

# BrM 5.2.1 Overview / Preview



*Formerly*



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# AASHTOWare Bridge Management

- Pontis 5.2 is funded by a voluntary participation from more than 20 state DOTs, under DOT guidance and expertise
- Tools that are easier to use and understand:
  - Planning
  - Deterioration
  - Risk
  - Multi-objective analysis
  - Lifecycle costs
  - Project models
  - Dashboards
  - Corridor planning



AASHTOWare Bridge Management

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



# Basic Approach of 5.2

- Utilize extensive research and lessons learned over past 20 years
  - Continue to evaluate best approach and layout
  - Give Task Force recommendations
  - TRT Expert Panel of State Representatives
- Develop the trunk of 5.2 and outward functionality at each level
- Multiple Phased implementation

# 5.2 Development Phases

- Phased releases
  - Version 5.2.1 - In Final Stages
    - Utility Functions, Multi-Objective Analysis Engine, New Filters/Layouts, Mapping, Bridge Analysis Groups, New AASHTO Elements.
  - Version 5.2.2
    - Implementation of new deterioration models, preservation actions, and project analysis
  - Version 5.2.3
    - Integrated project and program planning
    - Advanced administrative features



# What's in a Number and a Name?

Pontis 4.5

BrM 5.2.1

Pontis 5.1.0.3

BrM 5.2.2

Pontis 5.1.2

BrM 5.2.3

Pontis 5.1.3



# What's in a Number/Name?

- Pontis Version 4.5
  - C++ based
  - Standalone or Client/Server Windows Application
  - CoRe Elements
  - Management and Inspection software
- Pontis Version 5.1.03
  - Microsoft .NET
  - Standalone (.NET) or Enterprise Web Based Application
  - CoRe Elements
  - Only Inspection software
  - Can share common database with 4.5 for management



# What's in a Number?

- Pontis Version 5.1.2 / 5.1.3
  - Microsoft .NET
  - Standalone (.NET) or Enterprise Web Based Application
  - NBEs/BMEs
  - Only Inspection software
  - Management depends on 5.2
- BrM Version 5.2
  - Microsoft .NET
  - Standalone (.NET) or Enterprise Web Based Application
  - NBEs/BMEs
  - Advanced Bridge Management Software



## 5.2 Architecture

- 5.2 utilizes a flexible web-based architecture
  - Microsoft .NET application
  - Microsoft SQL or Oracle database support
  - Accessible anywhere/anytime via web-browser
- New technology/capabilities:
  - XML for transferring bridge data
  - Google Maps for GIS/Mapping



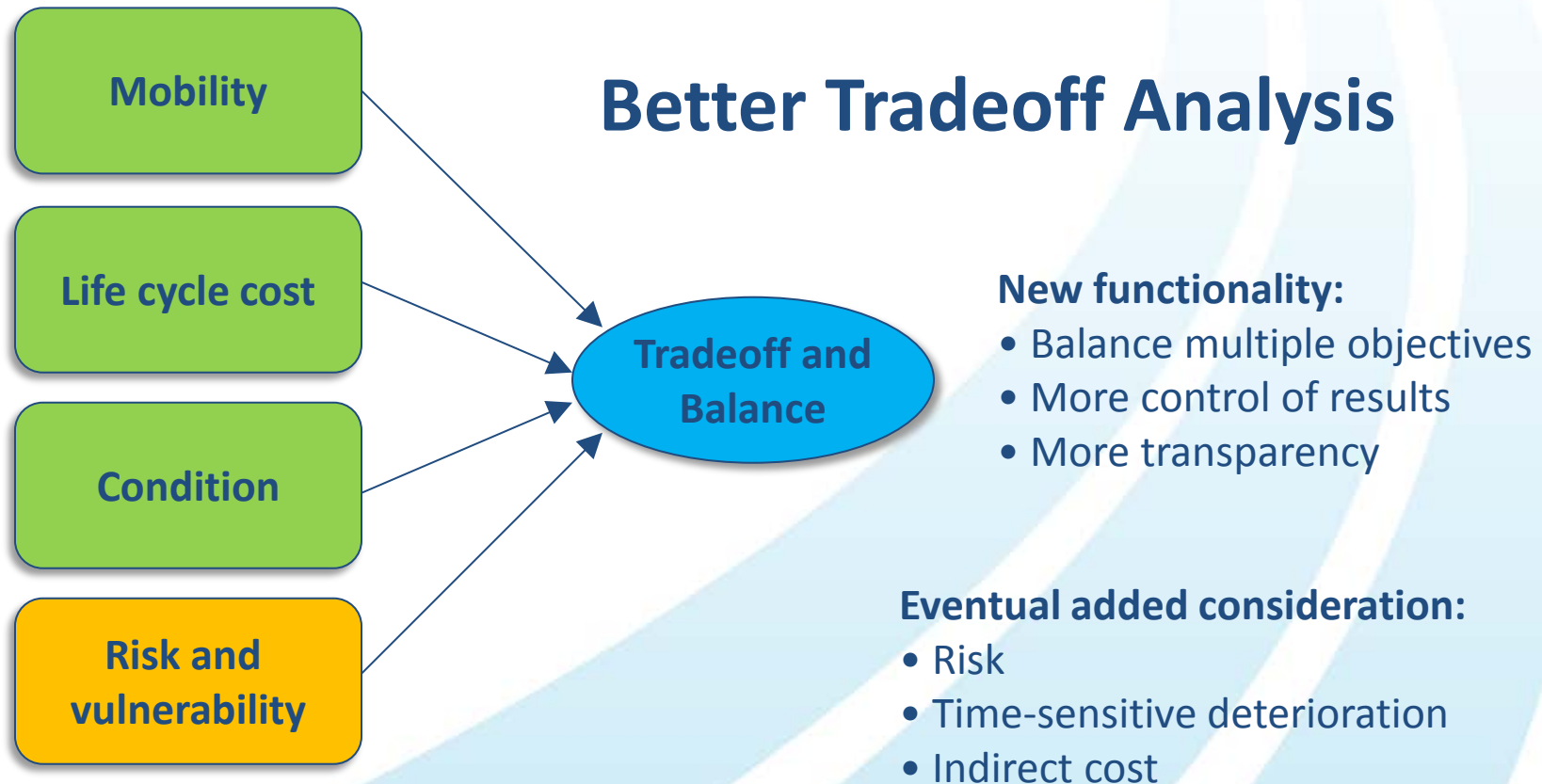


# Why are we doing 5.2?

- Many lessons learned from 4.X and previous versions
- New technology allows flexible web-based approach for better features, access, and support
- Inclusion of new AASHTO Elements including protective systems, defects
- Opening up the black box providing full transparency of why values are obtained



# Improved Decision Making Tools



Better fit for agency workflow and business processes

# Key Parts of Pontis/BrM 5.2

- What do I have?
- What Condition is it in?

