

Steps to Map Variability

1 BVR

1.1 Mapping a Feature to Model Elements

Number of required steps: 18

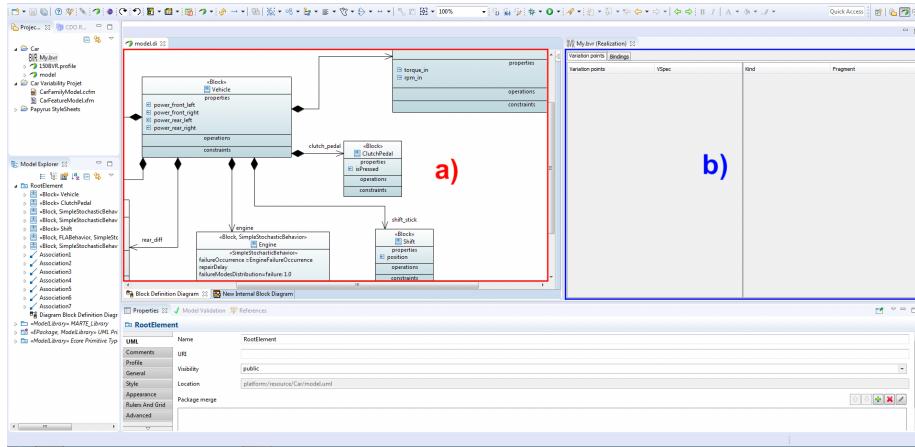


Figure 1: BVR Environment and its a) graphical editor of the targeting modeling language and b) Realization view

- i. In the graphical editor of the targeting modeling language e.g., SysML, select the model elements that should be removed from the model when the feature is selected;

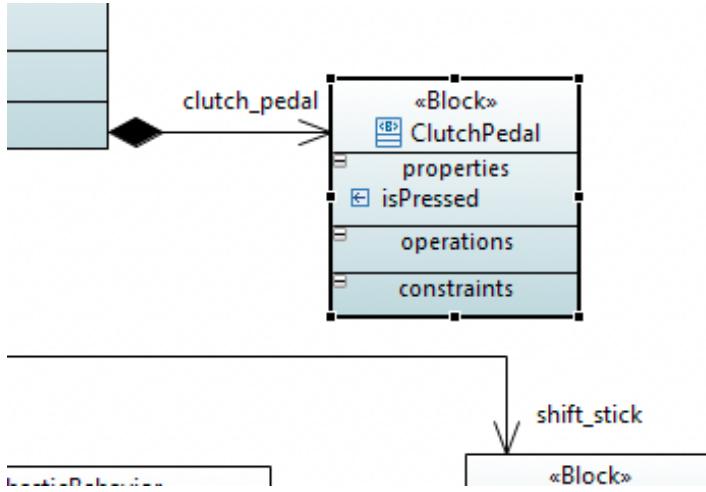


Figure 2: Step i

ii. Move to the BVR realization view:

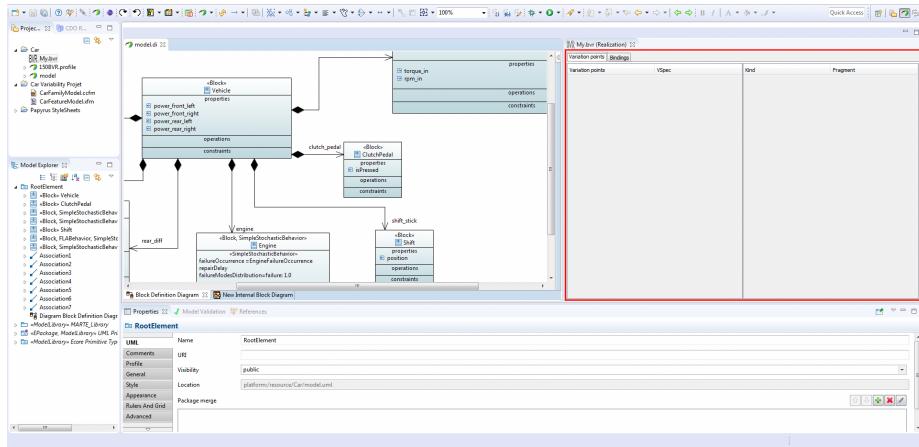


Figure 3: Step ii

iii. Right mouse click in the right side of the canvas:

