



Appendix 2: Updated Pilot Program Evaluation Criteria Based on Comments Received

**Briefing Book for TAC Meeting #6**

TAC Members Provided Feedback to Revise and Improve the Draft Evaluation Criteria Presented in May

The project team received comments from several TAC members indicating thorough review of the evaluation criteria and thoughtful consideration of ways to improve the first draft. The following four pages summarize all comments received and the project team's responses, followed by 8 pages of updated criteria, revised in response to the comments received.





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Summary of Comments Received

Category	Questions/Comments Received	Project Team Response
Overall	Can we evaluate trade-offs across categories?	Yes, the Independent Evaluator will be instructed to do so. Also, criteria will be assessed across all operational concepts.
	Do goals drive evaluation or vice versa?	Goals generally should drive what is evaluated (the process used thus far). That said, the results of pilot evaluation will help inform future decisions about whether and how to proceed, thus influencing goals.
	Are all criteria relative to fuel taxes? Should they be?	This is an area the TAC can provide guidance. In the draft provided, criteria are to be assessed relative to fuel taxes only where indicated.
1. Revenue	The most important revenue goal is the ability of the road charge to generate similar revenue as fuel tax “on day one.” Other considerations such as meeting needs are outside of the pilot scope.	To reflect this comment, the first two goals were combined and restated as, “Create a revenue stream that is able to match the fuel tax at time of implementation.”
	Make “double taxation” criterion more specific to road charge and fuel tax.	Clarified this criterion to reflect the concept of double taxation as applies strictly between road charge and fuel tax, and not other taxes.
2. Cost	Cost of collection should be measured relative to fuel tax.	Added cost of collection relative to fuel tax as an additional criterion.
	Compliance costs should be built into the rate, not passed on to the motorists	The criterion in question refers to the cost of compliance borne by motorists to report mileage. This language has been clarified.
	What does “projects” refer to?	Language in this criterion has been clarified to refer to the pilot project itself (as a barometer of potential cost issues).



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Category	Questions/Comments Received	Project Team Response
<p>3. Operations</p>	<p>Remove behavioral goal and associated criteria as these are beyond the scope of the road charge pilot</p>	<p>The purpose of these criteria is to test whether in fact there is no change in behavior, as commenter points out is the expectation. We have not removed them but are open to doing so at the TAC’s direction.</p>
	<p>Remove criteria related to beliefs as these are outside of scope.</p>	<p>The criteria related to “beliefs” have been removed.</p>
	<p>What is the distinction between “be enforceable” and “collect all charges owed?”</p>	<p>“Be enforceable” refers to the ability of the system to <i>encourage</i> voluntary compliance (language added to this effect). “Collect all charges owed” refers to the ability to actually collect all charges, including enforcing against violators / non-compliant behavior.</p>
	<p>“Collect all charges owed” is not an appropriate goal both because it may not be possible and it may lead to other undesirable effects such as privacy invasion.</p>	<p>This goal has been reworded as follows: “Optimize collection of charges in accordance with enforcement features recommended by the TAC.” An additional criterion has been added to reflect adherence to TAC-recommended enforcement features.</p>
<p>4. User Experience</p>	<p>What is the difference between “Administer effectively” (category 4) and “Administer efficiently” (category 2)?</p>	<p>Category 2 is from an agency perspective, while Category 4 is from a user perspective. Language updated in both places to reflect this distinction.</p>
	<p>Strengthen technology adaptability and flexibility criteria to ensure long-term viability of methods (including open system).</p>	<p>Added language to several criteria to reflect that these characteristics should be long-term in nature. Also, added a new criterion related to “openness” of the system architecture of the pilot to accommodate future providers.</p>



