

Sustainable Safety at WSDOT

Saving lives and reducing serious injuries



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Applying or Misapplying CMFs
CMF Clearinghouse webinar

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Evolution of transportation in Washington State



System & how it operates

Water & rail

Road & interstate construction

Expand & operate roadway network increased, continue to increase capacity

Transportation system serves multiple purposes, and multiple modes serve the public, preserve & maintain

Budgets & right of way

Land given for right of way

Large capital investments

Budgets generally shrink, environmental & project delivery cost increase

Technology: data, access to computing power, ability to study and evaluate, to forecast

Sliderule

Mainframe

PC

Single computer can be used for prediction, forecasting etc.

Science of safety

Engineering Judgment

Design standards interstates first and then other functional classes

Quantifying safety performance
Human factors & behavioral science

Sustainable Safety Performance

Targeted Solutions

Quantify safety performance

- Fatal & serious injury collisions
- Science-based methods
- Targeted solutions

Comprehensive

- Across activities agency-wide
- Based on contributing factors to fatal & serious injury collisions
- 5E approach

Integrated

- Throughout project development
- Performance-driven across programs, projects and activities

Incorporates context

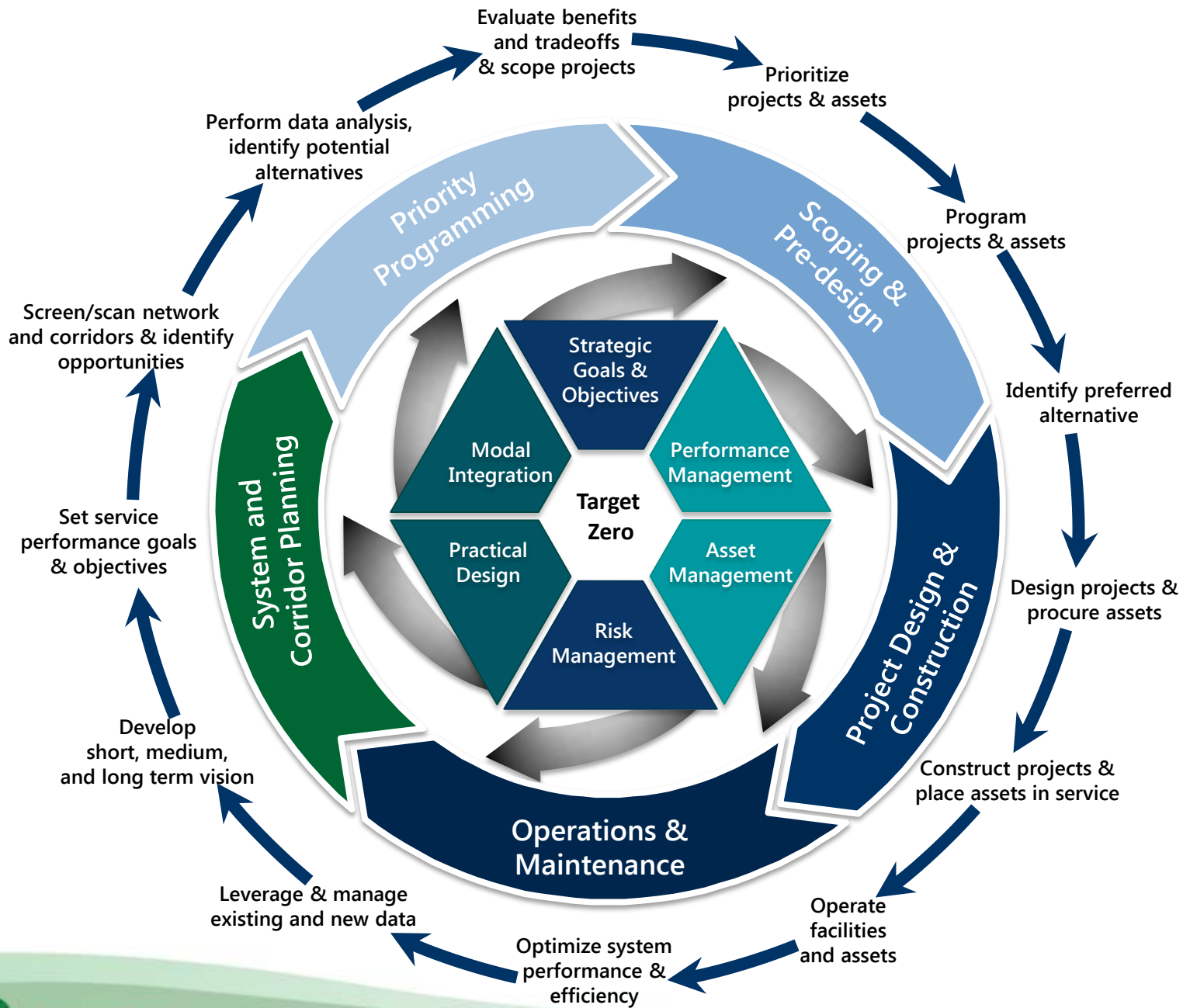
Considers land-use, speed, and other contextual factors

Multimodal

Pedestrians, bicyclists, large trucks, and other vehicle types and user groups

Consistent statewide approach

Safety performance measures; identification of system, corridors, and locations; analytical methods and approaches; documentation and business processes.