**Bridge  
Inventory**

**Bridge  
Conditions**

# Key Parts of Pontis/BrM 5.2

- What Risks Do I have?

Bridge  
Inventory

Bridge  
Conditions

Risk

# Key Parts of Pontis/BrM 5.2

- What are my identified needs?

Bridge  
Inventory

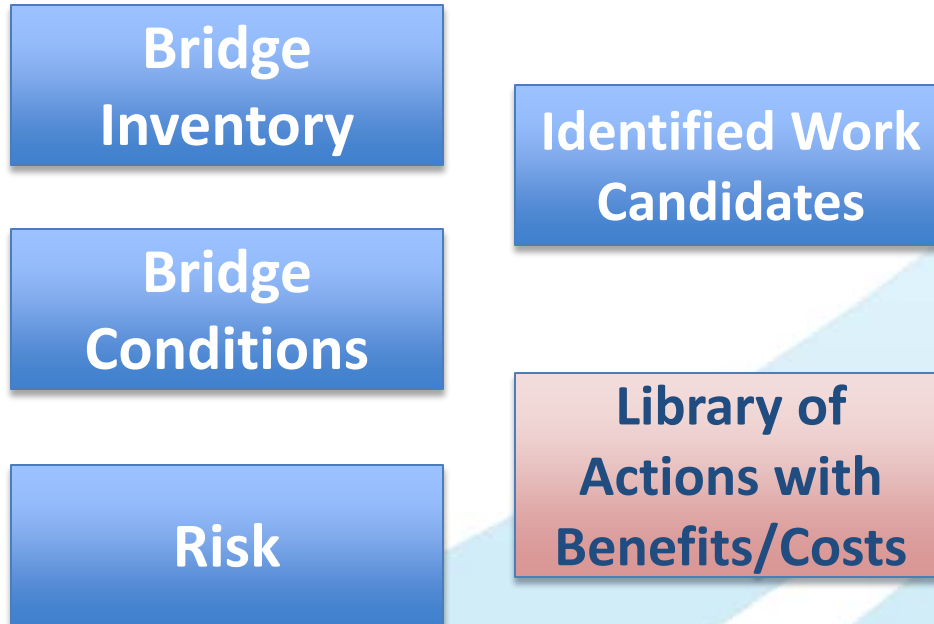
Bridge  
Conditions

Risk

Identified Work  
Candidates

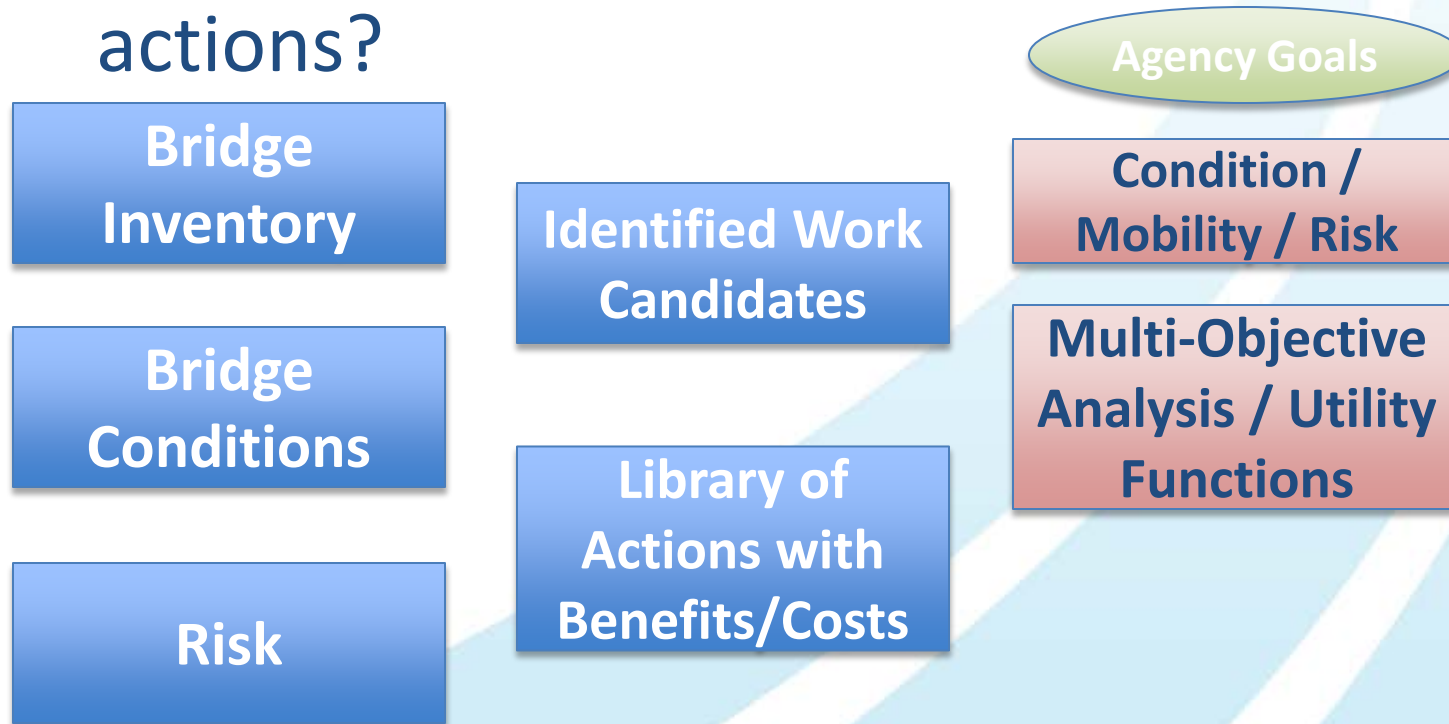
# Key Parts of Pontis/BrM 5.2

- What are the benefits of the work candidates?



