COLORADO
Department of Transportation

TAM Investment Decision Making

Asset Management Peer Exchange – July 2016

$1.43 BILLION BUDGET

Source: Colorado Department of Transportation, 2014

Purpose

Provide Freedom, Connection, and Experience through Travel

CDOT 2015

Summit

Best Department of Transportation in the Nation

Peaks

- Technology
  - Help Our People with Technology
  - Improve Travel Experience with Technology
  - Big Data
- People
  - Develop Leaders
  - Internal Customer Focus
- System
  - Asset Condition
  - Improve the Customer Experience

Base Camps

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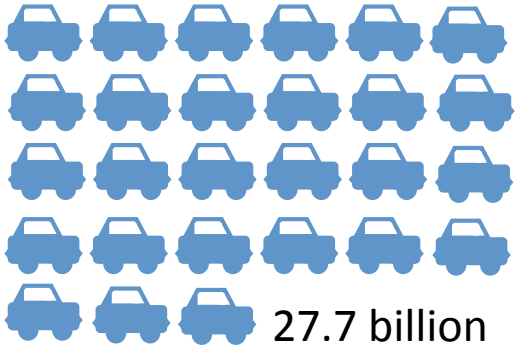
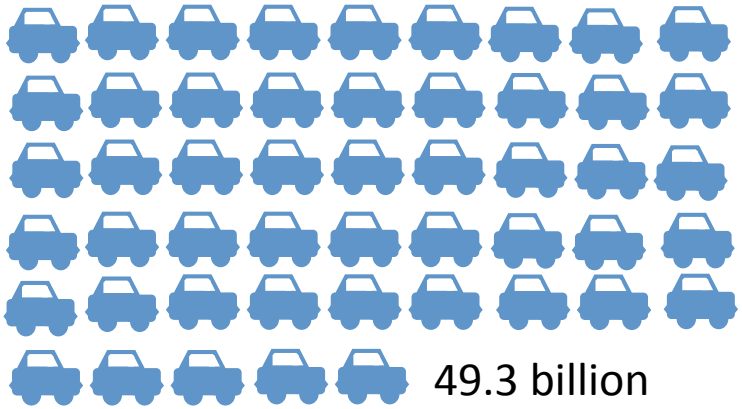
THEN AND NOW
per capita spending

1991		2015
 3.3 million	**population**	 5.4 million
 27.7 billion vehicles miles traveled	**vehicle miles traveled**	 49.3 billion vehicle miles traveled
 $125.70/person	**dollars spent/person**	 $68.94/person

All dollar figures adjusted for inflation

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WHERE DOES COLORADO RANK?

PAVEMENT CONDITION

SCALE: BEST to WORST

2013 – 32nd
2012 – 33rd

(2014) 32nd

NV UT FL SC KY MO MT WY KS AL ND AZ GA SD TN NM WV ME NC OR VT NE MN ID MS NH AR DE VA IL TX **CO** IN OK PA OH IA MI WI CT WA LA MD NY AK CA HI NJ MA RI DC

Source:
Highway Statistics
FHWA 2015

BRIDGE CONDITION

(2015) 18th

2014 – 15th
2013 – 11th

UT TX HI NV FL GA MD AL AZ KS OR MN WI OH DC VA KY **CO** DE TN NM MS VT SC IN ID AR ND NJ MT WA NE ME CA MI WV LA AK OK NH MO NC IL IA SD PA NY WY MA CT RI

Source:
National Bridge Inventory Data
USDOT FHWA 2015

SYSTEM RELIABILITY

2013 – 29th
2012 – 29th

(2014) Denver
28th out of 46

2013 – 11th
2012 – 12th

(2014) C. Springs
14th out of 33

2013 – 13th
2012 – 14th

(2014) Boulder
12th out of 22

Large Cities

Richmond
Salt Lake City
Cleveland
Jacksonville
- - - -
St. Louis MO
San Antonio
Nashville
Virginia Beach
Las Vegas
Orlando
Baltimore
Minneapolis
Philadelphia
DENVER
Oklahoma City
- - - -
New York
San Francisco
Los Angeles
Washington DC

