



AASHTOWare BrM 5.2.3

Conducting Trade-off Analysis

April 26, 2017

Mesa, Arizona

Contact

Trade-off
Analysis

Multi-objective

Trade-offs in
BrM

- Funding
- Targets
- Deterioration
Rates

BrM Help Desk

[AASHTOWareBridge.com](https://www.aashtowarebridge.com)

BrM@Bentley.com

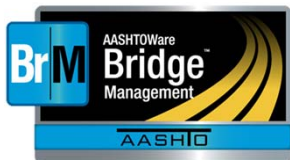
JIRA tickets:

bridgeware.atlassian.net

Zachary Boyle, PE

BrM Solutions
Consultant

Zac.Boyle@Bentley.com



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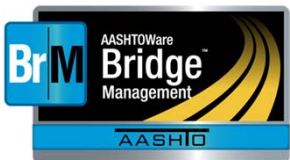
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Trade-off

- *Wikipedia: Trade-off*



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Multi-objective Optimization

For a nontrivial multi-objective optimization problem, no single solution exists that simultaneously optimizes each objective. In that case, the objective functions are said to be

[conflicting and thus exist in a state of conflict.](#)

- *Wikipedia: Multi-objective Optimization*



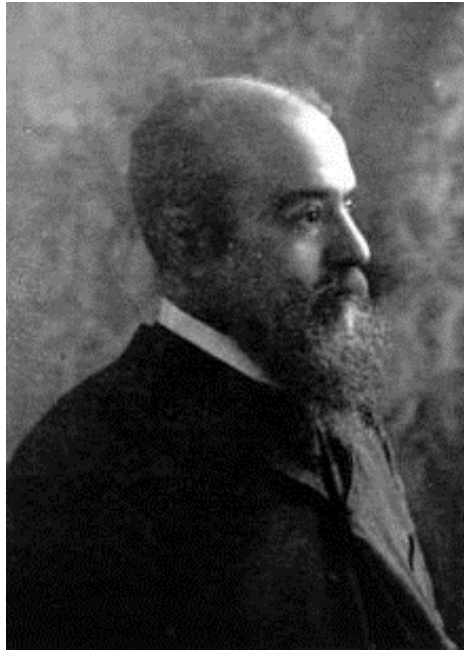
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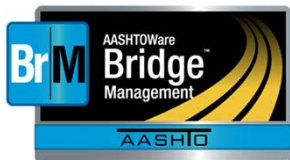
Vilfredo Pareto

1848 - 1923

Italian Civil Engineer turned socio-economist.

Best known for:

- The Pareto principle: the idea that variables have unequal influence on the outcome. For example, 80% of the result can be made up by 20% of the variables. Known as the 80-20 rule.
- Multi-objective optimization and Pareto Horizons.
- Pareto distribution of statistics.



