
>
> **Notes and Caveats:** Over time new techniques to improve the useful life of infrastructure will be invented and overall quality of infrastructure will likely improve. It may prove necessary to update the base years of useful life for new infrastructure, while retaining a different number for older infrastructure.
>
> **Next Steps:** Create a spreadsheet or script to calculate percent useful life over multiple time periods.

Illustrative Graphic:

ASSET	Age	Useful Life				Weighted By Age	Replacement Cost	Weighted by Replacement Cost
		Initial	Maintenance	Sum	Percent			
Asset 1	25	30	5	35	29%	7.14	$ 1,000,000	$ 285,714
Asset 2	29	30	0	30	3%	0.97	$15,000,000	$ 500,000
Asset 3	1	5	2	7	86%	0.86	$ 500,000	$ 428,571
Asset 3	35	25	6	31	-13%	-4.52	$ 10,000	$ (1,290)
					Condition Index-->	**4.451**	*System Value-->*	**$ 1,212,995**

<u>Future Expansions:</u> Explore non-linear depreciation curves.



3. Key Seasonal Emissions

Related Objective: Reduce mobile-source emissions that adversely affect health, quality of life, and the economy.

Tracking: Estimate the present level of emission of ozone and PM 2.5 precursors resulting from mobile sources in specific counties: Cache, Weber, Davis, SL, Utah, Uintah, and Washington.

Method: Use EPA Motor Vehicle Emissions Simulator (MOVES) v6 software.

Data Sources: Cache, Dixie, and MAG-WFRC travel model outputs; Department of Air Quality.

Notes and Caveats: While mobile sources emissions can be modeled, they cannot be directly measured. The EPA software requires inputs that can only be provided by a travel model. The travel models should be used judiciously in tracking, due to version changes.

Next Steps:

1. Expand air quality modeling coverage to the rest of the state.
2. Determine which counties may need improved modeling capability – most likely Cache, Uintah, and Washington – and improve automated algorithms for estimating these values.
3. Expand use of the DAQ protocol for technical assistance for counties that do not predict these values regularly.

Forecasting: Estimate future year production of ozone and PM 2.5 precursors resulting from mobile sources in specific counties: Cache, Weber, Davis, SL, Utah, Uintah, and Washington.

Method: As per tracking

Data Sources: As per tracking

Notes and Caveats: Factors such as motorized technology changes, average miles per gallon, and others beyond the control of the agencies could affect mobile source emissions and thereby affect predictions significantly. But assuming the overall emissions per VMT in the future were not so much better than the present, it may be challenging to set a target for reducing the overall tonnage of precursors in each county when the population of each county is growing significantly. Holding emissions steady, or improvement per capita or per VMT may end up more realistic than reducing net emissions, unless there are technology and fuel type changes that make the difference.

Next Steps: Expand geographic extent of DAQ capability.

Illustrative Graphic:[2]

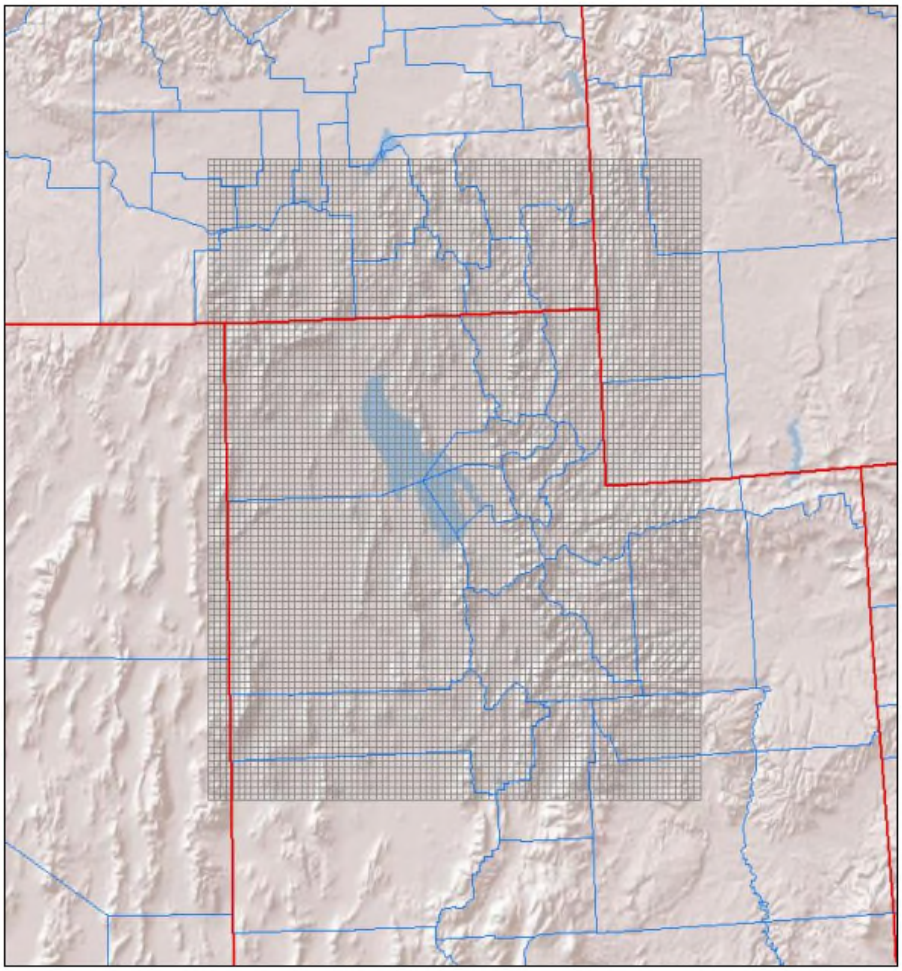


Figure 5.1: Northern Utah photochemical modeling domain.

<u>Future Expansions:</u> Disaggregate the impacts of VMT on air quality to incorporate trip chaining. VMT alone is not the best measure for air quality because cold starts contribute disproportionately to poor air quality.

[2]http://www.airquality.utah.gov/Pollutants/ParticulateMatter/PM25/SIPImp/docs/2013/12Dec/SIPIX.A.21_Adopted_12-4-13.pdf

4. Timely Access to Jobs & Activities

Related Objective: Improve access to jobs and higher education opportunities

Tracking: Number of jobs within a given travel time.

Method: Using either the WFRC-MAG model or the Utah Statewide Travel Model, calculate the number of jobs (alt: trip ends) that can be reached from each TAZ (Traffic Analysis Zone), within a given time period, using in-vehicle time for transit and highway. To create an index summary, weight that number by the population in the TAZ, and sum for any relevant geography (county, MSA, State). Repeat the process for 3 travel times: 15, 30 and 45 minutes. The intent is to track changes over time for each location and each mode relative to themselves, rather than comparing between modes or between locations.

> **Data-sources:** MPO and Statewide Travel Models to estimate zone to zone speeds.[3]
>
> **Notes and Caveats:** The travel models should be used judiciously in tracking, due to version changes. Not all travel models have mode choice models and may not be able to report all modes.
>
> **Next Steps:** Work with modelers to develop automated post-processors for standardizing accessibility calculations, and then apply those methods to all of the MPO models, and also to the Utah Statewide Travel Model.

Forecasting: Number of jobs within a given travel time.

> **Method:** Same as Tracking, with different model year for TAZ and network.
>
> **Data-sources:** Unified Plan Projects in travel model format.
>
> **Notes & Caveats:** Comparisons between existing conditions, No-Build, and other scenarios would be very useful.
>
> **Next Steps:** Develop a method to compare different scenarios, alternatives, and packages of projects.