Medium Cities

Bakersfield
Provo
Fresno
- - - -
Raleigh
CO SPRINGS
Knoxville
Wichita
- - - -
Tucson
Bridgeport
Honolulu

Small Cities

Indio CA
Lancaster CA
Laredo
- - - -
Eugene
Beaumont TX
BOULDER
Salem
- - - -
Little Rock
Pensacola
Spokane

Source:
Urban Mobility
Scorecard
TTI 2015

FATALITIES

(2014) 22nd

2013 – 23rd
2012 – 18th

MA VT MN DC RI NH NJ MD CT WA NY WI VA IL OH ME CA MI UT HI IN **CO** IA OR GA MO NV NE ID NC PA AZ FL AL KS DE ND TN AR KY OK WV TX SD AK NM LA MS MT WY SC

Source:
Highway Statistics
FHWA 2015

BIKE FRIENDLY

(2015) 7th

2014 – 6th
2013 – 2nd

WA MN DE MA UT OR **CO** CA WI MD NJ PA VA IL ME OH VT MI AZ TN ID CT NC FL GA RI NH IA NY TX NV MS LA MO WY AR IN SD ND NM AK WV HI SC OK MT NE KS KY AL

Source:
The League of American
Bicyclists 2015

TRANSIT UTILIZATION

(2014) 17th

2013 – 17th
2012 – 17th

NY MA DC PA IL HI CA NV OR NJ GA MD RI AZ WA LA **CO** WI MN CT FL UT OH TX VA MO NM MI IA IN NC WV AK NE DE SC WY KS NH TN MT KY ND AL ME SD AR OK ID VT MS

Source:
National Transit Database
2015

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OUR CHALLENGE
continued growth

From 2013 to 2040

Population

+47%

7.8 MILLION COLORADANS

Vehicle Travel

+47%

41.8 BILLION MILES TRAVELED

Avg. Traffic Delay on congested corridors

2 to 3 TIMES

DURING PEAK HOURS (if we do nothing)

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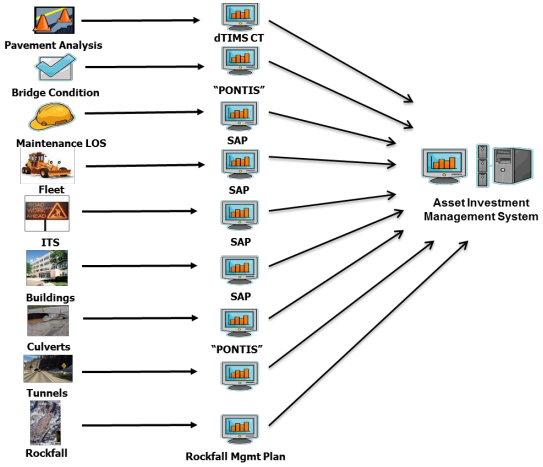
ASSET MANAGEMENT
Budget Setting Process

*Wideband Delphi Methodology



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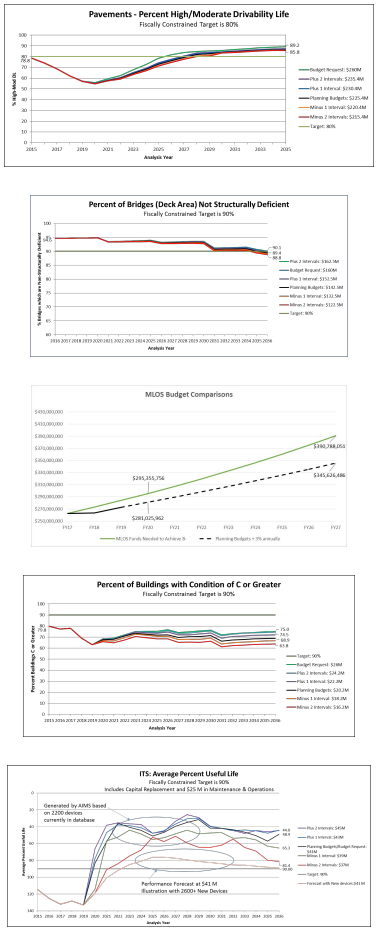