Understanding safety performance throughout project and program development

Setting Policy at the Highest Level Preparing the System For Quantification



TZ priorities focus our efforts and investments

- Clear policy objectives based on data
- If it isn't a priority in Target Zero, it isn't a WSDOT priority for safety
- Gives strategies for potential investments

Washington State 2009-2011	Fatalities		Serious Injuries	
	Number	% of Total	Number	% of Total
Priority Level One				
Impaired Driver Involved	704	50.1%	1,519	21.0%
Run-Off-the-Road	615	43.7%	2,156	29.7%
Speeding Involved	555	39.5%	2,126	29.3%
Young Drivers 16-25 Involved	487	34.6%	2,763	38.0%
Distracted Driver Involved	426	30.3%	868	11.9%
Intersection Related	290	20.6%	2,474	34.1%
Traffic Data Systems	**	**	**	**
Priority Level Two				
Unrestrained Vehicle Occupants	348	24.8%	764	10.5%
Unlicensed Driver Involved	253	18.0%	n/a	n/a
Opposite Direction	221	15.7%	702	9.7%
Motorcyclists	206	14.7%	1,230	17.0%
Pedestrians	193	13.7%	869	12.0%
EMS and Trauma Systems	**	**	**	**
Priority Level Three				
Older Drivers 75+ Involved	126	9.0%	378	5.2%
Heavy Truck Involved	115	8.2%	341	4.7%
Drowsy Driver Involved	45	3.2%	258	3.6%
Bicyclists	26	1.8%	339	4.7%
Work Zone	9	0.6%	132	1.8%
Wildlife	8	0.6%	78	1.1%
School Bus Involved	3	0.2%	18	0.2%
Vehicle-Train	2	0.6%	3	0.0%
Total*	1,406		7,247	

* More than one factor is commonly involved in fatalities and serious injuries. Therefore, each fatality and serious injury listed in "Total" may be represented in multiple factors in the table.

Examples

Target Zero Priorities

Washington State 2009-2011	Crash Number	% of Total	System Status Number	% of Total
Alcohol-Related				
Alcohol-Related	754	10.1%	1,019	10.0%
Speeding-Related	474	6.3%	3,296	32.7%
Speeding-Related	491	6.5%	3,328	33.0%
Young Drivers 16-25	461	6.1%	2,912	28.9%
Young Drivers 16-25	461	6.1%	2,912	28.9%
Intersection-Related	440	5.8%	2,471	24.5%
Traffic Data Systems	0	0%	0	0%
Impaired Driver				
Impaired Driver	319	4.2%	361	3.5%
Impaired Driver	324	4.3%	376	3.7%
Speeding	23	0.3%	12	0.1%
Speeding	201	2.7%	1,220	12.0%
Speeding	19	0.2%	89	0.9%
Run-Off-the-Road	0	0%	0	0%
Distraction				
Distraction	70	0.9%	219	2.1%
Distraction	15	0.2%	56	0.5%
Distraction	41	0.5%	158	1.5%
Distraction	14	0.2%	55	0.5%
Distraction	0	0%	10	0.1%
Distraction	0	0%	16	0.2%
Distraction	1	0.0%	8	0.0%
Distraction	0	0%	0	0%
Total	7,400		7,007	