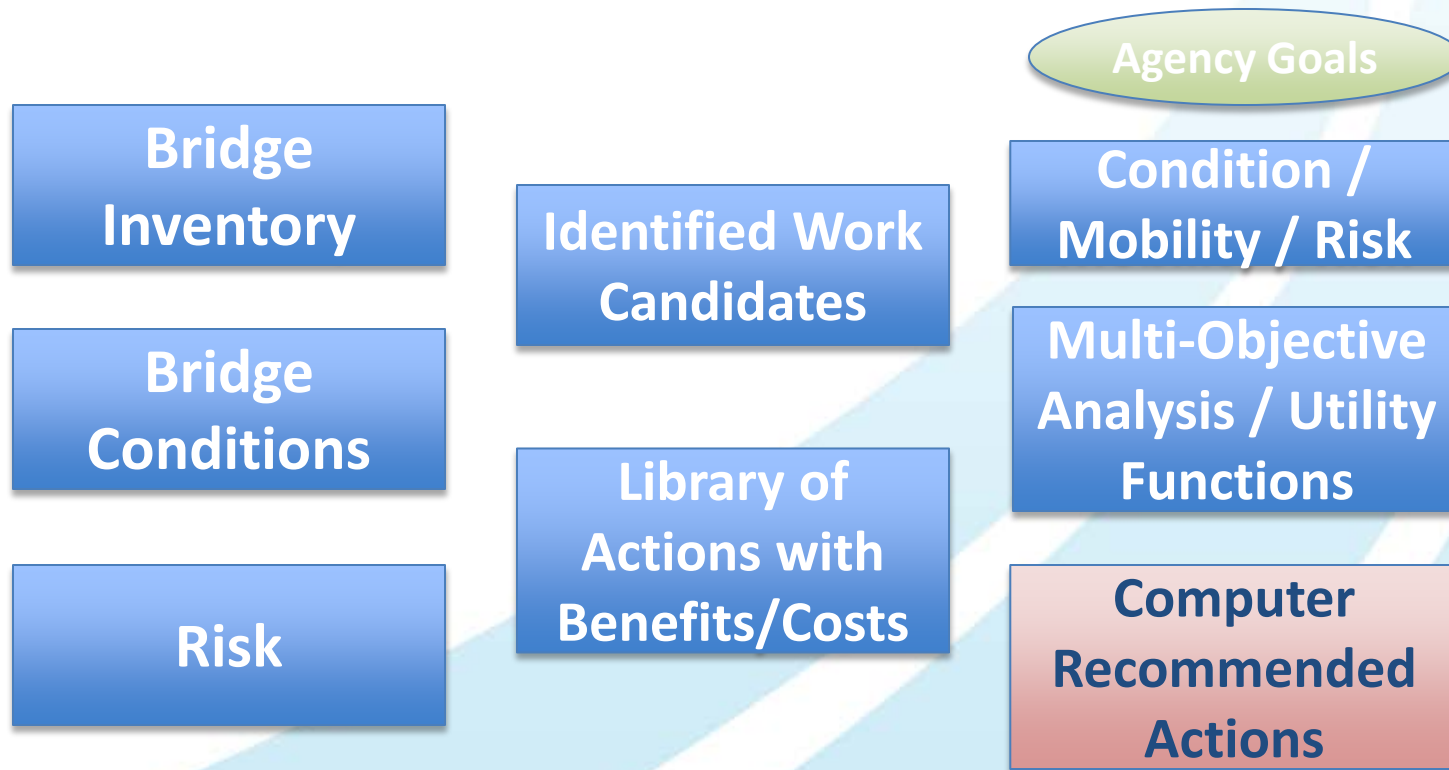
# Key Parts of Pontis/BrM 5.2

- How do I compare benefits of very different actions?



# Key Parts of Pontis/BrM 5.2

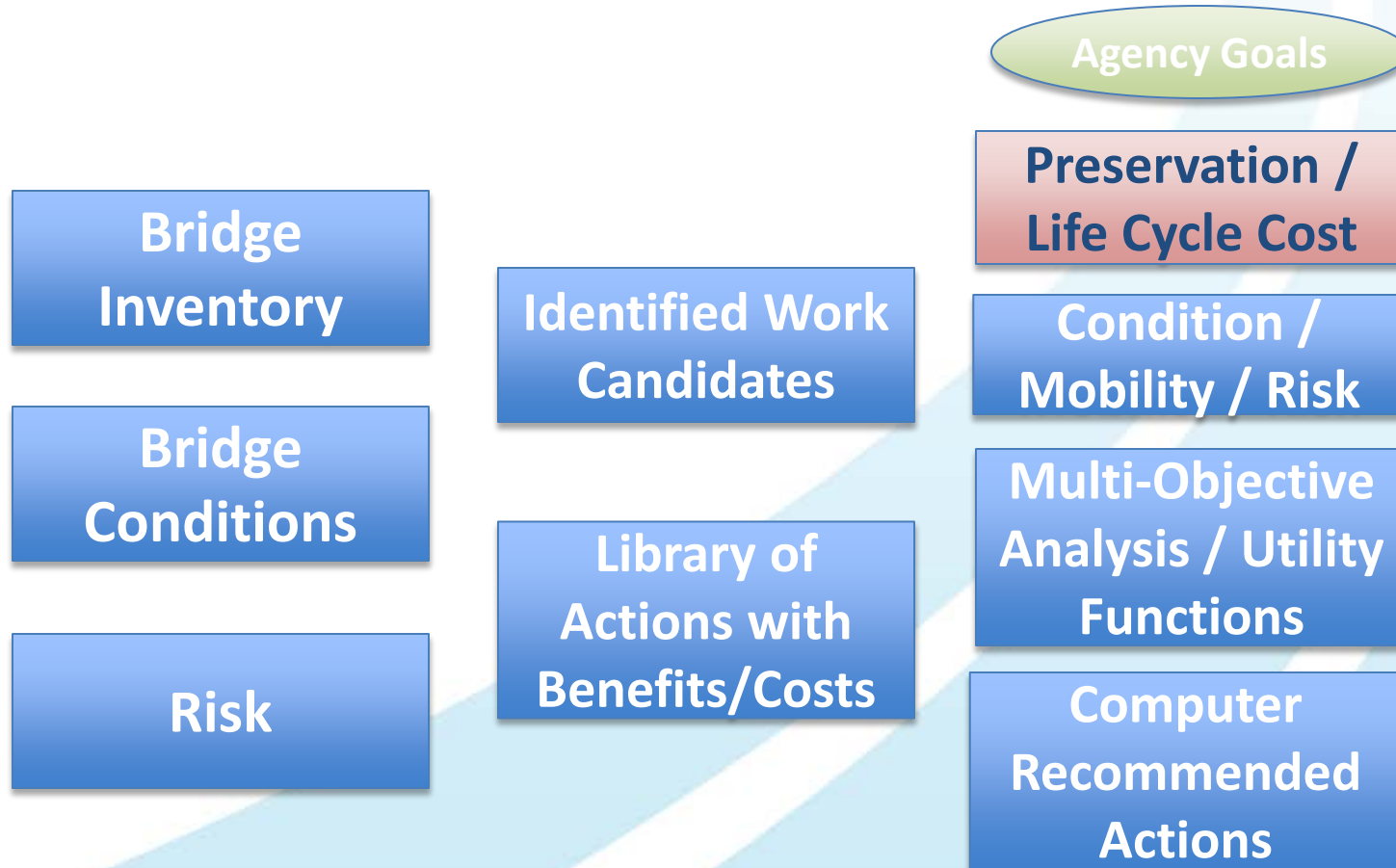
- What actions should I possibly take?