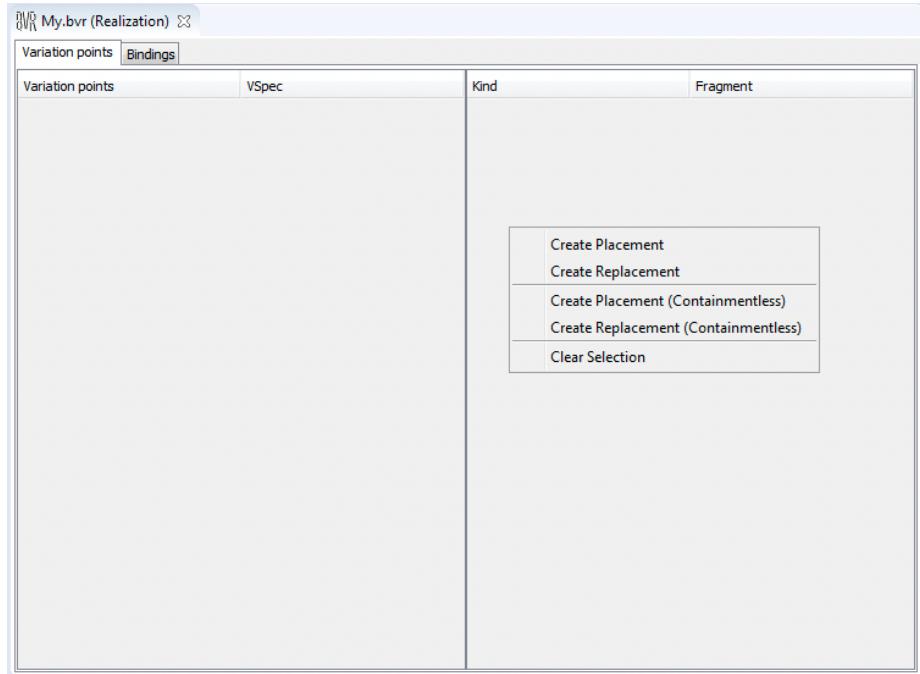


Figure 4: Step iii

iv. Select the option 'Create Placement':

