



# Deterioration Rate Setup

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User Group Meeting  
September 18, 2018  
Santa Fe, New Mexico



BrM Help Desk

[AASHTOWareBridge.com](http://AASHTOWareBridge.com)

[BrM@Bentley.com](mailto:BrM@Bentley.com)

JIRA tickets: [bridgeware.atlassian.net](https://bridgeware.atlassian.net)

Zachary Boyle, PE

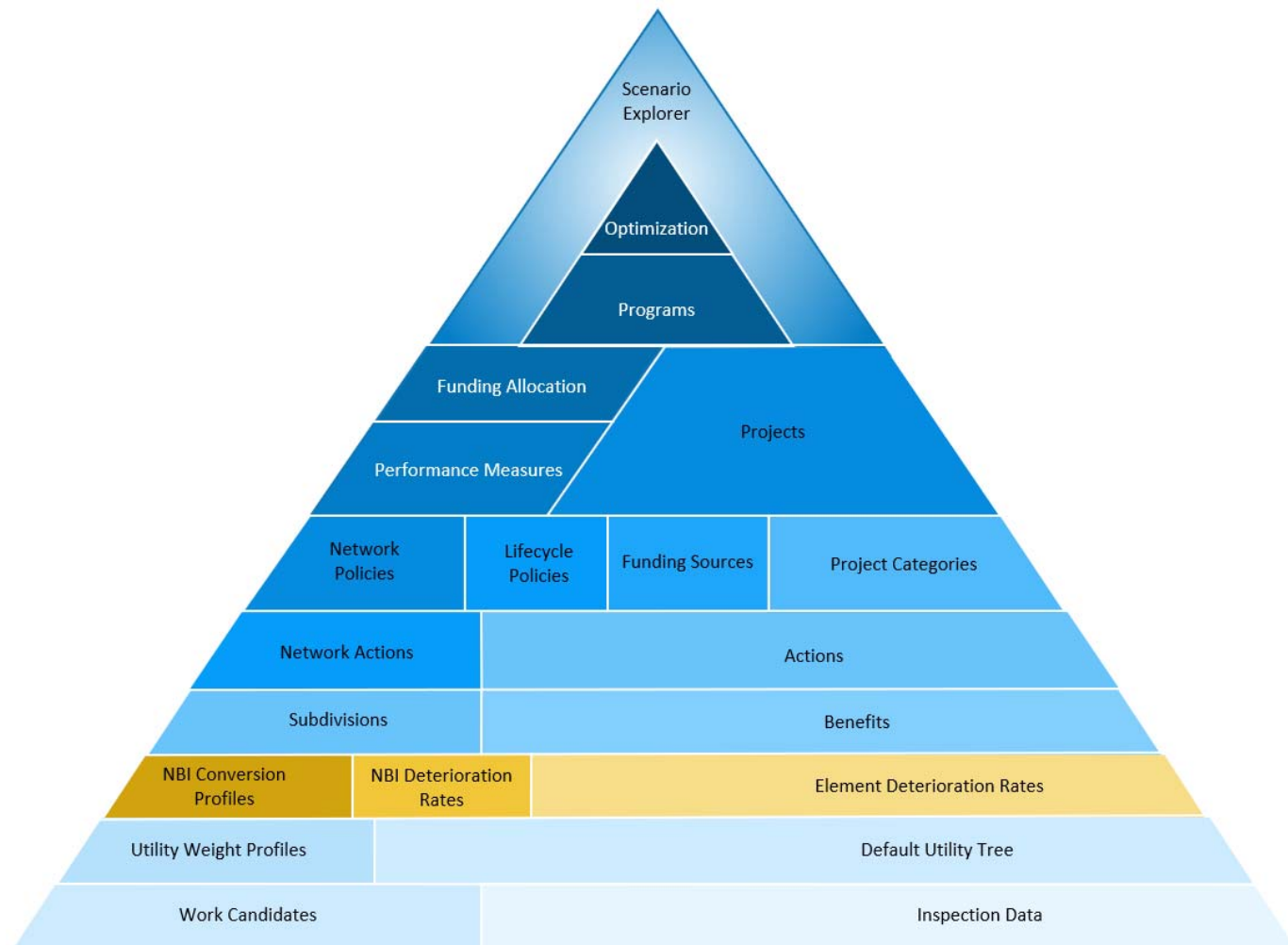
BrM Solutions Consultant

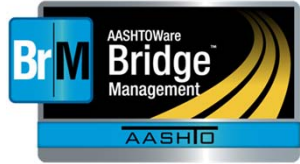
[Zac.Boyle@Bentley.com](mailto:Zac.Boyle@Bentley.com)



# Which things deteriorate:

- Pyramid
- Configuration
- Symptoms
- Element
- Deterioration
  - Where
  - How it works
  - Configuration
  - Focus
- NBI Conversion
  - How it works
  - Correlate to
  - Elements
- NBI Deterioration
  - Configuration





# Deterioration in BrM

The defaults are an average.

Pyramid

Configuration

Symptoms

Element

Deterioration

Where

How it works

Configuration

Focus

NBI Conversion

How it works

Correlate to

Elements

NBI Deterioration

Configuration

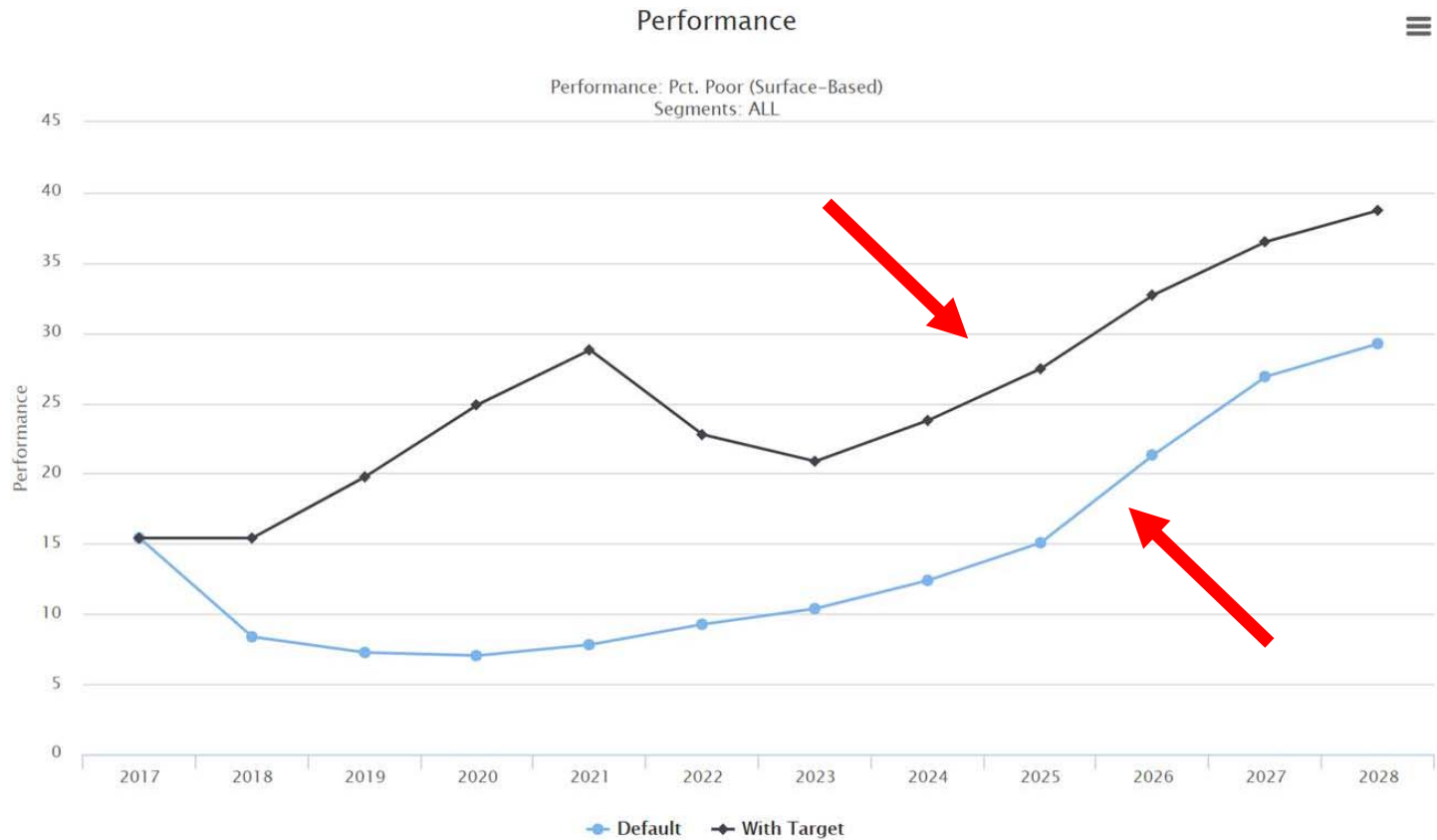




- Pyramid
- Configuration
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# Symptoms of Incorrect Deterioration

