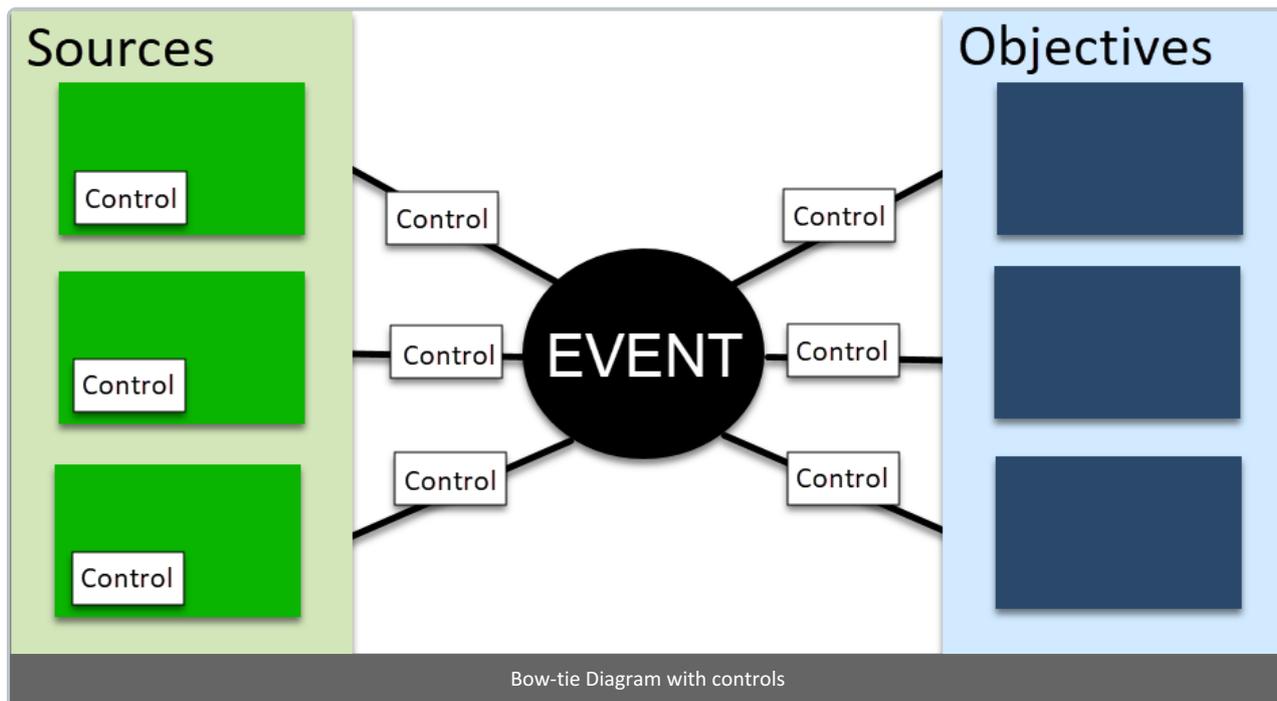


# Overall Bow-Tie Diagram with Controls

## Overview

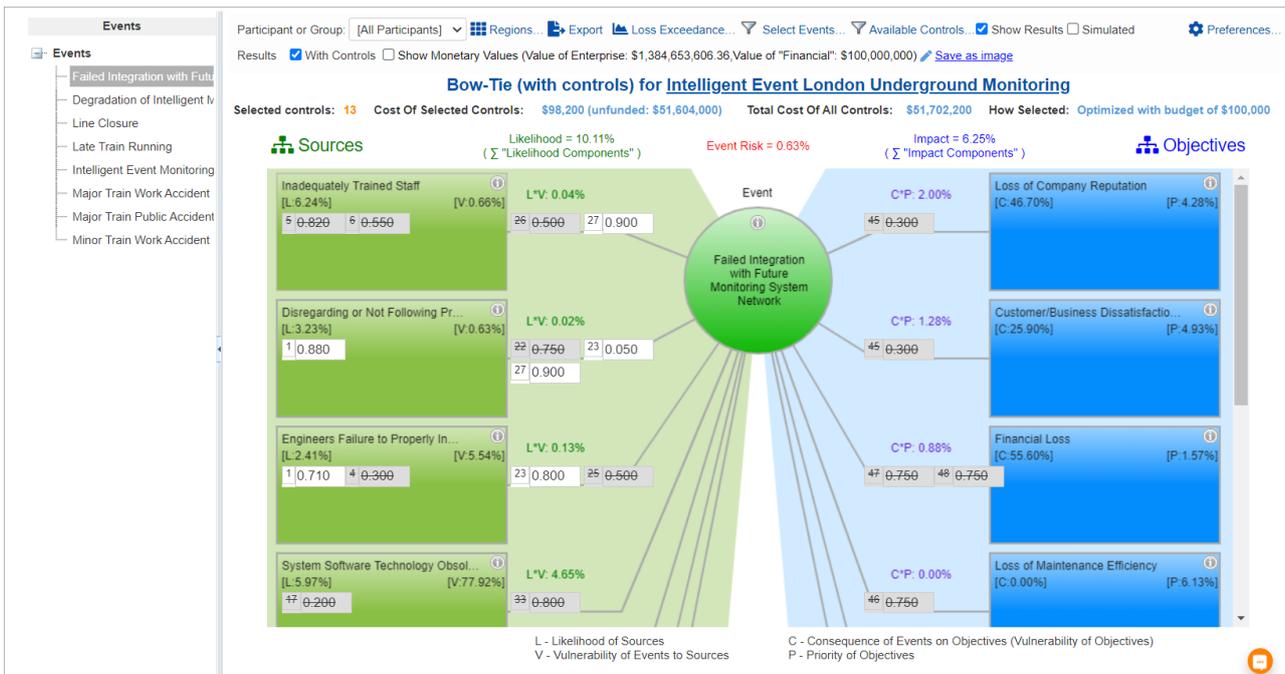
This page displays a similar diagram as with the [Overall Bow-tie Diagram](#) (without controls) -- but on this page, the likelihoods, impacts, and risks are calculated with controls in effect. Controls can also be viewed, selected/deselected (to be in effect), and assigned from the diagram.



Controls are defined to reduce or mitigate the:

- **Likelihood of Sources** (from the bow-tie, these are the controls on the sources boxes at the left)
- **Vulnerabilities of Events from Sources** (from the bow-tie, these are the controls on the lines connecting the event to the sources)
- **Consequences of Events to Objectives** (from the bow-tie, these are the controls on the lines connecting the event to the objectives)