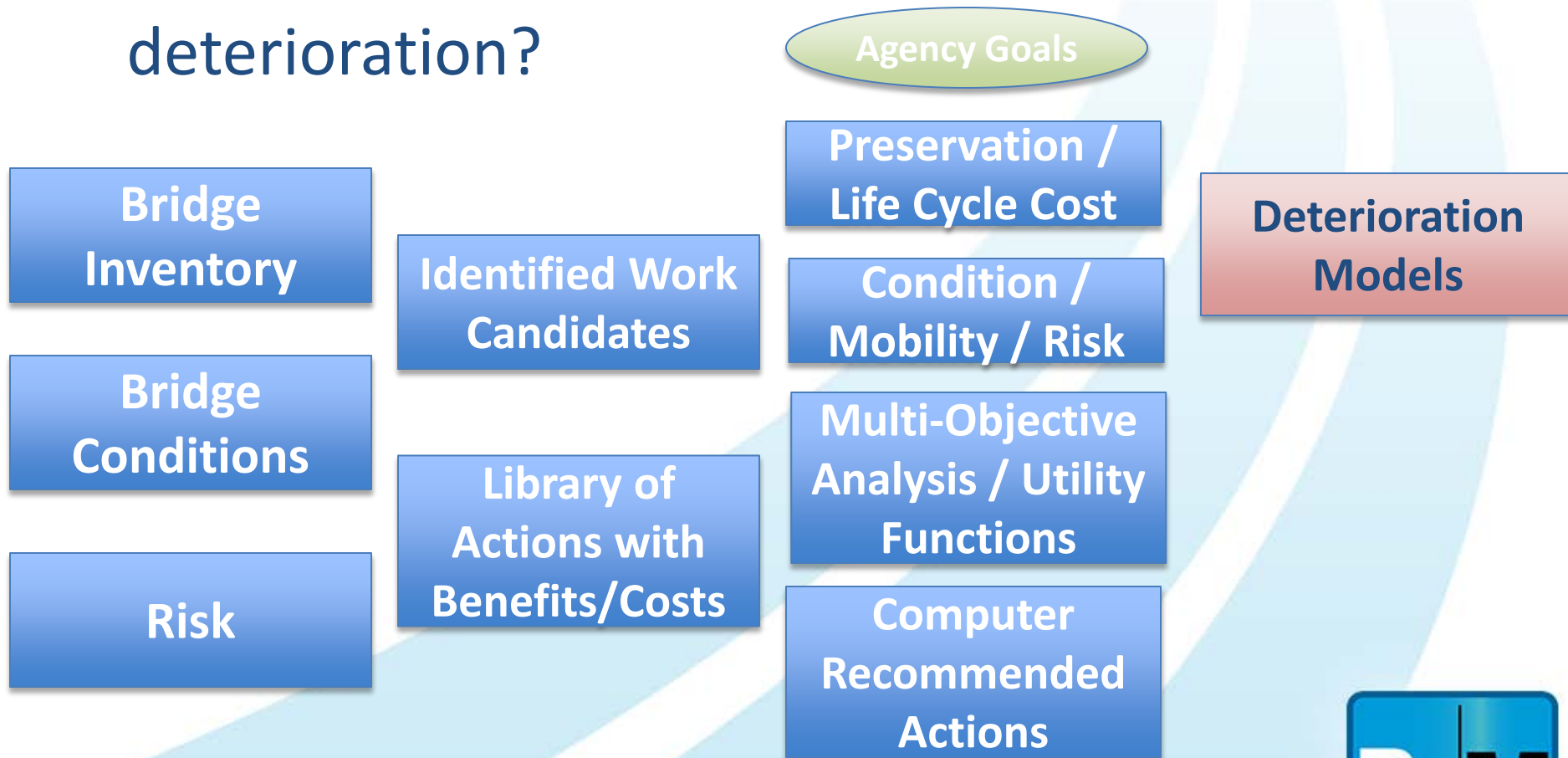
# Key Parts of Pontis/BrM 5.2

- What are the benefits of preservation actions?



# Key Parts of Pontis/BrM 5.2

- What is the effect of future time and deterioration?



# Key Parts of Pontis/BrM 5.2

- Grouping/comparing needs across bridges into projects and programs



# Release Version 5.2.1

- Role up Sub-Phases
  - I-A (Bridge Analysis Groups)
  - I-B (Risk Assessments – added to 5.1.3)
  - I-C (Multi-Objective Analysis)
- Select Additions:
  - Google Maps, New AASHTO Elements, Performance Enhancements
- New documentation
- Alpha/Beta Testing
- Installation Package



# BrM 5.2.1

- Main Questions Answered:
  - What is the utility value of an action being proposed on the bridge?
    - Evaluates user identified actions against library of benefits
    - Utilizes multi-objective analysis framework to define value
  - What actions might be taken to achieve the greatest value?
    - Utilizes library of all possible actions and default costs to determine potential benefits of each