## Potentially unrealistic slopes

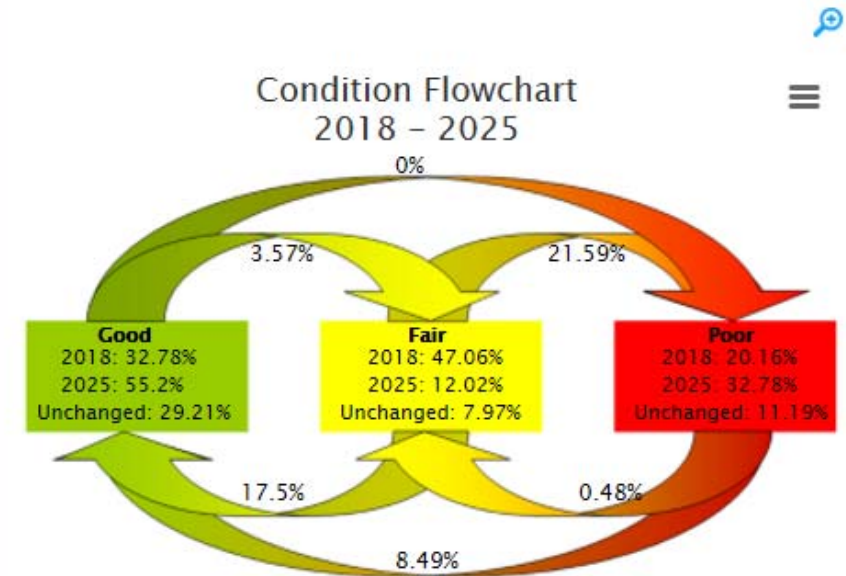
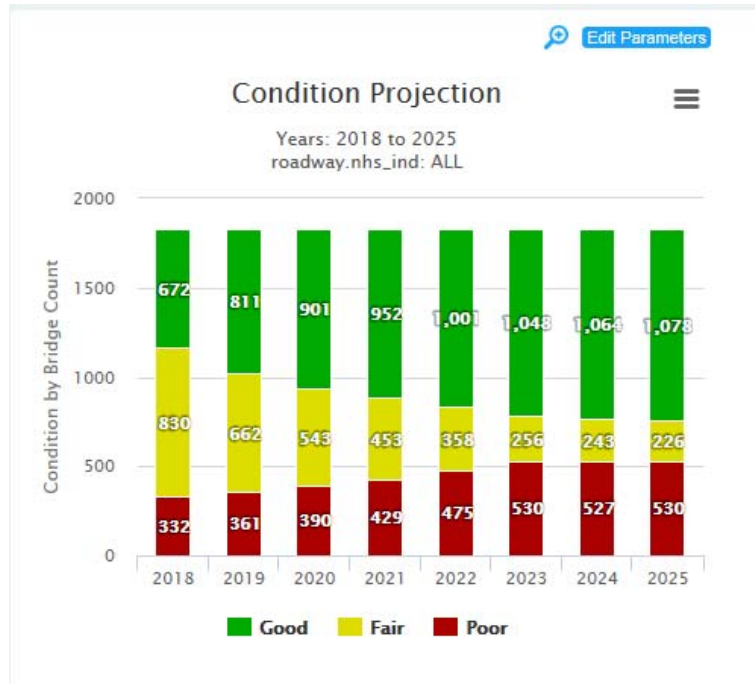




# Symptoms of Incorrect Deterioration

Know your inventory.

- Pyramid
- Configuration
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- Element Deterioration
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# Element Deterioration

## The basics.

Admin > Modeling Config > Element Spec

- Pyramid
- Configuration
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**Elements**

Element Filter  
Not Filtered

ID	Short Name
12	Re Concrete Deck
13	Pre Concrete Deck
15	Pre Concrete Top Flange
16	Re Conc Top Flange
28	Steel Deck - Open Grid
29	Steel Deck - Conc Fill Grid
30	Steel Deck - Orthotropic
31	Timber Deck
38	Re Concrete Slab
54	Timber Slab
60	Other Deck
65	Other Slab
102	Steel Clsd Box Gird
104	Pre Clsd Box Girder
105	Re Clsd Box Girder
106	Othr Clsd Web/Box Girder
107	Steel Opn Girder/Beam
109	Pre Opn Conc Girder/Beam
110	Re Conc Opn Girder/Beam
111	Timber Open Girder
112	Other Open Girder/Beam
113	Steel Stringer
115	Pre Conc Stringer
116	Re Conc Stringer

**Element Specifications**

Element Rollup Key: Undefined

Element Key:  NBE:

Short Name:  Long Name:

Relative Weight:  [All Relative Weights](#)

NBI Relative Weight:

Units:

Manual:  No file chosen

Defect:

Protective System/Wearing Surface:

Primary Defect:

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**Health Index Coefficients**

CS1:  CS2:  CS3:  CS4:

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**Deterioration Modeling**

Model:  [View Graphs](#)

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**Model Parameters**

Median years in CS1:  Shaping parameter:

Median years in CS2:  Formula:

Median years in CS3:

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**Classifications**

Category:

Material:

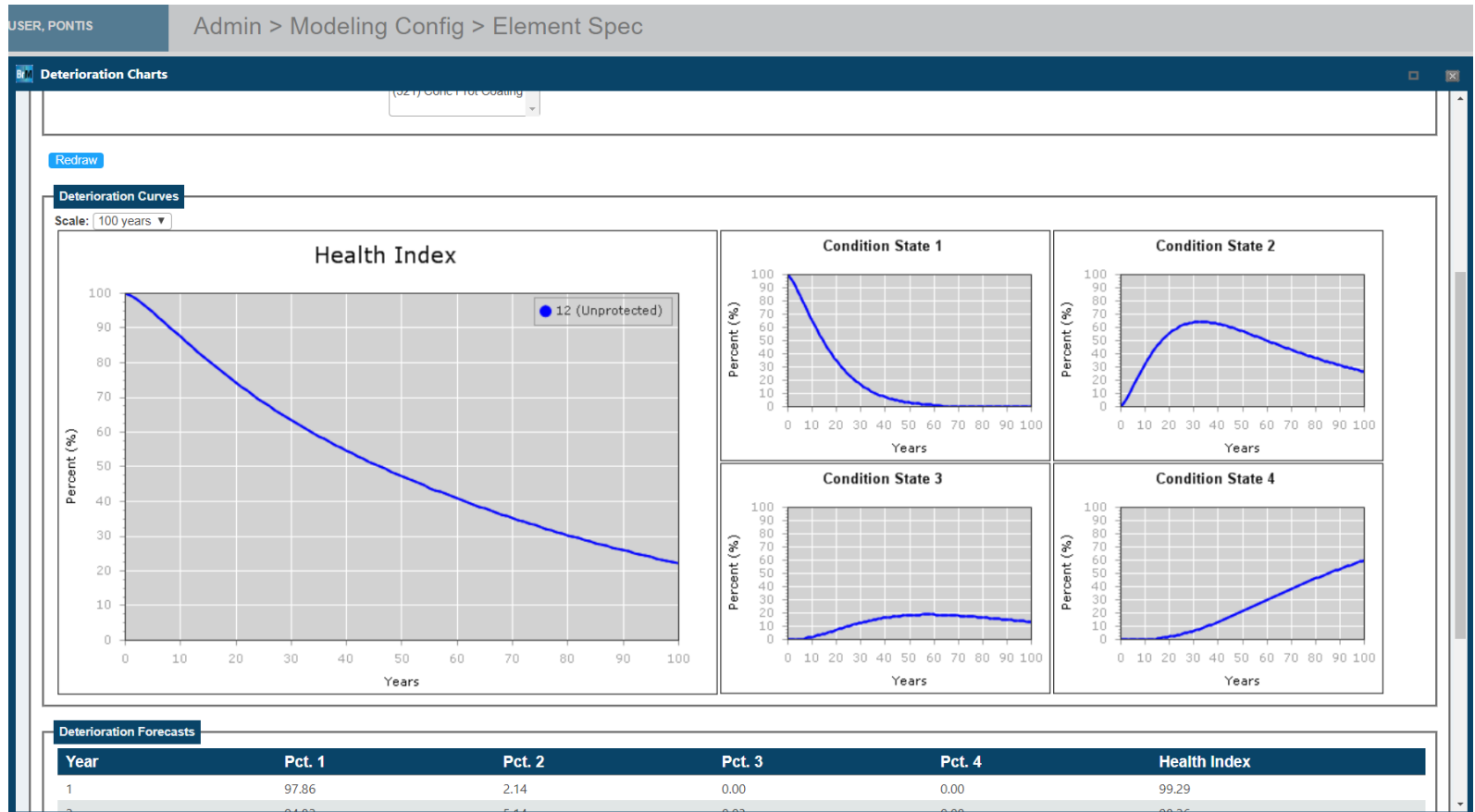
Type:



# Element Deterioration

## The basics.

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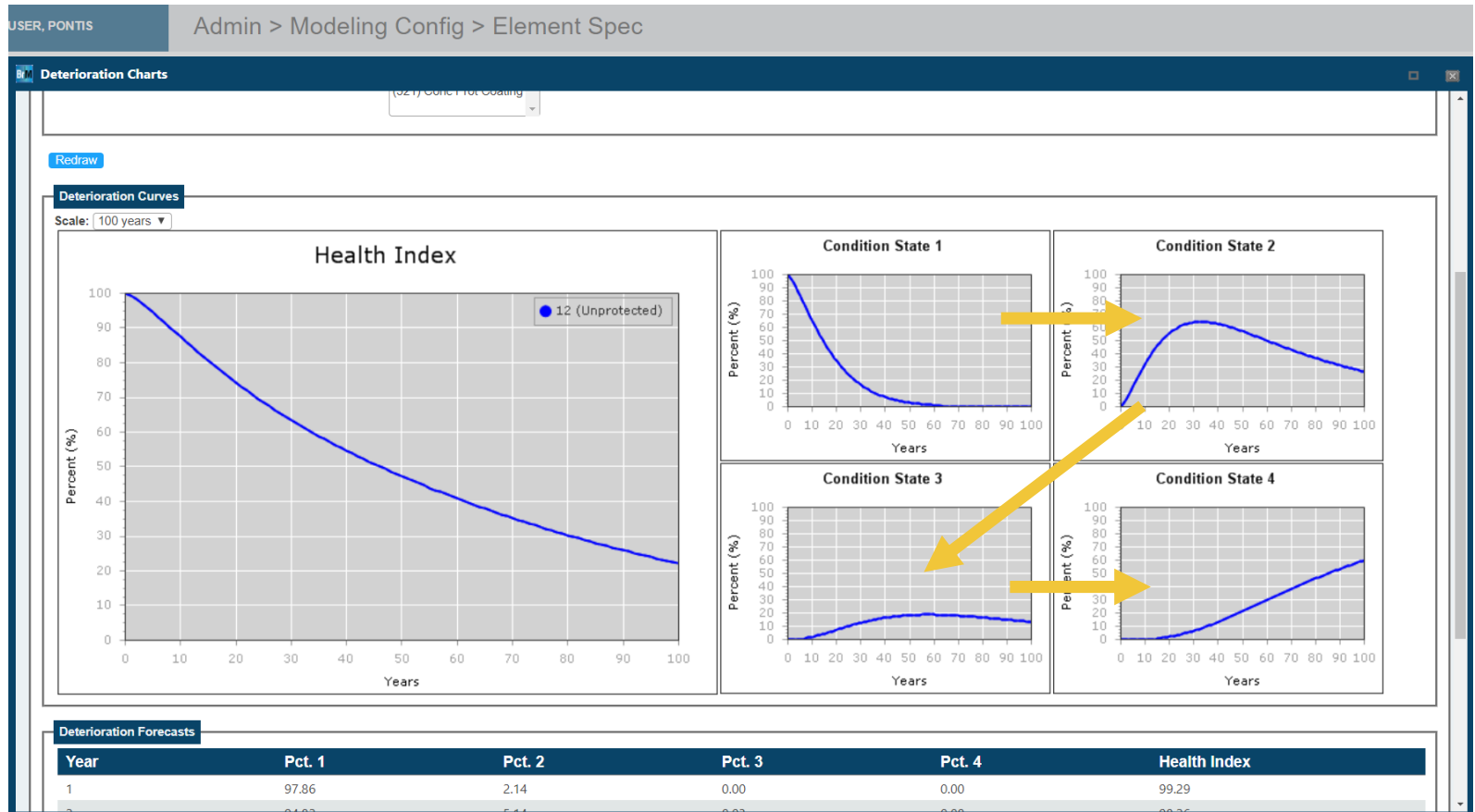


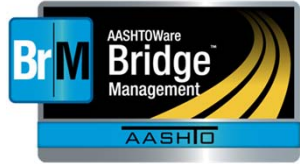


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# Element Deterioration

## Markovian Deterioration

Year	CS1	1%	CS2	1%	CS3	1%	CS4
1	100%						
2							
3							



# Element Deterioration

## Markovian Deterioration

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Year	CS1	1%	CS2	1%	CS3	1%	CS4
1	100%						
2	99%		1%				
3							



# Element Deterioration

## Markovian Deterioration

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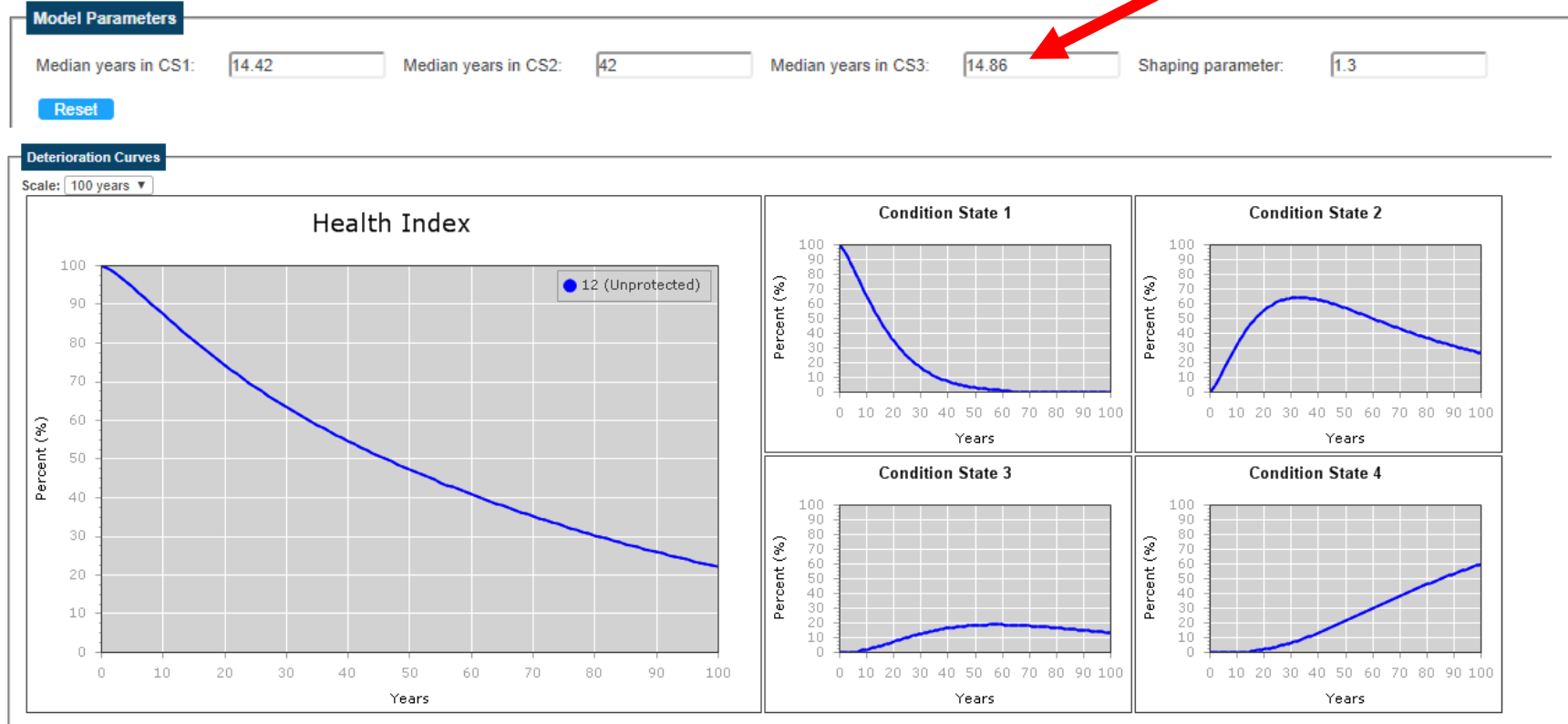
Year	CS1	1%	CS2	1%	CS3	1%	CS4
1	100%						
2	99%		1%				
3	98%		1.99%		0.01%		