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FY14-FY20 Asset Management Planning Budgets
(in millions)

Asset Class	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Surface Treatment	$238.8	$235.2	$235.9	$242.1	$231.4	$225.4	$222.0
Bridge, BE & Bridge Fixed Costs	$173.9	$168.2	$164.1	$163.2	$155.4	$142.5	$151.2
MLOS	$249.0	$251.3	$254.4	$262.6	$263.5	$272.8	$265.7
Road Equipment	$20.9	$20.9	$18.4	$26.4	$23.0	$26.8	$22.1
ITS*	$21.5	$27.6	$21.4	$24.5	$23.0	$23.5	$29.2
Geohazards	$9.0	$9.1	$9.2	$10.0	$8.5	$8.4	$9.7
Buildings	$11.3	$20.8	$12.9	$21.4	$17.5	$20.2	$17.6
Tunnels	$7.4	$12.4	$5.2	$7.6	$6.4	$8.4	$10.3
Culverts	$11.5	$9.6	$8.2	$11.0	$9.1	$7.6	$7.5
Walls	$0.0	$0.0	$2.4	$5.8	$4.6	$4.6	$5.1
Traffic Signals	$0.0	$0.0	$5.7	$16.9	$12.6	$14.8	$14.6
TOTAL	**$743.3**	**$755.1**	**$738.0**	**$791.5**	**$755.0**	**$755.0**	**$755.0**

*ITS for FY20 includes $7M for salaries/pass-thrus, which has historically come from the Asset Mgmt Budget

The FY20 numbers are DRAFT until approved by the Transportation Commission

Asset Investment Management System

Performance Scenarios

Planning Budget

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Asset Management
Available Budget vs. Need

DRAFT FY14-FY20 Asset Management Planning Budgets vs. Need								
Asset Class	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**	**FY19**	**FY20**	**Estimated Average Yearly Need to Reach Target by 2025***
Surface Treatment	$238.8	$235.2	$235.9	$242.1	$231.4	$225.4	$222.0	$260.0
Bridge, BE & Bridge Fixed Costs	$173.9	$168.2	$164.1	$163.2	$155.4	$142.5	$151.2	Target Currently Achieved
MLOS	$249.0	$251.3	$254.4	$262.6	$263.5	$272.8	$265.7	$295.4 in 2020 + 3% annually
Road Equipment	$20.9	$20.9	$18.4	$26.4	$23.0	$26.8	$22.1	$23.8
ITS*	$21.5	$27.6	$21.4	$24.5	$23.0	$23.5	$29.2	$41.0
Geohazards	$9.0	$9.1	$9.2	$10.0	$8.5	$8.4	$9.7	$30.0
Buildings	$11.3	$20.8	$12.9	$21.4	$17.5	$20.2	$17.6	$50.0
Tunnels	$7.4	$12.4	$5.2	$7.6	$6.4	$8.4	$10.3	Target Currently Achieved
Culverts	$11.5	$9.6	$8.2	$11.0	$9.1	$7.6	$7.5	$10.0
Walls	$0.0	$0.0	$2.4	$5.8	$4.6	$4.6	$5.1	$9.0
Traffic Signals	$0.0	$0.0	$5.7	$16.9	$12.6	$14.8	$14.6	$90.0
TOTAL	**$743.3**	**$755.1**	**$738.0**	**$791.5**	**$755.0**	**$755.0**	**$755.0**	**$953.2**