Priority Level One

Impaired Driver Involved

Run-Off-the-Road

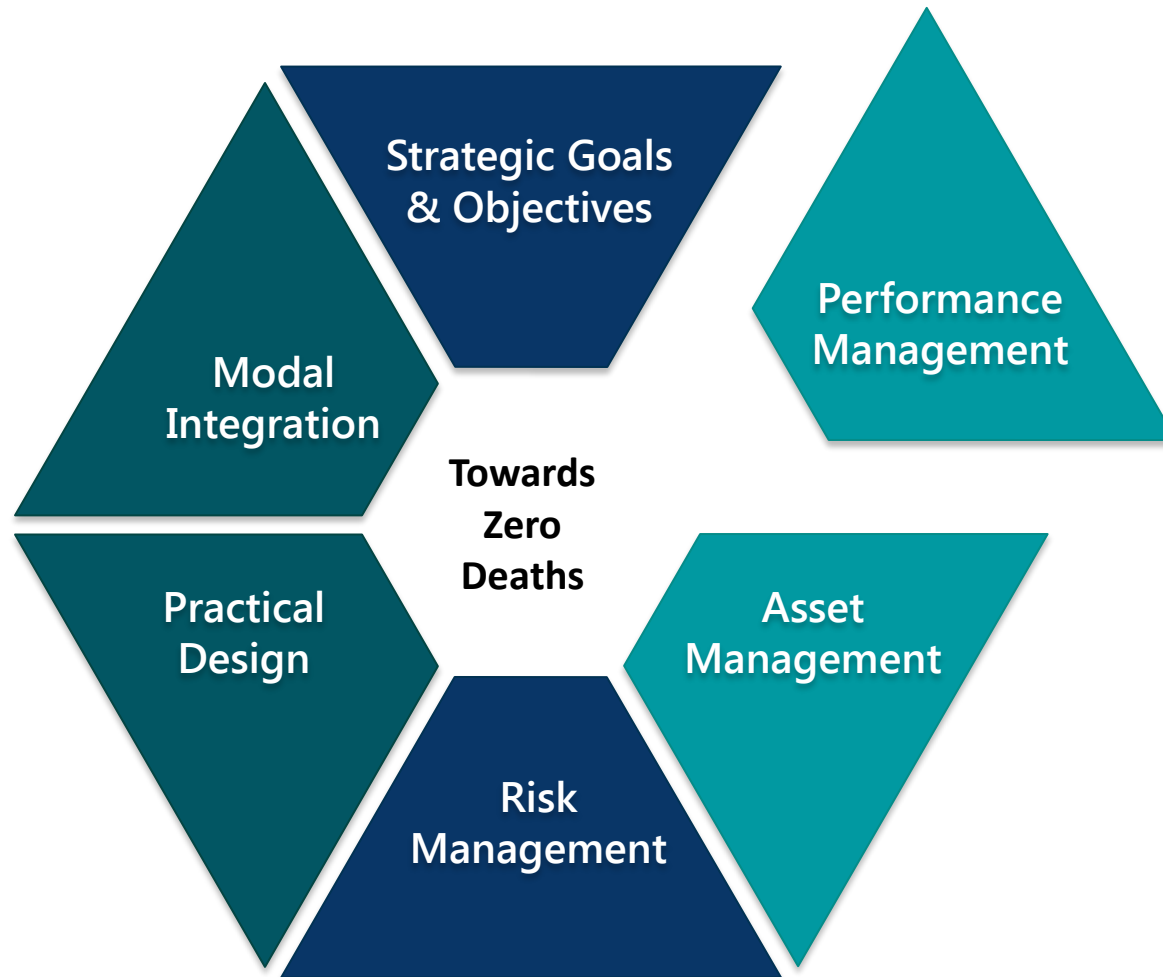
Speeding Involved

Young Drivers 16-25 Involved

Distracted Driver Involved

Intersection Related

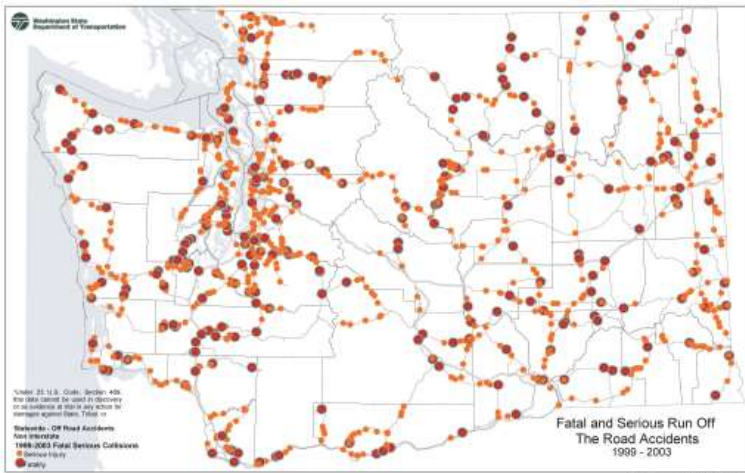
Traffic Data Systems



Run-off-the-road

Tracking and evaluation

In 2005:

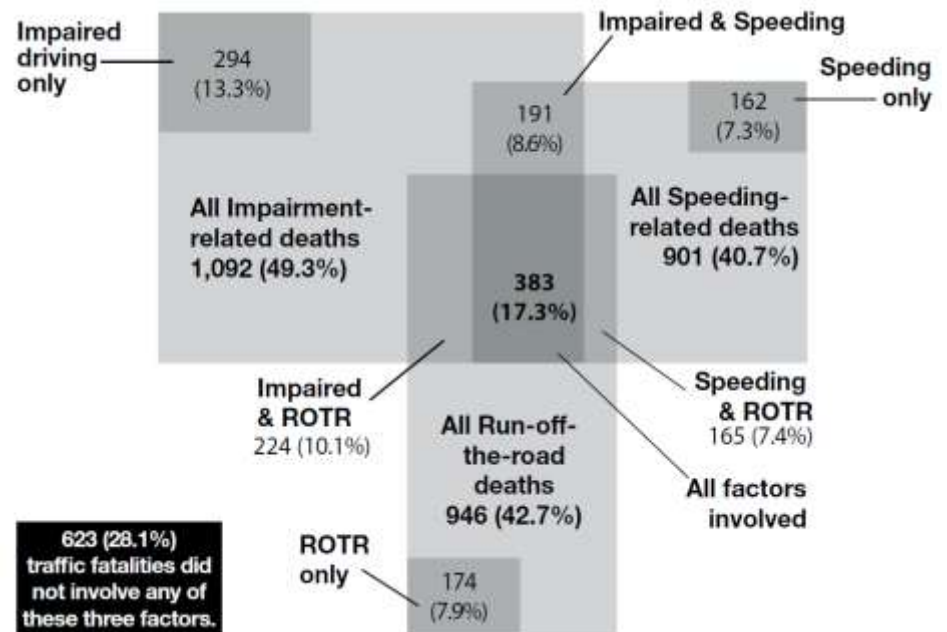


Fatal & serious injury Run-off-the-road crashes (1999 – 2003)

"Under 23 U.S. Code, Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against State, Tribal or Local Government that involves the locations mentioned in this data."