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Category	Questions/Comments Received	Project Team Response
5. Privacy	Can goals #2-4 replace goal #1?	Goal #1 relates to user perception, while #2-4 relate to actual system performance.
	What is meant by “respect user privacy trade-offs?”	The purpose of this goal and the corresponding criterion is to allow measurement of the system’s flexibility to accommodate users who opt in to services that may require sharing data beyond the minimum required for road charging.
	Ensure that criteria reflect TAC privacy actions, including more precision on Constitutional issues.	Given the detailed consideration of privacy issues the TAC is undertaking, we changed this criterion to reflect adherence in the pilot to TAC privacy principles, by incorporation.
6. Data Security	How is perception of data security distinct from perception of privacy?	Perception of privacy relates to information motorists may be required to disclose, while data security relates to how information is handled and secured by agency & vendors.
7. Equity	All equity criteria should be with respect to fuel taxes.	All proposed equity criteria are “with respect to fuel taxes.”
	Consider adding equity criteria without respect to fuel taxes.	We are open to TAC direction on this proposal.
	Equity with respect to items other than road use should not be evaluated.	We are open to TAC direction on removing equity criteria.
	Inter-temporal equity should not relate to age, but rather to differences between people at different points in time.	In recognition of this clarification, and given the short duration of the pilot, we have removed this criterion.
	Consider removing the “accommodate all users” goal, which is so vague as not to be useful.	We agree. This criterion has been removed.
	Define horizontal and vertical equity	Definitions added.
	Consider a term other than “equity.”	We are open to TAC suggestions should the equity category require reconsideration.



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Category	Questions/Comments Received	Project Team Response
8. Communications	“Quality” of public interactions is too vague to be useful.	This criterion has been updated to be more precise and measurable. It now relates to participant satisfaction with the interactions and feedback opportunities.



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Updated Categories of Goals and Evaluation Criteria

The table below summarizes the number of goals and criteria in each category based on TAC feedback received.

Category	Number of goals	Number of evaluation criteria
1. Revenue	2	2
2. Cost	4	5
3. Operations	8	12
4. User Experience	6	12
5. Privacy	6	4
6. Data Security	4	6
7. Equity	5	6
8. Communications	1	3
Total	36	50

The pages that follow outline each individual goal and evaluation criterion, organized by category.



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1. Revenue Criteria

Goals	Source	Evaluation Criteria
<p>Create a revenue stream that is able to match the fuel tax at time of implementation</p>		<p>Ability of Road Charge revenue to match fuel tax revenue at time of implementation</p>
<p>Avoid double taxation of Road Charge and fuel tax</p>	<p>CTIP</p>	<p>Ability to credit fuel taxes paid against Road Charges owed for pilot participants</p>



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2. Cost Criteria

Goals	Source	Evaluation Criteria
<ul style="list-style-type: none"> ▶ Administer Road Charges efficiently ▶ Incorporate cost efficiencies where available 	<ul style="list-style-type: none"> ▶ SB 1077 (f)(4) ▶ CTIP 	<p>Estimated agency cost of administering a statewide Road Charge based on relevant cost data from the pilot</p> <hr/> <p>Estimated agency cost of administering a statewide Road Charge based on relevant costs from the pilot, relative to fuel taxes</p>
<p>Provide users with low-cost compliance options</p>	<p>SB 1077 (f)(3)</p>	<p>Costs incurred by motorists in recording and reporting highway use</p>
<p>Implement projects on time and on budget</p>		<p>Completion of pilot project milestones relative to schedule required in SB 1077</p> <hr/> <p>Final pilot project expenditures relative to cost estimate following TAC final report at end of 2015</p>



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3. Operations Criteria

Goals	Source	Evaluation Criteria
<ul style="list-style-type: none"> ▶ Be easy to administer ▶ Clearly identify responsibilities 	<ul style="list-style-type: none"> ▶ SB 1077 (f)(4) ▶ CTIP 	Ease of administering collection of Road Charges <hr/> Adherence of all pilot vendors and administrators to operations responsibility matrix
<ul style="list-style-type: none"> ▶ Maintain compliance ▶ Be enforceable 	<ul style="list-style-type: none"> ▶ SB 1077 (f)(5) ▶ CTIP 	Effectiveness of methods for encouraging voluntary compliance <hr/> Resistance of methods to tampering and fraud <hr/> Quality/accuracy of road use data reported
Have neutral or efficient behavior impacts		Changes in individual road use behavior <hr/> Changes in collective road use behavior
Integrate with other charges	CTIP	Ease of administering interoperability with other jurisdictions
Optimize collection of charges in accordance with enforcement features recommended by the TAC		Difference between expected and realized revenue per mile <hr/> Implementation of and adherence to enforcement features recommended by the TAC
Be compliant with financial guidelines		Auditability of accounts <hr/> Auditability of account managers