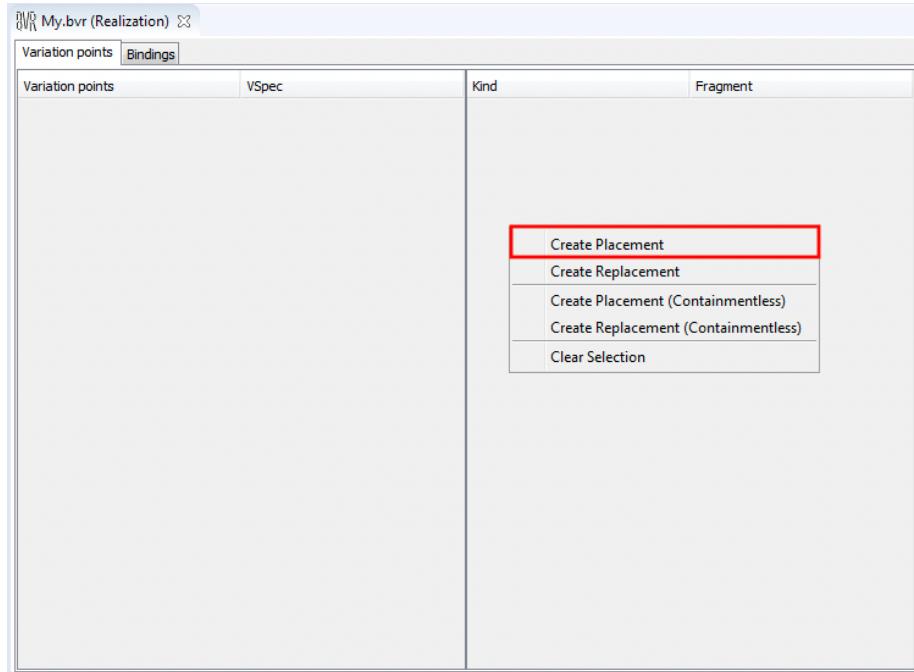


Figure 5: Step iv

v. Move to the editor of the targeting language;

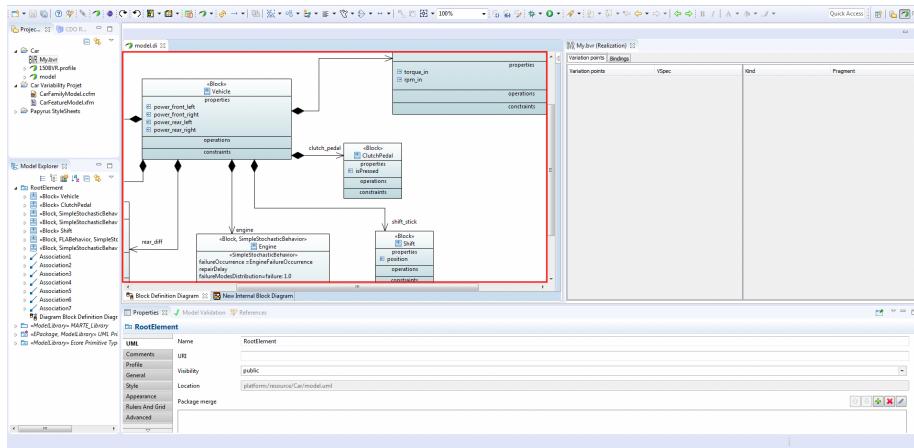


Figure 6: Step v

vi. Select the model elements that should be included (0..*) in the product when the feature selected;

vii. Move to the BVR realization view:

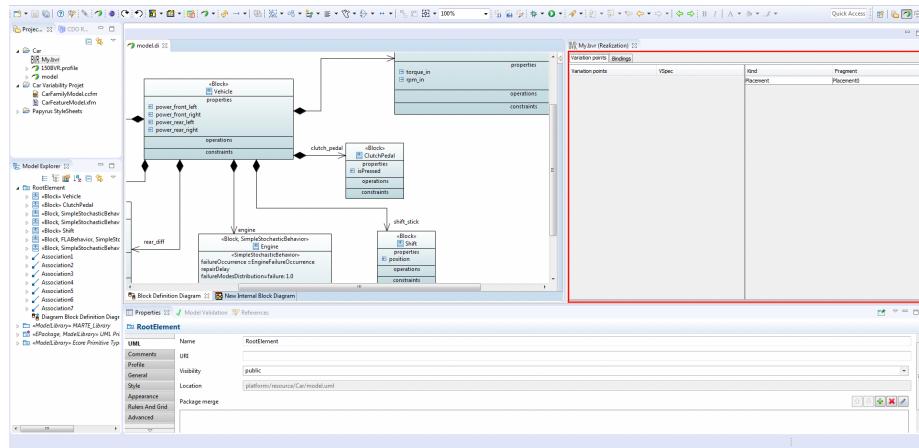


Figure 7: Step vii

viii. Right mouse click in the right side of the canvas:

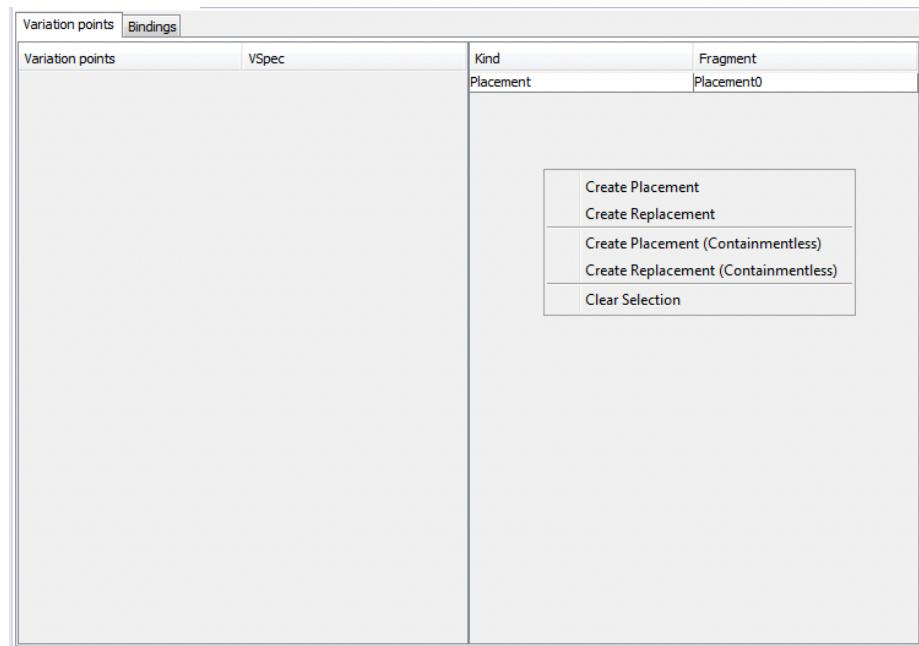


Figure 8: Step viii

ix. Select the option 'Create Replacement':

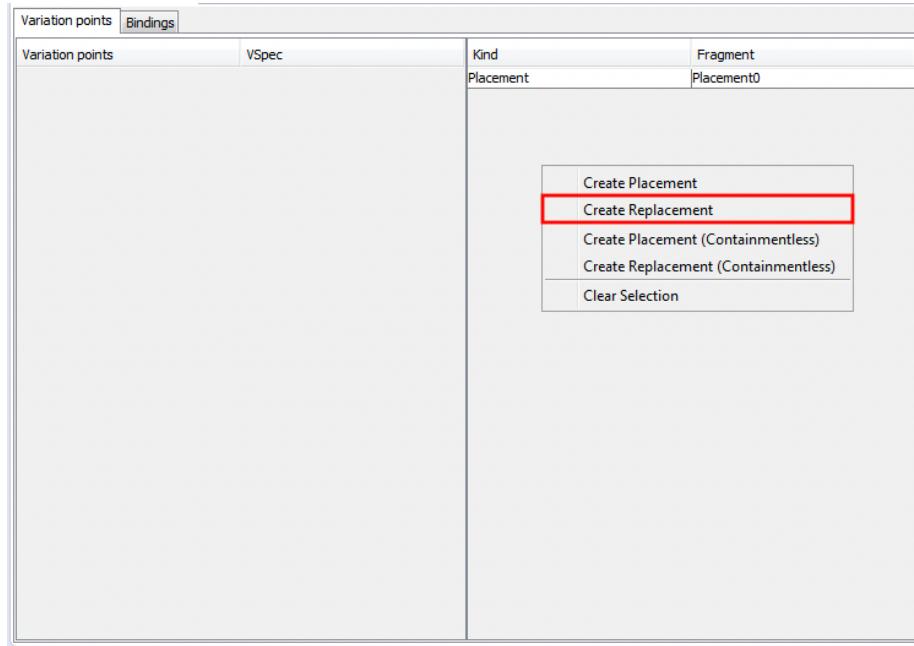


Figure 9: Step ix

- x. Select the Placement created in Step iv;
- xi. Select the Replacement created in Step ix;