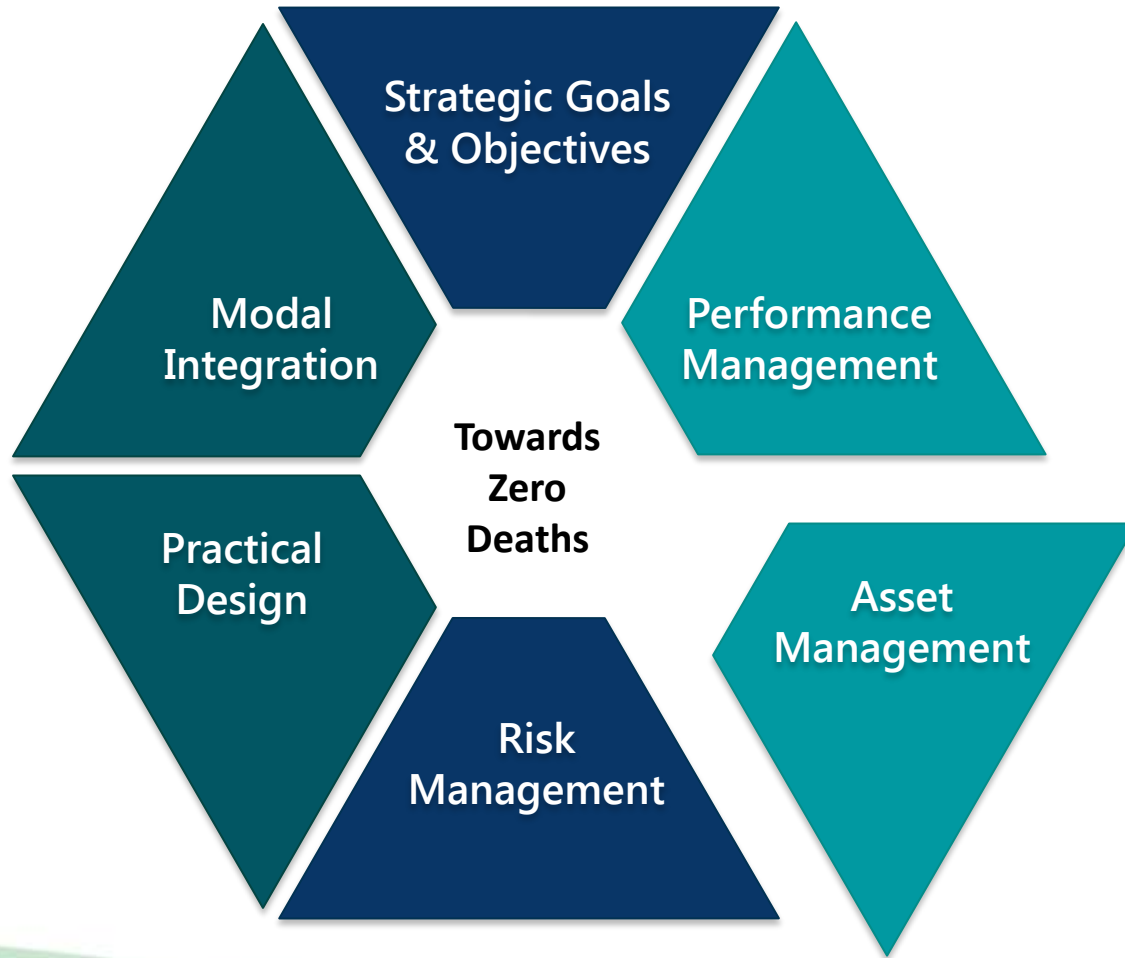
In 2011:

5E evaluation of contributing circumstances



The role of impairment, speed, or run-off-the-road in traffic fatalities, 2006-2009

Data source: Fatal Accident Reporting System (FARS) and WSDOT Statewide Travel and Collision Data Office (STCDO).
 Prepared by: WA Traffic Safety Commission.
 Data derived from 2,216 total traffic fatalities; 71.9% or 1,593 deaths involved driver impairment, speeding, or run-off-the-road (ROTR), or a combination of these behaviors.



