

OREGON TRANSPORTATION SAFETY ACTION PLAN UPDATE

Background Narrative #3

Emphasis Area Options and Recommendations

prepared for

Oregon Department of Transportation

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1.0 INTRODUCTION AND PURPOSE

Emphasis areas (EAs) provide a strategic framework for the development and implementation of the Transportation Safety Action Plan (TSAP). They are designed as near-term implementation focus areas directly related to the TSAP's long term goals, policies, and strategies. The selection of emphasis areas is therefore an important step in the planning process that should be based on the best available data and consideration of state values, trends, safety programs, and regulatory requirements.

EA selection is not a strictly quantitative process, but rather uses crash and other data as inputs into the process, with the ultimate goal of choosing EAs through consensus among safety stakeholders. The range of factors to be considered in the TSAP development process was summarized in Technical Memorandum #1: Emphasis Area Selection Considerations for this project, and include both quantitative and qualitative considerations.

This Background Narrative (#3) provides several options for selecting and organizing EAs for the TSAP based on findings from Technical Memorandum #1 and Background Narrative #2; a review of the 2011 TSAP; other state plan goals and policies; the FY 2014 Oregon Traffic Safety Performance Plan; Draft Goals, Policies, and Strategies for the TSAP update; and input from the Policy Advisory Committee (PAC) and Project Coordination Team (PCT). These EA options include: 1) Ungrouped EAs, 2) tiered EAs, 3) narrow/strategically focused EAs, 4) grouped EAs, and 5) EAs based on TSAP goals. The EA options presented are intended to serve as the starting point for deciding which EAs to select for the plan.

While EAs are used to focus near-term efforts and meet federal requirements for project and program prioritization, they are designed to be flexible and adaptive to new safety challenges and opportunities that may arise during implementation of the TSAP. As these challenges and opportunities arise, ODOT will need to ensure that any new emphasis area is consistent with the long term goals, policies, and strategies of the TSAP and will be a good use of resources to achieve the TSAP's overall vision.

2.0 2011 PRIORITY ACTIONS/EMPHASIS AREAS

The 2011 Oregon TSAP includes 112 actions for implementation over a 20 year period. Among these, 10 were identified as the highest priorities for implementation. In the current update process, consideration should be given to selecting EAs that continue the priorities established in the 2011 TSAP. These high priority actions are listed in Table 1, along with corresponding EAs under consideration for the 2015 update.

Table 1. 2011 TSAP EAs and Corresponding Potential EAs for 2015 TSAP Update

2011 TSAP High-Priority Action/Emphasis Area	Potential Emphasis Areas for 2015 TSAP Update
Infrastructure (Intersection crashes, roadway departure crashes, pedestrian and bicycle crashes)	Intersections, roadway departures, pedestrians, bicyclists
Increase emphasis on safety in construction and repair decisions	Intersections, roadway departures
Raise awareness and acceptance of the need for law enforcement.	Impaired driving, occupant protection, speeding, distracted driving
Establish processes to train enforcement personnel, attorneys, judges and DMV	Training
Pass Legislation to establish .04 percent BAC	Impaired driving
Expand driver education in Oregon	Young drivers, older drivers
Continue public education efforts aimed at increasing proper use of safety belts and child restraint systems	Occupant protection
Consider legislation requiring the inclusion of helmets, reflective gear and lighting with new bicycles.	Bicyclists
Work with partner agencies to position Oregon’s EMS system as world class and affordable for the average Oregonian	EMS (Foundational EAs)
Develop strategies to assure the recruitment and retention of EMS volunteers	EMS (Foundational EAs)

3.0 DATA ANALYSIS

Based on the research and findings from Technical Memo #1, a framework for selecting EAs was developed. The framework includes the following considerations:

Quantitative Considerations

- **Frequency:** total number of fatal and serious injury crashes (2009-2013).
- **Severity:** number of fatal and serious injury crashes per 100 total crashes (2009-2013).
- **Trend:** trend line slope for fatal and serious injury crashes (2009-2013).

Implementation Considerations

- **Effectiveness Data:** are there proven countermeasures available for use in Oregon? If not, is there an ability and commitment to evaluate effectiveness of programs and projects?
- **Institutional Capacity:** are there agencies or individuals who are able to commit ongoing staff resources to address this safety problem?
- **Emphasis Area Overlap:** does the potential emphasis area significantly overlap with other potential emphasis areas and, if so, can they both be addressed simultaneously?

Policy Considerations

- **Consistency with Existing Plans and Policies:** Is the potential EA consistent with other state plans and policies and does it address a significant policy goal? If not, does the potential EA push the state in an appropriate policy direction?

The EA selection framework is intended to inform the decision-making process, rather than to serve as a final decision tool. Ideally, EAs will be selected through the consensus of the PAC, where the selection framework can serve as an important input. The assessment of each category is presented below, and rating results follow.