Variation points	Bindings		
Variation points	VSpec	Kind	Fragment
		Replacement	Replacement1
		Placement	Placement0

Figure 10: Steps x and xi

xii. Right mouse click in in left side of the BVR realization view:

Variation points	Bindings		
Variation points	VSpec		
		Kind	Fragment
		Replacement	Replacement1
		Placement	Placement0
	<div style="border: 1px solid black; padding: 5px; text-align: center;"> Create FragmentSubstitution Clear Selection </div>		

Figure 11: Step xii

xiii. Select the option create a fragment substitution:

Variation points	Bindings		
Variation points	VSpec	Kind	Fragment
		Replacement	Replacement1
		Placement	Placement0
Create FragmentSubstitution Clear Selection			

Figure 12: Step xiii

xiv. Open the VSpec combobox to see the available features that can be mapped to the created Fragment Substitution:

Variation points	Bindings		
Variation points	VSpec	Kind	Fragment
FragmentSubstitution0	RWD	Replacement	Replacement1
	AWD	Placement	Placement0
<input type="button" value="DifferentialManufacturer"/> <input type="button" value="ManufacturerA"/> <input type="button" value="ManufacturerB"/> <input type="button" value="Gear"/> <input type="button" value="Automatic"/> <input type="button" value="Manual"/> <input type="button" value="Car"/>			

Figure 13: Step xiv

xv. Select the feature to be mapped to the created Fragment Substitution:

Variation points	Bindings		
Variation points	VSpec	Kind	Fragment
FragmentSubstitution0	RWD	Replacement	Replacement1
	AWD	Placement	Placement0
	DifferentialManufacturer		
	ManufacturerA		
	ManufacturerB		
	Gear		
	Automatic		
	Manual		
	Car		

Figure 14: Step xv

xvi. Select the created Fragment Substitution:

Variation points	Bindings		
Variation points	VSpec	Kind	Fragment
FragmentSubstitution0	Automatic	Replacement	Replacement1
		Placement	Placement0

Figure 15: Step xvi

xvii. Right mouse click:

Variation points	Bindings		
Variation points	VSpec	Kind	Fragment
FragmentSubstitution0	Automatic	Replacement	Replacement1
	Create FragmentSubstitution	Placement	Placement0
	Clear Selection		
	Generate Bindings		
	Delete FragmentSubstitution		

Figure 16: Step xvii

xviii. Select the option "Generate bindings":

Variation points	Bindings		
Variation points	VSpec	Kind	Fragment
FragmentSubstitution0	Automatic	Replacement	Replacement1
	Create FragmentSubstitution	Placement	Placement0
	Clear Selection		
	Generate Bindings		
	Delete FragmentSubstitution		

Figure 17: Step xviii

2 CRITVAR

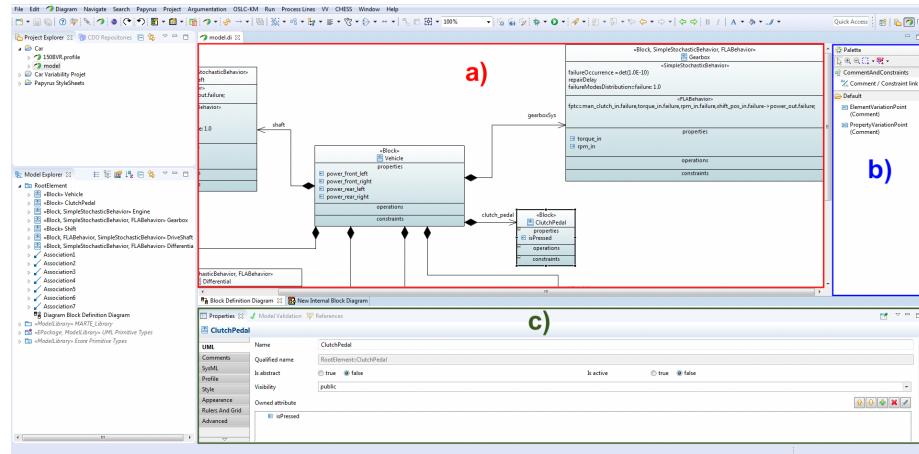


Figure 18: CRITVAR Environment and its a) graphical editor of the targeting modeling language, b) palette and c) properties view