# Element Deterioration

Disconnect this from its name.

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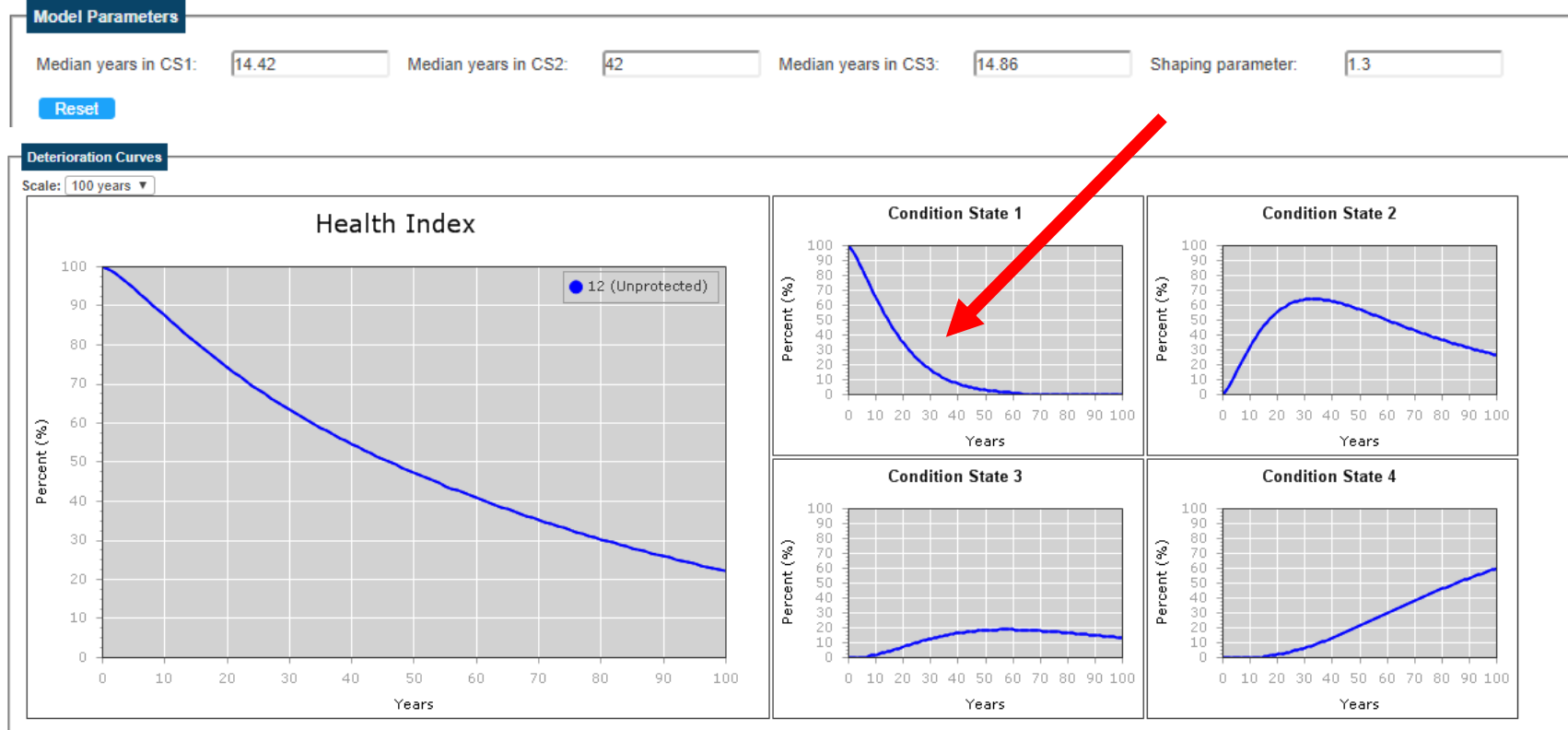




# Element Deterioration

Focus on the curves.