Run-off-the-road

Systemic treatments since 1999

Rumble Strips (Edge & centerline)



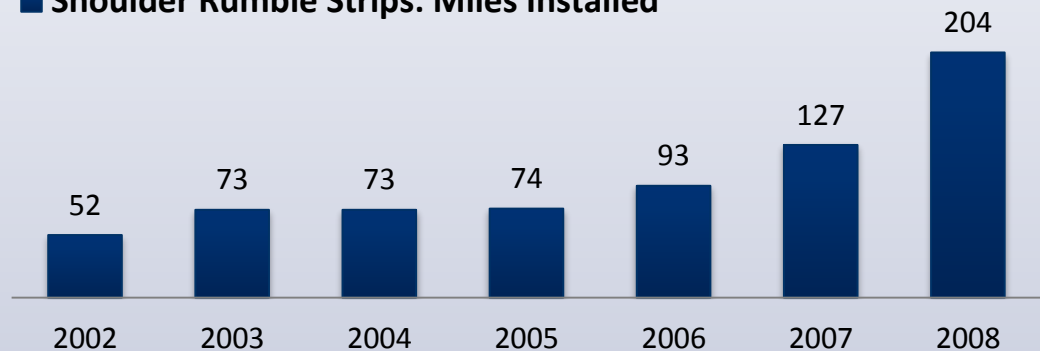
Center and Edge line (shoulder) rumble strips

Source: <http://www.flickr.com/photos/wsdot/3972234532/>

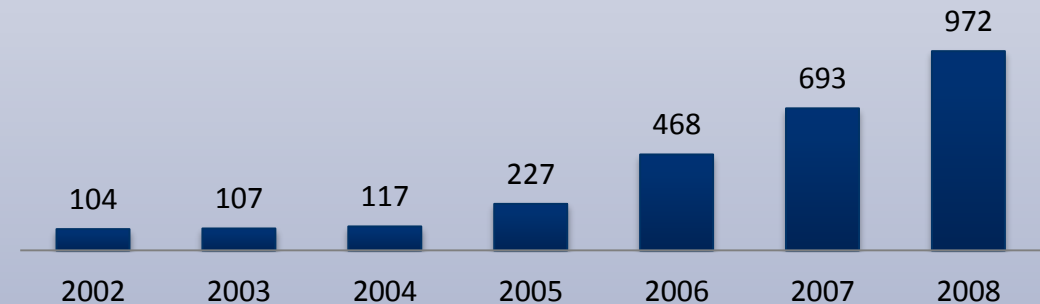
Continuing to track installation and performance

Example (2009):

■ Shoulder Rumble Strips: Miles Installed



■ Edge Shoulder Rumble Strips: Miles Installed



Run-off-the-road

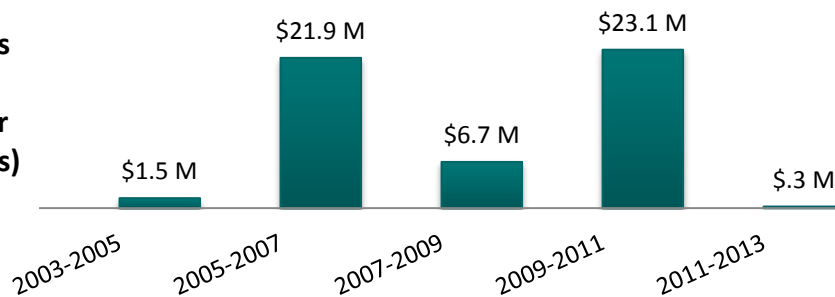
Systemic treatments since 1999

Cable Median Barrier



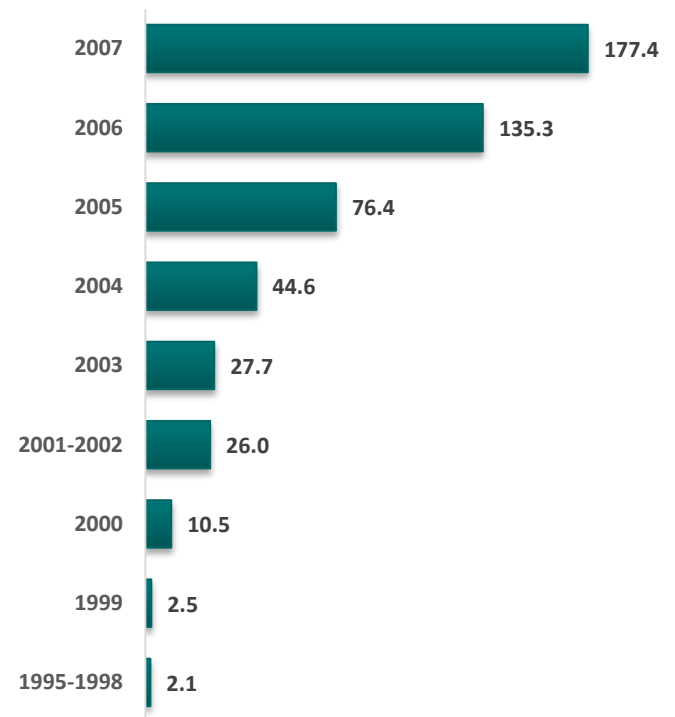
Cable Median Barrier Expenditure by Biennium (2014 Dollars)