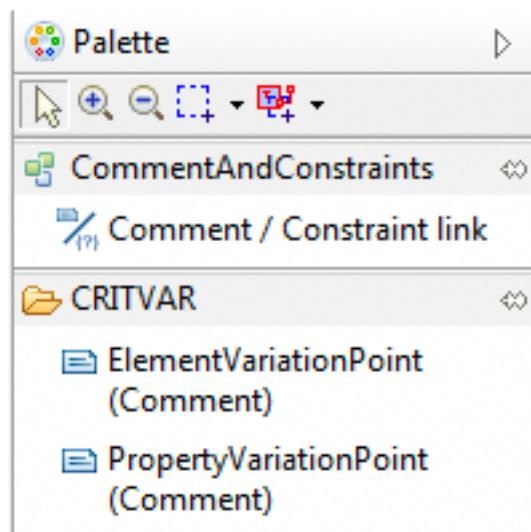


Figure 19: CRITVAR Palette



Figure 20: Properties View

2.1 Steps for Mapping Features to Model Elements

Number of required steps: 11

- i. Double click on the ElementVariationPoint element on the palette:

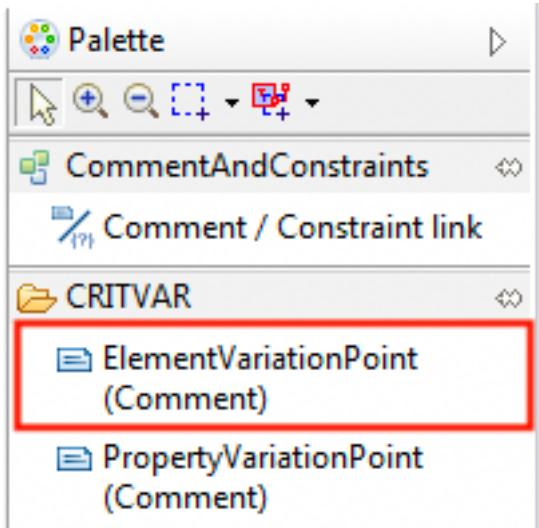


Figure 21: Window 1

- ii. Double click the featureExpr parameter in the window that just opened (Window 1):

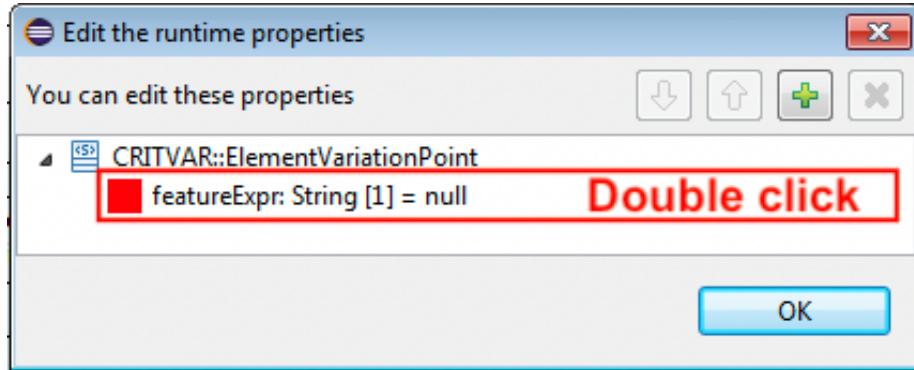


Figure 22: Window 1

- iii. Enter the desired feature expression on the window that just opened (Window 2):