Future Expansions: Evaluate bike and pedestrian accessibility.

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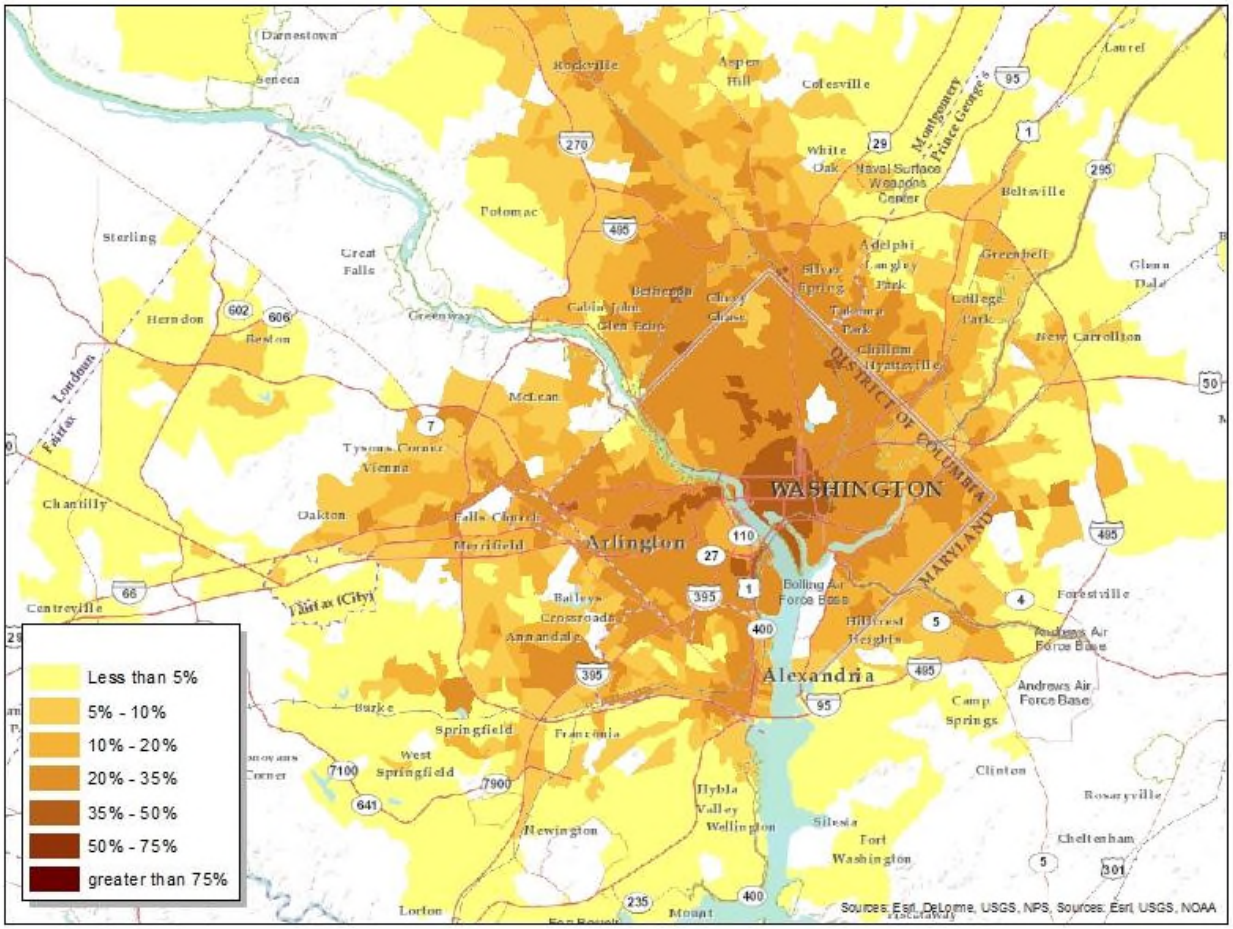
[3] Also follow the "Access Across America" proposal to track accessibility to jobs at the census block level. If this project occurs, it could be an excellent source for tracking.

Illustrative Graphic:



4

[4] http://www.epa.gov/smartgrowth/smartlocationdatabase-map2.htm

5. Mode Choice Percentages

Related Objective: Increase the share of trips using non-SOV modes.

Tracking: Commute share for each mode.

Method: Primary mode of travel to work (Walk, bike, transit, car-pool, worked at home, SOV). Commute mode was selected rather than the mode for all trips, because the commute mode is tracked by the census, while other purposes are not tracked.

Data Sources: Journey to Work data from the five-year American Community Survey (ACS); Utah Travel Study, Statewide Household Travel Diary survey, and data on access to campus from different Universities.

Notes & Caveats: The ACS Journey to Work reports does not isolate trips by students to college. Yet those trips can be considered "commute" trips by students, and they are impressive in terms of mode split. For tracking, use actual data for work trips, supplemented by college surveys or even travel model estimates of present day mode split to colleges.

The Statewide model does not currently have a mode choice element, and that may be fine if mode choice really is not relevant outside of MPO areas.

Commuter mode split is not necessarily the best measure of the extent to which Active Mode projects and programs are being utilized, given that many use bike/ped features for short trips, exercise, and recreation. But it is a good indicator – if more are actively commuting, then probably more are also actively traveling for many other purposes too.

Next Steps: Compile a five-year rolling average from the five-year ACS datasets.

Forecast:

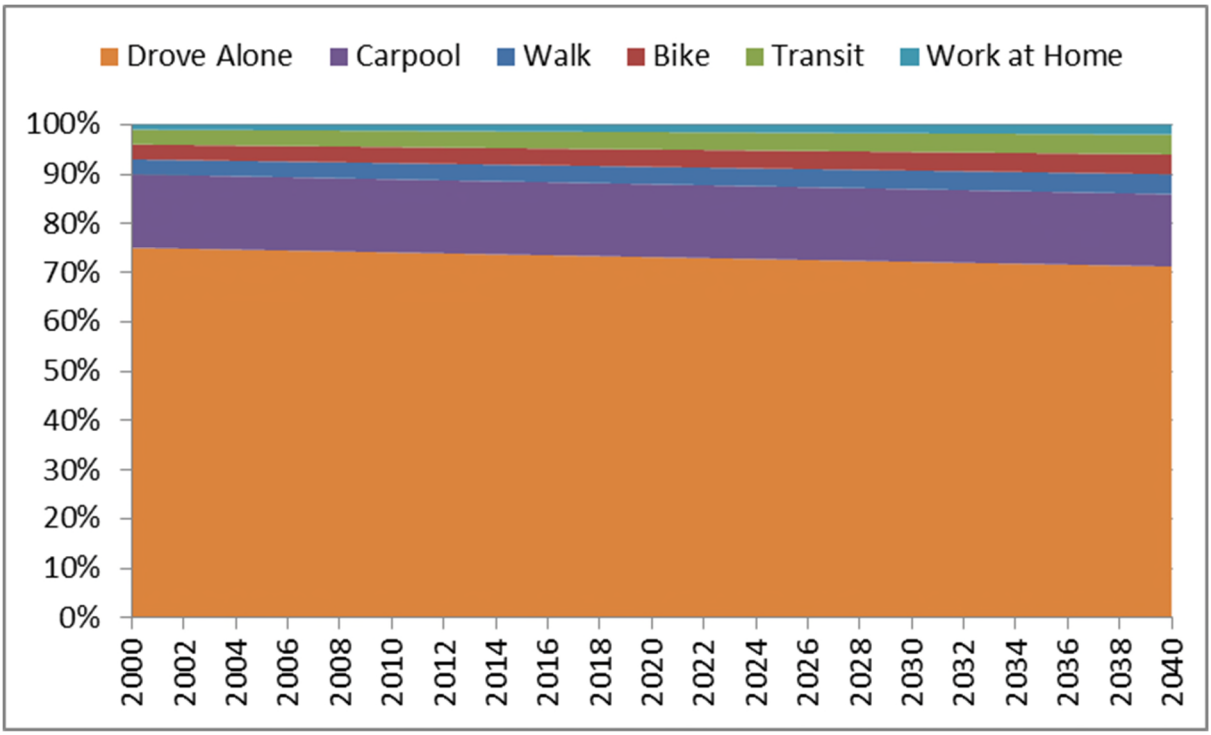
Method: Mode choice outputs from MPO models

Data Sources: Utah Statewide Travel Model (USTM), MPO travel models; Travel Study/statewide Household Travel Diary survey

Next Steps: Work with modelers to improve logic of estimating the attractiveness of Active Transportation modes and likely responses to various Active Transportation investment proposals.