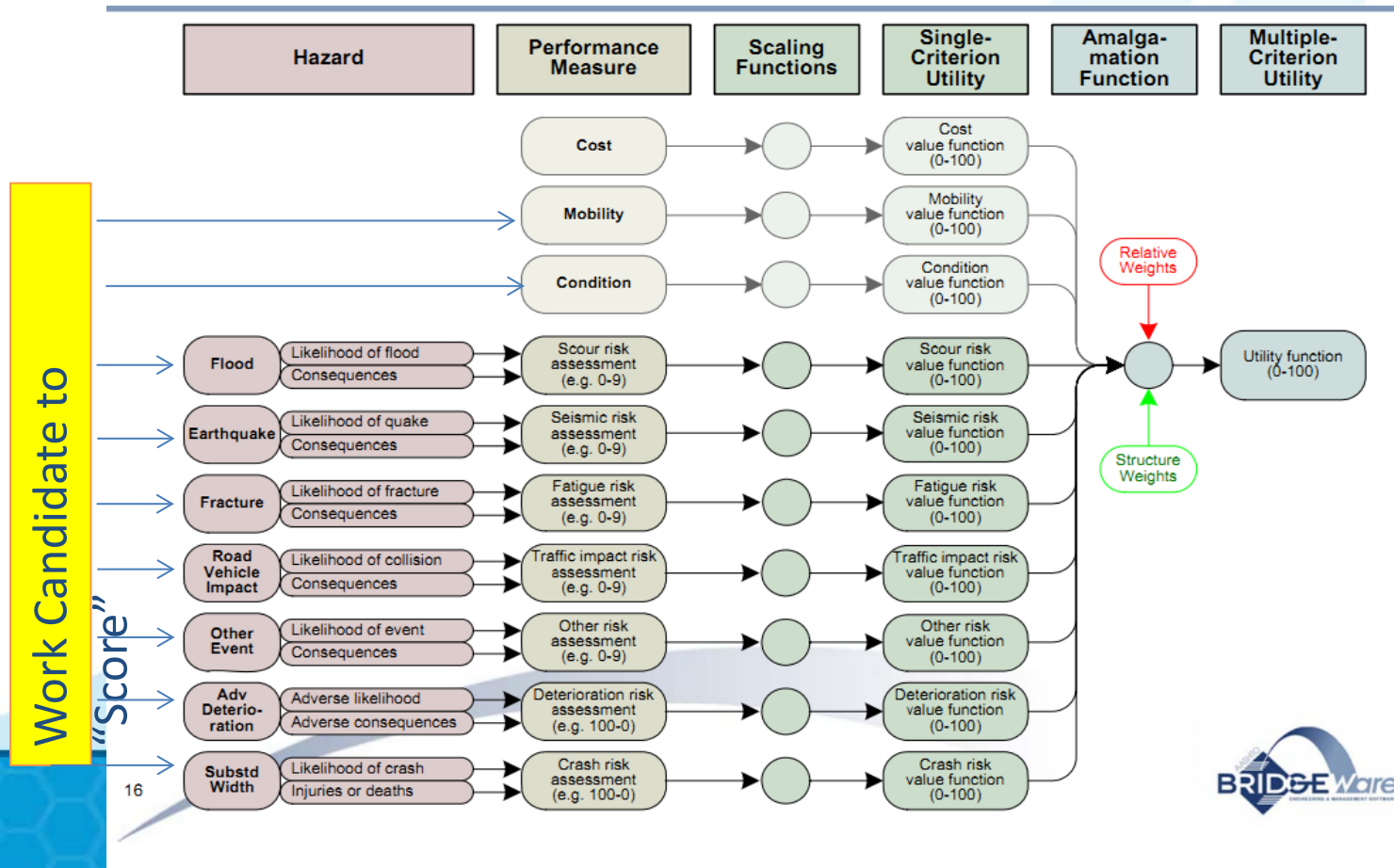
# Implementing Utility Functions

- Create a multi-objective framework that can be used to show the value (utility) of an action for a bridge
- Utility will also be shown for each sub-area
  - Mobility
  - Condition
  - Risk
  - Life Cycle Cost (5.2.2 / deterioration models needed)
- Work candidates are evaluated for how they contribute to mobility, lifecycle cost, condition and risk weightings




# Multi-Objective Analysis Framework

- The model will score each work candidate identified.



# Full Transparency for Utility Values


Welcome: AASHTOWARE Bridge Management Database: BrM\_Demo [Help ?](#) [Account](#) [LogOut](#)

**Menu** | Bridges | Reports | Admin | Inspection | Gateway | Analysis

[Work Candidates](#) | **Utility Value**

## Utility Value: 45.98

**Condition Value** Base Condition Value: 47.29 Scaled Value: 47.29 x Weight: 31.00 = Adjusted Condition Value: 1465.99

Condition Item	Base Value	Scaled Value	Weight	Adjusted Value
Deck	4	42	10.00	420.00
Superstructure	6	81	1.00	81.00
Substructure	7	91	1.00	91.00
Culverts			1.00	
Element ratings	22.74	22.74	1.00	22.74

**Risk Value** Base Risk Value: 55.90 Scaled Value: 55.90 x Weight: 22.00 = Adjusted Risk Value: 1229.80

Risk Item	Base Value	Scaled Value	Weight	Adjusted Value
Scour	6	58	1.00	58.00
Accident	20.00	53.81	1.00	53.81

**Mobility Value** Base Mobility Value: 34.2 Scaled Value: 34.2 x Weight: 22.00 = Adjusted Mobility Value: 752.40

Mobility Item	Base Value	Scaled Value	Weight	Adjusted Value
Percent of truck detoured.	10	34.20	1.00	34.20

**LifeCycle Value** Base LifeCycle Value: N/A Scaled Value: N/A x Weight: 25.00 = Adjusted LifeCycle Value: N/A

LifeCycle Item	Base Value	Scaled Value	Weight	Adjusted Value
No records to display.				