3.1 Quantitative Considerations

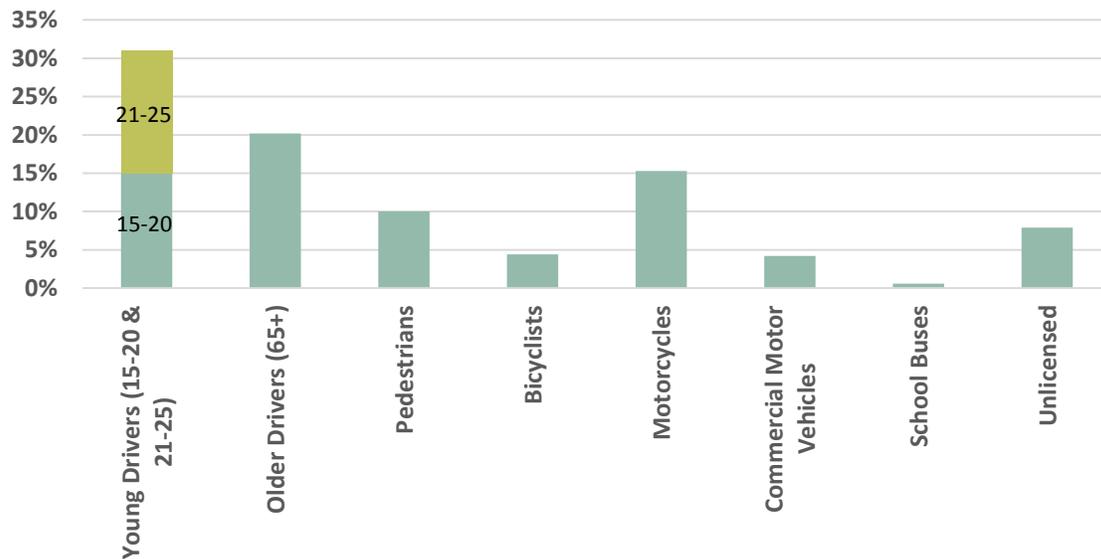
3.1.1 Who, Why, Where

Fatal and serious injuries may be thought of in terms of who (user groups involved), why (behavioral risk factors), and where (location of crash). Figures 1-3 show the percentage of fatal and serious injuries involving each of these categories. Viewing crashes in this way helps to tell the story of fatal and serious injury crash frequency and rate in Oregon.

Who

As seen in Figure 2, around 30 percent of all fatal and serious injuries result from crashes with a young driver (15-25 years) behind the wheel. Older drivers, motorcyclists, and pedestrians are the next most common (20, 15, and 10 percent, respectively). Note that there is overlap among the categories. For example, a single crash could involve an older driver and a pedestrian, and a young motorcyclist would be counted as both a young driver and a motorcyclist.

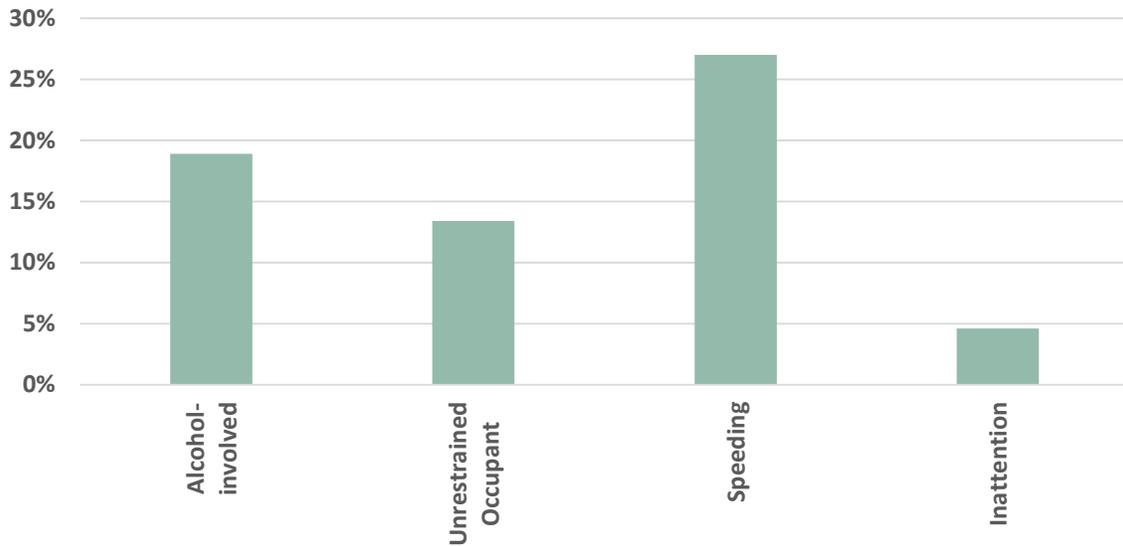
Figure 1. WHO: Proportion of Fatalities and Serious Injuries by User Involved, 2009-2013



Why

Risky behaviors are known to contribute to a significant portion of fatal and serious injuries. Figure 2 shows speeding is the most commonly observed behavioral risk factor, accounting for over a quarter of all fatal and serious injuries (27 percent). Alcohol involvement is also prevalent (19 percent), and failure to use seat belts or other available occupant protection devices is a significant contributor to greater injury severity levels in crashes (13 percent).