Safety Program Expenditures for Median Cable Barrier (2014 Dollars)



In 2008:

Tracking cumulative miles of cable median barriers



Cable Barrier Miles in Place (Cumulative)

Intersection related Systemic treatments since 1999

The safety performance of our roundabouts has been excellent

Roundabouts



SR 539 Wisner Lake roundabout

Photo: Lyle Jansma; *Source:*
<http://www.flickr.com/photos/wsdot/4184630257/sizes/o/in/photostream/>

Big Rock roundabout in Mount Vernon

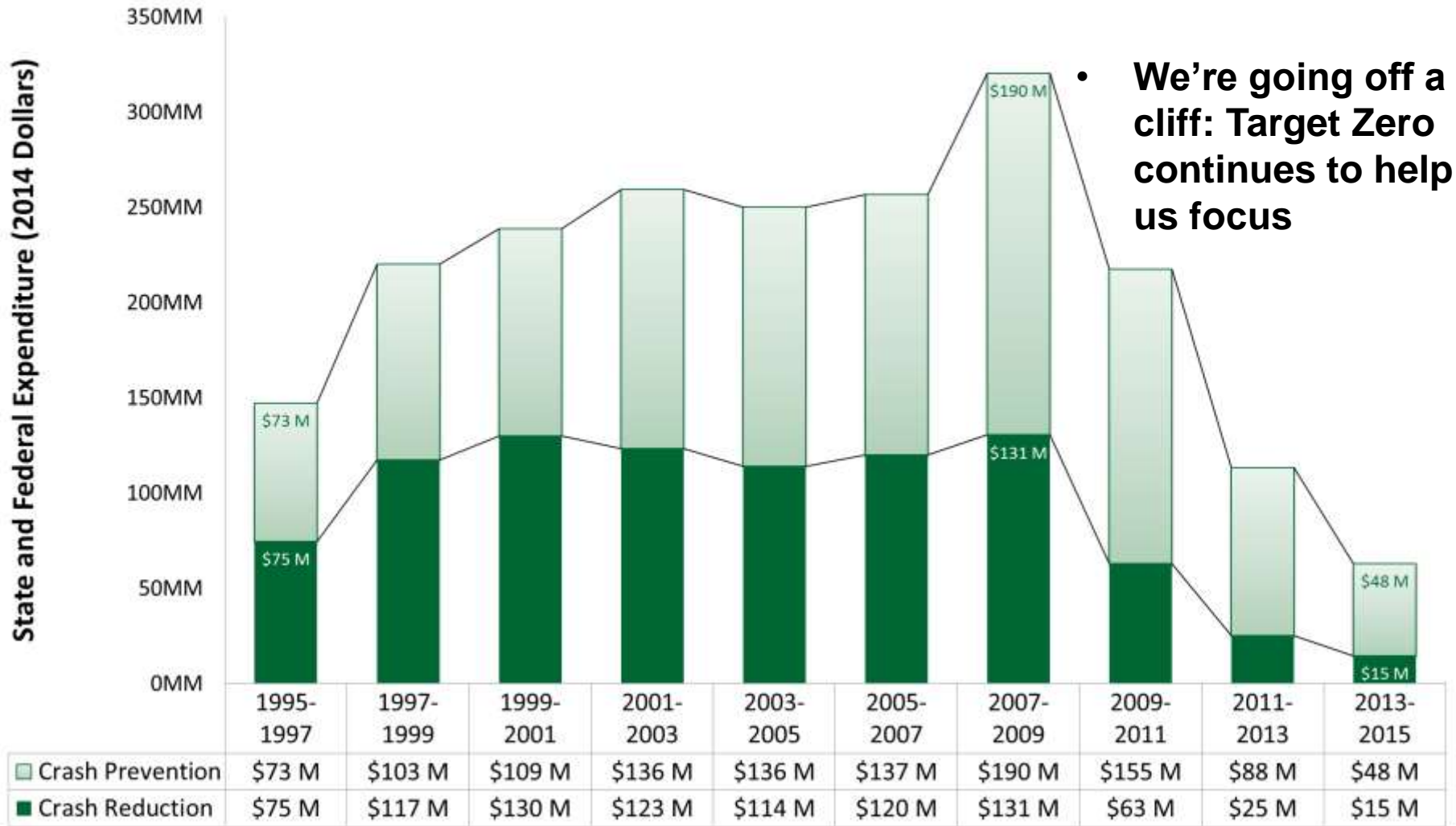
Roundabout at the intersection of SR 9 and SR 538 to accommodate increased traffic and improve safety performance. The roundabout was built and paid for by a local developer under the direction of WSDOT. (Completion Date: August 2007)

Photo: WSDOT; *Source:*
<http://www.flickr.com/photos/wsdot/3951199368/sizes/o/in/set-7215762232234341/>