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4. User Experience Criteria

Goals	Source	Evaluation Criteria
Administer Road Charges effectively		Users' ease of recording and reporting highway use Quality/accuracy of highway use data reported
Allow user choice	CTIP	User acceptance of methods available Market availability of methods
Keep pace with change over the long term	CTIP	Openness of system architecture for future providers Long-term ability of methods to incorporate other services
Provide methods that are available, adaptable, reliable, and secure	SB 1077 (f)(1)	IT availability of methods Long-term adaptability of methods to changing technologies Reliability of methods Security of methods
Be transparent about how charge works		User understanding of system, including choices, operations, and invoices
Do not negatively impact safety		Incidence of safety issues related to Road Charging



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5. Privacy Criteria

Goals	Source	Evaluation Criteria
Honor personal privacy through privacy policies	CTIP	User perception of privacy protections
Protect personally-identifiable information (PII)	SB 1077 (f)(2)	
Ensure identity protection using location data even after removal of PII	SB 1077 (f)(6)	Protection of PII in accordance with principles adopted by the TAC
Ensure privacy protection when using location data with other technologies	SB 1077 (f)(7)	
Protect privacy pursuant to Article I Section 1 of the California Constitution with respect to data access by public agencies (including law enforcement) and private firms	California Constitution and SB 1077(f)(8)	Protection of privacy, including implementation and operation of procedures, in accordance with principles adopted by the TAC
Respect user privacy trade-offs		Ability of the system to accommodate user privacy preferences and choices relative to opt-in services



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6. Data Security Criteria

Goals	Source	Evaluation Criteria
Honor personal privacy through data security	CTIP	User perception of data security
<ul style="list-style-type: none"> ▶ Ensure data are secure from external breaches ▶ Ensure data are secure from internal breaches ▶ Ensure data are secure from abuse based on internal process exposure 		Ability of system to withstand breaches or attacks
		Protection of data in accordance with TAC direction on data security
		Availability of data for appropriate and necessary uses
		Conformity with relevant ISO 9000 data security standards
		Conformity with relevant ISO 27001 data security standards



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7. Equity Criteria (with Respect to Fuel Taxes)

Goals	Source	Evaluation Criteria
Be fair and equitable	CTIP	User perception of equity, relative to fuel taxes
Preserve or improve horizontal equity (relative to fuel taxes), which provides that people of similar abilities to pay would pay at the same (effective) rates		Road Charges and compliance costs incurred, by distance traveled, relative to fuel taxes
		Road Charges and compliance costs incurred, by vehicle type, relative to fuel taxes
Preserve or improve vertical equity (relative to fuel taxes), which provides that people of differing abilities to pay would pay at different (effective) rates		Road Charges and compliance costs incurred, by household income, relative to fuel taxes
Preserve or improve spatial equity (relative to fuel taxes)		Road Charges and compliance costs incurred, by location, relative to fuel taxes: North, Central, South; urban/suburban, rural/agricultural; in-state, out-of-state
Preserve or improve procedural equity (relative to fuel taxes)		Road Charges and compliance costs incurred, by method chosen, relative to fuel taxes



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8. Communications Criteria

Goals	Source	Evaluation Criteria
Engage the public meaningfully		Opportunities for participant feedback <hr/> Opportunities for general public feedback <hr/> Participant satisfaction with interactions and feedback opportunities



Appendix 3: Development of the Pilot Participant Design Matrix

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There Are Many Approaches for Recruiting Pilot Project Volunteers

There are several channels envisioned for recruiting volunteers to participate in the pilot project, including but not limited to the following:

- ▶ Recruitment by TAC members of their constituents and stakeholder groups
- ▶ Recruitment by Work Group members of their constituents and stakeholder groups
- ▶ Web-based and social media outreach to the general public
- ▶ Targeted demographic recruitment via web postings, community events, and word-of-mouth
- ▶ Placement of print and television news media stories and public service announcements
- ▶ Appeals to existing customers of commercial account managers

Participants will likely be eligible for incentives (details to be determined), conditional on their completion of the pilot test and evaluation surveys.

More details about the participant recruitment strategy can be developed after the TAC decides the final parameters of the pilot program, including the “matrix” of participants. The remaining pages of this appendix, and the accompanying presentation and discussion for the June meeting, aim to help the TAC arrive at a participant matrix that adequately represents all constituencies or demographic “sub-groups” of particular interest.