Future Expansions: Improve available data by engaging in a more frequent survey of travel demand characteristics of the Utah population, rather than relying solely on a large survey every 10 or 20 years. Use intersection traffic cameras to automate detection of pedestrians and cyclists in order to improve count data. Develop a multi-modal mode choice model that includes access mode (walk, drive, bus) to transit.

Illustrative Graphic:



6. VMT per capita

Related Objective: Reduce the likelihood of driving long distances daily

Tracking: Each year, compute Vehicle Miles Traveled divided by population.

Method: Sum of vehicle miles traveled on Utah Highways.

Data Sources: Traffic on Utah Highways; HPMS.

Notes & Caveats: This is a required MAP-21 measure. Not all roads required for MAP-21 may currently have data collected for them. A simple measure of VMT says nothing of the conditions under which travel takes place. A useful related measure could be VMT that occurs in congested conditions, to tie it more closely to the mobility/accessibility and economic vitality goals.

Next Steps: Establish which roads will be tracked—existing protocols vs. MAP-21 requirements.

Forecasting

Method: Use MPO and Statewide Travel Models to estimate

Data Sources: MPO and Statewide Travel Models

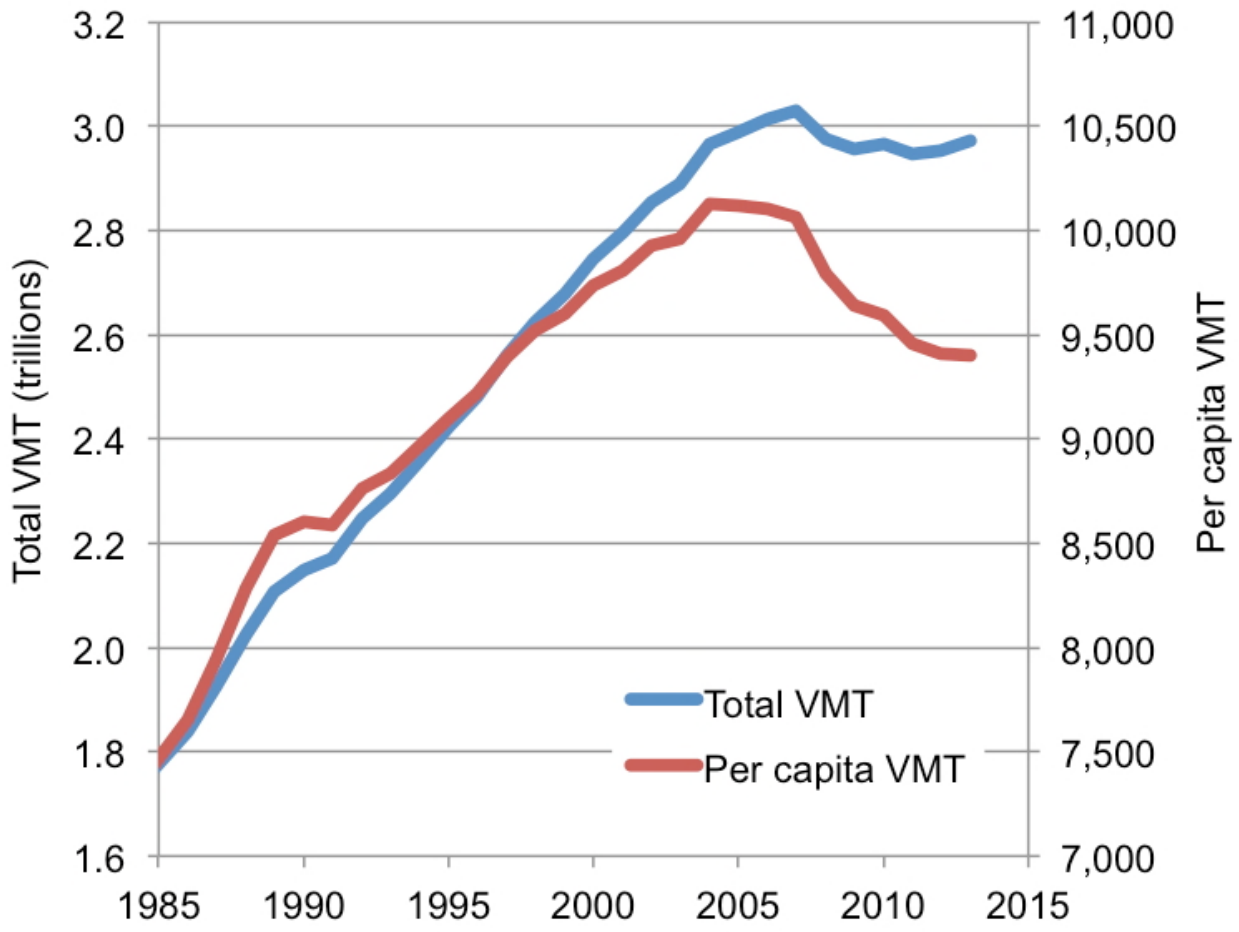
Notes and Caveats: Forecasts are a travel model output, so not version-proof. Different versions of the travel model will have different results, due to changes in the travel model as it improves and becomes more sophisticated. This may generate jumps in trends, making it difficult to reconcile tracking with forecasts.

Next Steps: Establish protocols for 'version proofing' model outputs with some sort of comparability index.

Future Expansions:

- Improve Active Modes forecasting to better detect VMT reductions due to efforts aimed at increasing use of Active Modes
- Attempt to account for aspects of the 7Ds not currently well addressed in models
- Attempt to account for demographic and technological shifts that are generally agreed will affect VMT, but are not presently well accounted for, such as increasing share of seniors, the effect of mobile phone apps, etc.
- Improve model choice modeling in rural areas.

Illustrative Graphic:[5]



[5] State Smart Transportation Initiative: "Per Capita VMT drops for 9th straight year; DOTs taking notice", Feb. 2014

Next Steps Toward Implementation

In order to make progress toward the goals and objectives, it is essential to begin tracking the key performance measures soon. The 2019 long-range transportation plans will need forecasting methods for as many of the measures as possible, ideally standardized across all agencies, if the measures are to be used in project selection to reveal which projects and policies are more cost-effective than others at achieving the goals and objectives.

Decisions are also made frequently through environmental studies, corridor studies, etc., where decision-makers will benefit from the ability to see how various alternatives perform with regard to joint goals and objectives, and perhaps include the measures as part of their purpose and need. Below are the key steps required to begin organizing the state's transportation industry around joint goals, objectives, and measures.