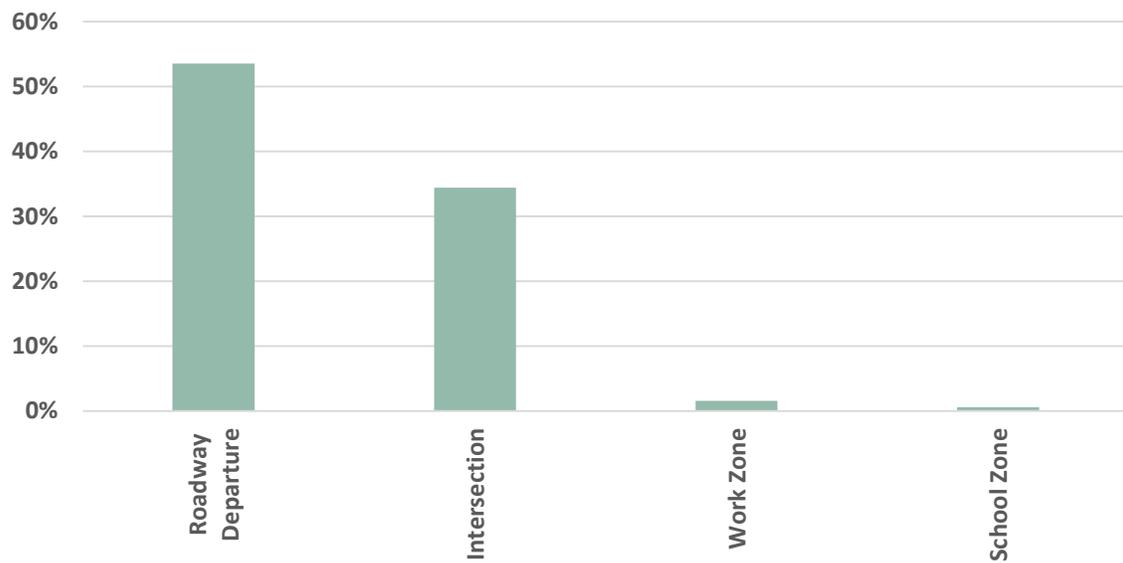
Figure 2. WHY: Proportion of Fatalities and Serious Injuries by Behavioral Risk Factor, 2009-2013



Where

Understanding where crashes occur with respect to the roadway is an important step toward identifying potential solutions. Over half of all fatal and serious injuries in Oregon result from crashes in which the vehicle leaves the roadway (54 percent; Figure 3.). Another third occur at intersections (34 percent).

Figure 3. WHERE: Proportion of Fatalities and Serious injuries by Location Type, 2009-2013

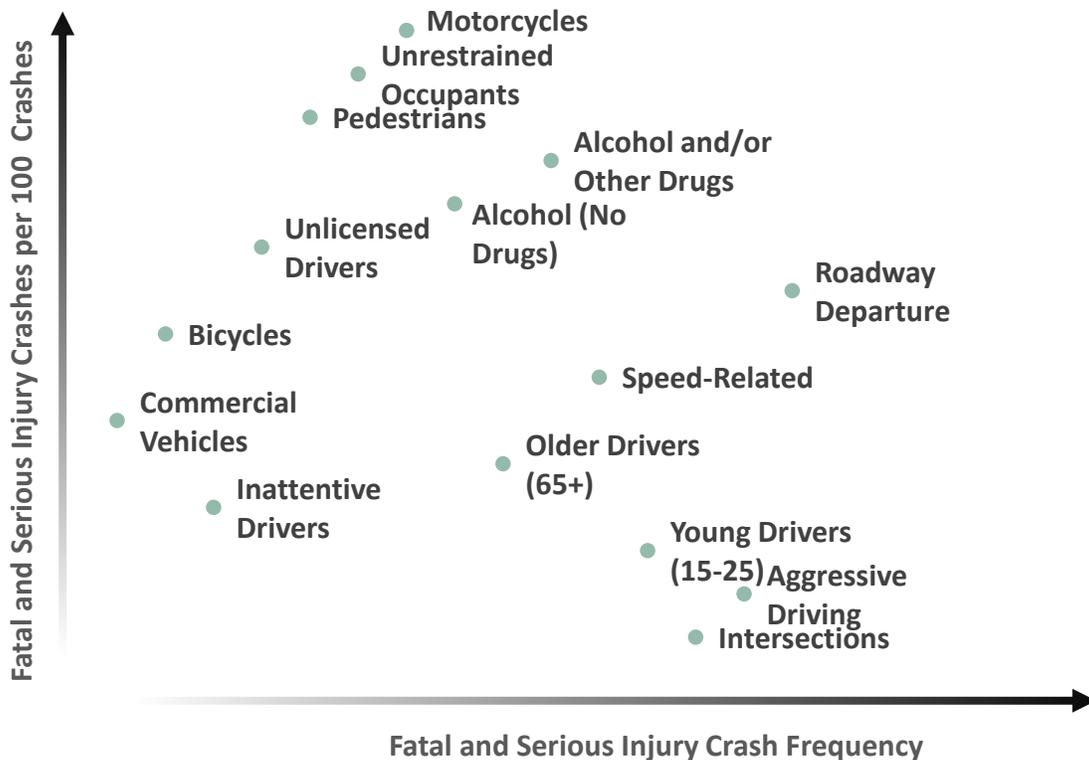


3.1.2 Fatal and Serious Injury Frequency and Rate

In choosing EAs for the TSAP, it is important to consider both the overall number of fatal and serious injuries as well as the relative severity of crash categories. These metrics are shown in Figure 4. The x-axis represents the total number of fatal and serious injuries, and the y-axis represents the fatal or serious injury crash rate (i.e., injuries per 100 crashes).

Potential EAs in the lower right portion of the figure (intersections, young drivers, aggressive driving) indicate a high number of fatal and serious injuries, but a relatively low crash severity rate. Those in the upper left (motorcycles, unrestrained occupants, pedestrians) indicate a low number of fatal and serious injuries overall, but high severity rates. Potential EAs in the upper right (impaired driving, roadway departure, speed) rank highly from both perspectives. The underlying data for Figure 4 is also shown in the Appendix (Tables A-1 and A-2).

Figure 4. Potential Emphasis Areas by Crash Frequency and Severity Rankings (2009-2013)



Source: Crash Analysis for TSAP update, based on data provided by ODOT.