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Judgmental Sampling Can Effectively Guide Recruitment Targets

Below are three example approaches for recruiting a sample of the California population as pilot project volunteers.

- ▶ **Proportional sample:** select participants in a way that reflects the demographics of California in proportion to the total population. Some implications of this approach (assuming 5,000 participants for the sake of this example) include
 - > 50 would be heavy truck participants
 - > 350 would be rural participants
 - > 2,500 would be the from Southern California Association of Governments (SCAG) region
 - > It could be difficult to recruit volunteers to meet specific multi-dimensional targets if we were striving to reflect many demographic characteristics at once (e.g., middle income, urban, Northern Californian, Asian, male, age 65+, passenger car driver with time permit)
- ▶ **Simple random sample:** select participants at random. Implications of this approach
 - > Difficult, perhaps impossible, to achieve with volunteers
 - > No guarantee that sub-groups of interest have meaningful representation
- ▶ **Judgmental sample (recommendation for the TAC):** recruit and select participants in a way that guarantees meaningful representation by sub-groups of interest by setting target ranges for each
 - > Target a range of 300-500 heavy trucks
 - > Target a range of 1,000-1,500 rural participants
 - > Target a range of 300-500 low-income rural participants
 - > ***There are many other sub-groups the TAC could develop targets for; the above three are intended purely as examples***

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The Pilot Will Feature Both Quantitative and Qualitative Evaluation

Statistical significance is an important concept in quantitative analysis. It refers to the confidence with which one can reject a null hypothesis in comparing two statistics measured across a sample population. For example:

- ▶ Before the pilot, 30% of participants support Road Charging.
- ▶ After the pilot, 40% of participants support Road Charging.
- ▶ Whether this change is statistically different from zero depends on the value of the change in measurement, sample size, and population size. Generally speaking, for large populations, a sample size of 300+ is required for statistical significance at the 90 or 95% confidence level.

Most of the pilot evaluation will address qualitative questions. For example, the Independent Evaluator will conduct longitudinal surveys of participants, focus groups, and in-depth case analysis of pilot vendors and administrators. Example analyses may include the following:

- ▶ Longitudinal surveys of participants asking about such issues as the following:
 - > Cost of compliance
 - > Ease of use
 - > Privacy perceptions
- ▶ Focus groups delving more deeply into views and experiences of participants
- ▶ Performance analysis of vendors (and pilot administration in general), measuring:
 - > Customer service and troubleshooting
 - > Ability to process large volumes of invoices across multiple operational concepts
 - > Compliance with privacy guidelines

**Briefing Book for TAC Meeting #6****Other Road Charge Pilots Have Had a Wide Range of Participation Levels**

- ▶ Puget Sound Regional Council Traffic Choices Study (2005-06)
 - > 275 volunteer participants from Puget Sound region of Washington State
 - > Tested billing systems and driving behavior in response to variable pricing across the entire road network of Puget Sound
- ▶ Oregon Road User Fee Test (2006-07)
 - > 260 participants from Metro Portland
 - > Tested billing system and driving behavior in response to variable pricing across the entire road network of Metro Portland
- ▶ University of Iowa GPS Field Trials (2008-10)
 - > 2,650 participants from 12 regions around the country (9 medium-to-large metro areas, 2 small cities, and 1 rural area)
 - > Tested public response to the concept of mileage-based charging using GPS
- ▶ Minnesota Road Fee Test (2011-12)
 - > 500 participants from Minneapolis-St Paul and immediate surroundings
 - > Tested billing systems and driving behavior (including speeding) in response to pricing and vehicle tracking information
- ▶ Oregon Road Usage Charge Pilot (2012-13)
 - > 88 invited statewide participants (44 from Oregon, 21 from Washington State, 23 from Nevada; only Oregon participants actually paid the charge)
 - > Tested open system for charging technology and billing platform for statewide/regional road charging with a flat rate per mile (rate charged varied in each state)

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The TAC Will Use Judgment in Determining How Many Participants to Recommend for the Pilot

Although the pilot participant surveys will have some questions that lend themselves to statistical hypothesis testing (e.g., testing the statistical significance of any change in road charge acceptance before versus after the pilot), the majority of the information gathered will be qualitative in nature. In qualitative research, there are no generally accepted numerical guidelines for determining sample sizes.