Key steps:

1. Gain buy-in from leadership in each agency.
2. Advertise joint goals in each agency's annual report/strategic plans (no stats, just goals)
3. Elaborate on goals and the simplest to compute measures in the 2015 Unified Plan
4. Retain consultant aid to develop protocols, tools, algorithms for tracking/forecasting.
5. Coordinate internal experts within UDOT, UTA, etc. to work with consultants.
6. Encourage use of joint goals, objectives, measures in project studies (I-15/FR, etc.)
7. In 2016, start annual reporting
8. Prepare to use in project prioritization for 2019 plans.

Technical Guidance – Locate professionals, most likely including outside consultants, who design tracking and forecasting protocols and algorithms. Map out an initial approach to tracking and forecasting each measure. Conduct more extensive literature review on methods, and consult with national experts in designing the initial approach.

Internal Coordination – For each measure, identify experts within UDOT, UTA, and elsewhere who are most informed about the measure and its data sources. Convene meetings between consultant experts and internal experts to refine computational methodology, identify data production challenges to be overcome, and any potential fatal flaws.

Tool Production – Devise strategies for tracking and predicting measures. Determine how frequently statewide / MPO-wide / County-wide current status will be reported (tracking) and how frequently forecasts will be made (prediction). Engage experts to design and document the required protocols, and to automate as much of the process as possible.

Cultural Shift – This initial agreement regarding joint goals, objectives, and measures is really just a very small sampling of the individuals ultimately involved in the planning and delivery of transportation infrastructure and policy. Seek leadership support to adopt as official policy that corridor studies, alternatives analysis, and environmental studies sponsored by any of the partnering agencies should analyze alternatives against the joint objectives, or explain why the joint measures would not be relevant. Organize workshops with attendance from within agencies, cities, and private consultants to discuss the value of the objectives, and how to compute measures that reveal a project or policy's performance with regard to that objective.

Appendix A. MAP-21

Each agency has specific planning requirements associated with MAP-21. Where the selected performance measures are sufficiently similar to those for MAP-21, they should conform explicitly to those measures, in order to eliminate the need for duplicate analysis.

The FHWA is required to establish measures through rulemaking to assess performance in 12 areas generalized as follows: [6]

(1) Serious injuries per Vehicle Miles Traveled (VMT);
(2) Fatalities per VMT;
(3) Number of serious injuries;
(4) Number of fatalities;
(5) Pavement condition on the Interstate system;
(6) Pavement condition on the non-Interstate National Highway System (NHS)
(7) Bridge condition on the NHS;
(8) Traffic congestion;
(9) On-road mobile source emissions;
(10) Freight movement on the Interstate system;
(11) Performance of the Interstate system; and
(12) Performance of the non-Interstate NHS.

The Notice of Proposed Rule Making (NPRM) for planning was released in June, and the final Rule is expected soon. Relevant to this process include the following:

The proposed rule would make the regulations consistent with current statutory requirements and proposes the following: A new mandate for State departments of transportation (States) and metropolitan planning organizations (MPO) to take a **performance-based approach** to planning and programming; a new emphasis on the **nonmetropolitan** transportation planning process, by requiring states to have a higher level of involvement with nonmetropolitan local officials and providing a process for the creation of regional transportation planning organizations **(RTPO)**; a structural change to the membership of the larger MPOs; a new framework for voluntary **scenario planning**; revisions to the integration of the planning and environmental review process; and a process for **programmatic mitigation plans.**[7]

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[6] https://www.federalregister.gov/articles/2014/03/11/2014-05152/national-performance-management-measures-highway-safety-improvement-program

[7] https://www.federalregister.gov/articles/2014/06/02/2014-12155/statewide-and-nonmetropolitan-transportation-planning-metropolitan-transportation-planning

Most notable is the creation of RTPO organizations, which can be expected to significantly affect project delivery in rural (non-metropolitan) parts of the state.

Additionally, performance based planning is now mandatory, viz: "MPOs and States must integrate the goals, objectives, performance measures, and targets of other performance-based plans and processes into their planning processes". While it does not *per se* mandate the use of performance measures for project selection, it comes very near, noting that "recipients of Federal-aid highway program funds and Federal transit funds would be required to link the investment priorities contained in the STIP and TIP to achieving performance targets". This strongly suggests that the joint performance measures will need to be used to evaluate progress toward targets.

Finally, an asset management plan is now required.[8] This is especially important given that MAP-21 expanded the NHS (National Highway System) to include conditions on Principle Arterials.

The metrics used for VMT is not 'per VMT' but "...per one hundred million VMT as documented in the Highway Performance Monitoring System (HPMS)", and is calculated on a five-year rolling average (rather than a single year).[9] Failure to "make significant progress for at least 50 percent of their safety targets (2/4 of the VMT Safety/Fatality) means that "use obligation authority equal to the apportionment of the State for the prior year under section 104(b)(3) only for highway safety improvement projects". Thus, failure to meet safety goals will result in obligated spending on safety related projects.

MAP-21 mandates that agencies "establish one aggregate target for urbanized areas and one aggregate target for non-urbanized areas for each performance measure" and that "MPOs would be required to establish targets for their entire Metropolitan Planning Area". Thus, there are only three possible geographies for performance measures: State, Urban, and Rural. No differentiation between urban areas (or parts of urban areas) is permitted.

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[8] https://www.federalregister.gov/regulations/2125-AF57/asset-management-plan-map-21-

[9] https://www.federalregister.gov/articles/2014/03/11/2014-05152/national-performance-management-measures-highway-safety-improvement-program

Appendix B. Visualization Opportunities

Many showcase measures are designed to boil down to just one or a handful of numbers statewide, though there will often be value in reporting them at sub-state levels also. But it is still true that one good picture is worth a thousand words, and some great maps, charts, and other tools can be created around these measures to easily display their meaning much better.

Fatalities & Injuries: Fatalities and Injuries can be assigned to the TAZ in which it occurred, or link on which it occurred, and then colored or extruded. As an alternate visualization, normalize visualizations not by per capita but instead by VMT or something else – accidents in wilderness areas will appear extremely high on a per capita basis.

Useful Life: This is not easily mappable, but it is easy to demonstrate with trend charts showing the average age of facilities, and expected years until the end of their useful life.

Emissions: Emissions are not easily mappable, so we will instead develop a trend line chart from the present day, or a point in the past, to 2040, showing population change as one line and tons of key emissions as another. Ideally emissions will go down even as population is increasing. The chart can be summarized statewide and at MPO/County level.

Accessibility: The number of jobs that can be reached from each TAZ can be easily colored or extruded for each zone. The change from existing to no-build to build is also mappable. That way county and state-level numbers tell their story, but MPO and statewide TAZ maps also help reveal localized accessibility and how it is changing. Self-guided tours can be set up as part of a "Virtual Unified Plan" so that people can learn about accessibility in their neighborhood.

Mode Choice: Mode choice by TAZ is easy to map. Though post-processors and automated maps are yet to be developed, all of the models with mode-choice features can easily generate TAZ-specific mode splits. Resulting maps will reveal origins / destinations where non-SOV modes are very high now and increase over time in part due to planned projects.