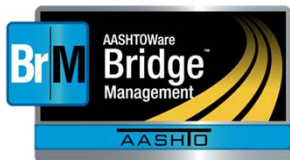
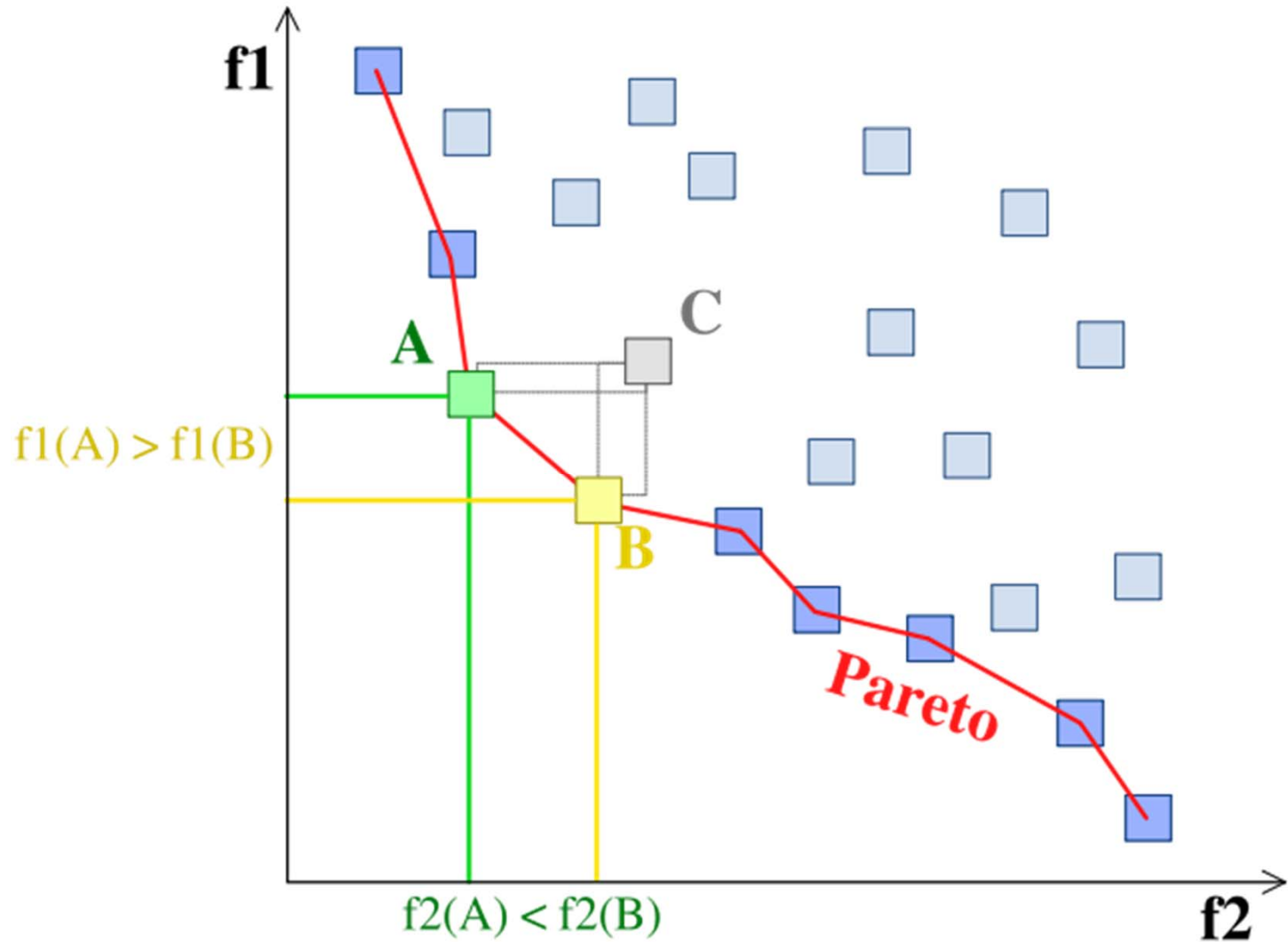
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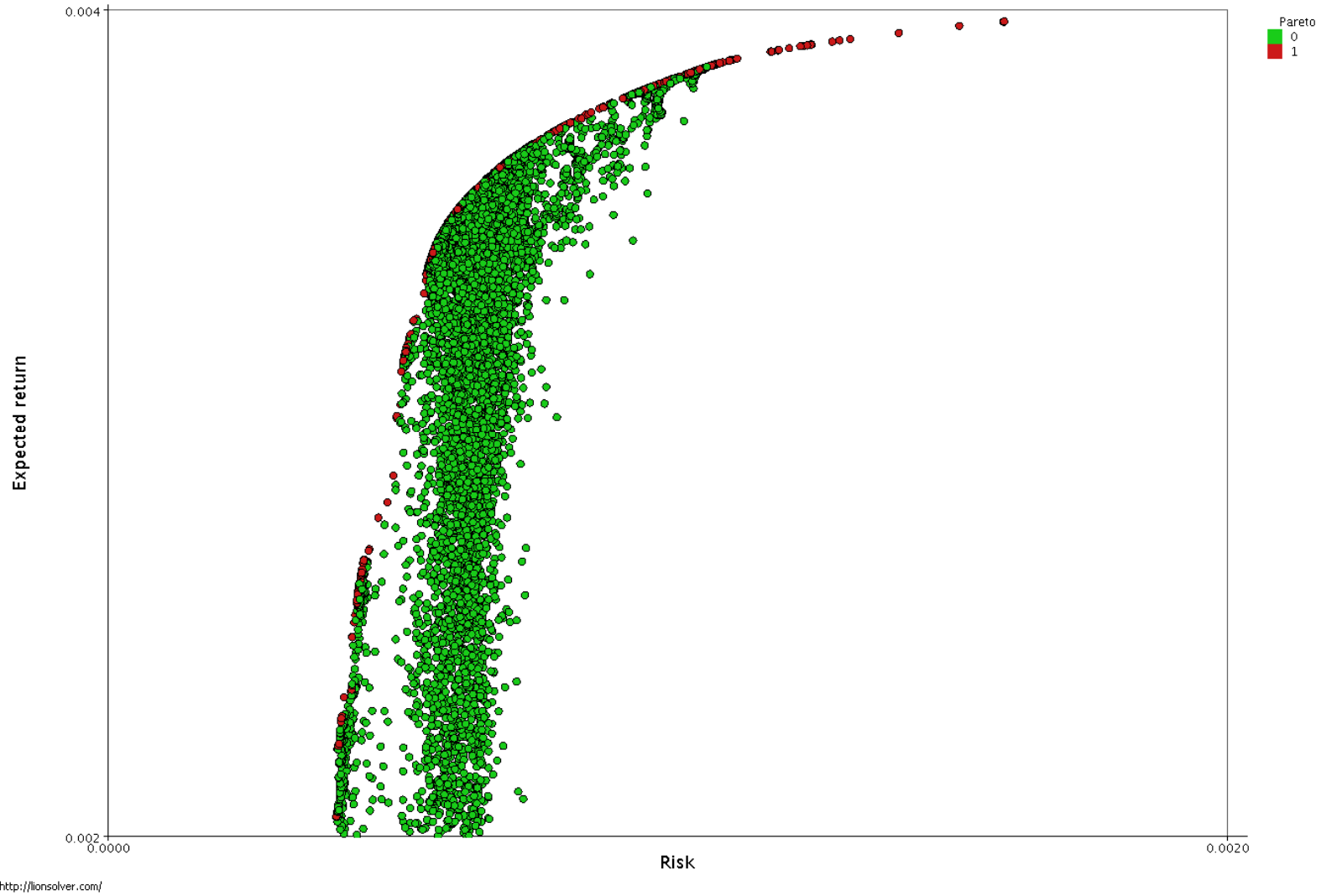
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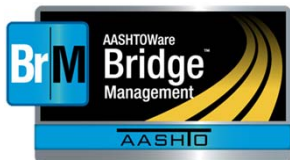