3.1.3 Fatal and Serious Injury Trends

In addition to fatal and serious injury counts and crash severity rate, EA selection should take into account whether fatalities and serious injuries are increasing or decreasing. All else being equal, potential EAs with an increasing number of fatalities and serious injuries should be ranked higher in the process of considering and selecting EAs.

Fatality-Only Trends

A ten year fatality-only trend analysis (2004-2013) is shown in Figure 5, based on data from the National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS) for the NHTSA Performance Measures (PM). These PMs are not directly comparable to the potential EAs discussed elsewhere in this memo and throughout the TSAP analysis process due to data definitions, but generally correspond.

Figure 5 illustrates a downward trend for all NHTSA PMs except pedestrian fatalities. Motorcyclist fatalities have only decreased slightly, but the decrease in other PMs has been more substantial. It is worth noting, however, the trend in the last five years appears to have flattened for several categories (e.g., Alcohol-Impaired Driving Fatalities, Young Drivers in Fatal Crashes).

Trend lines depict the overall direction in fatalities and can highlight categories with increasing fatalities, but should be interpreted cautiously as trend calculations are influenced by the selection of start and end points for the analysis. This is particularly relevant for bicycle fatalities due to the small number of fatalities. For instance, the trend line for 2004-2012 would be somewhat different than for 2004-2013 due to the low number of bicyclist fatalities in 2013.

Fatal and Serious Injury Trends

Table 2 shows the year-to-year percentage change in fatality and serious injury crashes within each potential EA since 2009. For example, there were 501 fatal and serious injury crashes involving aggressive driving in 2009, followed by a 9.4 percent increase in 2010, an additional 10 percent increase in 2011, and a decline in 2012 (-6 percent) and 2013 (-3.4 percent). A trend line for fatal and serious injury crashes was also calculated for each potential EA over the 2009-2013 timeframe, and the resulting slope from this calculation is shown in the last column of Table 2.

An important limitation of this analysis is that serious injury data from 2011 and later are not directly comparable to earlier years due to an increase in non-fatal crash data collection in the ODOT system. The increase in reported serious injuries between 2010 and 2011 was approximately 11.5 percent, but it is not known what portion of these may represent an actual increase in injuries as opposed to what is attributable to the change in reporting process. Another consideration when studying this data is that crashes fluctuate on an annual basis, so major conclusions about the direction of the trend should be reached cautiously.

Figure 5. FARS Performance Measures, 2004-2013



Source: National Highway Traffic Safety Administration. Fatality Analysis Reporting System.

Table 2. Annual Change in Fatal and Serious Injury Crashes since 2011 by Potential Emphasis Areas

Potential Emphasis Area	2009 Fatal and Serious Injury Crashes	Annual Change				Average Annual Change, 2009-2013 (5-Year Trend line Slope)
		2010	2011	2012	2013	
Roadway Departure Crashes	747	6.2%	11.2%	-0.3%	-8.8%	+19.6 per Year
Aggressive Driving Involved	501	9.4%	10.0%	-6.0%	-3.4%	+11.3 per Year
Intersections Crashes	419	19.1%	15.2%	1.0%	-3.8%	+36.2 per Year
Young Drivers - 15-25 Involved	401	20.7%	6.0%	0.4%	-12.0%	+13.5 per Year
Speed-Related Crashes	379	11.1%	7.6%	-8.4%	-3.9%	+3.4 per Year
Alcohol and/or Other Drugs Involved	288	-2.8%	29.3%	11.3%	-10.2%	+27.1 per Year
Older Drivers - 65+ Involved	271	5.9%	13.9%	7.6%	-11.6%	+14.5 per Year
Alcohol Involved (No Drugs)	246	-2.8%	32.2%	8.9%	-12.8%	+21.3 per Year
Unrestrained Occupants	203	-16.3%	35.9%	-2.6%	-11.1%	+4.9 per Year
Motorcycle Involvement	198	3.5%	20.5%	14.6%	-16.3%	+15.6 per Year
Pedestrian(s) Injured or Killed	128	21.1%	5.8%	6.1%	-14.4%	+6.1 per Year
Unlicensed Drivers Involved	89	-4.5%	60.0%	14.7%	-12.2%	+16.7 per Year
Pedalcycle(s) Injured or Killed	66	-33.3%	81.8%	-1.3%	-17.7%	+3.3 per Year
Inattentive Drivers Involved	55	29.1%	11.3%	1.3%	-18.8%	+2.9 per Year
Commercial Motor Vehicle Involved	49	49.0%	12.3%	-35.4%	22.6%	+1.2 per Year

Note: Red cells indicate an annual increase in fatal and serious injury crashes, and blue cells indicate an annual decrease. Darker colors correspond to a more dramatic increase or decrease.

Source: Crash Analysis for TSAP update, based on data provided by ODOT. Note: A higher number of crashes may be reported as of 2011 compared to prior years. This resulted from a change to an internal departmental process and does not necessarily reflect an increase in annual crashes.

3.2 Policy and Implementation Considerations

Several implementation considerations should be considered as part of the EA selection process. These include:

- **Effectiveness Data:** Are there proven countermeasures available for use in Oregon? If not, is there an ability and commitment to evaluate effectiveness of programs and projects?
- **Institutional Capacity:** Are there agencies or individuals who are able to commit ongoing staff resources to address this safety problem?
- **Emphasis Area Overlap:** Does the potential emphasis area significantly overlap with other potential emphasis areas and, if so, can they both be addressed simultaneously?
- **Consistency with Existing Plans and Policies:** Is the potential EA consistent with other state plans and policies and does it address a significant policy goal? If not, does the potential EA push the state in an appropriate policy direction?