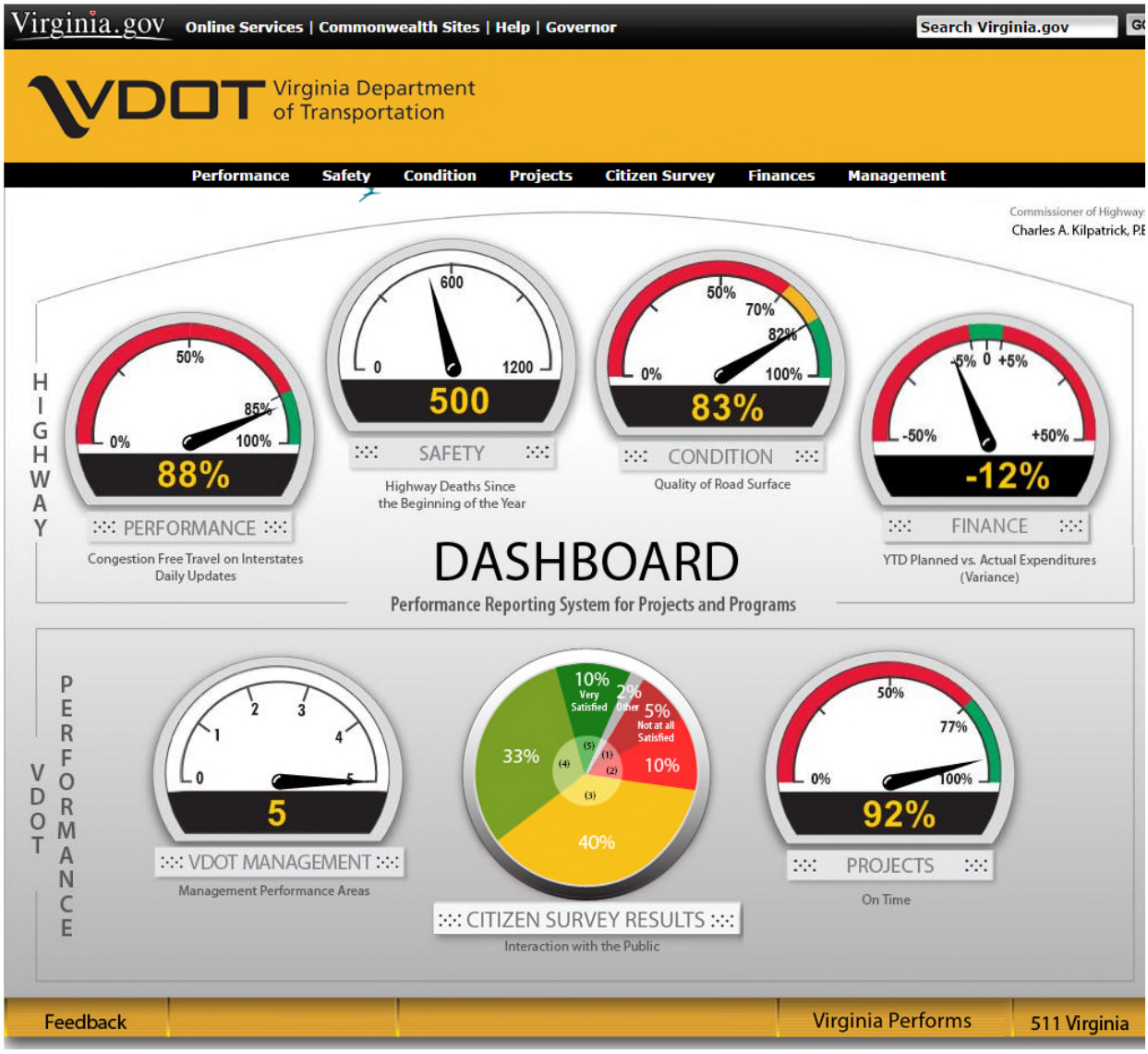
VMT/Capita: VMT per capita can be computed for each TAZ in Utah from the respective model most relevant to that TAZ, or from just the statewide model for convenience. It is computed as vehicle trips to each zone by distance to each zone, then divided by the number of people and jobs in the zone (must include jobs because some zones generate a lot of VMT, but have no population). Resulting maps will show zones that for a myriad of reasons have higher or lower VMT per capita.

Appendix C. Dashboards

Reporting performance measures on an annual basis is insufficient. Agencies that have successfully implemented Performance Based Planning either report quarterly, or make use of Dashboards. Dashboards are web-pages linked to a dynamically updated database. Dashboards also include the capability to 'drill down' into measures, providing a fuller and more nuanced understanding of the situation. They also facilitate the sharing of information, including the broader public, and thus also to enhance accountability and transparency.

An example of a quarterly 'Report Card' from the Mid-Ohio Regional Planning Commission can be seen at: http://www.morpc.org/pdf/2014MTPReportCard.pdf. It is provided in full below. Another fine example, from the Wisconsin DOT, can be seen at: http://www.dot.wi.gov/about/performance/docs/scorecard.pdf

Both the North Carolina (https://apps.dot.state.nc.us/dot/dashboard/) and Virginia (http://dashboard.virginiadot.org/) Departments of Transportation make use of dashboards with the capacity to 'drill down' into more detailed information in a manner very similar to Utah's own *Zero Fatalities* website (http://ut.zerofatalities.com/). West Virginia makes use of a geographically referenced (like UPlan, http://uplan.maps.arcgis.com/home/) project and planning Dashboard. The dashboard has two levels: 'Executive', for public display, and 'Business' for internal staff and partner use.


Virginia.gov
Online Services | Commonwealth Sites | Help | Governor
Search Virginia.gov
VDOT Virginia Department of Transportation
Performance
Safety
Condition
Projects
Citizen Survey
Finances
Management
Commissioner of Highway
Charles A. Kilpatrick, P.E
HIGHWAY
50%
85%
0%
100%
88%
PERFORMANCE
Congestion Free Travel on Interstates
Daily Updates
600
0
1200
500
SAFETY
Highway Deaths Since
the Beginning of the Year
50%
70%
82%
0%
100%
83%
CONDITION
Quality of Road Surface
-5% 0 +5%
-50%
+50%
-12%
FINANCE
YTD Planned vs. Actual Expenditures
(Variance)
DASHBOARD
Performance Reporting System for Projects and Programs
VDOT PERFORMANCE
1
2
3
4
0
5
5
VDOT MANAGEMENT
Management Performance Areas
10%
Very Satisfied
2%
Other
5%
Not at all Satisfied
33%
10%
40%
CITIZEN SURVEY RESULTS
Interaction with the Public
50%
77%
0%
100%
92%
PROJECTS
On Time
Feedback
Virginia Performs
511 Virginia

2012-2035 Metropolitan Transportation Plan (MTP)
2014 Report Card

morpc
Mid-Ohio Regional Planning Commission

MORPC included performance measures in the 2012-2035 MTP. Targets were associated with how transportation can impact the MTP goals. The chart below includes the indicators being measured, the 2012 benchmarks, and the short- and long-term targets. Advancements made toward reaching the targeted outcomes are also displayed.