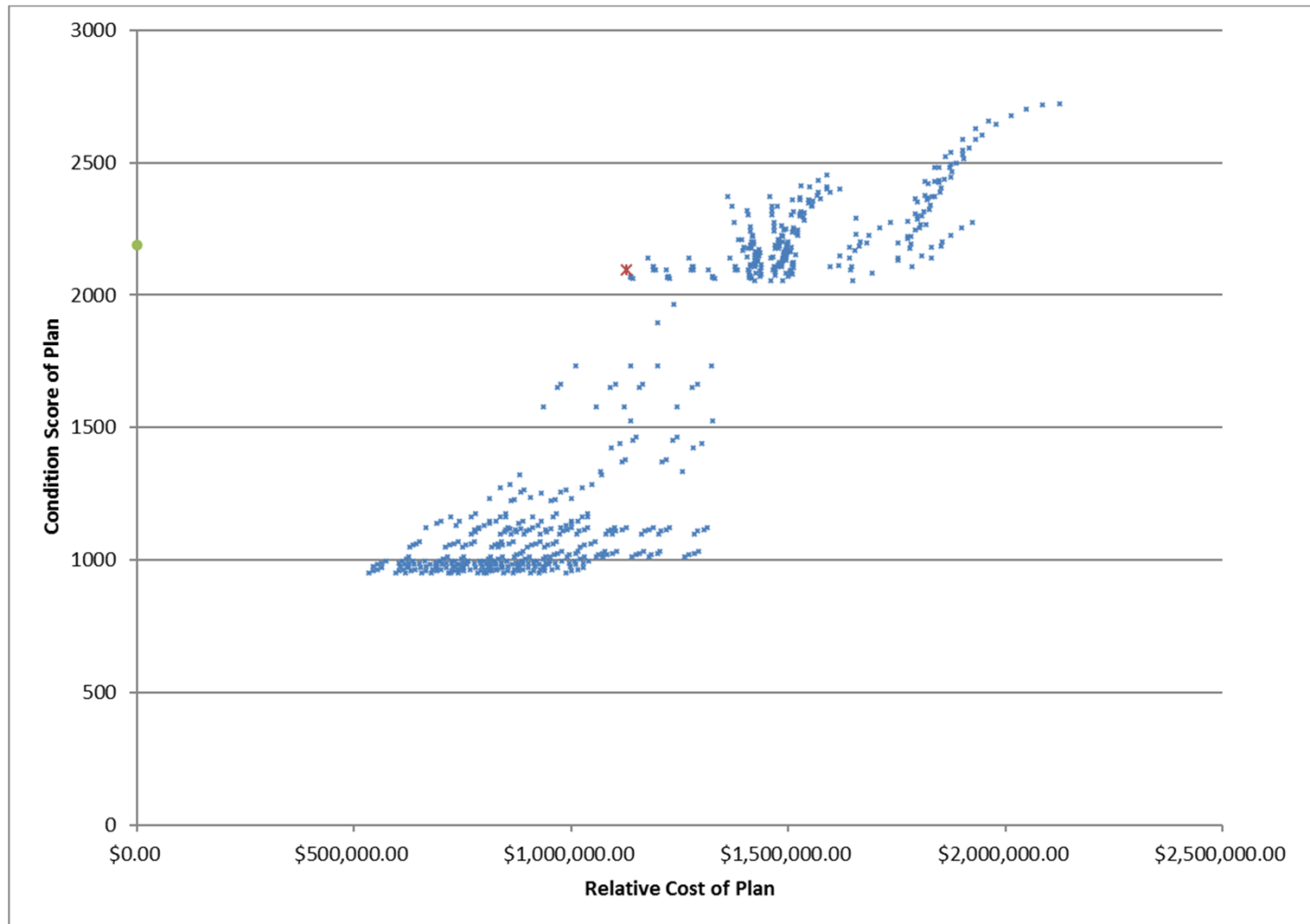
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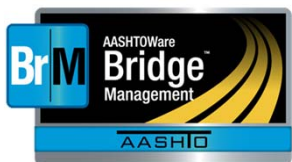
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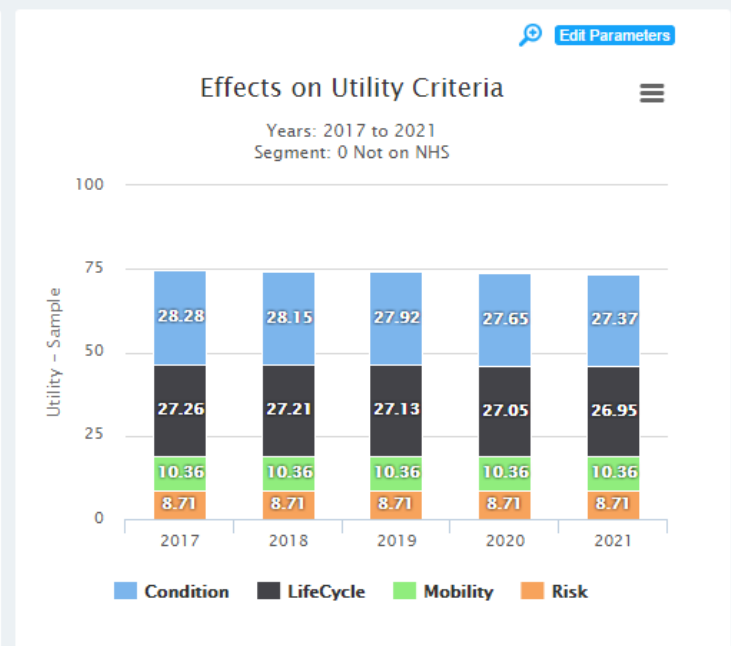