The bow-tie diagram for the **Event "Failed Integration with Failure Monitoring System Network"** from the Overall Source with controls is displayed below.



The selected **Event** is displayed at the center of the diagram (circle). The event **background color** varies based on the event's %risk.

The **Sources** of the selected event are on the left side of the diagram (green boxes).

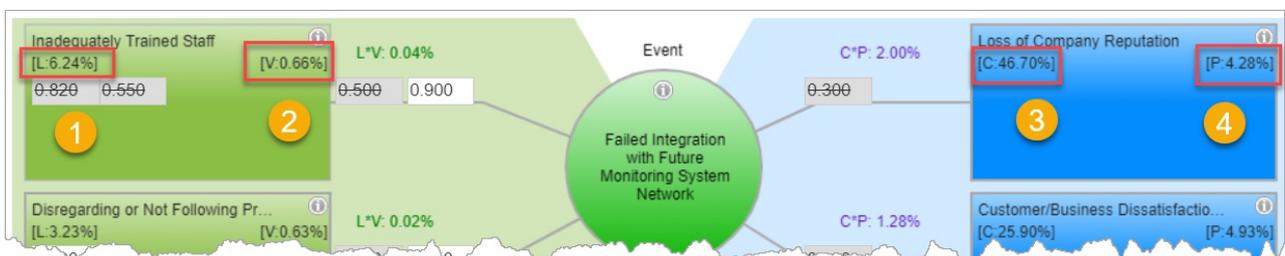
The **Objectives** of the selected Event are on the right (blue boxes).

The small boxes represent the **Controls**. The value inside the control boxes is the effectiveness of the control. Controls that are in effect have a white background color, while those that are not in effect are grey-out. Controls to be in effect are selected manually or by **optimization**.