Report Card Key

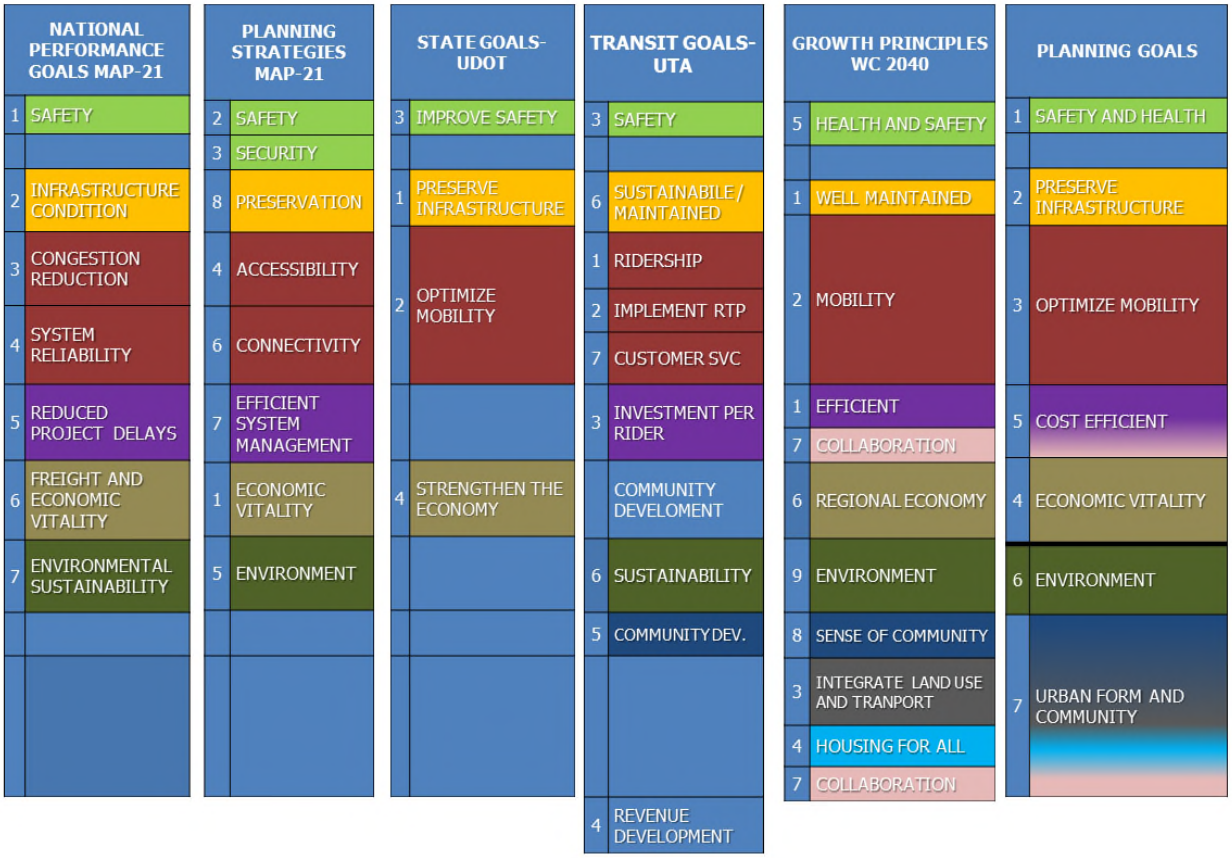
Meets target	On track to meet target	Not on track to meet target

Goal	Measure	2012-2035 MTP Indicator		2012 Benchmark	2016 Year Target	2035 Year Target	2014 Grade	Rationale for grade
Economy	Congestion	Percentage of the transportation system under congested conditions based on vehicle miles traveled (VMT)	*Daily*	3%	Less than 5%	Less than 5%	Meets target	**Meets target** Travel under congested conditions are within targets.
			Peak periods	8%	Less than 10%	Less than 10%		
	Transportation options	Miles of bikeways (at least 10 per year)		564 (miles)	600 (miles)	800 (miles)	Meets target	**Meets target** 19 miles of bikeways were constructed in 2013.
Natural Resources	Air quality	Meet EPA air quality standards for each criteria pollutant	*Ozone*	Attainment	Attainment	Attainment	On track to meet target	**On track to meet target** The area has been redesignated to be in attainment for PM2.5 but is in non-attainment for ozone due to new standards.
			PM2.5	Non-attainment	Attainment	Attainment		
Energy	Energy consumption	Percentage of commuters driving alone		83%	82%	78%	Not on track to meet target	**Not on track to meet target** The percent of commuters driving alone has not changed.
Working Together	Multi-jurisdictional collaboration	Percentage of communities conducting new transportation studies that include multi-jurisdictional participation			100%	100%	On track to meet target	**On track to meet target** Two examples: SR 161 Traffic Study; collaboration along US 33 SE for the Carroll interchange.
People	Transit	Percentage of population and jobs within census-defined urbanized area that are within ¾ mile of a transit stop		69%	71%	80%	Not on track to meet target	**Not on track to meet target** The 2013 measure is 66%.
	Bike facilities	Percentage of population and jobs within census-defined urbanized area that are within ¾ mile of bike facilities		62%	65%	80%	On track to meet target	**On track to meet target** There was a slight increase in the percentage.
	Safety	Number of crashes per million vehicle miles traveled (VMT), on collector or above roadways, for all travelers		2.31 (crashes / million VMT)	2.25 (crashes / million VMT)	2.0 (crashes / million VMT	Not on track to meet target	**Not on track to meet target** The crash rate has declined since the baseline year. However, it is not on track to meet the targeted reduction.
	Bridges	Percentage of structurally deficient and/ or functionally obsolete bridges		18%	17%	14%	On track to meet target	**On track to meet target** There has been a slight reduction in the percentage.
	Pavement conditions	Percentage of lane miles of streets (collectors and above) with unacceptable pavement conditions, based on ODOT ratings		2.4%	No more than 5%	No more than 5%	Meets target	**Meets target** Pavement conditions ratings remain unchanged from the benchmark.
Neighborhoods	Complete streets	Percentage of communities adopting complete streets policies or policies that contain those elements		0%	25%	100%	On track to meet target	**On track to meet target** Dublin, New Albany, and Franklin Co. have adopted policies to encourage multiple transportation modes.
	Environmental justice	Percentage of disadvantaged population average trip travel time compared to the regional average trip time		94%	Never higher than 100%	Never higher than 100%	Meets target	**Meets target** The average travel time ratio remains under the future year targets.
	Density	Density (people and jobs per acre) within ¾ mile of roadways (arterials and above)		4.5 (people + jobs / acre)	4.8 (people + jobs / acre)	6.0 (people + jobs / acre)	On track to meet target	**On track to meet target** There was a slight increase in the density.

Appendix D: Joint Goals and Measures Process Documentation

Goal Selection Process

The goal selection process began with looking at national goals and strategies and comparing them to the goals and strategies of the Utah Department of Transportation, the Utah Transit Authority, the principles from a regional visioning effort (Wasatch Choices 2040), and the goals of planning organizations.



Goals (and goal equivalents) from other states and agencies were presented from the following states: California, Colorado, Florida, Maryland, Minnesota, New Hampshire, Ohio, Oregon, Pennsylvania, Washington, Michigan, Nevada, and North Carolina. This was done in order to provide an overview of both the types of goals and to familiarize participants with the language used in stating goals.

The goals selection process used the following criteria.

- Something that benefits all the modes, not mode specific
- 'Their goal is the same as our goal...goals we have common ground on'.
- Measures that success of the transportation network.

- Supports joint projects in common corridors.
- All working together to fund it; Highway projects with trail projects and trail crossings.

Performance Measure Selection Process

From a wide variety of sources, a menu of potential performance measures from other states, federal agencies, and Metropolitan Planning Organizations was compiled. From this initial list of hundreds of possible measures, the consultants selected a list of the best, most feasible measures. A list of potential performance measures was brought forward for consideration

Selection Criteria

There are hundreds of potential performance measures. In order to narrow the options to the best joint measures, seven basic criteria were used:

1. **Commonality**: Something that UDOT, UTA, and the MPOs are all concerned with and capable of influencing. Not mode specific.
2. **Understandable**: Measures help explain to the public the big picture benefits of the unified plan and highlight any unmet needs. Even if the measure itself is somewhat complicated, the "plain English" description and purpose should be easy to explain to the average citizen.
3. **Trackable**: For present conditions and historic trends, is there real data available that is easy to obtain? Are the calculations themselves easy to create from actual data, or do they require weighting factors, predictive models, and other complications?
4. **Predictable**: Is this a measure that can be strongly influenced by potential project and program decisions? Are there existing standard practice forecasts of this measure? If not, is there a good way to create forecasts and standardize/automate the forecast within the various models or other tools? If the above is all very difficult, then it isn't an easily predictable measure.
5. **Level of Control**: Can the partnering agencies strongly affect the outcome of the measure though their project and policy choices? Or is it a measure that is heavily influenced by other factors only loosely connected to them?
6. **Value of Measure**: Is this a measurement that matters? Is it measuring the correct thing? Is it a good top-level measure, or a sub-measure of a higher measure?
7. **Connection to Goals**: Every goal should have at least one measure that supports the goal well. Great measures will support several goals.