Based on this section of the memo, potential EAs are evaluated on the basis of each of these topics. It should be noted that this evaluation is subjective.

3.2.1 Effectiveness Data

Engineering Countermeasures

Effectiveness data is available for many engineering countermeasures. In particular, the effects of roadway departure and intersection countermeasures are well understood and documented. There is likely to be some variance in their effectiveness depending on context, but overall impacts can be predicted with some confidence.

Pedestrian and bicycle-focused countermeasures are not as thoroughly documented as those for roadway departure and intersection crashes, but the literature in this area is improving. Additionally, procedures for evaluating pedestrian and bike countermeasures are well documented and follow a similar approach as for other engineering treatments.

Behavioral and Age-Related Countermeasures

A commonly used resource for behavioral countermeasure effectiveness data in the U.S. is NHTSA's *Countermeasures That Work* publication. Countermeasures rated as five-star have been consistently shown to be effective through high-quality evaluations; however, the ratings do not directly correlate to anticipated crash reductions.

Five-star ratings are generally available for one or more countermeasures within each potential behavioral EA, with the exception of Older Drivers, for which only four-star countermeasures are reported. Further review of existing programs would need to be conducted to determine which five-star countermeasures may have already been deployed in Oregon, and whether new strategies can be implemented with high reliability. Countermeasures not listed in this guide often will require evaluation for cost, effectiveness, and ease of replication before implementation.

3.2.2 Institutional Capacity

There are many ongoing transportation safety programs in Oregon with relevance to the selection of EAs. The Highway Safety Improvement Program addresses roadway departure, intersection, pedestrian, and bicycle crashes through spot-specific and systemic projects. Existing plans target each of these crash types.¹

Similarly, the Oregon Transportation Safety Performance Plan includes projects that address impaired driving, speeding, seat belt use, young drivers, motorcyclists, pedestrians, and bicyclists. Older drivers are not a specific program area and thus would represent a new focus area that may not be supported by existing safety programs.

For potential EAs addressed through existing programs (the vast majority, as noted above) selection as an EA for the Plan could require a higher level of effort to implement new strategies in the future.

3.2.3 Emphasis Area Overlap

Fatal and serious injury crashes often involve more than one risk factor and fall into multiple potential EA categories. From an implementation standpoint, this suggests it may be possible to focus resources on problems which are more easily addressed and, in the process, reduce correlated crash types or emphasis areas. In particular, roadway departures are responsible for a high percentage of most other EA categories (85 percent of speed-related crashes, 71 percent of alcohol-involved crashes, 72 percent of unrestrained crashes, etc.).² Similarly, 62 percent of bicyclist fatal and serious injury crashes occur at intersections, which suggests these crashes could be addressed through a comprehensive approach to addressing safety issues at intersections.

Other categories show a lesser degree of overlap. For instance, fatal and serious injuries involving an older driver are almost evenly split between intersection and roadway departure crashes (40

¹ Oregon Roadway Departure Safety Implementation Plan; Oregon Intersection Safety Implementation Plan; Oregon Pedestrian and Bicycle Safety Implementation Plan

² Background Narrative #2, figures 24, 28, 32.

and 44 percent respectively). Similarly, pedestrian crashes do not significantly overlap with any other potential EAs.

3.2.4 Consistency with Plans and Policies

To better understand the relationship of the TSAP and other Oregon plans and policies, several previously adopted documents were reviewed. From this review, support for the following broad goals emerged, as related to TSAP EA selection: community livability, safe multimodal interactions, improved data and analysis capabilities, enhanced emergency response, and increased emphasis on safety culture.

These policy themes point to the importance of pedestrian and bicycle safety, and lend support for including data and EMS-related strategies in the TSAP. Additionally, the need to promote safety culture throughout Oregon should be reflected in the selected EAs.

3.3 Framework Assessment Results

The quantitative, policy and implementation considerations of each potential EA are rated as strong, moderate or weak for each criterion in Figure 6. Results from the quantitative assessment were used to score the frequency, severity, and trend categories, along with our best judgment and findings from the research conducted for this memo to evaluate the qualitative criteria. The emphasis area overlap category can be interpreted as follows: an open circle means there is strong overlap between the category and a different category; therefore there is less need for the category to be a separate EA. Again, the effectiveness data, emphasis area overlap, institutional capacity and policy focus categories are subjective. Further, overall the EA selection framework is intended to inform the decision-making process, rather than to serve as a final decision tool. Ideally, EAs will be selected through the consensus of the PAC, where the selection framework can serve as an important input.