You can also view and analyze the following information:

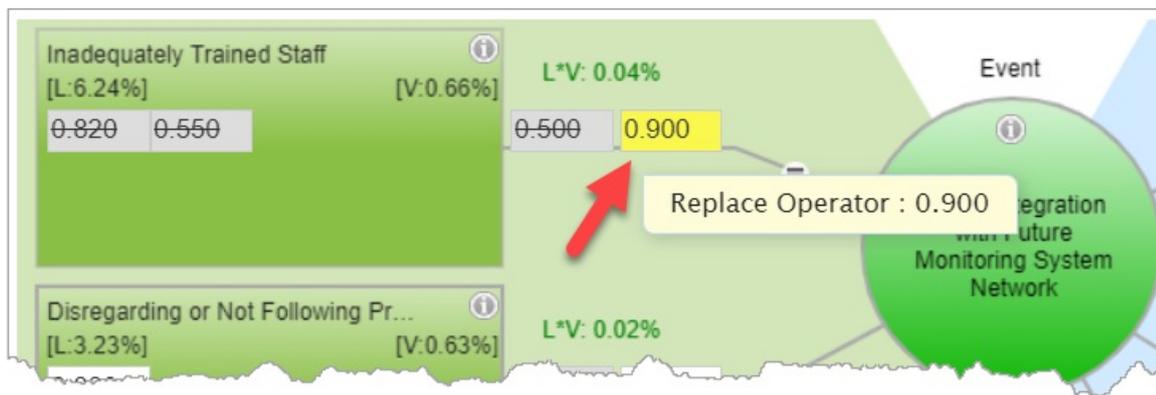
- L - Likelihood of Sources
- V - Vulnerabilities of events to sources
- C - Consequences of Events on Objectives
- P - Priority of Events on Objectives

Focusing on the first source and objective on the diagram:



1. The Likelihood (L) of the Source "Inadequate Trained Staff" is **6.24%** (overall or global likelihood)
2. The Vulnerability (V) of the Event "Failed Integration with Future Monitoring System Network" to the source "Inadequately Trained Staff" is **0.66%**
3. The Consequence (C) of the Event "Failed Integration with Future Monitoring System Network" on the Objective "Loss of Company Reputation" is **46.70%**
4. The Priority (P) of Objective "Loss of Company Reputation" is **4.28%** (overall or global impact)

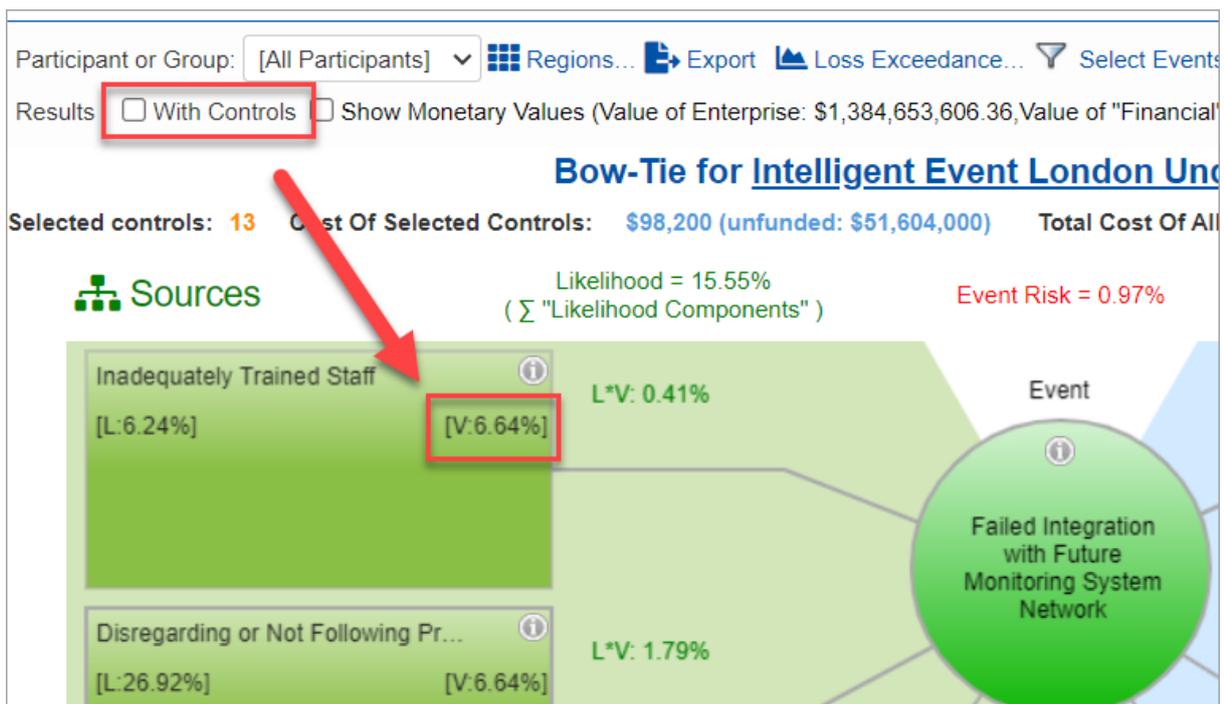
From the above diagram, we can see that there are 5 potential controls and only 1 is in effect as represented on the box with the value **0.900**.