- ▶ One method of determining sample size for qualitative research is based on the concept of saturation. Saturation is achieved when adding new samples does not appreciably change the outcome. Knowing when saturation has been achieved is a judgment call, made more challenging if done prior to the start of the research.
- ▶ The challenge for the TAC is not in determining the overall size of the pilot. The overall pilot participant pool will likely be large enough for both qualitatively meaningful feedback and a high degree of statistical significant with respect to specific quantifiable questions. Rather, the challenge for the TAC is in determining the sample size for sub-groups of interest.
- ▶ The TAC can focus on sample design to obtain meaningful qualitative feedback from the diverse sub-groups that represent the populations of greatest interest to the TAC.
- ▶ The remainder of this appendix is devoted to determining a framework for identifying sub-groups of interest and populating each sub-group with an adequate sample size. The next page is a preview of a proposed matrix for TAC consideration for guiding the sample design exercise.



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Proposed Pilot Participant Matrix

The image below depicts a pilot participant matrix of 32 sub-groups created from analysis of all permutations of sub-groups, simplification of vehicle weight categories, elimination of non-existent or unusual sub-groups, and prioritization of the 32 sub-groups depicted below. The numbers inside each box are *example* sample size ranges for each sub-group. For example, the upper left box assigns a range of 100-150 volunteer slots to light-duty commercial vehicles belonging to businesses in Northern California. The box immediately below it assigns 300-400 volunteer slots to low-income urban and suburban individuals and households in Northern California who drive passenger cars and light trucks. The remaining pages explain how to arrive at this matrix and how to use it.

		North	Central	South	North	Central	South	Small Fleet	Med. Fleet	Large Fleet
Commercial Vehicles (Businesses)		100 - 150	50 - 100	100 - 150	100 - 150	50 - 100	100 - 150	50 - 100	50 - 150	100 - 200
Private Vehicles (Individuals & Households)					Out-of-state vehicles			Agency vehicles		Tribal
Urban and Suburban	\$	300 - 400	100 - 150	300 - 400						25
	\$\$	300 - 400	100 - 150	300 - 400						
	\$\$\$	300 - 400	100 - 150	300 - 400						
Rural and Agricultural	\$	150 - 200	50 - 100	150 - 200	50	50	50	100	100	100
	\$\$	150 - 200	50 - 100	150 - 200	-	-	-	-	-	-
	\$\$\$	150 - 200	50 - 100	150 - 200	100	100	100	200	200	200



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Seven Dimensions Define Pilot Participant Sub-Groups

The table below presents the seven dimensions addressed by the TAC (four already decided, three scheduled for decision at the June meeting), as well as the categories agreed within each dimension

Decisions Made January – May				Decisions Scheduled for June		
Vehicle Weight	Vehicle Status	Participant Status	Operational Concept	Location	Income	Region
<ul style="list-style-type: none"> • Passenger Cars • Class 2 Trucks • Class 3 Trucks • Class 4 Trucks • Class 5 Trucks • Class 6 Trucks • Class 7 Trucks • Class 8 Trucks 	<ul style="list-style-type: none"> • Private • Commercial 	<ul style="list-style-type: none"> • Individual • Household • Business • Agency 	<ul style="list-style-type: none"> • Time Permit • Mileage Permit • Odometer Pre-pay • Odometer Post-pay • Non-location Mileage Meter • Non-location Smartphone • Non-location Telematics • Non-location Other • Location-based Mileage Meter • Location-based Smartphone • Location-based Telematics • Location-based Other 	<ul style="list-style-type: none"> • Urban and Suburban • Rural and Agricultural 	<ul style="list-style-type: none"> • Low • Middle • High 	<ul style="list-style-type: none"> • Northern • Central • Southern
8	2	4	12	2	3	3

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Getting to a Manageable Number of Sub-Groups

One example of a sub-group is the following, based on choosing one category from each of the seven dimensions on the previous slide:

Commercial Class 2 truck belonging to a low-income household in an urban or suburban location of Central California who selects the Mileage Permit operational concept.