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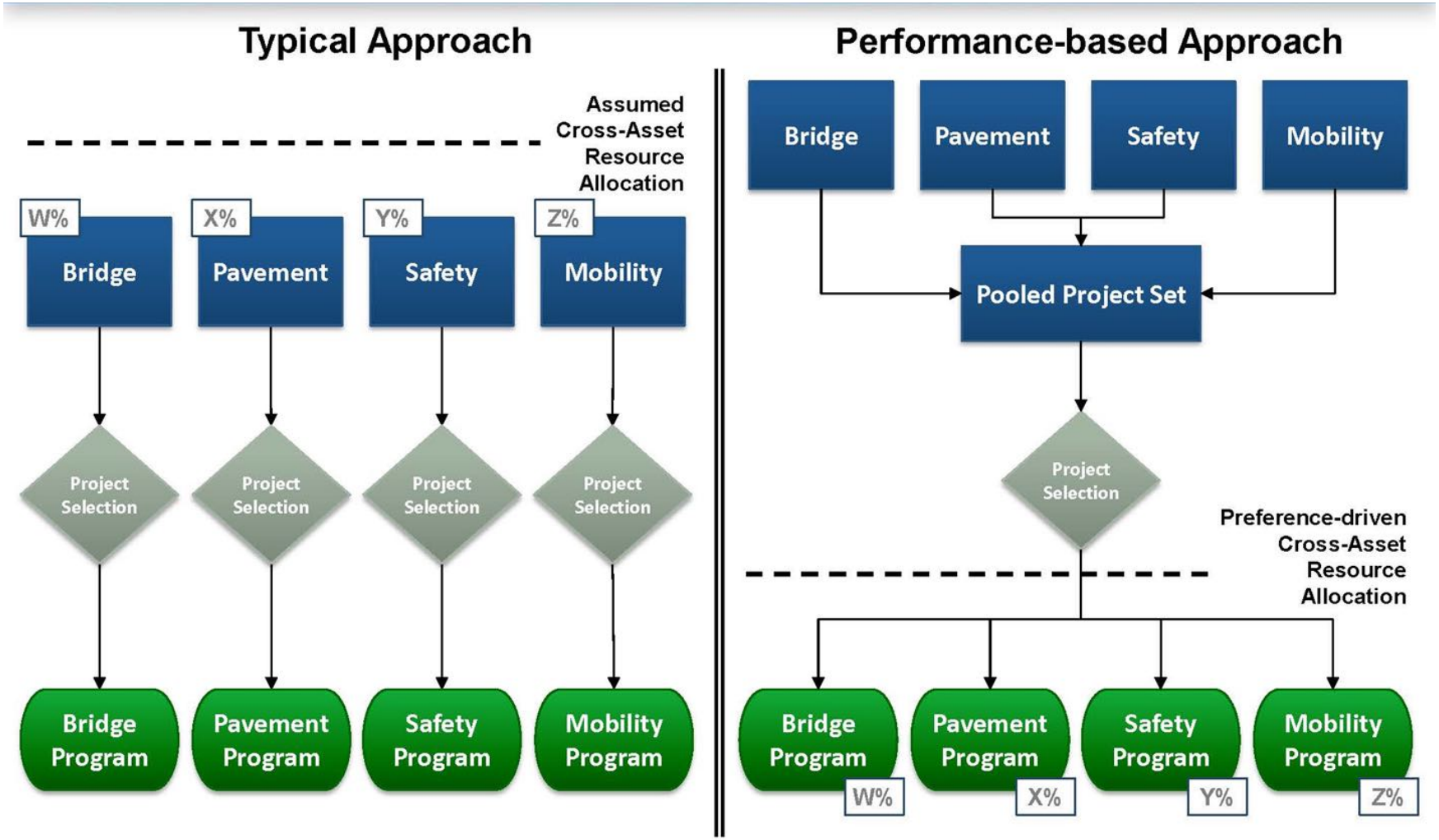
The Future
MODA



Swing Rating Procedure:

1. Assess how much value you would receive if you could swing each objective from its worst possible outcome to its best possible outcome
2. Rank criteria according to the swing in value when moving from the worst feasible outcome to the best
3. Weight criteria
4. Once you have weights for each objective, review them for consistency and validity

Swing Weights Account for Both Importance AND Variability

Weight:	x% **Color**	y% **Cost**
		$17,000
		$17,100

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Swing Rating in Action

Criteria	Measure-ment Scale	Worst Feasible Outcome	Best Feasible Outcome	Rank	Weight	Weight
1. Minimize air and GHG emissions	mpg	16	50	3	70	16%
2. Maximize exterior styling	1-3 scale	1	3	2	85	19%
3. Maximize safety	1-3 scale	1	3	4	65	15%
4. Maximize "fun" to drive	1-3 scale	1	3	2	85	19%
5. Maximize comfort in the interior	1-3 scale	2	3	5	20	4%
6. Maximize cargo capacity	Cubic feet	22	55	5	20	4%
7. Cost per mile (life cycle)	Dollars	$1.10	$0.49	1	100	22%
Total					445	100%