Hovering on it will show the control name, "Replace Operator" as shown above.

The "Replace Operator" with the effectiveness of 0.9 is a control that mitigates the Vulnerability of the Event "Failed Integration with Future Monitoring System Network" From the source "Inadequately Trained Staff". With this, [V:0.66%] is a mitigated vulnerability.

You can uncheck the "With Controls" checkbox on the toolbar to see the results without controls.



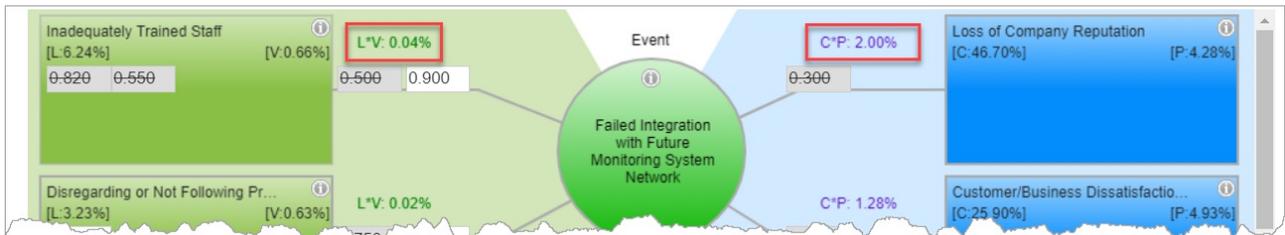
Here we see that the Vulnerability [V] of the event to the source without control is **6.64%**. When the "Replace Operator" control is in effect, the Vulnerability is reduced by **5.976%**.

```
= Event Vulnerability without control * Control Effectiveness
= 6.64 * 0.9
= 5.976 %
```

Finally, the resulting Event Vulnerability with control is 6.64 % - 5.976% = **0.66%**.

The Likelihood of the event to a given source (L\*V), and the Impact of the event (C\*P) on a given objective are shown on the