Figure 6. Emphasis Area Selection Framework

Potential Emphasis Area	Frequency	Severity	Trend	Effectiveness Data	Emphasis Area Overlap	Institutional Capacity	Policy Focus
Aggressive Driving	■	●	◐	◐	●	◐	■
Impaired Driving	◐	■	■	■	●	■	■
Bicycles	●	◐	●	◐	■	■	■
Commercial Vehicles	●	◐	●	●	■	■	◐
Distracted Driving (Inattentive Drivers)	●	●	●	●	■	●	●
Intersections	■	●	■	■	■	■	■
Motorcycles	◐	■	■	◐	●	◐	■
Older Drivers (65+)	◐	●	◐	●	◐	◐	◐
Pedestrians	●	■	◐	◐	■	■	■
Roadway Departure	■	◐	■	■	◐	■	■
Speed-Related	■	◐	●	◐	●	◐	■
Unlicensed Drivers	●	■	■	●	■	●	●
Unrestrained Occupants	◐	■	●	■	●	◐	■
Young Drivers (15-25)	■	●	◐	◐	◐	◐	■
Foundational EAs (EMS, Data, and Training)	N/A					■	■
Legend and Notes							
	■	Strong Emphasis Area Candidate					
	◐	Moderate Emphasis Area Candidate					
	●	Weak Emphasis Area Candidate					
Frequency = number of fatal and serious injury crashes from 2009 to 2013; Severity = fatal and serious injury crashes per 100 total crashes; Trend = regression trend line slope for fatal and serious injury crashes from 2009 to 2013; Effectiveness Data = proven, effective countermeasures are known, or projects and programs can be evaluated for effectiveness; Emphasis Area Overlap = the potential EA significantly overlaps with one or more other potential emphasis areas; Institutional Capacity = there are existing programs and resources to support implementation of strategies related to this potential EA; Policy Focus = the potential EA represents a significant policy focus for Oregon.							

4.0 EMPHASIS AREA OPTIONS

Several options exist for selecting and organizing EAs. The challenge lies in selecting EAs that are consistent with the range of existing and anticipated transportation safety activities, and address federal requirements for consistency between the HSIP and HSP through the SHSP, but are focused and strategic in helping the State of Oregon achieve the vision of the plan. Any of the options presented in Section 4.0 should allow the state to meet the federal HSIP/HSP consistency requirement either through the wide range of EAs selected or through inserting the categories not chosen as EAs in the EA strategies and action steps, where applicable. This latter method has been used successfully by several states and deemed acceptable by FHWA.

Considering the assessment in Figure 6 and conversations with the PAC and the Project Coordination Team, a range of EA options are presented, each with pros and cons. Within each EA option, a recommendation is offered for consideration, along with a brief rationale.

4.1 Ungrouped Emphasis Areas

Approach

Choose several EA categories based on EA selection considerations, without grouping or prioritization.

Pros

- Allows a large number of topics and interests to be addressed through the TSAP.
- Low risk of inconsistencies between the TSAP and other plans and policies.

Cons

- Lacks strategic focus: resources may be used on problems that do not represent the best opportunities for reducing fatalities and serious injuries.
- Requires significant organizational effort to implement.

Recommendation

Emphasis Areas: Roadway Departure, Intersections, Impaired Driving, Speeding, Occupant Protection, Motorcycles, Pedestrians, Bicyclists, Older Drivers, Young Drivers, Commercial Vehicles, Distracted Driving, Foundational EAs (EMS, Data, and Training).

- **Rationale:** The recommended set of EAs covers a significant portion of transportation safety issues and risk factors in Oregon. This approach would provide Oregon with the greatest flexibility in implementing transportation safety projects and programs.

4.2 Tiered Emphasis Areas

Approach

Choose several EA categories based on EA selection considerations, with designated priority levels.

Pros

- Focused on EAs that represent the greatest safety problem.
- Allows a large number of topics and interests to be addressed through the TSAP.
- Low risk of inconsistencies between the TSAP and other plans and policies.

Cons

- Potential lack of consensus on priority levels.
- Activities that require ongoing maintenance for continued success may become deemphasized and less successful.
- Tier 3 EAs may be perceived as a low priority.
- Requires significant organizational effort to implement.

Recommendation

Emphasis Areas: Tier 1 - Roadway Departure, Impaired Driving, Motorcycles; **Tier 2** - Occupant Protection, Speeding, Pedestrians, Bicyclists; **Tier 3** - Intersections, Older Drivers, Young Drivers, Commercial Vehicles, Distracted Driving; **Foundational EAs** (EMS, Data and Training)

- **Rationale:** Tier 1 EAs account for categories that represent a high number of fatal and serious injuries and are relatively severe; Tier 2 EAs account for a lower number of fatal and serious injuries, but are still significant, and pedestrian and bicyclist safety is emphasized in other Oregon policies; Tier 3 EAs contribute to a large number of fatal and serious injuries, but generally have a lower rate of fatal and serious injuries per 100 crashes, and may be

expensive to address. Foundational EAs are proposed as a separate category, but are recognized as being essential to reducing fatal and serious injuries in the other EA categories.

4.3 Narrow/Strategically Focused Emphasis Areas

Approach

Choose a small number of EAs based on EA selection considerations. Categories not chosen as EAs could be addressed through the selected EA strategies, where applicable.

Pros

- Focused on EAs that represent the highest crash severity frequency and rate.
- Lower organizational effort to implement.

Cons

- Chance of inconsistencies between the TSAP and other plans and policies.
- Activities that require ongoing maintenance for continued success may become deemphasized and less successful.
- Potential lack of consensus over chosen EAs.

Recommendations

Emphasis Areas: Roadway Departure, Impaired Driving, Motorcycles, Pedestrians, Foundational EAs (EMS, Data, and Training).

- **Rationale:** The recommended EAs would provide a focused approach to addressing the crash types that account for a high percentage of fatal and serious injuries, and have a high severity rate. Although several potential EAs with high fatal and serious injury crash frequency or severity would not be included as EAs under this approach, they could be addressed through subcomponents to the EAs and overall policies and strategies. For example, the roadway departure EA would need to include strategies to reduce speeding to achieve the greatest benefit. EMS, data, and training are recommended to assist with problem identification and improved capabilities across agencies.