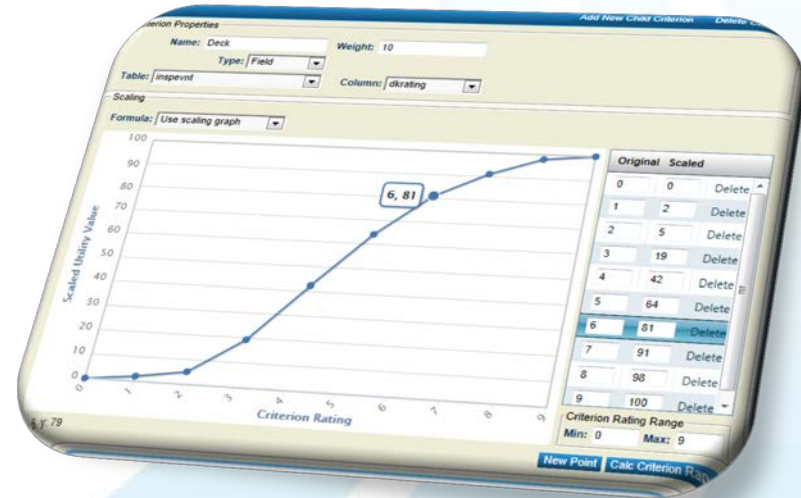




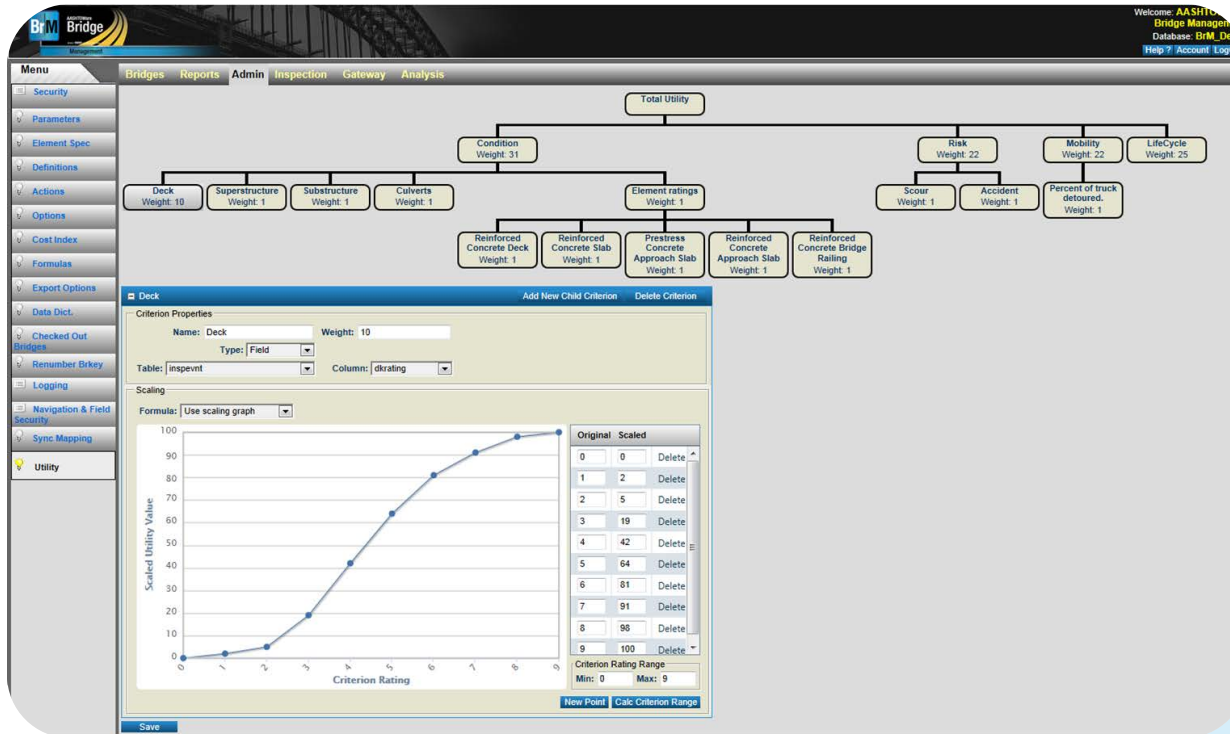
# Utility Functions

## Functionality:

- Add/Define new criterion
- Set weight & define scale
- Click and plot points on the graph to adjust
- Edit/Add values to the table



# Utility Function



By incorporating utility functions, BrM is able to combine elements of Risk, Lifecycle Cost, Condition, Mobility, and other agency defined criteria to calculate the utility or value of a particular bridge.

# Actions

- Default Actions supplied by TRT
- Apply element costs to actions
- Attach actions to benefit groups

The screenshot displays the 'Action Defs' configuration screen in the AASHTOWare Bridge Management software. The interface includes a top navigation bar with 'Bridges', 'Reports', 'Admin', 'Inspection', 'Gateway', and 'Analysis' tabs. A left sidebar contains a 'Menu' with options like Security, Parameters, Element Spec, Definitions, Actions, Action Defs, Options, Cost Index, Formulas, Export Options, Data Dict., Checked Out Bridges, Renumbr Brkey, Logging, Navigation & Field Security, Sync Mapping, and Utility. The main content area shows a table of 'Action Defs' with columns for ID, Name, Description, Notes, and Sort Order. Below the table is an 'Associated Benefit Group' section with a dropdown menu set to '1 - Deck Rehab' and a table listing associated elements with their IDs, names, costs per unit, and units.

ID	Name	Description	Notes	Sort Order
26	Channel-Regrde Channel	Channel-Regrade Channel Under Bri		-1
27	Channel-Remove Debris	Channel-Remove Debris		-1
28	Channel-Repair Washout	Channel-Repair Washouts / Erosion		-1
29	Deck-Install Protection Sy	Deck-Install Protection System		-1
30	Dck-Ptch spls->Dck-Repr	Deck-Patch spalls->Deck-Repair (Po		-1
31	Deck-Place Overlay	Deck-Place Overlay		-1
32	Deck-Rehab	Deck-Rehab		-1

ID	Element Name	Cost Per Unit	Unit
12	Concrete Deck	\$ 74.32	sq.ft
38	Concrete Slab	\$ 74.32	sq.ft

# Benefit Groups

Benefit Groups

Benefit Group Name	Description	Action Defs		
Deck Rehab	Rehab a concrete deck	Deck-Rehab	Edit	Delete
Bridge rail repair	Repairs done to the bridge rail	Bridge Rail-Rehab; Bridge Rail-Repair	Edit	Delete
Approach Slab repair	Repairs to the approach slab	Approach Slab-Repair	Edit	Delete

Deck Rehab Elements

Element Name	Origin State	CS1	CS2	CS3	CS4		
Element: (38) Concrete Slab							
(38) Concrete Slab	CS3		100%			Edit	Delete
(38) Concrete Slab	CS4		100%			Edit	Delete
Element: (12) Concrete Deck							
(12) Concrete Deck	CS3		100%			Edit	Delete
(12) Concrete Deck	CS4		100%			Edit	Delete

Deck Rehab Fields

Table Name	Column Name	New Value	Increment		
inspevnt	dkrating	8		Edit	Delete

Deck Rehab Risks

Assessment Name	New Value	Increment		
Accident		-5	Edit	Delete

Save

- Create Benefit Groups which define what effects an action has on a given bridge
- Benefit Groups can be comprised of fields, elements, or risks.