Considering all possible permutations of categories across all seven dimensions reveals 13,824 sub-groups, including the example above. Supposing the TAC wanted to ensure at least 30 participants representing each of these sub-groups, the road charge pilot would need to recruit 414,720 participants. In addition, not reflected in the chart above are out-of-state participants (a group the TAC has recommended testing) and Native American participants living on tribal lands (a group the TAC may specifically recommend for inclusion).

The TAC can take three steps to reduce the large number of sub-groups from 13,824 to a more manageable 32.

- ▶ Step 1: Collapse the weight dimension from 8 categories to 3.
- ▶ Step 2: Down-select to sub-groups that exist, are common, and are meaningful.
- ▶ Step 3: Do not consider operational concepts as a defining dimension of each sub-group. Rather, allow participants in each sub-group to choose which operational concepts they prefer.



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Step 1: Collapse the Weight Dimension from 8 Categories to 3

The table below shows the correspondence between the 8 original weight classes proposed by the TAC and the 3 simplified classes based on the U.S. Department of Transportation vehicle classification system.

Original Vehicle Weight Classification	Revised Vehicle Weight Classification
Passenger Cars	Passenger Cars and Light Trucks (<10,000 pounds GVWR)
Class 2 Trucks	
Class 3 Trucks	Medium Trucks (10,000-26,000 pounds)
Class 4 Trucks	
Class 5 Trucks	
Class 6 Trucks	
Class 7 Trucks	Heavy Trucks (>26,000 pounds)
Class 8 Trucks	

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Step 2: Down-Select to Sub-Groups that Exist, Are Common, and Are Meaningful

The vast majority of pilot participant matrix sub-groups do not exist. Others cover such a small group of individuals that they do not merit special consideration for recruiting participants. Still others may not serve as meaningful ways to characterize participants.

- ▶ Examples of non-existent sub-groups include *private heavy-duty vehicles* and *commercial agency vehicles*:
 - > Heavy-duty vehicles (e.g., dump trucks and tractor-trailers) are technically registered as commercial vehicles in California, not private.
 - > Agency vehicles are exempt, not commercial.
- ▶ An example of a rare sub-group is *heavy, commercial trucks belonging to individuals*.
 - > The TAC may find more value in focusing on heavy, commercial trucks used for business purposes, including individuals who are owner-operators. This does not include the very rare category of individuals who use heavy commercial trucks for personal transportation.
- ▶ Examples of sub-groups that do not provide meaningful characterization participants include *individual vs. households cars* and *North vs. Central vs. South heavy truck operations*:
 - > While the TAC can direct the project team to ensure a certain number of complete households participate in the pilot, the distinction between an individual and a household is not strong enough to merit its inclusion as a defining dimension of each sub-group.
 - > Heavy truck fleets tend to operate across broad geographies, including across state boundaries. The TAC may find more value in distinguishing between large truck fleets by fleet size rather than whether they are domiciled in Northern vs. Southern California.

**Briefing Book for TAC Meeting #6****Step 3: Allow Participants to Select Operational Concepts**

The TAC can allow volunteers recruited to the pilot to choose from among the operational concepts available (e.g., time permit, mileage permit, automated location-based device).

- ▶ Participants will receive summary information about each concept, including information about any technology requirements, reporting requirements, costs, privacy implications, value-added services, or other features of each concept.
- ▶ By leaving participant choices unconstrained, the pilot will generate valuable information about the concepts that people prefer.
- ▶ The TAC may nonetheless opt to instruct the project team to ensure that a minimum number of each operational concept is selected, to ensure that useful feedback about all concepts is gathered.



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Table of Sub-Groups Following Simplification

The table below shows the remaining dimensions used to create 32 sub-groups based on the above simplification steps. For example, the first row results in 18 sub-groups of private passenger cars and light trucks based on permutations of location (urban/suburban vs. rural/agricultural), income (low vs. middle vs. high), and region (Northern vs. Central vs. Southern): $2 \times 3 \times 3 = 18$.