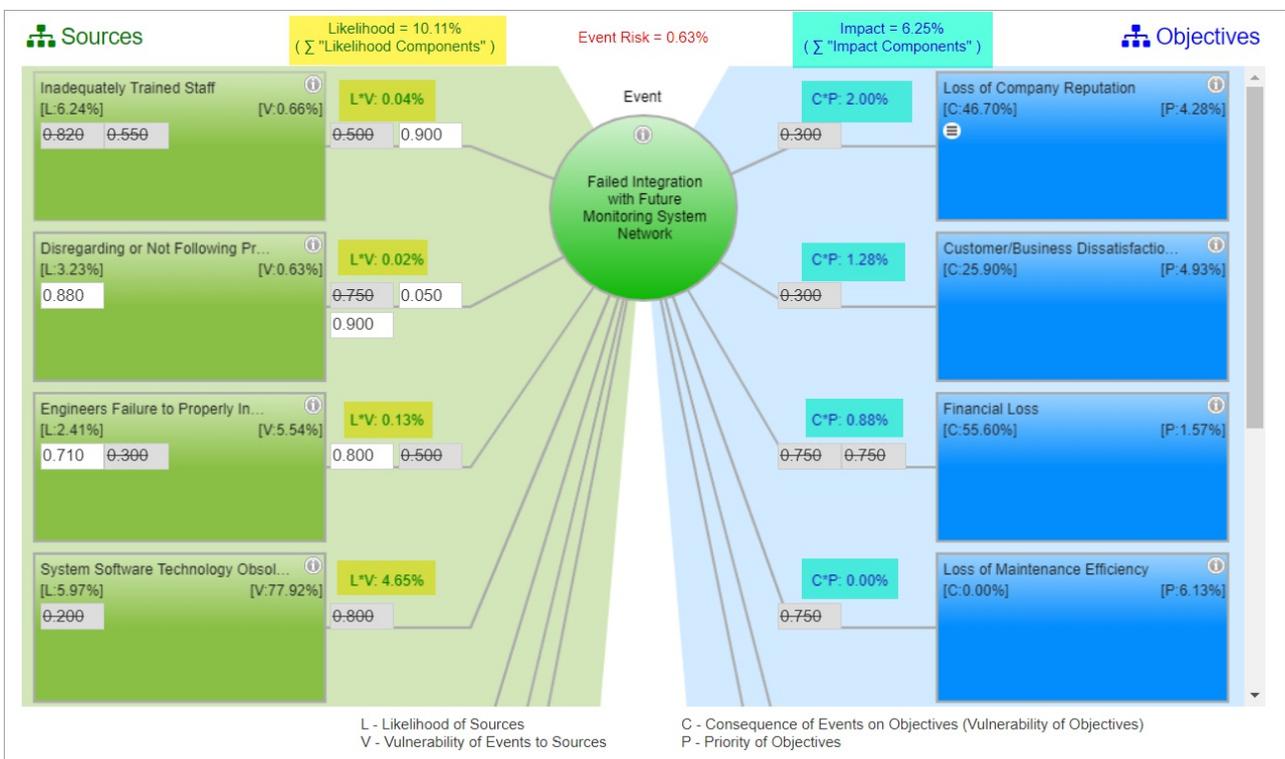
connecting lines to the source/objective boxes:



The Likelihood of the Event "Failed Integration with Future Monitoring System Network" to the source "Inadequately Trained Staff" with control is **0.04%** (*this is 0.41% without control*).

- The Impact of the Event "Failed Integration with Future Monitoring System Network" on the Objective "Loss of Company Reputation" is **2.0%** (*since there is no control is in effect for this event given the objective, the impact remains 2.0%*)

The summation of likelihoods ( $\sum "L*V"$ ) of the event to each source is the Overall Likelihood of the event, and the summation of impacts ( $\sum "C*P"$ ) of the event on each objective is the Overall Impact of the event.



The event "Failed Integration with Future Monitoring System Network" has Overall Likelihood and Impact **10.11%** and **6.25%** respectively when controls are in effect.

The Overall Event Risk is then computed by Likelihoods \* Impacts,  $10.11\% * 6.25\% = 0.63\%$

You can uncheck the  With Controls checkbox to compare results when no controls are in effect and see how the likelihoods, impacts, and risk reduced as controls are in effect.

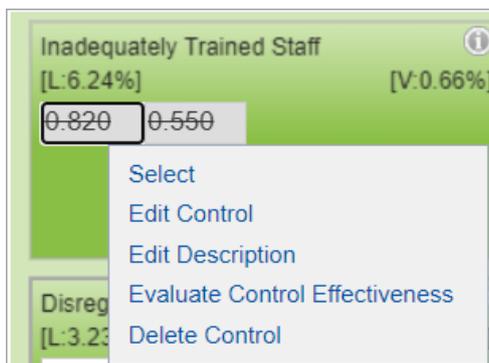
You can select another Event to analyze from the Events list at the left:



## Manage Controls from the Bow-tie Diagram

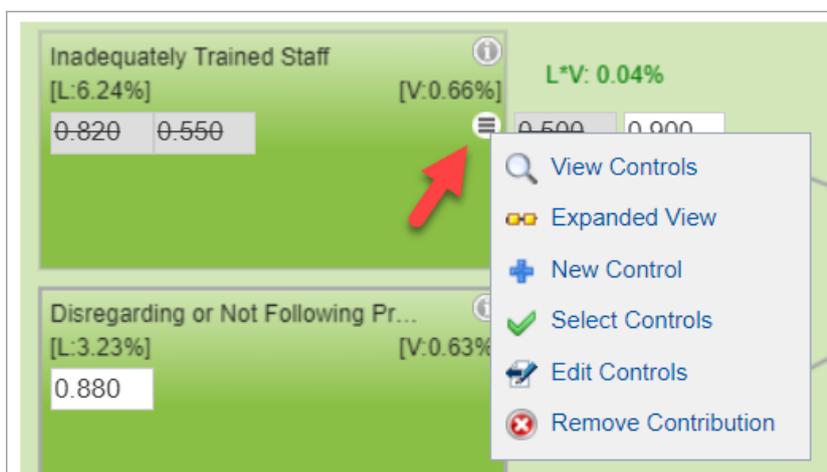
You can select/deselect a control to be in effect by double-clicking a control.

Alternatively, you can right-click on a control box to see the select/deselect options together with other functionality.



- Edit Control - open to update the control name, cost, and categories.
- Edit Description - open a rich text editor to edit the control description
- Evaluation Control Effectiveness - redirect to evaluation step specific to the control selected
- Delete control - delete the control

Hovering on the Source box, and the connecting line from Event to Source and Event to Objective will show a hamburger menu.

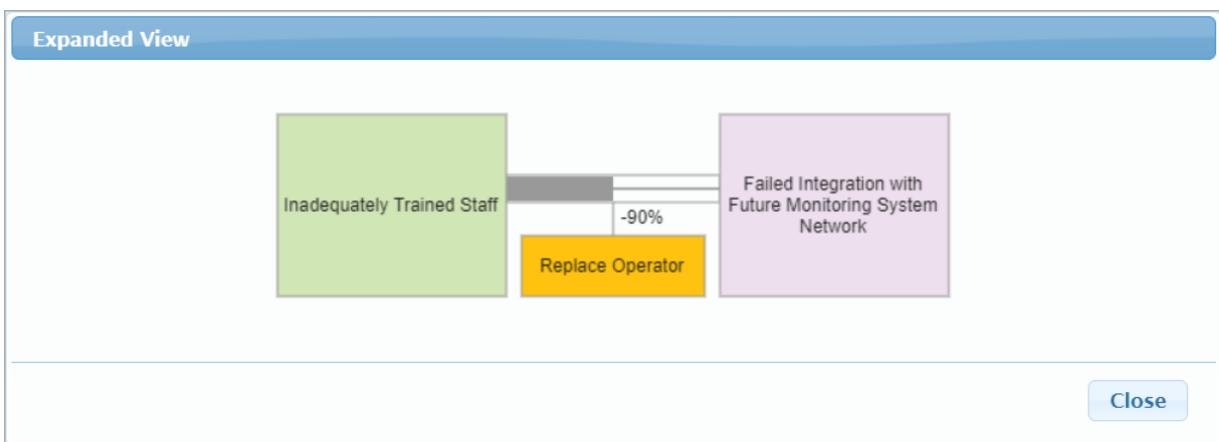


- View Controls - open a modal listing all the potential controls for the specific source, event from a source, or event to an objective. The effectiveness of the control and is active (YES if selected, NO if not) is also displayed.