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Pyramid

Configuration

Symptoms

Element  
Deterioration

Where

How it works

Configuration

Focus

NBI Conversion

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Correlate to

Elements

NBI Deterioration

Configuration

# Element Deterioration

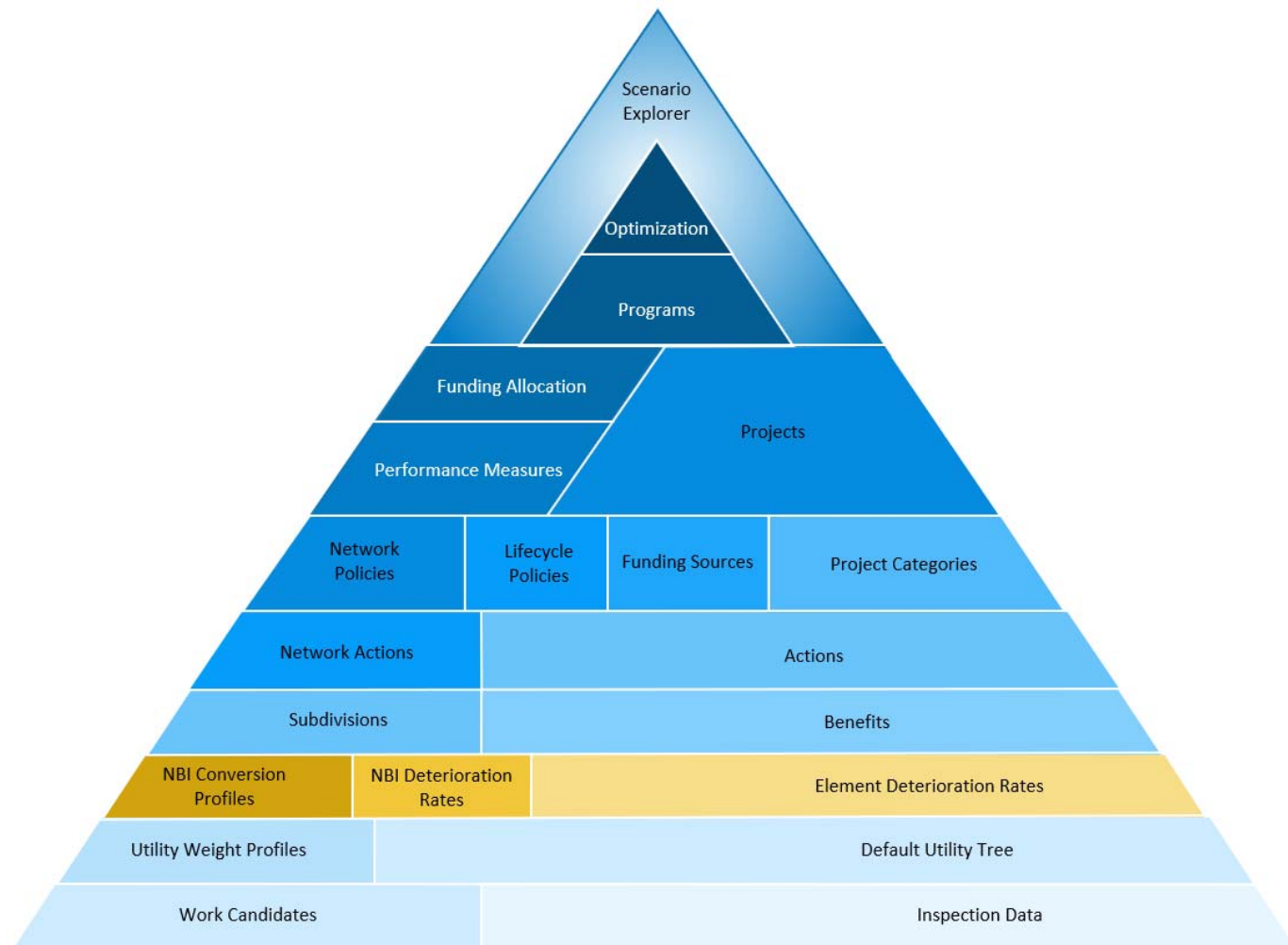
## Focus on the Basics First

- 12 – Reinforced Concrete Deck
- 107 – Steel Open Girder
- 109 – Precast Open Concrete Girder
- 215 – Reinforced Concrete Abutment
  
- Worry about Secondary Steel Cables later



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# NBI Conversion

## Upper Limits.

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Profile enabled

**Generic Upper Limits**

Group enabled

Method of CS average:

NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %
9	<input checked="" type="checkbox"/>	100	1	1	1
8	<input checked="" type="checkbox"/>		5	5	1
7	<input checked="" type="checkbox"/>		20	5	2
6	<input checked="" type="checkbox"/>			10	3
5	<input checked="" type="checkbox"/>			20	5
4	<input checked="" type="checkbox"/>				15
3	<input checked="" type="checkbox"/>				100
2	<input type="checkbox"/>				
1	<input type="checkbox"/>				



# NBI Conversion

## Upper Limits.

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Profile enabled

Generic Deck Superstructure Substructure Culvert

**Generic Upper Limits**

Group enabled

Method of CS average: Element weighting

NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %
9	<input checked="" type="checkbox"/>	100	1	1	1
8	<input checked="" type="checkbox"/>		5	5	1
7	<input checked="" type="checkbox"/>		20	5	2
6	<input checked="" type="checkbox"/>			10	3
5	<input checked="" type="checkbox"/>			20	5
4	<input checked="" type="checkbox"/>				15
3	<input checked="" type="checkbox"/>				100
2	<input type="checkbox"/>				
1	<input type="checkbox"/>				

	CS1	CS2	CS3	CS4
Quantity	595.8	597.3	300.1	0
Percent	39.9%	40%	20.1%	0%
NBI Rule	-	6	4	-
Converted NBI: 4				



# NBI Conversion

## With Element Deterioration.

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Profile enabled

Generic Deck Superstructure Substructure Culvert

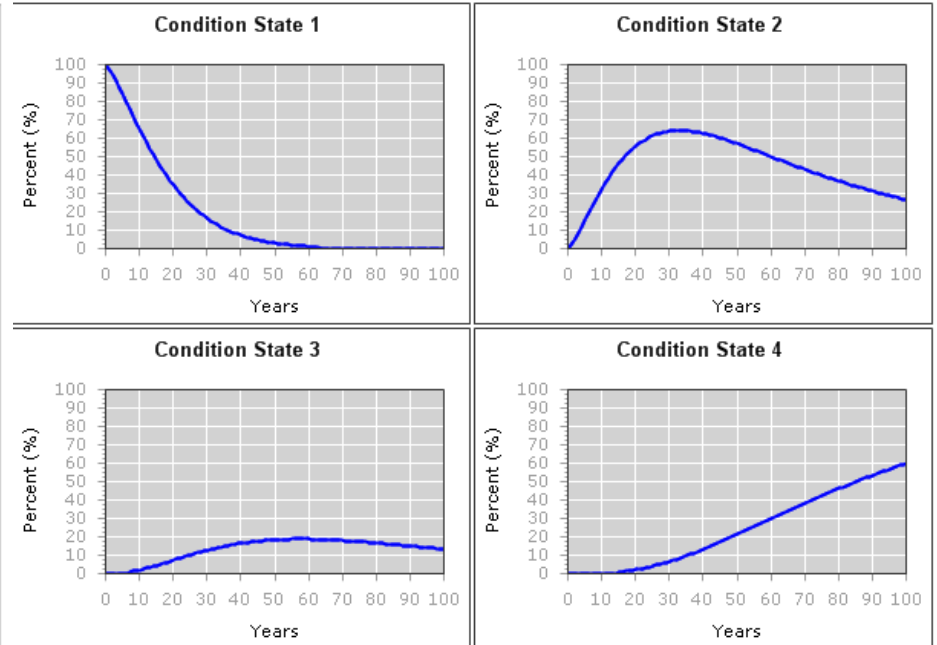
**Generic Upper Limits**

Group enabled

Method of CS average: Element weighting

NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %
9	<input checked="" type="checkbox"/>	100	1	1	1
8	<input checked="" type="checkbox"/>		5	5	1
7	<input checked="" type="checkbox"/>		20	5	2
6	<input checked="" type="checkbox"/>			10	3
5	<input checked="" type="checkbox"/>			20	5
4	<input checked="" type="checkbox"/>				15
3	<input checked="" type="checkbox"/>				100
2	<input type="checkbox"/>				
1	<input type="checkbox"/>				

Element 12 – Reinforced Concrete Deck





# NBI Conversion

## With Element Deterioration.

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Profile enabled

Generic Deck Superstructure Substructure Culvert

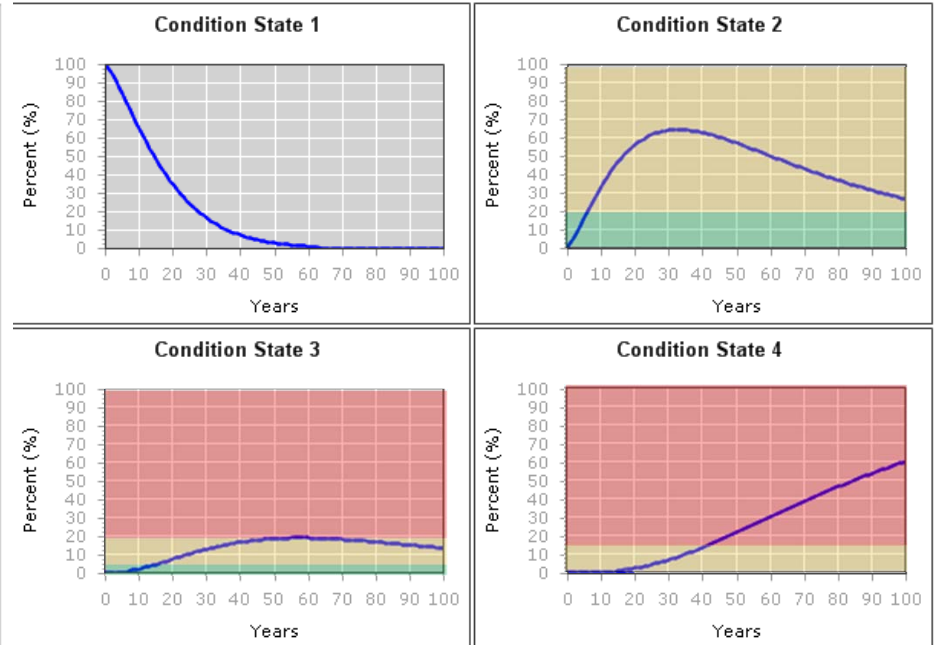
**Generic Upper Limits**

Group enabled

Method of CS average: Element weighting

NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %
9	<input checked="" type="checkbox"/>	100	1	1	1
8	<input checked="" type="checkbox"/>		5	5	1
7	<input checked="" type="checkbox"/>		20	5	2
6	<input checked="" type="checkbox"/>			10	3
5	<input checked="" type="checkbox"/>			20	5
4	<input checked="" type="checkbox"/>				15
3	<input checked="" type="checkbox"/>				100
2	<input type="checkbox"/>				
1	<input type="checkbox"/>				