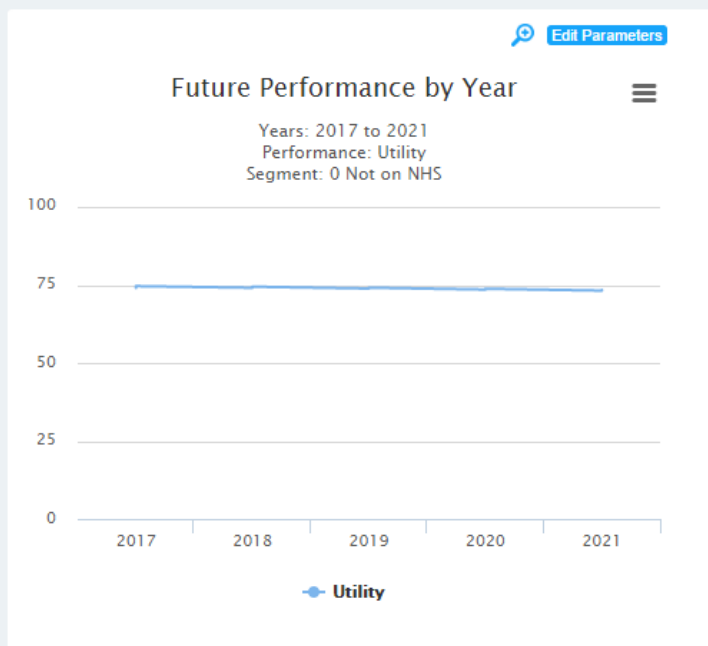
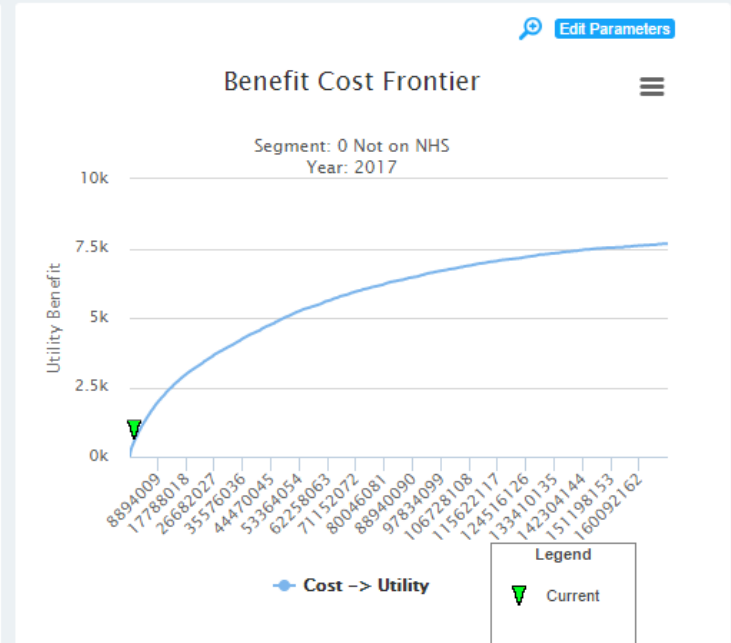
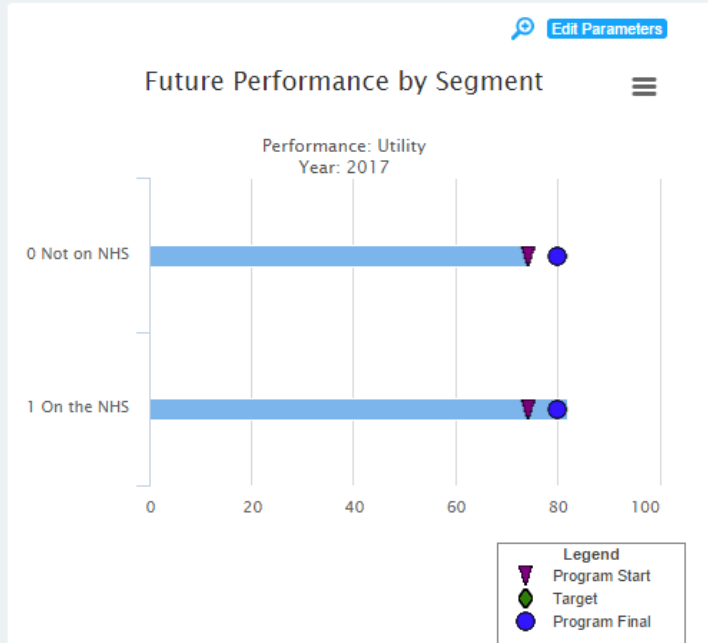
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Programs > Program Results