Controls Applications		
Control	Effectiveness	Is Active
Periodic Proficiency Training	0.820	
Identify Staff requiring additional training	0.550	

[Close](#)

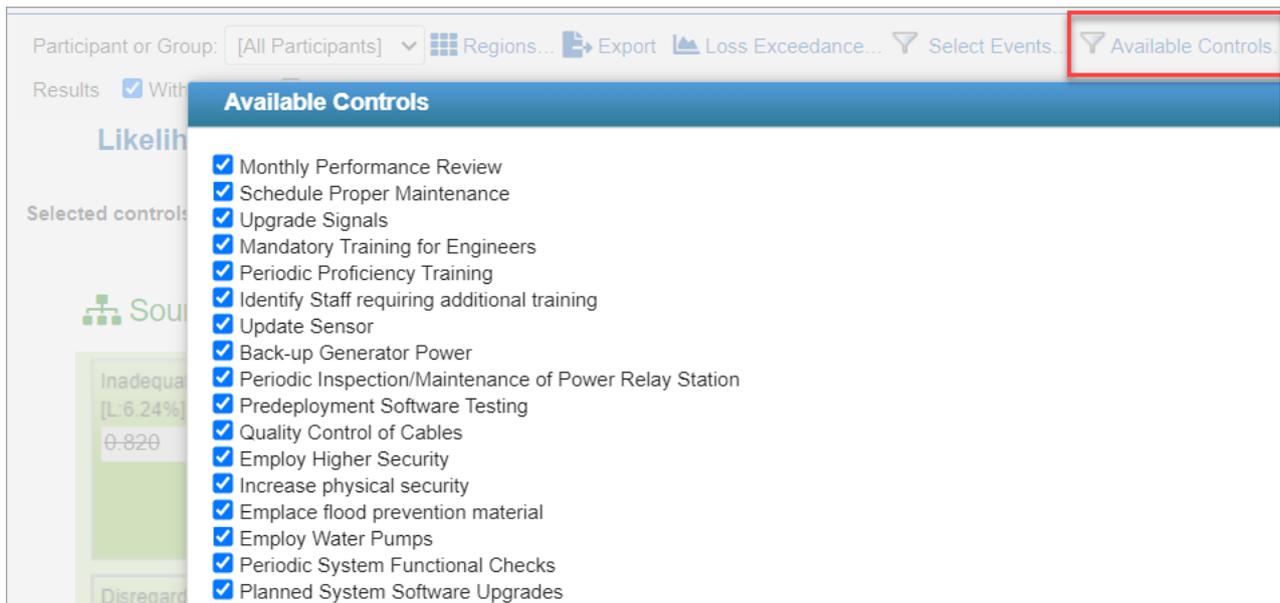
- Expanded View - shows a diagram of the elements (source, event, objective, control)



- New Control - add a new control
- Select Controls - list all the available controls for the specific control type (for sources, events to source, or events to objectives). Here you can select potential control of given elements involved.
- Edit Controls - redirect to the Identify Controls page
- Remove Contribution

## Available Controls

Clicking Available Controls will open a modal listing all the identified potential controls.



Controls that are "checked" means that the control can be in effect or selected (manually or by optimization)

Controls that are "unchecked" mean that the control is **disabled** and can't be in effect or selected.

The "Available controls" option is just similar to the "Disabled" column on the **Identify controls** grid -- disabled controls are unavailable for selection for controls to be in effect.

If control is un-available, the box of that control showing its effectiveness is hidden on the bow-tie diagram