# Individual Bridge Analysis

**Menu** | Bridges | Reports | Admin | Inspection | Gateway | Analysis  
 Welcome: AASHTOWare Bridge Management Database: BrM\_Demo | Help ? | Account | LogOut

Bridge 04 07598 | Name: Western Canal Bridge | Facility Carried (007): JESSE OWENS PKWY | Feature Intersected (006A): WESTERN CANAL | Metric: English

**Description**  
 Route: 00000 | Milepoint: mi  
 District: District 2 | County: Maricopa  
 Func: 17 Urban Collector | Area: 02B - Paul Goldsmith  
 Owner: City/Municipal Hwy Agenc | Resp: City/Municipal Hwy Agenc  
 Material: 5 Prestressed Concrete | Design: 05 Multiple Box Beam  
 Scour: 6 Calcs not made

**Mobility - Safety**  
 Operating: 1 LF Load Factor | Inventory: 1 LF Load Factor  
 Geometry: 9 Above Desirable Crit | Approach: 8 Equal Desirable Crit  
 Waterway: 8 Equal Desirable

**Conditions**  
 Deck: 4 Poor | Superstr: 6 Satisfactory  
 Substr: 7 Good | Culvert: N N/A (NBI)  
 Structure: 8 Protected | Deck Index: 50  
 Superstr Index: 44.44 | Substr Index:  
 Culvert Index: | Structure Ht: 42.1

**Current Scaled Performance**  
 Condition: 47.29 | Risk: 55.9  
 Lifecycle: | Mobility: 34.2

**Sufficiency**  
 Rating: 97.5 | SD/F0: Not Deficient

**Recent Completed Work**  
 No recently completed work found.

**History - Geometry**  
 Built: 1988 | Reconst: -4  
 Length: 42.001 ft | Width: 72.001 ft  
 Span: 42.001 ft

**Work Candidates Existing for the Selected Bridge**

Work Candidate	Utility	Utility Change	Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit
Do Nothing	45.98				
04 0759-NIMO-091313-E2A8C9DA58 - Approach Slab-Repair	46.38	0.4	\$10,000.00	0.04	\$25
A-DOT001-057F6A47-0000006A - Bridge Rail-Repair	46.67	0.69	\$50,000.00	0.0138	\$72.4638
A-DOT001-057F6A47-0000006D - Deck-Rehab	64.54	18.56	\$100,000.00	0.1856	\$5.3879

- Provides a snapshot of all work candidates and an detailed view of how each work candidate affects a selected bridge
- Detailed view includes all related utility value information and criterion



# Reverse Calculations

The screenshot displays the AASHTOWare Bridge Management software interface. The top navigation bar includes 'Menu', 'Bridges', 'Reports', 'Admin', 'Inspection', 'Gateway', and 'Analysis'. The main content area shows details for Bridge 04 07598, named 'Western Canal Bridge'. The interface is divided into several sections:

- Description:** Route: 00000, Milepoint: mi, District: District 2, County: Maricopa, Func: 17 Urban Collector, Area: 02B - Paul Goldsmith, Owner: City/Municipal Hwy Agenc, Resp: City/Municipal Hwy Agenc, Material: 5 Prestressed Concrete, Design: 05 Multiple Box Beam, Scour: 6 Calcs not made.
- Mobility - Safety:** Operating: 1 LF Load Factor, Inventory: 1 LF Load Factor, Geometry: 9 Above Desirable Crit, Approach: 8 Equal Desirable Crit, Waterway: 8 Equal Desirable.
- Conditions:** Deck: 4 Poor, Superstr: 6 Satisfactory, Substr: 7 Good, Culvert: N N/A (NBI), Structure: 8 Protected, Deck Index: 50, Superstr Index: 44.44, Substr Index: , Culvert Index: , Structure HI: 42.1.
- Current Scaled Performance:** Condition: 47.29, Risk: 55.9, Lifecycle: , Mobility: 34.2.
- Sufficiency:** Rating: 97.5, SD/FO: Not Deficient.

Below these sections is a table titled 'All Available Work Candidates' with the following data:

Work Candidate	Base Utility	Utility	Utility Change	Estimated Cost	Benefit / Cost (\$k)	Cost (\$k) / Benefit
Approach Slab-Repair	45.98	46.38	0.4	\$1,114.84	0.3588	\$2.7871
Bridge Rail-Rehab	45.98	46.67	0.69	\$45,720.00	0.0151	\$66.2609
Bridge Rail-Repair	45.98	46.67	0.69	\$45,720.00	0.0151	\$66.2609
Deck-Rehab	45.98	64.54	18.56	\$148,644.86	0.1249	\$8.0089

- Provides a benefit/cost and cost/benefit ratio for all agency defined actions as if they were applied to a bridge
- Ranks all available actions by a decreasing benefit/cost ratio, providing recommendations on what action should be applied to a bridge



# Updated Manage Layouts

- Controls the look of the grid(i.e. columns displayed)
  - Ability to apply a layout to a filter

Table Name | Field Name | Header Text | Use Parameters

bridge	brkey	brkey	<input type="checkbox"/>	Edit	Delete
roadway	roadway_name	roadway_name	<input type="checkbox"/>	Edit	Delete
bridge	district	district	<input type="checkbox"/>	Edit	Delete

- Dynamic tables and columns
- Easy to use UI

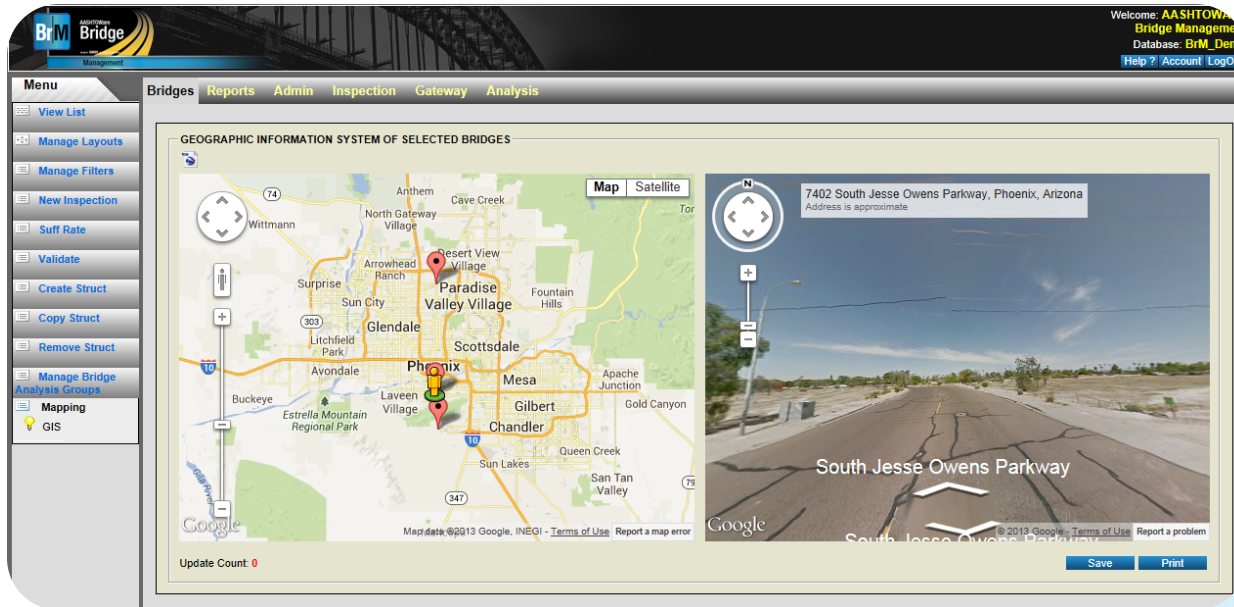
# Updated Filters

The filtering capabilities have been completely redesigned with ease of use in mind. Users can now define filters through a simple point and click process.