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So in what scenarios
will you conduct a
trade-off analysis?



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Programs > Create/Edit Scenarios

Scenarios

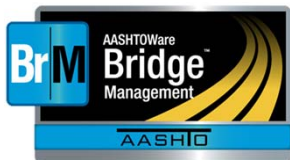
Scenario Name	
<input type="checkbox"/>	Default
<input checked="" type="checkbox"/>	\$10m
<input checked="" type="checkbox"/>	\$20m
<input checked="" type="checkbox"/>	\$30m

Scenarios Details:

Name:

Program:

Deterioration Profile:



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Programs > Funding Allocation

Program: Scenario:

Funding Allocation

A new Funding Source Target in Projects > Funding Sources may be created for new Funding Allocations
No Funding Sources

Budget Distribution

Quick Distribution

Override budget

Total budget: \$180,000,000

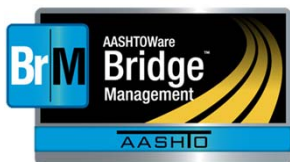
Total allocated funds: \$0

	2017	2018	2019	2020	2021
Identified annual funds:	\$0	\$0	\$0	\$0	\$0
Additional funds:	<input type="text" value="\$30,000,000"/>	<input type="text" value="\$30,000,000"/>	<input type="text" value="\$30,000,000"/>	<input type="text" value="\$30,000,000"/>	<input type="text" value="\$30,000,000"/>
Total annual budget:	\$30,000,000	\$30,000,000	\$30,000,000	\$30,000,000	\$30,000,000
Allocated funds:	\$0	\$0	\$0	\$0	\$0
Available Funds:	\$30,000,000	\$30,000,000	\$30,000,000	\$30,000,000	\$30,000,000

Budget distribution by program's segments:

Input method: Actual Budget

Segment	Total Budget per segment	Pct. overall budget	2017 <input type="checkbox"/>	2018 <input type="checkbox"/>	2019 <input type="checkbox"/>	2020 <input type="checkbox"/>	2021 <input type="checkbox"/>
ALL	\$0	0%	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
Total	\$0		\$0	\$0	\$0	\$0	\$0



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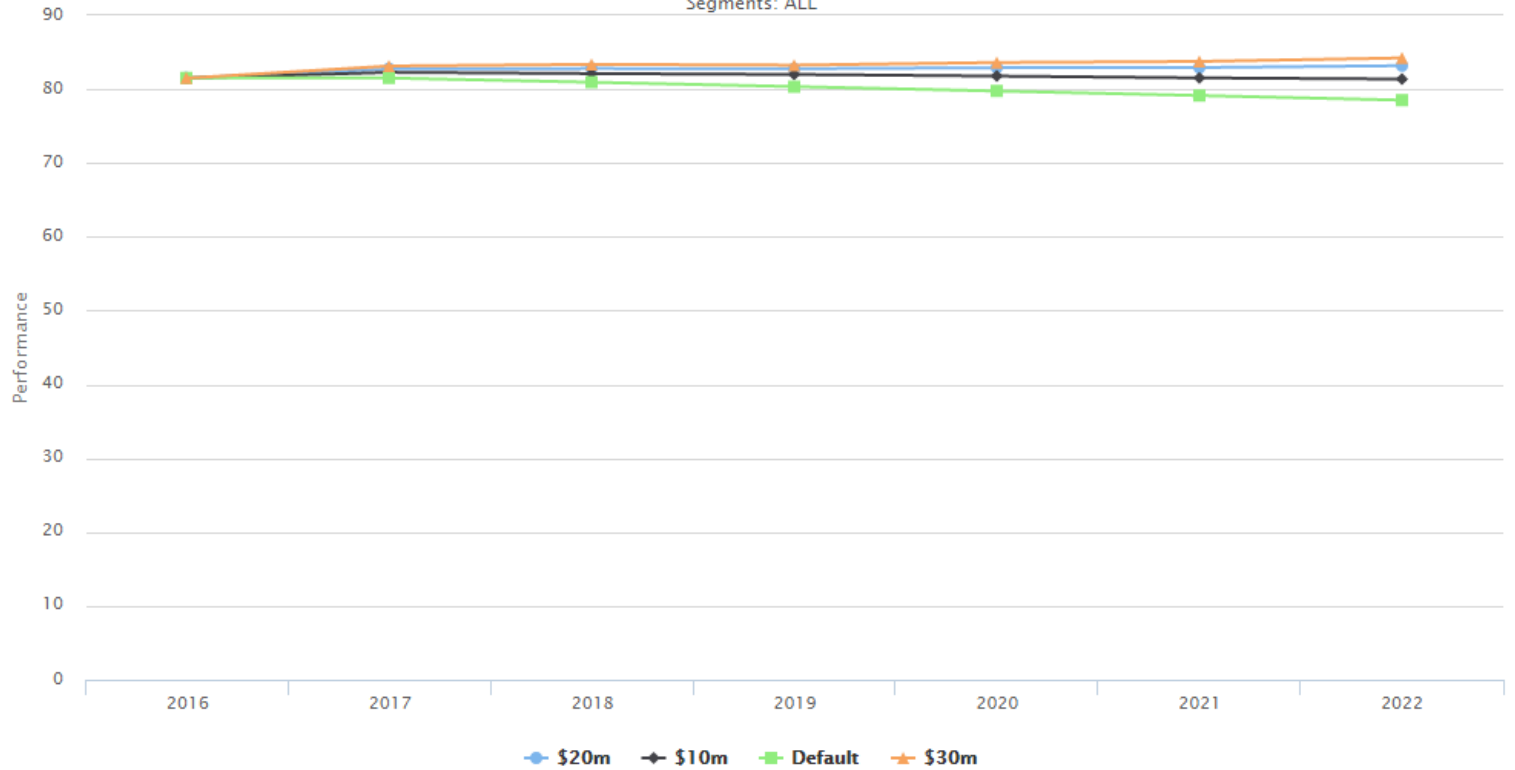
Programs > Scenario Explorer