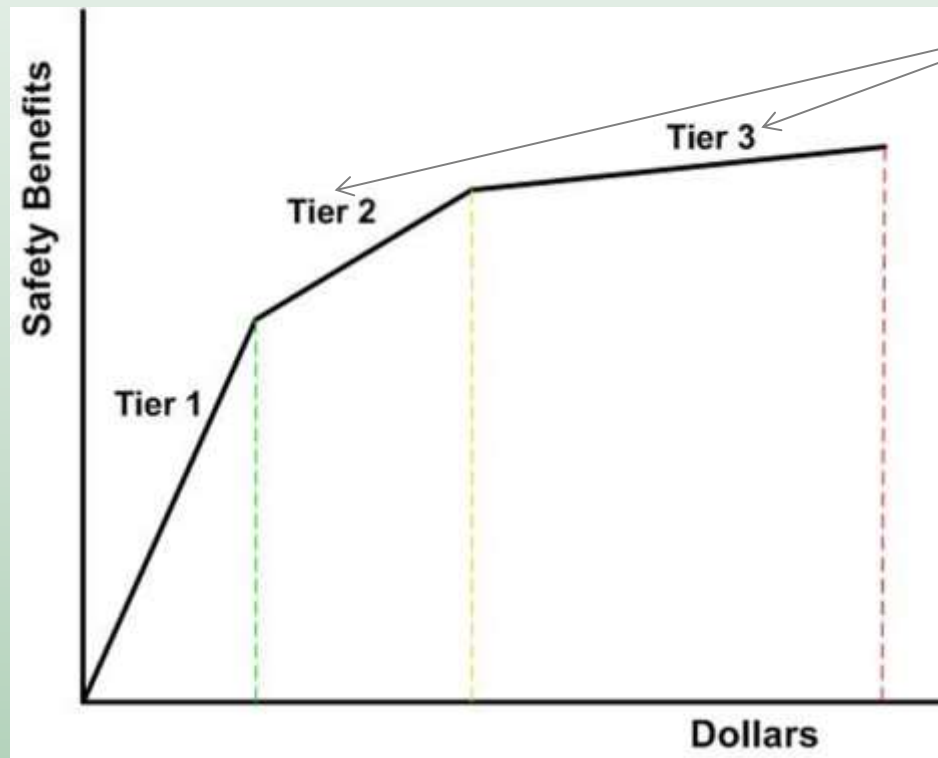
WSDOT Safety Investments - State & Federal Dollars (2014 Dollars)



Investment approach

Incremental Benefit-driven Decision Making

Address the contributing circumstances to the crash first, rather than using simple standards based applications



Nominal/
Full Standards

Historic Perspective

WSDOT approach to highway safety

Major
efforts
completed

Systemic treatments
(e.g. cable median barriers, rumble strips)

80s & 90's:
3R Companion
Safety Projects

90's to Present:
Design matrix
approach

Today: Sustainable
Highway Safety

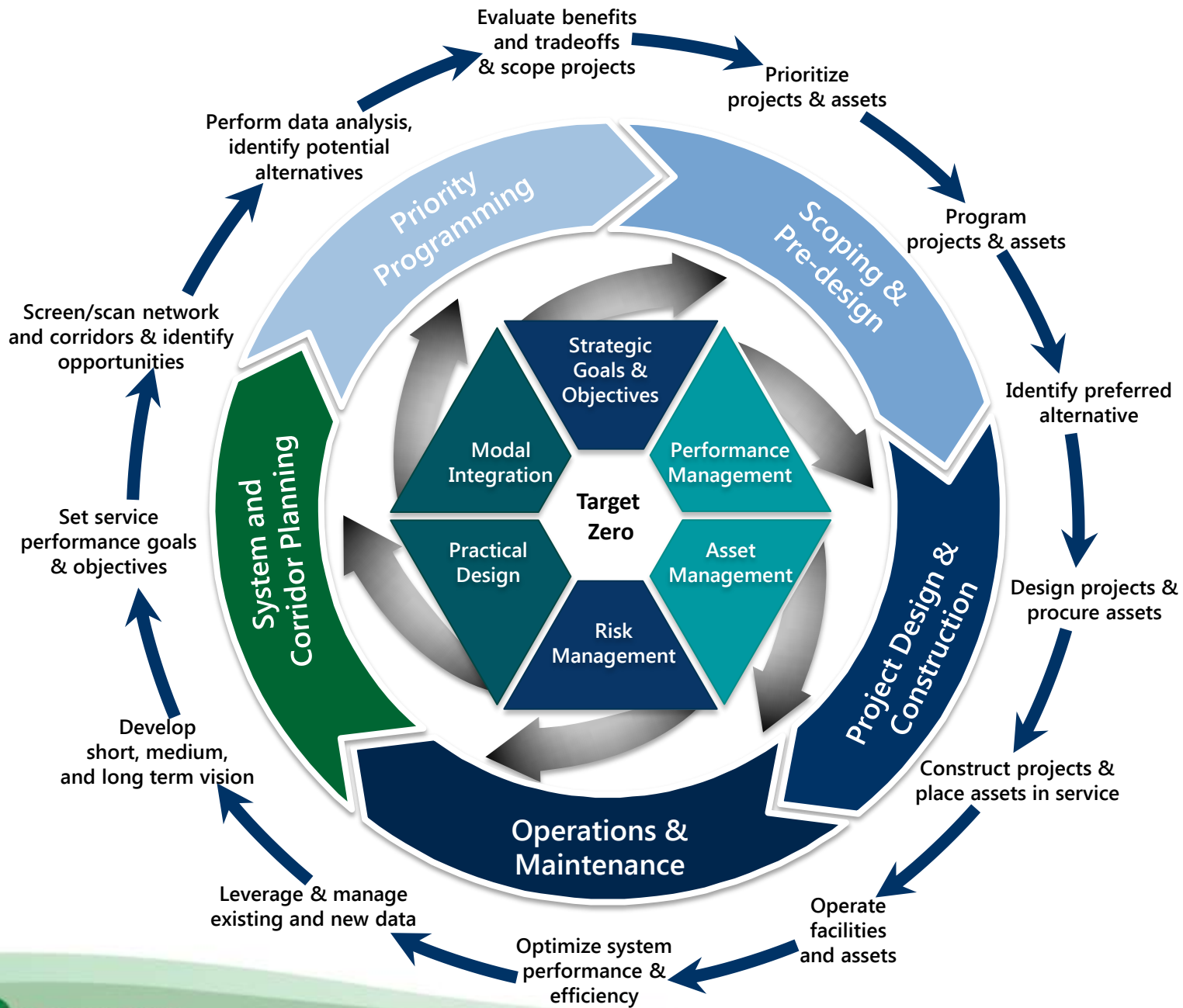
- Priorities driven by Paving Needs
- Approach to solutions was not standardized across the system
- Marginal risk reduction
- Marginal efficiency of reducing system-wide collision risk