The screenshot displays the AASHTOWare Bridge Management software interface. The top navigation bar includes the logo, user information (Welcome: AASHTOWare Bridge Management, Database: BrM\_Demo), and links for Help, Account, and LogOut. The main menu on the left lists options like View List, Manage Layouts, Manage Filters, Edit Filter, Edit SQL, New Inspection, Suff Rate, Validate, Create Struct, Copy Struct, Remove Struct, Manage Bridge Analysis Groups, and Mapping. The central workspace is titled 'Bridges' and contains tabs for Reports, Admin, Inspection, Gateway, and Analysis. The 'Edit Filters' section is active, showing a 'Select a filter' dropdown, buttons for 'Load Filter', 'New Filter', 'Shared?', 'Access Filter?', and 'Delete Filter', and language/metric options. Below this, the 'Context' is set to 'inspection' and the 'Table' is 'bridge'. A dropdown menu shows 'fhwa\_regn', 'district', 'county', and 'facility'. Three columns of filter lists are visible: 'bridge.county', 'bridge.owner', and 'bridge.district'. Each column has a 'Delete From Filter?' checkbox. At the bottom, there are 'Save Filter', 'Save Filter As', and 'DistrictFilter' buttons.



# Mapping



BrM now has the ability to view bridge locations based on their longitude and latitude settings. Locations can be changed through a drag and drop interface.

# Bridge Analysis Groups

- Create agency defined, custom grouping of 'like' bridges (e.g. district, region, county, material, etc.)
- Automatically create bridge analysis groups using a 'wizard' that uses pre-defined criteria.

The screenshot displays the 'Bridge Analysis Groups' configuration screen in the AASHTOWare Bridge Management software. The interface includes a menu on the left with options like 'View List', 'Manage Layouts', 'Manage Filters', 'New Inspection', 'Suff Rate', 'Validate', 'Create Struct', 'Copy Struct', 'Remove Struct', 'Manage Bridge Analysis Groups', 'Bridge Analysis Groups', 'Bridge Analysis Group Details', 'Add/Remove Roadways', 'Setup Bridge Analysis Groups', and 'Mapping'. The top navigation bar shows 'Bridges', 'Reports', 'Admin', 'Inspection', 'Gateway', and 'Analysis'. The main content area is titled 'ALL BRIDGE ANALYSIS GROUP FILTERS' and includes a filter dropdown set to 'BrM - None' and a layout dropdown set to 'Bridge Analysis Group'. Below this is a 'Bridge Analysis Groups Quick Filter' section with a 'User' dropdown set to 'User 1 Ad hoc' and a 'Save As' field. The 'Roadway Characteristics' section includes fields for 'Roadway On (005A): Route On Structure', 'Kind of Highway (005B): Not Applicable (P)', 'Level of Service (005C): 0 None of the below', 'Rt# (005J):', 'Directional Suffix (005K): Unknown (NR)', 'Roadway Name:', 'Kilometer Post (011):' km, 'Average Daily Traffic (029):', 'Truck Percentage (100):', 'Number of Lanes (028A):', 'NHS Status (104): 1', and 'Functional Class (026): 01 Rural Interstate'. The 'Bridge Characteristics' section includes fields for 'District (002): District 1', 'Admin. Area: 900 - Not NBI', 'County (003): 33JALAMEDA', 'Owner (022): State Highway Agency', 'Custodian (024): State Highway Agency', 'On/Off State System: Off System', and 'Bridge Group:'. Below the form is a 'Create' button and a table titled 'Bridge Analysis Groups' with columns for 'Bridge Analysis Groups', 'Bridge\_Count', 'Roadway\_Count', and 'Description'. The table contains two rows: 'New Bridge\_Grps 9172013\_236' and 'New Bridge\_Grps 9172013\_4', both with counts of 0 and descriptions 'Created by software, please replace with valid description.'. The table has a 'Delete' button for each row and a '2 items in 1 pages' indicator at the bottom right.

Bridge Analysis Groups	Bridge_Count	Roadway_Count	Description
New Bridge_Grps 9172013_236	0	0	Created by software, please replace with valid description.
New Bridge_Grps 9172013_4	0	0	Created by software, please replace with valid description.

# Bridge Management Contact Info:

Feel free to contact us or visit our website for more information:

Support line: 1-877-913-1550

Support email: [brm@bentley.com](mailto:brm@bentley.com)

Website: <http://aashtowarebridge.com>



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## AASHTO's proven Bridge Management Software

**Welcome**

The **AASHTOWare™** Bridge Management software **BrM** (formerly *Pontis*) was first developed under an NCHRP project sponsored by the FHWA in the early 1990's and soon thereafter was transferred to **AASHTO** for further development, maintenance and support. For over 20 years **BrM** has seen dramatic improvements due to technological changes, product innovations, and, most importantly, direct user feedback. As a key product in the AASHTOWare software suite, **BrM** continues to be widely used as the primary bridge management software by transportation agencies across the U.S., and internationally.

AASHTOWare's efforts are headed by a **Task Force** comprised of State bridge engineering and information technology professionals. This Task Force manages the product and the contractor's efforts on behalf of AASHTO and the user community in order to ensure development, maintenance, and support of the software meets the needs and requirements of current bridge owners in State and local agencies, governmental organizations such as the **FHWA**, and private consultants.

The latest official release of **BrM** is 5.1.3. This version was accepted by the TAG and approved by the Task Force for release in April 2013. Agencies wishing to install and use 5.1.3 should contact the Contractor directly to request the software (email or phone call will suffice). The contractor is currently developing the next generation of AASHTOWare Bridge Management software (version 5.2), sponsored by a national project solicitation. This next generation of **BrM** is expected to be released soon.

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AASHTOWare Bridge Management

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