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Goal Areas and Criteria

Staff Workshop

Goal Areas

- Safety
- Mobility
- Maintain the System
- Economic Vitality
- Other Considerations

Table 2 CDOT Project Prioritization and Selection Criteria and Performance Measure Library		
Goal Area and Criteria	**Relatively "Quantitative" Measure**	**Relatively "Qualitative" Measure**
A. Safety		
1. Fatalities reduced	change in crash rate over x years, converted to dollar measure	Existing crash rate
2. Serious injuries reduced	change in crash rate over x years, converted to dollar measure	
3. Property damage reduced	change in crash rate over x years, converted to dollar measure	
4a. Other considerations or measures		Addresses a LOSS 3 or 4 location; safety measures such as >2 foot paved shoulders
4b. Other considerations or measures		Consider ranking by 'need' as well as potential for reduction in crashes. Need could be qualified by relative severity index, potential for safety improvement, etc.
4c. Other considerations or measures		Consider evaluating by differing roadway types, etc. Do not try to compare/rank same across all types.
4d. Other considerations or measures		Removes an at-grade rail crossing
B. Maintaining the System		
1. Pavement Drivability Life Index improvement	Model outputs	
2. Bridge rating improvement	Model outputs	Improvement in bridge-deck area that is Not Structurally Deficient
		Vertical clearance
		Load restrictions
3. Bridge historic significance		Could be a yes/no
4. Age		Extent to which asset is near or past design life

102 Candidate Criteria Identified

Table 3 CDOT Project Prioritization and Selection Common Criteria: Suggested Starting Point for Evaluations	
Goal Area and Criteria	**Measurement Scale**
1. Safety	
1.1 Fatalities reduced	Number of fatalities reduced per year
1.2 Serious injuries reduced	Number of serious injuries reduced per year
1.3 Property damage only reduced	Dollars of property damage only reduced per year
2. Maintaining the System	
2.1 Pavement Drivability Life Index improvement	Model outputs
2.2 Bridge rating improvement	Model outputs
2.3 Redundancy	GIS-based analysis that considers average concentration of alternate routes, alternate route concentration and endpoints, and length of road segment
2.4 Other asset improvement	Developed on a case-by-case basis
3. Mobility	
3.1 Reliability	Buffer index improvement (ratio between the difference of the 95th percentile travel time and the average travel time divided by the average travel time)
3.2 Modal choice	GIS/population based calculation of number of people that receive access to other modes, perhaps multiplied by "accessibility factor"
3.3 Connectivity	GIS/population based calculation of number of people that have connectivity improved - perhaps multiplied by "connectivity factor"
4. Economic Vitality	
4.1 Income (value added) created	TREDIS estimate
4.2 Jobs created	TREDIS estimate
4.3 Operating cost savings	Dollars
4.4 Freight-relevant corridor economics	Freight corridor economic importance score (scale might reflect NHS, congressional priority, and energy corridors)
4.5 Access to other regionally significant facilities or destinations (job centers, agriculture, tourism, etc)	A yes/no scale or develop a qualitative scale with gradations
4.6. Intermodal connections	A yes/no scale or develop a qualitative scale with gradations
5. Other Considerations	
5.1 Project readiness	Qualitative scale reflecting stage of readiness
5.2 Region priority	Qualitative scale using plans where projects or corridors are ranked in importance
5.3 Innovative Financing and Partnerships	Percent of local match financing or financing from other sources that leverages CDOT funds
Project cost (the denominator in Value-Cost calculation used as basis for prioritization)	Long-term life cycle cost (capital, long-term O&M, and replacement) net of any revenues