Decisions Made January – May		Decisions Scheduled for June			Number of Sub-Groups
Participant Status	Vehicle Weight/Status	Location	Income	Region	
<ul style="list-style-type: none"> Individual and Households 	<ul style="list-style-type: none"> Private Passenger Cars and Light Trucks 	<ul style="list-style-type: none"> Urban and Suburban Rural and Agricultural 	<ul style="list-style-type: none"> Low Middle High 	<ul style="list-style-type: none"> Northern Central Southern 	$1 \times 1 \times 2 \times 3 \times 3 = 18$
<ul style="list-style-type: none"> Business 	<ul style="list-style-type: none"> Commercial Passenger Cars and Light Trucks Commercial Medium Trucks Commercial Heavy Trucks 	N/A	N/A	<ul style="list-style-type: none"> Northern Central Southern 	$1 \times 3 \times 3 = 9$
<ul style="list-style-type: none"> Agency 	N/A	N/A	N/A	N/A	1
<ul style="list-style-type: none"> Tribal 	<ul style="list-style-type: none"> Private Passenger Cars and Light Trucks 	N/A	N/A	N/A	$1 \times 1 = 1$
<ul style="list-style-type: none"> Out-of-State 	<ul style="list-style-type: none"> Private Passenger Cars and Light Trucks Private Medium Trucks Private Heavy Trucks 	N/A	N/A	N/A	$1 \times 3 = 3$



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Matrix of 32 Sub-Groups and Examples of Sample Size Ranges for Each

Having down-selected to 32 priority sub-groups, they can be represented in a single matrix as shown below. Each of the 32 sub-groups is represented as a distinct box with *example* numbers inside. Using this representation, the TAC can begin to consider sample sizes for each sub-group.

		North	Central	South	North	Central	South	Small Fleet	Med. Fleet	Large Fleet
Commercial Vehicles (Businesses)		100 - 150	50 - 100	100 - 150	100 - 150	50 - 100	100 - 150	50 - 100	50 - 150	100 - 200
Private Vehicles (Individuals & Households)					Out-of-state vehicles			Agency vehicles		Tribal
Urban and Suburban	\$	300 - 400	100 - 150	300 - 400	50 - 100	50 - 100	50 - 100	100 - 200	25 - 100	
	\$\$	300 - 400	100 - 150	300 - 400						
	\$\$\$	300 - 400	100 - 150	300 - 400						
Rural and Agricultural	\$	150 - 200	50 - 100	150 - 200	100	100	100	200	100	
	\$\$	150 - 200	50 - 100	150 - 200						
	\$\$\$	150 - 200	50 - 100	150 - 200						

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Summary of Assumptions and Decisions to Create a Manageable Number of Pilot Participant Matrix Sub-Groups

1. Use judgmental sampling
2. Reduce weight classification from 8 to 3 categories
3. Use region (Northern vs. Central vs. Southern) to define 3 sub-groups of commercial passenger cars/light trucks and 3 sub-groups of commercial medium trucks
4. Use fleet size (small vs. medium vs. large) to 3 define sub-groups of commercial heavy trucks
5. Define location (urban/suburban vs. rural/agricultural), income (high vs. middle vs. low), location (Northern vs. Central vs. Southern), and heavy commercial truck fleet size (small vs. medium vs. large)
6. Use location (urban/suburban vs. rural/agricultural), income (high vs. middle vs. low), and region (Northern vs. Central vs. Southern) to define 18 sub-groups of private passenger cars/light trucks for individuals and households
 - ▶ Specify the range of private passenger cars/light trucks in each of the 18 sub-groups
 - ▶ Specify a minimum number for each operational concepts and for the number of complete households desired in each of the 18 sub-groups
 - ▶ Specify minimum values for other demographics of interest across the entire sample of 18 sub-groups
7. Specify range for out-of-state vehicles participating across 3 sub-groups (passenger cars/light trucks, medium trucks, and heavy trucks)
8. Specify range for agency vehicles participating
9. Specify range for tribal participants



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What to Expect at the June Meeting

At the June meeting, the TAC will undertake the following discussions:

- ▶ First, an introduction of the matrix as summarized in this section will be presented as a framework for defining key categories, making more detailed decisions about sub-group sample sizes, and understanding implications of those choices on total pilot sample size.
- ▶ Next, background on California demographics, including population estimates by the key dimensions outlined above, will be presented.
- ▶ Finally, the TAC will have a dynamic discussion of pilot sample size by filling out the matrix with target ranges for volunteer participants to recruit in each sub-group. The project team will facilitate this discussion using a dynamic matrix that allows the TAC members to see in real time the implications of varying sample sizes of each sub-group and other constraints on demographic attributes of interest.