When there are un-available controls, the button will have an exclamation mark 

## Select Participant or Group

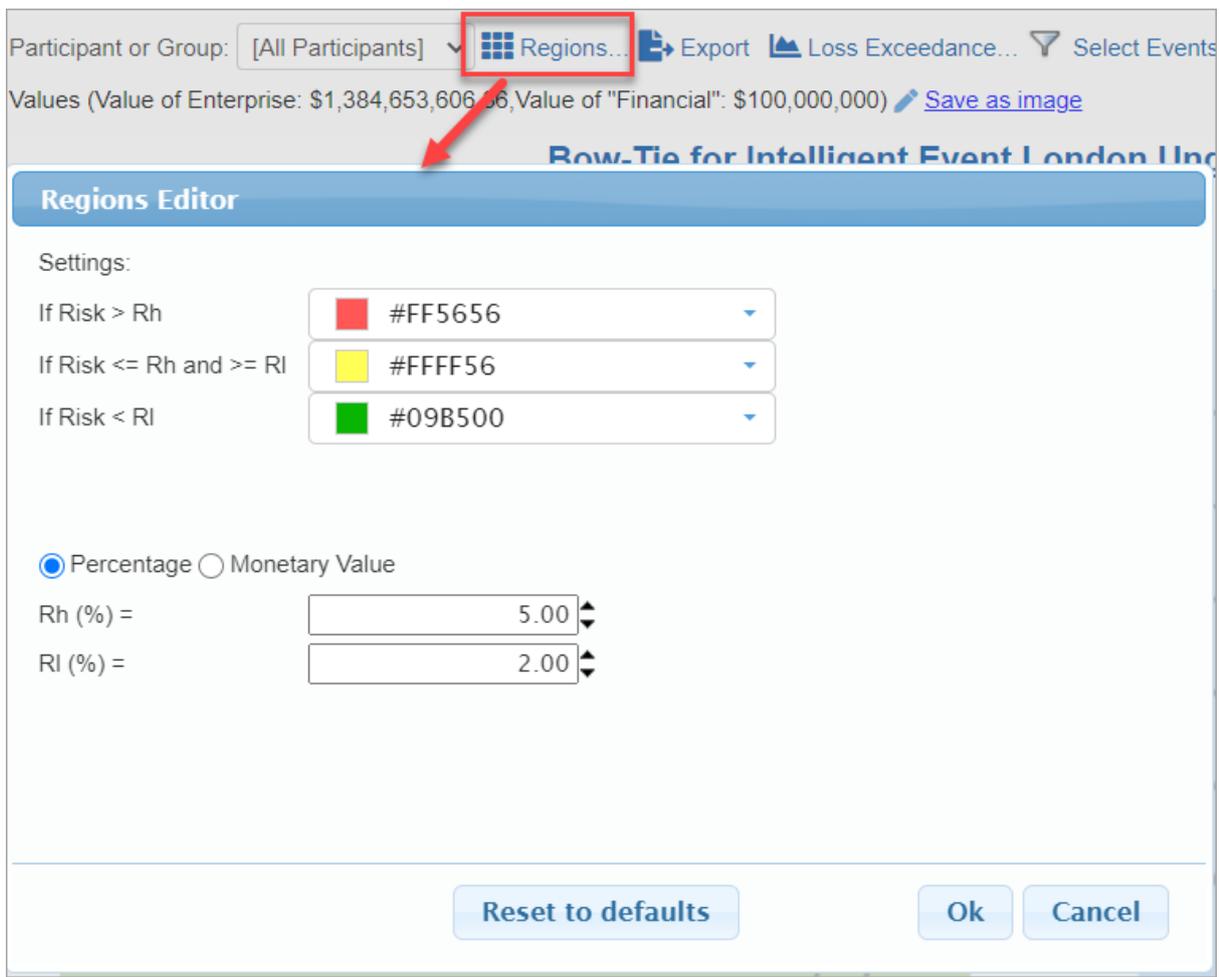
The bow-tie for the "All Participants" group is displayed by default. By selecting from the "Participants and Groups" dropdown, you can display the bow-tie analysis for another participants or group:

Participant or Group:	[All Participants]
Show Monetary Value	[All Participants]
	[C-Level Executives]
	[Engineering]
-----	
Sources	
Inadequately Trained [L:6.24%]	Denis Risman
	Brian Quigley
Disregarding or Not [L:26.92%]	Chief Risk Officer
	Chief Engineering Officer
Engineers Failure to [L:8.32%]	IT Supervisor
	Chief Executive Officer
System Software Te [L:5.97%]	Devin Nagy
	Michael Mankowski
System Hardware Te	John Doe

## Define Event Color (Region)

Default colors are already provided for the events on the diagram based on the event's %risk.

You can change this by clicking Regions...



Here you can specify the limits: Rh (risk high) and RI (risk low) both for percentage or monetary.

Given the limits, you can specify the 3 regions/colors:

- High Risk
- Mid (in-between) Risk
- Low Risk

## Export Bow-tie to Excel or Image Format

Click  [Export](#) to export the bowtie into a .xlsx file.

Click [Save as image](#) link to download the diagram as an image file (.jpeg)

## Show Monetary Values

## Simulated vs Computed Event Likelihoods, Impacts, and Risks (Flaw of Averages)

## Preferences

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