Element 12 – Reinforced Concrete Deck





# NBI Conversion

## With Element Deterioration.

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Profile enabled

Generic Deck Superstructure Substructure Culvert

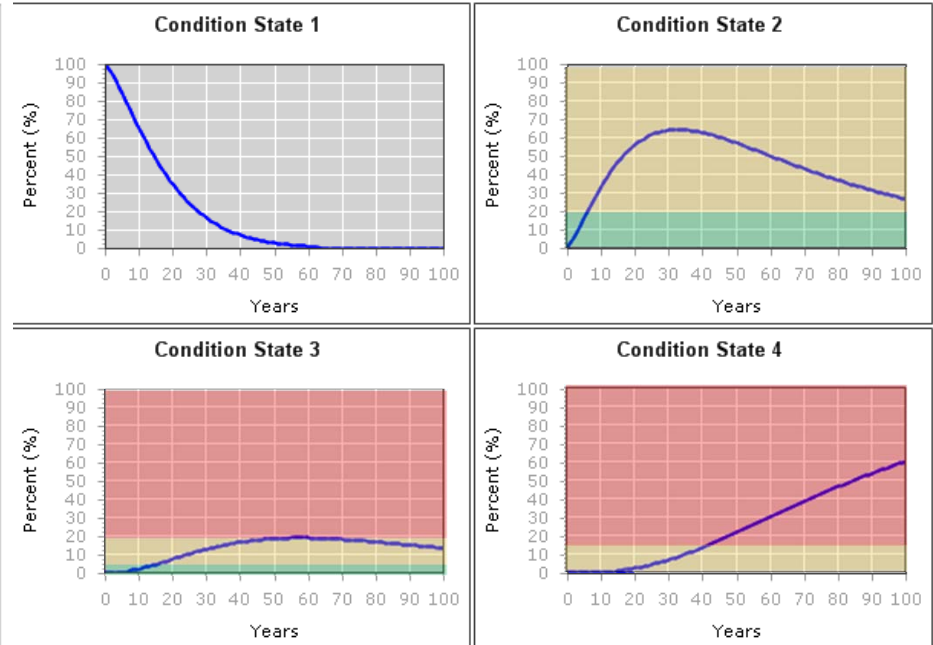
**Generic Upper Limits**

Group enabled

Method of CS average: Element weighting

NBI	Enabled	CS1 %	CS2 %	CS3 %	CS4 %
9	<input checked="" type="checkbox"/>	100	1	1	1
8	<input checked="" type="checkbox"/>		5	5	1
7	<input checked="" type="checkbox"/>		20	5	2
6	<input checked="" type="checkbox"/>			10	3
5	<input checked="" type="checkbox"/>			20	5
4	<input checked="" type="checkbox"/>				15
3	<input checked="" type="checkbox"/>				100
2	<input type="checkbox"/>				
1	<input type="checkbox"/>				

Element 12 – Reinforced Concrete Deck



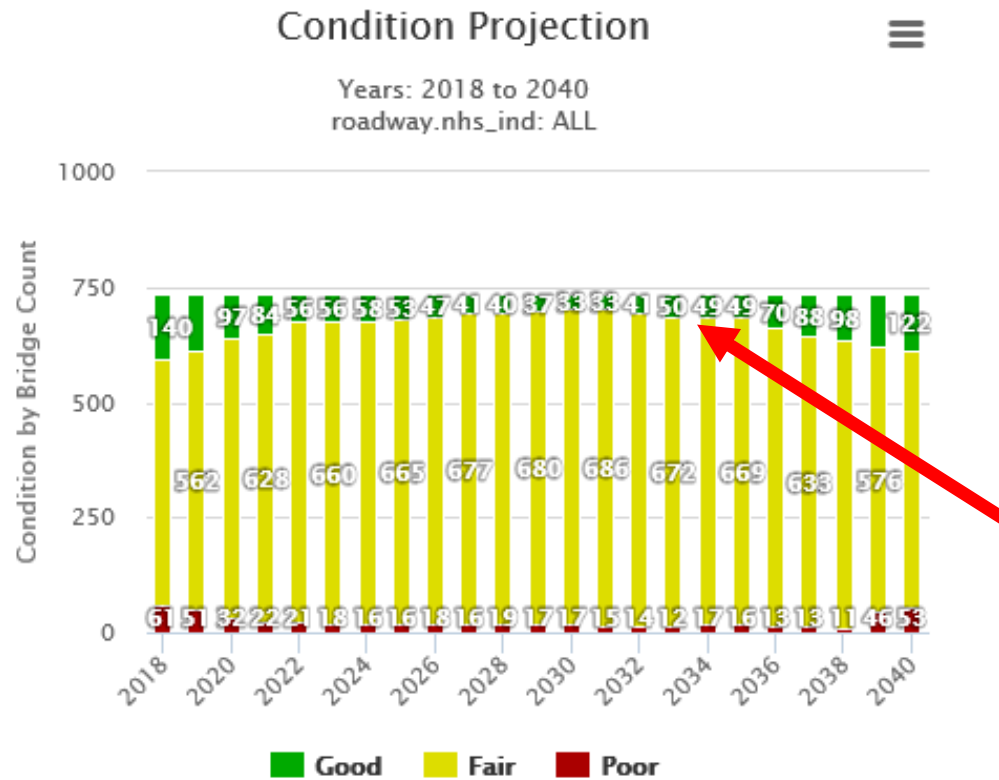
9: 2 years 8: 4 years 7: 6 years 6: 8 years 5: 25 years 4: 45 years 3: 100+ years



# NBI Conversion

So consider this problem.

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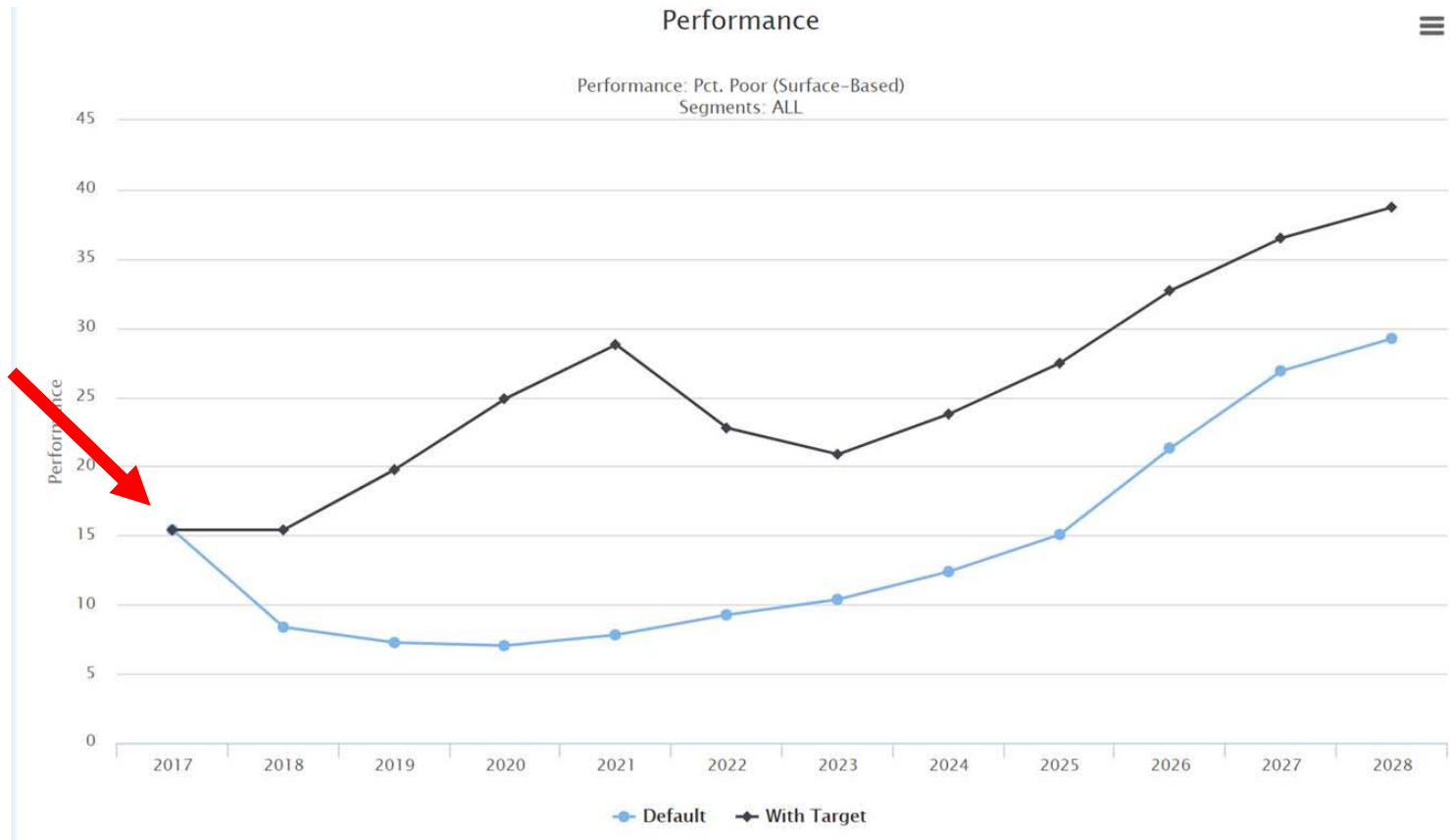