4.4 Grouped Emphasis Areas

Approach

Choose broad EA groups based on EA selection considerations. Groupings would be based on similarities among EA categories or implementation considerations (e.g., same group of stakeholders or funding source).

Pros

- Allows a large number of topics and interests to be addressed through the TSAP.
- Low risk of inconsistencies between the TSAP and other plans and policies.
- Lower organizational effort to implement compared to individual EA categories.

Cons

- Potential for lack of strategic focus: resources may be used on problems that do not represent the best opportunities for reducing fatalities and serious injuries.
- Stakeholders within groups may not be interested in all topics.

Recommendation

Emphasis Areas: Infrastructure - Roadway Departure, Intersections; **Risky Behaviors** - Impaired Driving, Speeding, Occupant Protection, Distracted Driving; **Vulnerable Users** - Motorcycles, Pedestrians, Bicyclists; **Improved Systems** - Commercial Vehicles, Foundational EAs (EMS, Data, and Training).

- **Rationale:** Similar to the option for ungrouped emphasis areas discussed in section 4.1, the recommended set of grouped EAs covers a significant portion of transportation safety issues and risk factors in Oregon. While it is recognized that severe crashes often involve a combination of infrastructure and behavioral contributing factors, for organizational purposes, roadway departures and intersections may be thought of as relating closely to infrastructure, while impaired driving, speeding, and occupant protection are risky behaviors. Vulnerable users would require cross-cutting approaches which address both infrastructure and behavior, and improved systems would apply most directly to commercial vehicles, EMS, data, and training. In contrast to the ungrouped and tiered EA options presented above, the grouped EA option recommendation does not include older and younger drivers; however, these groups could be addressed through targeted strategies within the proposed EAs.

4.5 Goal-Oriented Emphasis Areas

Approach

Choose EA categories based on EA selection considerations, grouped by TSAP goal area.

Pros

- EA selection is clearly linked to overall TSAP goals.

Cons

- Some goal areas do not have a clear connection to an EA category (e.g., investment).
- Stakeholders within groups may not be interested in all topics.

Recommendations

Emphasis Areas: Safety Culture – Impaired Driving, Speeding, Occupant Protection, Motorcycles, Older Drivers, Young Drivers, Aggressive Driving, Distracted Driving, Unlicensed Drivers;

Infrastructure – Roadway Departure, Intersections; **Safe and Livable Communities** – Pedestrians, Bicyclists, EMS; **Technology** – Commercial Vehicles, Foundational EAs (EMS, Data, and Training);

Collaboration and Communication; Strategic Investments.

- **Rationale:** As mentioned above, severe crashes often relate to numerous risk factors and similarly may be related to more than one TSAP goal. However, risky behaviors such as impaired driving, speeding, aggressive driving, inattentive driving, and occupant protection are often considered to be closely related to safety culture. Additionally, target groups such as young drivers, older drivers, and motorcyclists fall under the same umbrella. Meanwhile, roadway departure and intersection crashes are addressed largely through infrastructure countermeasures. The concept of Safe and Livable Communities encompasses a range of topics, but foremost among these are pedestrian and bicyclist safety. Technology also relates to numerous transportation safety topics, but is most closely associated with EMS, data, and training. The need for collaboration and communication, and strategic investments applies to all potential EAs.

4.6 Grouped Option 2: “W” Emphasis Areas

Approach

Choose EA categories based on EA selection considerations, grouped by *Who*, *Why*, *Where*, and *What*.

Pros

- Allows a large number of topics and interests to be addressed through the TSAP.
- Low risk of inconsistencies between the TSAP and other plans and policies.
- Lower organizational effort to implement compared to individual EA categories.

Cons

- Lacks strategic focus: resources may be used on problems that do not represent the best opportunities for reducing fatalities and serious injuries.
- Stakeholders within groups may not be interested in all topics.

Recommendation

Emphasis Areas: Who – Motor vehicles, Motorcycles, Pedestrians, Bicyclists, Commercial Vehicles, Young Drivers, Older Drivers; **Where** - Roadway Departure, Intersections; **Why** - Impaired Driving, Speeding, Occupant Protection, Distracted Driving, Aggressive Driving; **What** - Foundational EAs (EMS, Data, and Training).

- **Rationale:** Similar to the option for grouped emphasis areas discussed in section 4.4, the recommended set of EAs within the 4W approach covers a significant portion of transportation safety issues and risk factors in Oregon. This grouping structure allows for a close correspondence between the EAs and user groups ('Who'), behavioral risk factors ('Why'), infrastructure ('Where'), and supporting activities ('What').

5.0 SUMMARY

Figure 7 provides a summary of which crash categories are represented in the various EA options. It may serve as a useful reference for selecting an EA grouping option.

Figure 7. Summary of EA Grouping Options

Crash Category	Emphasis Area Option ³																
	Ungrouped	Tiered				Narrow/Strategic Focus	Grouped				Goal-Based ⁴			4 "W"s			
		Tier 1	Tier 2	Tier 3	Foundational EAs		Infrastructure	Risky Behaviors	Vulnerable Users	Improved Systems	Safety Culture	Infrastructure	Healthy, Livable Communities	Technology	Who?	Why?	Where?
Aggressive Driving										x					x		
Impaired Driving	x	x				x		x		x					x		
Bicycles	x		x					x				x		x			
Commercial Vehicles	x			x					x				x	x			
Distracted Driving (Inattentive Drivers)										x					x		
Intersections	x			x			x				x					x	
Motorcycles	x	x				x		x		x				x			
Older Drivers (65+)	x			x						x				x			
Pedestrians	x		x			x		x				x		x			
Roadway Departure	x	x				x	x				x					x	
Speeding	x		x					x		x					x		
Unlicensed Drivers										x				x			
Unrestrained Occupants	x		x					x		x					x		
Young Drivers (15-25)	x			x						x				x			

³ 'X' indicates the Emphasis Area category is included in the corresponding Emphasis Area Grouping Option, as recommended in this memo.