- Spot & corridor focus based on B/C
- One size fits all approach
- Standards based matrix driven solutions
- Improved but still marginal risk reduction
- Improved but marginal efficiency in reducing risk

- Needs based on quantitative assessment of system performance
- Solutions based on assessment of site specific contributing factors
- Based on current scientific methods for predicting collision risk and reduction risk
- Substantive risk reduction
- Economically efficient

Substantive safety
(actual anticipated performance)

Focus: fatal and serious injury collisions 18



What Quantification Means to
Program and Project Development

Philosophy

Statewide assessment identifies locations with potential for safety improvement *based on performance of similar locations*

Data-driven, science-based and statewide process



Ranking sites for further review



What are the contributing factors to fatal and serious injury collisions? 4E's

Data-driven and science-based

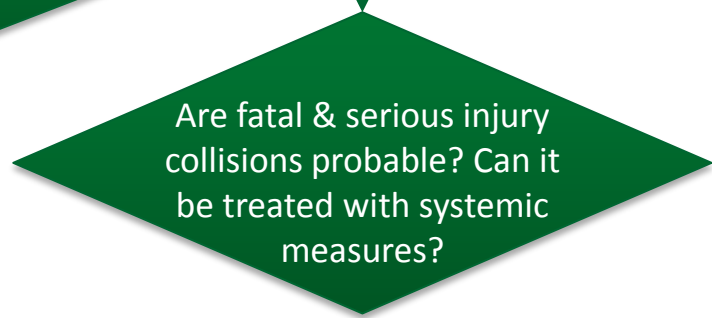
The Philosophy

This *also* means asking



Yes

No



This *also* means asking



Yes

No



Identify and evaluate alternative measures

This *also* means asking

Potential impact on fatal & serious injury collisions (science-based)

No

Not a viable alternative

Yes

Does it make sense in terms of the vision for the corridor?

No

Not a viable alternative

Yes

Other fatal and serious injury collision impacts

No

Can it be mitigated?

Yes

No

Not a viable alternative

The Philosophy

Identify and evaluate alternative measures
(Continued)

This *also* means asking

Is the alternative sustainable?

No

Not a viable alternative

Within our current low budget scenario we are required to shift our perspective...

While we view alternatives locally, we also have a statewide perspective

The Philosophy

1

“Most events are possible but not all events are probable”

Fundamental thought process:

What is probable?

2

Lowest lifecycle cost is not a viable perspective on its own! **We need high returns over the short term to reach our safety performance goals** (saving lives and reducing serious injuries)

- Preference given to 10:1 shorter investment versus 3:1 longer term investment
- Decision to spend \$17 million versus \$3 million at one location has statewide implication.

3

Can we maintain what we create (either through modification or new infrastructure)?

4

Continuing low-cost, high impact systemic approaches within corridors and the network

Summary

- ❑ **Data analysis and scientific approaches provide a means to cost effectively reduce fatal and serious crashes**
- ❑ **Understanding that CMF lead to alternatives selection**
 - ❑ Alternatives have benefits and risks
- ❑ **CMF quantify the impacts of each alternative as it relates to the contributing circumstances and type of crash being investigated**
 - ❑ Policy needs to be in place to allow for effective implementation of the CMF
- ❑ **Target performance and use targeted solutions for specific context and need**