Common Criteria – reduced from candidate criteria

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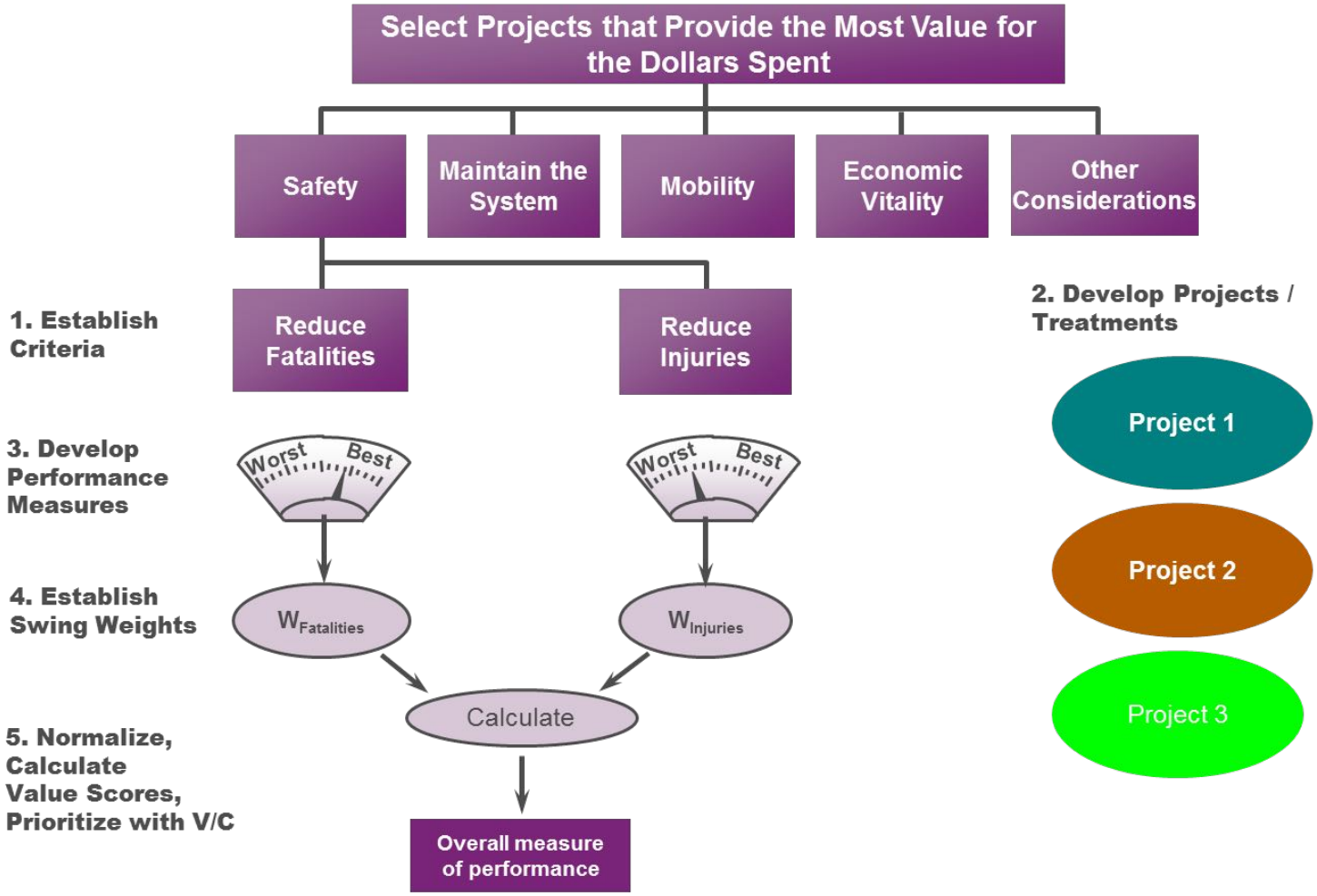
How it Could Work