⁴ Within the 'Goal-Based' EA Grouping option, the 'Communication and Collaboration' and 'Strategic Investment' goal areas are not shown in the table, but would apply to all crash categories.

APPENDIX. SUPPORTING DATA

Table A-1. Potential Emphasis Areas Ordered by Fatal and Serious Injury Crash Frequency (2009-2013)

Order	Potential Emphasis Area	Fatal and Serious Injury Crashes
1	Roadway Departure Crashes	4,103
2	Aggressive Driving Involved	2,767
3	Intersection Crashes	2,633
4	Young Drivers - 15-25 Involved	2,366
5	Speed-Related Crashes	2,067
6	Alcohol and/or Other Drugs Involved	1,695
7	Older Drivers - 65+ Involved	1,548
8	Alcohol Involved (No Drugs)	1,445
9	Motorcycle Involvement	1,170
10	Unrestrained Occupants	1,029
11	Pedestrian(s) Involved	770
12	Unlicensed Drivers Involved	603
13	Inattentive Drivers Involved	350
14	Pedalcycle(s) Involved	334
15	Commercial Motor Vehicle Involved	322

Source: Crash Analysis for TSAP update, based on data provided by ODOT.

Table A-2. Potential Emphasis Areas Ranked by Fatal and Serious Injury Crashes per 100 Total Crashes (2009-2013)

Order	Potential Emphasis Area	Fatal and Serious Injury Crashes	Total Crashes	Fatal and Serious Injury Crashes per 100 Total Crashes
1	Motorcycle Involvement	1,170	4,831	24.2
2	Unrestrained Occupants	1,029	5,205	19.8
3	Pedestrian(s) Involved	770	4,077	18.9
4	Alcohol and/or Other Drugs Involved	1,695	11,990	14.1
5	Alcohol Involved (No Drugs)	1,445	10,798	13.4
6	Unlicensed Drivers Involved	603	8,102	7.4
7	Roadway Departure Crashes	4,103	56,488	7.3
8	Pedalcycle(s) Involved	334	4,694	7.1
9	Speed-Related Crashes	2,067	35,627	5.8
10	Commercial Motor Vehicle Involved	322	6,829	4.7
11	Older Drivers - 65+ Involved	1,548	41,139	3.8
12	Inattentive Drivers Involved	350	11,668	3.0
13	Young Drivers - 15-25 Involved	2,366	84,024	2.8
14	Aggressive Driving Involved	2,767	107,301	2.6
15	Intersection Crashes	2,633	109,460	2.4

Source: Crash Analysis for TSAP update, based on data provided by ODOT.

Table A-3. Over-Representation of EA Categories by ODOT Region

Emphasis Area Category	Percentage of Total						Over-Representation Factor				
	State	ODOT Region					ODOT Region				
		1	2	3	4	5	1	2	3	4	5
Aggressive Driving	36.1%	35.5%	34.6%	33.5%	41.0%	45.6%	0.98	0.96	0.93	1.14	1.26
Impaired Driving	22.1%	20.9%	22.2%	23.3%	24.5%	21.5%	0.95	1.00	1.05	1.11	0.97
Bicycles	4.4%	6.2%	4.4%	2.4%	2.6%	1.8%	1.42	1.01	0.56	0.59	0.41
Commercial Vehicles	4.2%	2.9%	4.0%	4.4%	6.7%	8.0%	0.69	0.94	1.04	1.60	1.91
Distracted Driving (Inattentive Drivers)	4.6%	3.3%	6.2%	4.5%	4.0%	4.4%	0.72	1.36	0.98	0.88	0.97
Intersections	1.9%	2.7%	1.9%	1.1%	1.2%	0.4%	1.44	0.99	0.61	0.62	0.21
Motorcycles	15.3%	13.9%	15.1%	17.0%	17.1%	16.9%	0.91	0.99	1.11	1.12	1.11
Older Drivers (65+)	20.2%	16.1%	22.1%	24.0%	22.8%	19.7%	0.80	1.09	1.19	1.13	0.97
Pedestrians	10.0%	13.9%	9.7%	7.4%	5.2%	5.0%	1.38	0.97	0.74	0.52	0.50
Roadway Departure	53.5%	37.2%	56.3%	64.7%	70.0%	74.9%	0.69	1.05	1.21	1.31	1.40
Speed-Related	27.0%	21.1%	28.2%	26.3%	36.0%	40.2%	0.78	1.05	0.98	1.33	1.49
Unlicensed Drivers	7.9%	7.2%	8.1%	7.9%	8.4%	9.4%	0.92	1.02	1.00	1.07	1.20
Unrestrained Occupants	13.4%	8.3%	14.1%	15.6%	18.9%	23.9%	0.62	1.05	1.16	1.41	1.78
Young Drivers (15-25)	30.9%	31.9%	31.8%	28.8%	27.7%	30.5%	1.03	1.03	0.93	0.90	0.99

Note: Warmer colors (red/orange) indicate EAs that are overrepresented (higher priority concerns) in the given region relative to Oregon overall, while green and greenish yellow indicate EAs that are underrepresented (lower priority concerns) relative to the State.