The above criteria helped narrow performance measure options from hundreds to under twenty that had potential. The various options were discussed at length during workshops, and the six showcase measures were selected by the group. Additional criteria that was verbally discussed included whether a measure had the strong ability to aid in project selection decision, and whether it could be tracked and/or predicted without much susceptibility to changes in the calculation tools themselves (i.e. 'version proof').

Criteria Weighting Approach

Each candidate measure was rated as a 3,2,1, meaning "Great, Good, Mediocre" with regard to each of the seven criteria. Points were totaled to help reveal which measures seemed generally very good, and which were problematic. Below are results of that analysis, followed by a description of what a 3,2,1 means with regard to each criteria.

	Commonality	Understandable	Trackable	Predictable	Level of Control	Value of Measure	Addresses Goals	Total	
Showcase Measures									**Supported Goals**
1 Fatalities & Serious Injuries	3	3	3	2	2	3	3	19	Safety, Economy
2 Maintenance Losses (Ounce of Prevention...)	3	3	2	2	3	3	3	19	Good Repair, Economy, Mobility
3 Key seasonal emmisions	3	3	1	2	2	2	3	16	AQ, Economy
4 Timely access to jobs and activities	3	2	2	3	3	3	3	19	Mobility/Access, Economy
5 Commute Mode Split Percentages	3	3	3	2	3	3	3	20	AQ, Economy, Mobility/Access
6 VMT per capita	3	3	3	3	3	3	3	21	AQ, Safety, Mobility/Access
Other Good Measures									
7 Household transportation cost	2	3	2	2	1	2	2	14	Economy, Good Repair
8 Reliability and predictability	3	2	2	1	3	2	2	15	Economy, Mobility/Access
9 Monetary Return on Investment	3	2	1	2	2	3	2	15	Can estimate but impossible to track
10 Percent of useful life	3	2	2	2	3	2	2	16	Vague; Other PM easier to compute & understand
Discarded, Problematic Measures									**Reason for Discard**
11 Active Transportation, # of Users	3	3	1	2	3	3	3	18	Cannot track; covered by mode split
12 Active Transportation, Network Miles	3	2	2	2	3	1	2	15	Vague; Not measuring right thing
13 Productive Time Saved	3	2	2	3	3	2	2	17	Delay measure, but hard to combine w/transit

Performance Measure Score	Commonality	Understandable	Trackable	Predictable	Level of Control	Value of Measure	Connection to Goals
3	Concern to all	Anyone could quickly understand	Data sources are regularly refreshed	Spreadsheet or models estimate easily	Agencies have strong influence	Powerful top-level measure addressing multiple goals	Great measure of multiple goals
2	Meaningful to all	May take some explaining	Data frequency and scale are issues	Can be automated, but may be difficult	Agencies have marginal influence	Addresses some goals well.	Good measure of at least one goals
1	Meaningful to some	Hard for most to understand	Must be estimated	Very challenging to estimate reliably	Difficult for agencies to influence	Loosely connected to goals. Probably better measures	There are better measures for our goals

Appendix E, Other Potential Joint Measures

There was also a desire to avoid too many showcase measures to help focus the message of the overall system. While the following represent valuable measures, these measures were not deemed to be preferred.

1. Household Transportation Cost

Measure: Percent share of median household's budget devoted to meeting transportation costs

Explaining it: We want to track and estimate how much people are spending to get around. If the amount they are spending to get around is rising, the transportation system is not serving them well.

Related Objective: Reduce the percentage of household income spent on transportation

Tracking:

Method: Use population to weight the Location Affordability Index (LAI) of Typical Household Transportation Costs for the area(s) of interest.

Data Sources: Housing and Urban Development (HUD) LAI index. LAI actually lists eight different household types. 'Regional typical' can be used, or a weighted metric to include all types.

Notes & Caveats: LAI is available now, but may not be updated regularly. If it is not, it will be necessary to calculate the index using the published methodology. If so, additional data needs will include methodology including neighborhood characteristics, auto ownership, auto usage, and public transit usage. Full method: http://www.locationaffordability.info/LAPMethods.pdf

Forcasting:

Method: Extrapolate LAI costs for the future by pair-matching future TAZ characteristics with current TAZ characteristics.

Data Sources: GOPB estimates of future demographic characteristics

Notes & Caveats: HUD might not update the LAI with more current data, requiring the (well documented) method to be computed locally, rather than simple provided.

Why not Showcase? While people can relate well to the amount they spend on transportation, it is a challenging figure to track and predict. It is also difficult performance measure for the agencies to influence – or rather, different investment scenarios may not affect household cost very much. There was also a desire to avoid too many showcase measures, to help focus the message of the overall system. Still, if an automated method can be developed for this, it would prove useful in some circumstances.

2. Travel Time Index

Measure: Total hours per person per year of time regained (compared to No-Build), computed as the sum of reduced delay.

Explaining it: In order to get somewhere on time, travelers need some assurance of how long it will probably take even if there is congestion. This measure helps us know if we are improving transit schedule reliability and minimizing the daily variance on highways. Everyone has stories of when their bus was extremely late or when congestion was unusually bad, so the possibility of this measure resonates with people.

Tracking:

Method: Calculated as the ratio of travel time in the peak period to travel time in free-flow. A value of 1.30 indicates a 20-minute free-flow trip takes 26 minutes in the peak. For transit, due to GTFS feeds, it is possible to compare actual location to scheduled location, and create a weighted index on that basis. The same can be done for major roadways using INRIX data.

Data Sources: GTFS feeds, INRIX data. While INRIX provides similar data to the GTFS for highways, it is not freely available, and would require an annual purchase, at an unknown price. However, many state DOTs (including Idaho) currently purchase the data, so it seem unlikely to be cost-prohibitive.

Notes & Caveats: Travel model output, so not version-proof. Different versions of the travel model will have different results, due to changes in the travel model as it improves and becomes more sophisticated. This may generate jumps in trends, making it difficult to reconcile tracking with forecasts.

Forcasting:

Method: Calculated as the ratio of travel time in the peak period to travel time in free-flow. A value of 1.30 indicates a 20-minute free-flow trip takes 26 minutes in the peak.

Data Sources: Travel model output

Notes & Caveats: Travel model output, so not version-proof. Different versions of the travel model will have different results, due to changes in the travel model as it improves and becomes more sophisticated. This may generate jumps in trends, making it difficult to reconcile tracking with forecasts.

Why not Showcase? INRIX data is not a currently available data source. Nor are travel models calibrated with INRIX data, making comparisons between tracking and prediction difficult. Secondly, there is no goal directed toward predictability or reliability, or toward any measure of congestion.

3. Monetary Return on Investment

Measure: Societal value and incremental gain in Gross Domestic Product expected as a result of time saved, lives saved, fuel and maintenance saved, and other factors that have direct monetary value relative to what will be spent to achieve that value (i.e., Benefit/Cost analysis).

Explaining it: If we spend a dollar, will the value we get back be more or less than we spent? When you can use your time more productively, by shorter trip times or by being able to get things done while traveling, you have more time for life. That can be expressed in dollars as a function of how you value your time. For many people and businesses, increased productive time means they will produce more revenue in their businesses, resulting in more and better paying jobs for our citizens.