[Edit Parameters](#)

Performance



Performance: Health Index
Segments: ALL



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Programs > Create/Edit Scenarios

Scenarios

Scenario Name	
<input checked="" type="checkbox"/>	10% SD
<input type="checkbox"/>	Default
<input checked="" type="checkbox"/>	15% SD
<input checked="" type="checkbox"/>	5% SD

Scenarios Details:

Name:

Program:

Deterioration Profile:



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Programs > Performance Measures

Performance Measures

Program: Scenario:

Select Performance Measures

Performance Measures	Best Value	Worst Value		
Utility	100.00	0.00		
Health Index	100.00	0.00		
Pct. Poor (Count-Based)	0.00	100.00		
<input type="button" value="+ Add new record"/>				

Performance Constraints by Segment

Segment	Utility	Health Index	Pct. Poor (Count-Based)
1 On the NHS	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text" value="10"/>
0 Not on NHS	Min: <input type="text"/> Target: <input type="text"/>	Min: <input type="text"/> Target: <input type="text"/>	Target: <input type="text" value="10"/>



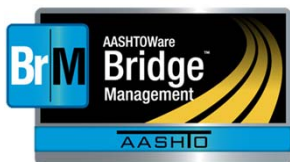
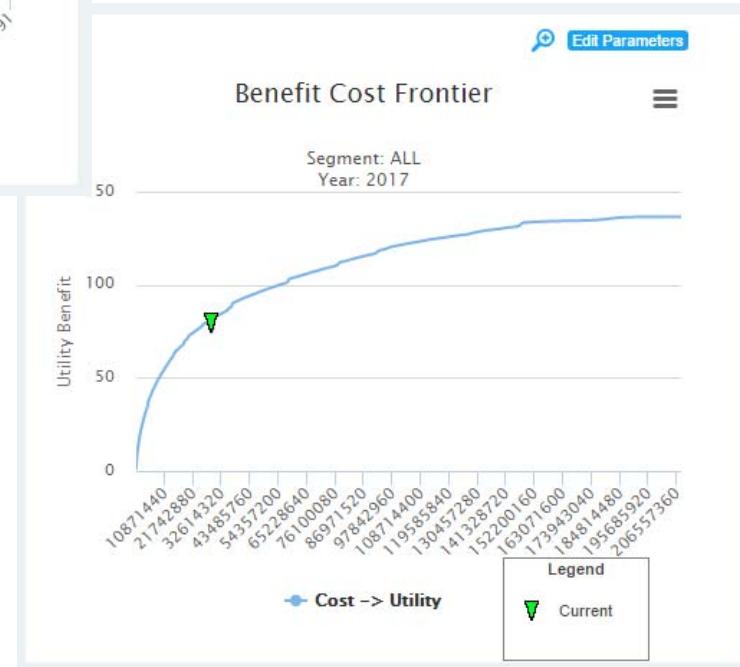
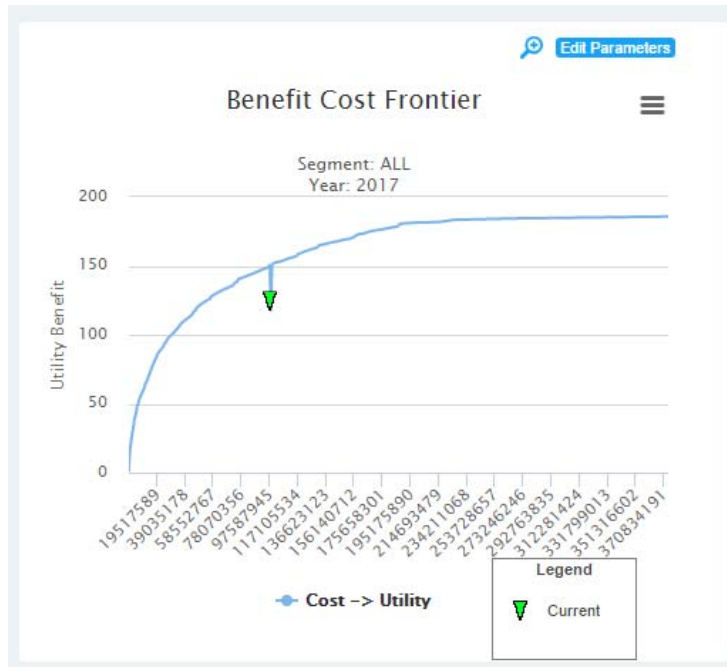
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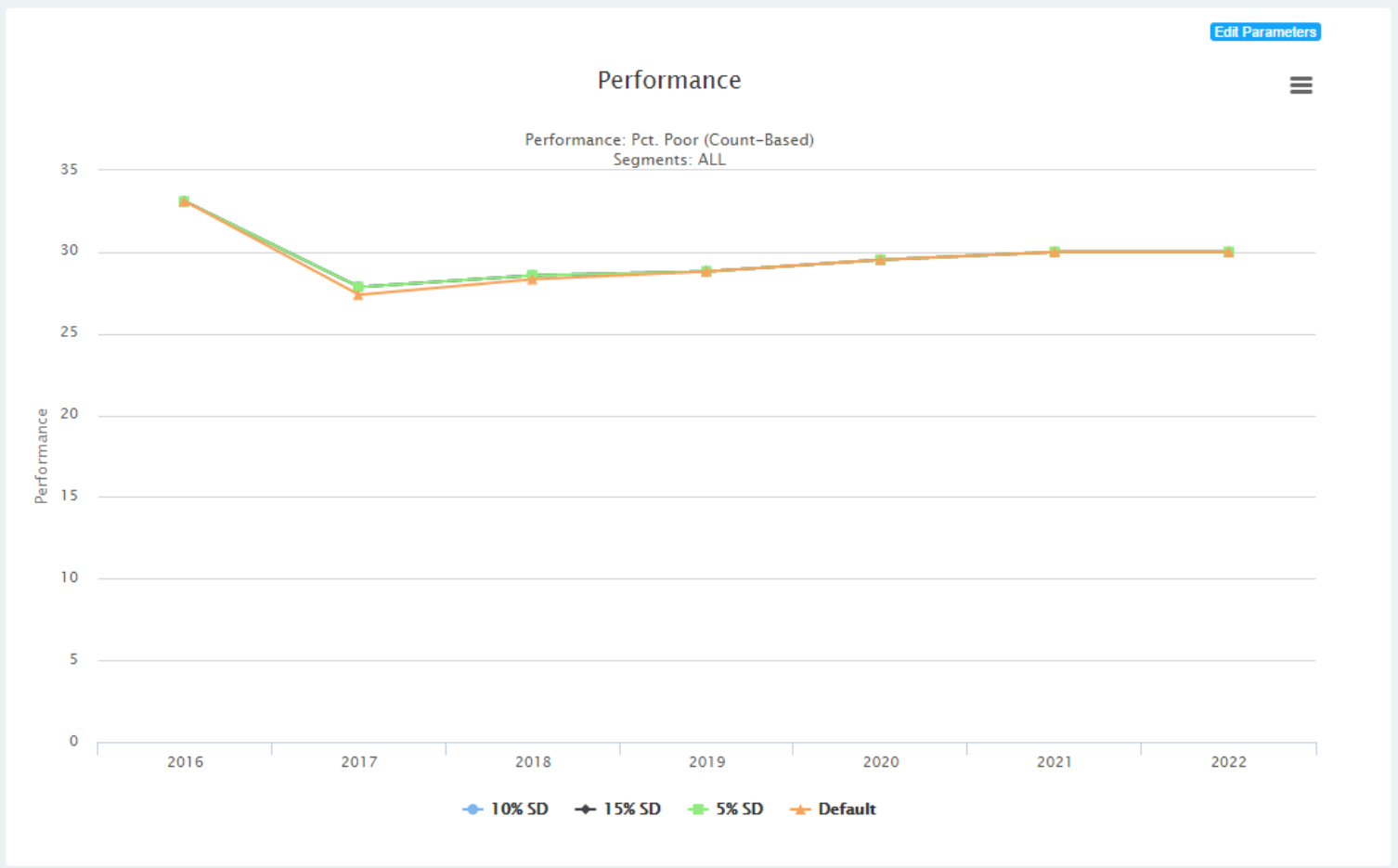
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Programs > Scenario Explorer



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Programs > Create/Edit Scenarios