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# NBI Conversion

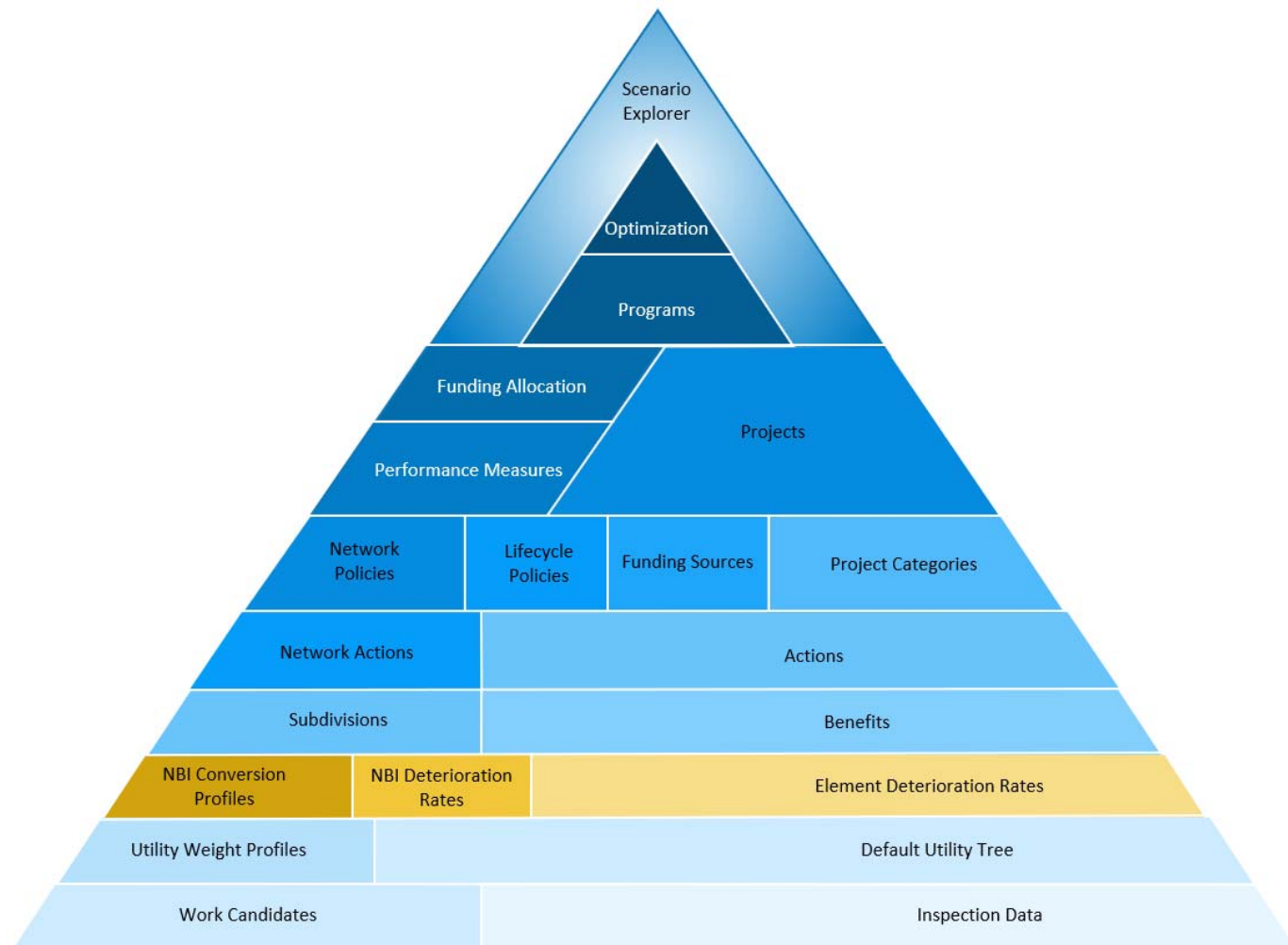
So consider this problem.





# NBI Deterioration

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**Component Specification**

Name:

Description:

Category:

Table Name:  Column Name:

Min NBI Value:  Max NBI Value:

**Component Deterioration Modeling**

Model

**Model Parameters**

NBI Transition Time in Years 9 :	<input type="text" value="2"/>
NBI Transition Time in Years 8 :	<input type="text" value="12.5"/>
NBI Transition Time in Years 7 :	<input type="text" value="18"/>
NBI Transition Time in Years 6 :	<input type="text" value="14"/>
NBI Transition Time in Years 5 :	<input type="text" value="12"/>
NBI Transition Time in Years 4 :	<input type="text" value="7"/>
NBI Transition Time in Years 3 :	<input type="text" value="4"/>
NBI Transition Time in Years 2 :	<input type="text" value="0.5"/>
NBI Transition Time in Years 1 :	<input type="text" value="0"/>



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**Component Specification**

Name:

Description:

Category:

Table Name:  Column Name:

Min NBI Value:  Max NBI Value:

---

**Component Deterioration Modeling**

Model

**Model Parameters**

NBI Transition Time in Years 9:

NBI Transition Time in Years 8:

NBI Transition Time in Years 7:

NBI Transition Time in Years 6:

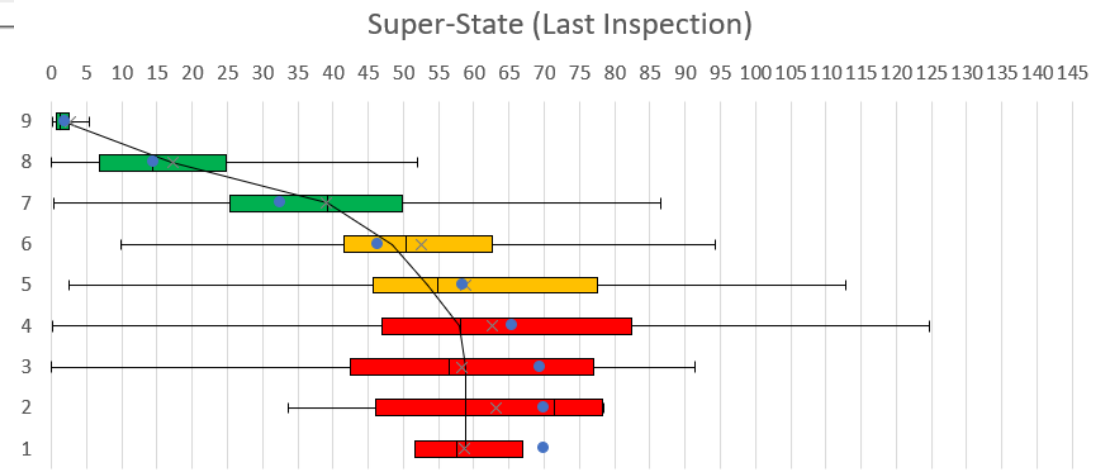
NBI Transition Time in Years 5:

NBI Transition Time in Years 4:

NBI Transition Time in Years 3:

NBI Transition Time in Years 2:

NBI Transition Time in Years 1:





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Component Specification

Name:

Description:

Category:

Table Name:  Column Name:

Min NBI Value:  Max NBI Value:

Component Deterioration Modeling

Model

Model Parameters

NBI Transition Time in Years 9 :

NBI Transition Time in Years 8 :

NBI Transition Time in Years 7 :

NBI Transition Time in Years 6 :

NBI Transition Time in Years 5 :

NBI Transition Time in Years 4 :

NBI Transition Time in Years 3 :

NBI Transition Time in Years 2 :

NBI Transition Time in Years 1 :

Bridge Filter:

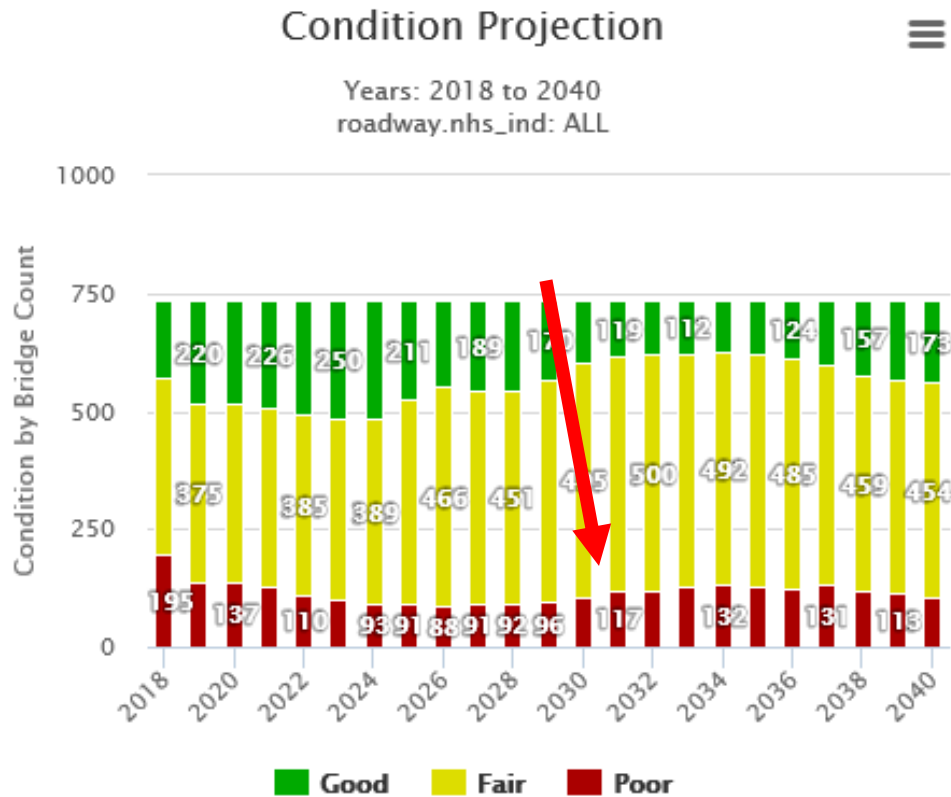
Component:

	Latest Inspection Reported	Current	+5 Years	+10 Years
NBI Rating 9	4	0	0	0
NBI Rating 8	2	5	0	0
NBI Rating 7	2	3	8	7
NBI Rating 6	6	3	3	3
NBI Rating 5	4	6	4	2
NBI Rating 4	7	6	3	4
NBI Rating 3	1	2	4	2
NBI Rating 2	0	1	1	1
NBI Rating 1	0	0	0	0
NBI Rating 0	0	0	3	7



# NBI Deterioration

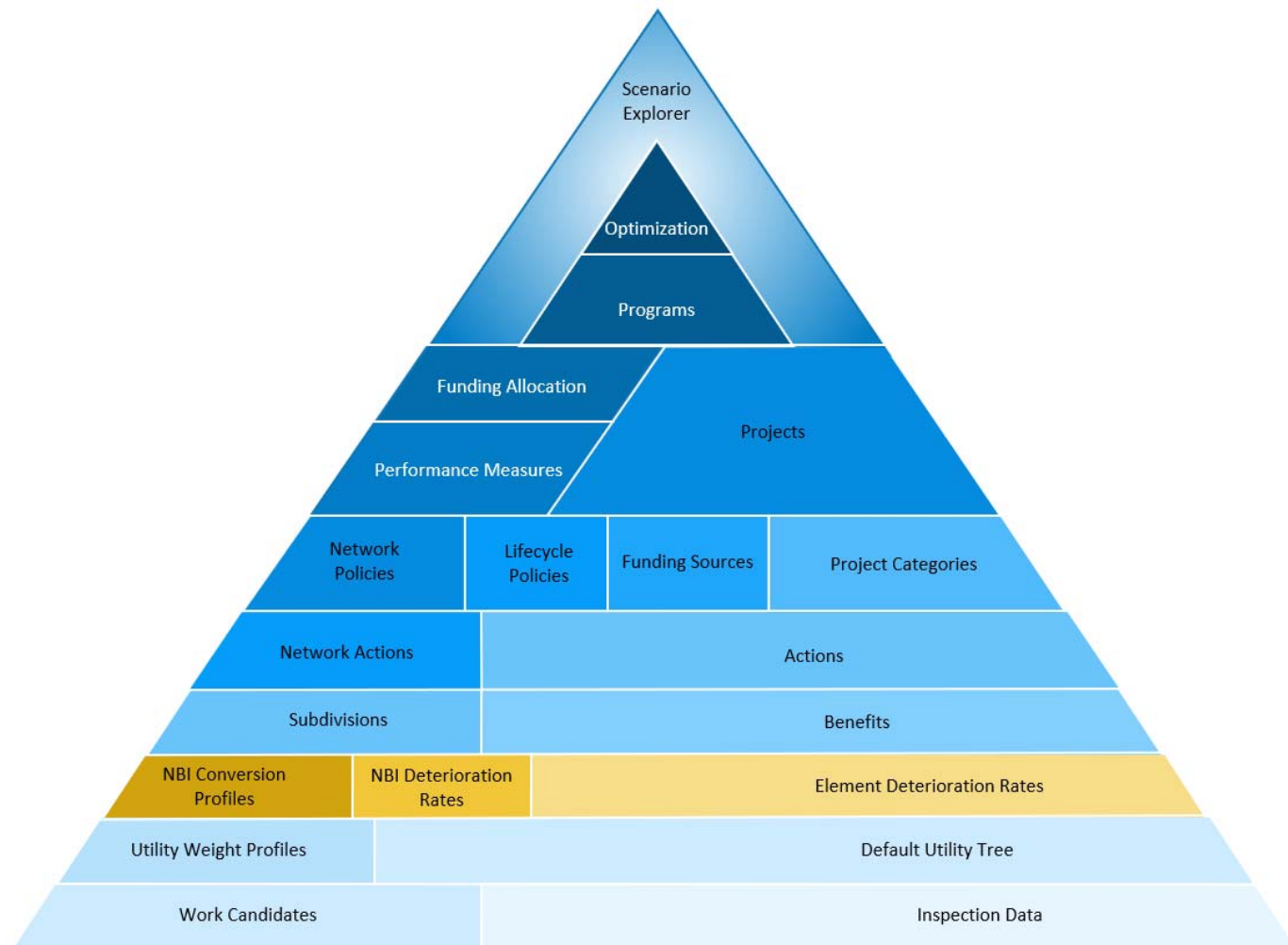
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[AASHTOWareBridge.com](http://AASHTOWareBridge.com)

[BrM@Bentley.com](mailto:BrM@Bentley.com)

JIRA tickets: [bridgeware.atlassian.net](https://bridgeware.atlassian.net)

Zachary Boyle, PE

BrM Solutions Consultant

[Zac.Boyle@Bentley.com](mailto:Zac.Boyle@Bentley.com)

Or add '@ZacBoyle' to your JIRA tickets