If the Unified Plan will cost $50 Billion, and the effect will be $150 Billion in societal value and increased GDP, then this 3-1 Return on Investment makes a strong case for doing what it takes to ensure agency plans do not suffer setbacks due to funding challenges.

Related Objective: Increase societal value and Gross Domestic Product

Tracking: Estimated change in regional GDP as a result of transportation investments.

Method: Using outputs from travel demand models, estimate the monetary benefit resulting from reduction in congestion and other travel costs, using the TREDIS software. Much of the logic behind TREDIS can be developed as a Cube-Voyager script and embedded directly into all of Utah's travel models without the need to purchase ongoing TREDIS licenses. Such a Cube script can also be applied to any individual project to determine the societal value of the project, and the expected GDP increase that is traceable to the project. EDRG, the makers of TREDIS, are happy to provide a free version. The data and algorithms needed for this measure could be achieved with the free version.

Data Sources: Travel model outputs, local value of time, TREDIS

Notes & Caveats: Lacking data, the exact monetary ROI (Return on Investment) can only be estimated, not directly measured.

Predicting: Forecast increased in GDP and social benefit resulting from congestion and air quality mitigation.

Method: Using outputs from travel demand models, estimate the monetary benefit resulting from reduction in congestion and other travel costs, using the TREDIS software.

Data Sources: Travel model outputs, local value of time, TREDIS

Notes & Caveats: There are accepted methods for predicting and calibrating models that can reveal the general, probable effects of multi-modal investments even if the actual effect cannot be known for any given locale. Predicted values are always in relation to a baseline (i.e., the economic effect of effective investments as opposed to no investment or less effective investments).

Why not Showcase? While not selected as a showcase measure, this is still a very good measure that can help make a strong case for transportation funding. The ability to say "for every dollar we invest in the Unified Plan, we will get two dollars back in higher gross domestic product" would be worthy of showcasing for the legislature and many other audiences and is a great way to help those audiences feel good about investing to support the plan even in view of other important topics vying for funds. The measure could also be used for individual projects. Nonetheless, we definitely recommend creating the capacity within your models to compute this measure, for which you will find dozens of uses.

4. Money Saved Due to Proper Maintenance

Related Objective: Invest in capital asset maintenance every year sufficient to eliminate financial losses due to lack of proper maintenance. "An ounce of prevention is worth a pound of cure."

Explaining it: We want to pass on to the next generation a transportation system that is in a state of good repair. Delaying repairs lessens our costs today, but like failing to change your oil, it will eventually cost more than if we'd just budgeted for regular maintenance along the way. This measure helps determine how much we are saving down the road when we keep things up today. Or conversely, how much we will be losing later due to years where we were unwilling or unable to keep up with needed maintenance.

Correlation to Goals: Directly measures the State of Good Repair in terms of why we care about good repair – we want to save money in the long run, by spending as necessary today to avoid spending even more later.[10] Doing so supports Economic Vitality, because higher infrastructure costs require higher taxes that drag down the economy. In addition, the quality of transportation assets affects the ability to attract and retain businesses. Finally, also affects the quality of Mobility.

Near Term Tracking: Comparative cost of maintenance for this year vs. next year.

Method: Using typical depreciation curves (see graphic) for maintained and unmaintained facilities, estimate how much needs to be budgeted for maintenance to maximize our potential long-term savings. Then compare that with what is actually budgeted for that purpose. If what was budgeted is the same as what was needed, then the full long-term savings potential is realized (i.e. zero loss) But if the budget was less than what was needed, determine how much we did save as compared to doing nothing, but also compute how much more we could have saved had the maintenance budget been ideal. How much more will we have to spend next year to get back on track because we deffered maintenance this year? Also estimate user costs due to poor maintenance and add into total cost. For detailed reporting, show both public costs as well as user costs.

[10] http://www.fhwa.dot.gov/pavement/preservation/ppc0621.cfm

Data Sources: Much of the data necessary for this measure will become available as a result of the MAP-21 required Transportation Asset Management Plans. It will be necessary to collect some additional data, for some types of infrastructure, not covered under MAP-21 requirements. Use ASCE depreciation curves.

Notes and Caveats: Actual asset conditions may not exactly match depreciation schedule, due to a variety of factors. Requires computations to determine cost of getting back on track in the event that the maintenance schedule is delayed due to shortfalls.

Next Steps: Begin compiling MAP-21 relevant data about the age, useful life, and replacement cost of infrastructure assets, as well as their depreciation by age of life in maintained and unmaintained scenarios.

Forcasting:

Method: Essentially the same process as for tracking, but compare programmed budgets over the coming years to expected maintenance needs. As under-funding accumulates, estimate the accumulated loss as the costs required to get back to the ideal state of good repair and user costs during that period (the pound of cure), minus the "savings" of not spending on maintenance (the ounce of prevention). Predict this annually for short-term budget effects, and every four years with planning cycle to assess long-term effects of any systemic shortfalls.

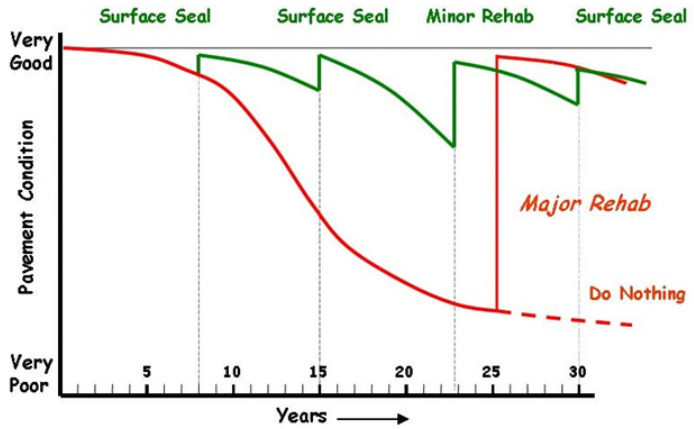
Data Sources: As per tracking

Notes and Caveats: Over time, infrastructure cost elements are going to change in price. Estimate future costs in present year dollars.

Next Steps: Begin comparing current conditions of infrastructure vs. items in Unified Plan.

<u>Potential Future Methods:</u> Identify how other factors, such as snow, truck volumes, and accidents, utility maintenance affect the useful life of facilities and/or vehicles. General national depreciation rates may not be attributable to Utah conditions.

Why not Showcase? The general consensus was that this measure was too complicated, and that there were too many unknowns associated with calculating it. It was replace with 'years of useful life'.



Appendix F. Discarded Measures

While seriously considered, these measures were discarded

Active Transportation, Number of Users & Percent who use:

People who are using active transportation facilities at least once per week; percent of population that is doing so.

Not recommended because: Requires substantial additional data collection. Apart from the travel survey, there is no existing data source on active transportation use. Hard to separate commuting from recreation uses. Predicting future users could require statistical modeling.

Active Transportation, Network Miles:

Miles of roadside or transitways accommodating bike use and accommodating pedestrian use.

Not recommended because: Not specific enough. Types of facilities and investment options vary so much. If we install a pedestrian bridge or bike tunnel, it may attract huge numbers of users, but how many miles does it count for? Or if we install bike lanes in the farmlands you can get a lot of miles, but does anyone use them? There are so many sidewalks that they may obscure progress. It could inadvertently measure sprawl.

Productive Time Saved:

Total hours per person per year of productive time regained (compared to No-Build), computed as the sum of reduced auto delay and the productive use of transit time.

Not recommended because: It is insufficiently quantitative; determining what counts as 'productive time' is difficult, as is predicting it.