Scenarios

Scenario Name	
<input checked="" type="checkbox"/>	BYU New Deterioration Rates
<input type="checkbox"/>	Default

Scenarios Details:

Name:

Program:

Deterioration Profile:



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Admin > Modeling Config > Deterioration Profiles

Deterioration Profile Editor

Deterioration Profile Details

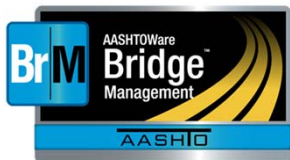
Name:

Description:

Elements

Element Key	Element Name	Altered	
12	Re Concrete Deck	Yes (Use Default)	View/Edit Model
13	Pre Concrete Deck	No	View/Edit Model
15	Pre Concrete Top Flange	No	View/Edit Model
16	Re Conc Top Flange	No	View/Edit Model
28	Steel Deck - Open Grid	No	View/Edit Model
29	Steel Deck - Conc Fill Grid	No	View/Edit Model
30	Steel Deck - Orthotropic	No	View/Edit Model
31	Timber Deck	No	View/Edit Model
38	Re Concrete Slab	No	View/Edit Model
54	Timber Slab	No	View/Edit Model

First Previous **1** 2 3 4 5 6 7 8 9 10 Next Last



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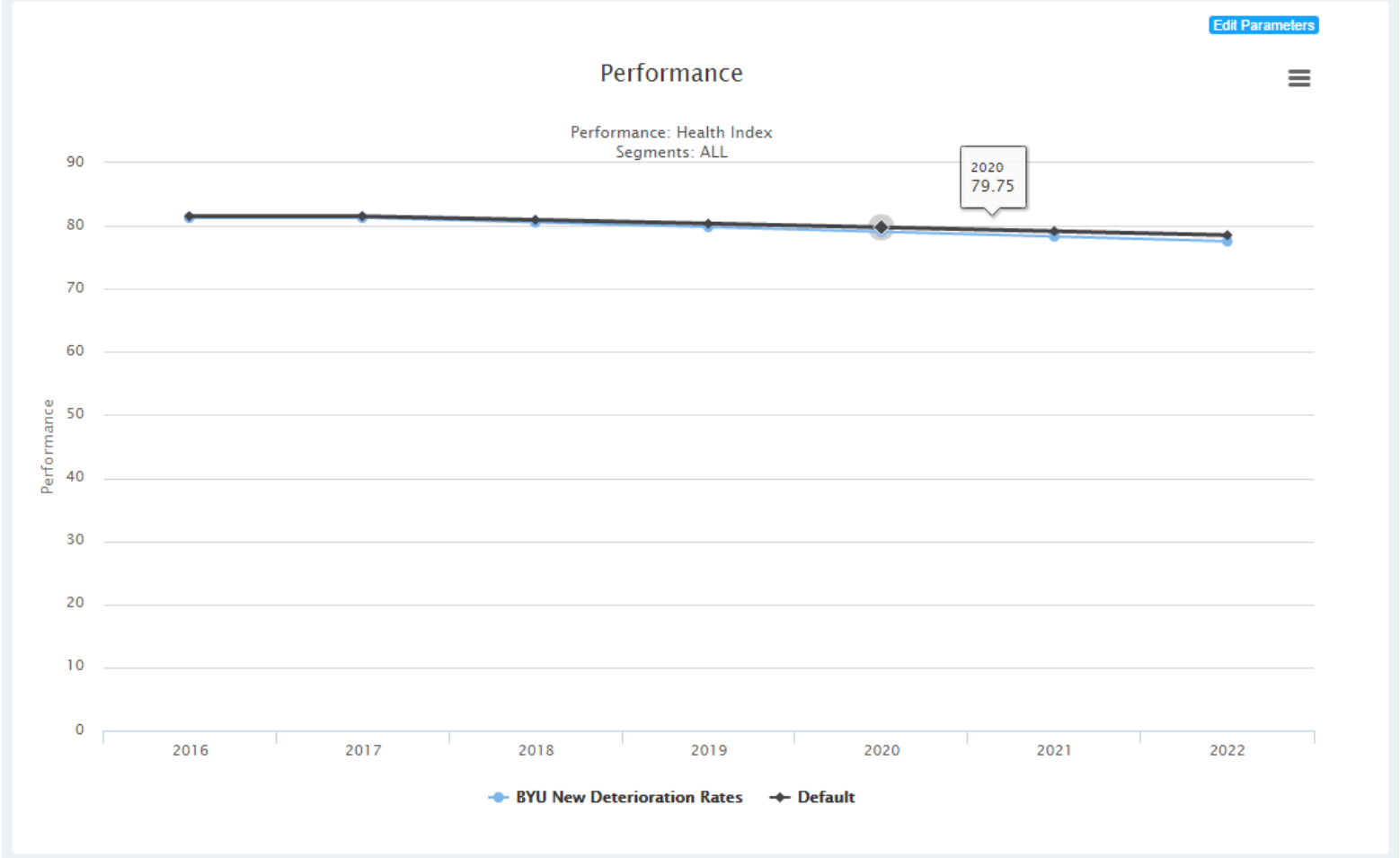
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