Prioritization Approach



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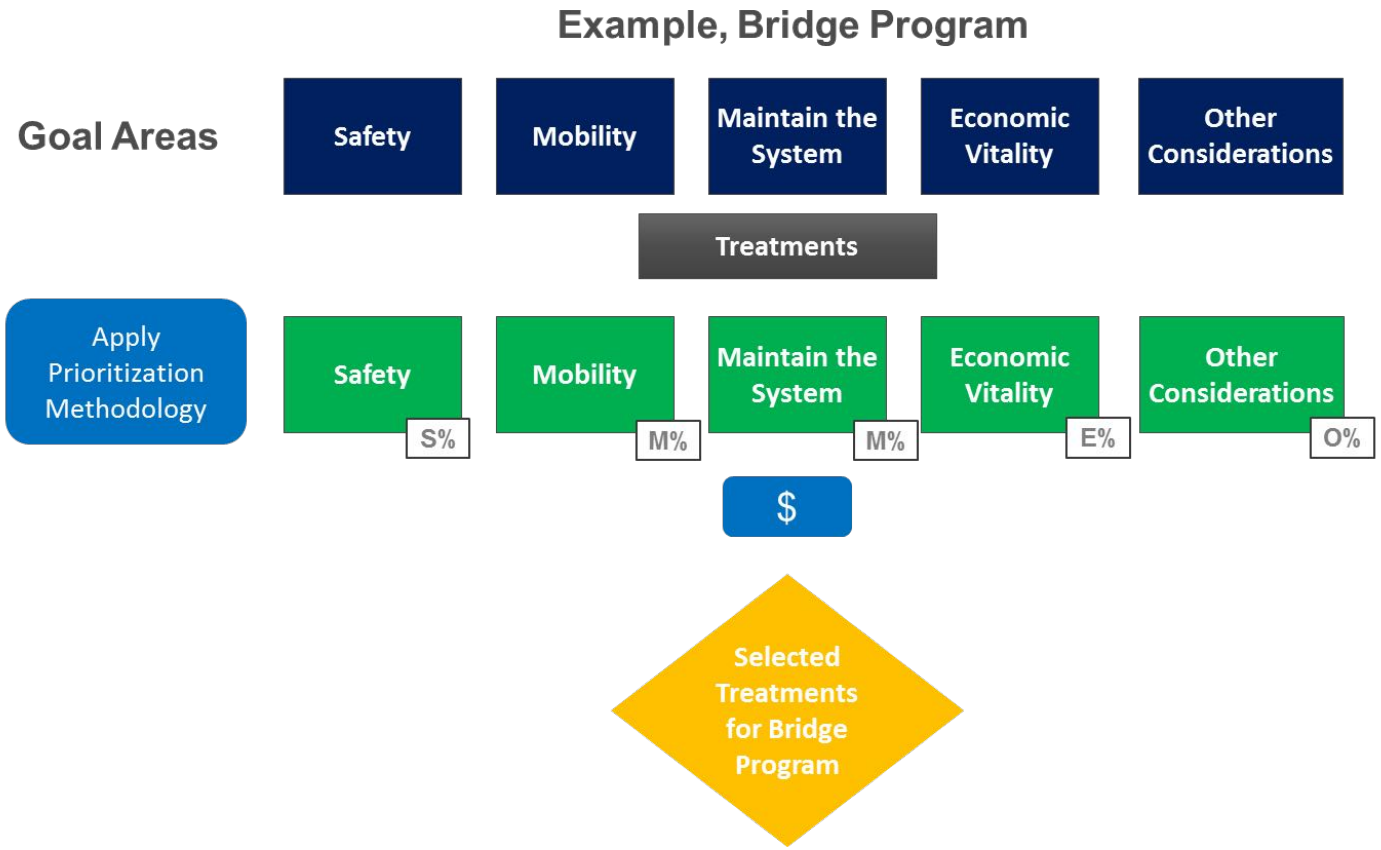
How it Could Work

Prioritization within specific program considering all goal areas



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Next Steps
…and obstacles

Next Steps:

- Implementation on TAM, Development Program (mostly capacity), and ITS expansion.
- TAM split into two activities – treatment selection and prioritization, and cross-asset optimization

Obstacles to Overcome:

- Culture eats strategy for breakfast…or lunch…or possibly all three meals.

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