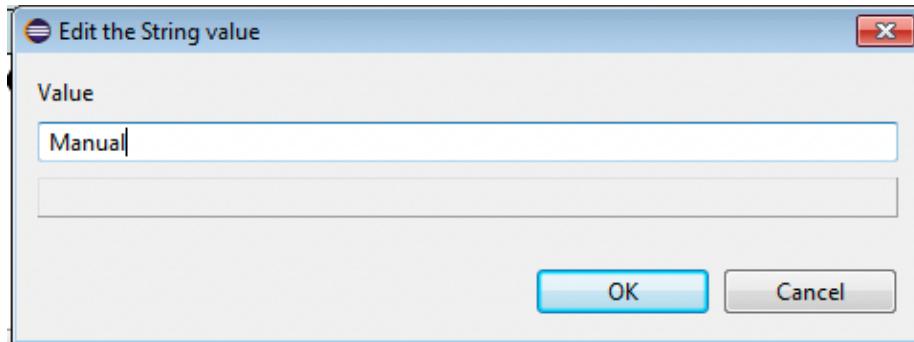


Figure 23: Window 2

- iv. Select 'OK' on Window 2:

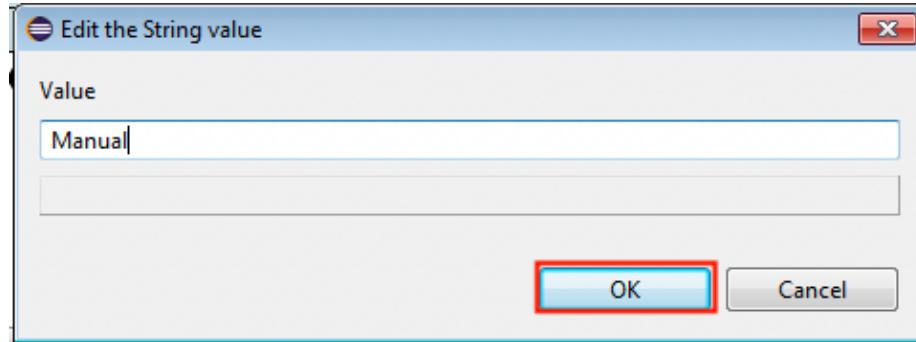


Figure 24: Step iv

v. Select 'OK' on Window 1 (Figure 22);

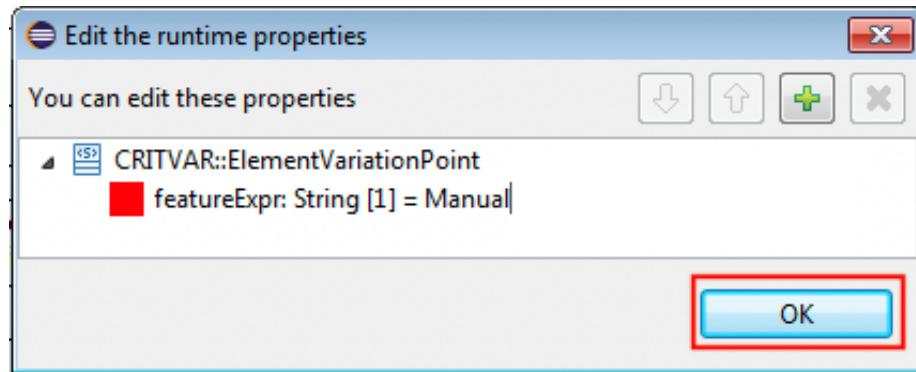


Figure 25: Step v

vi. Highlight the newly created ElementVariationPoint on the canvas;

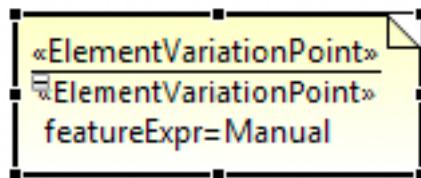


Figure 26: Step vi

vii. Move to the properties view;

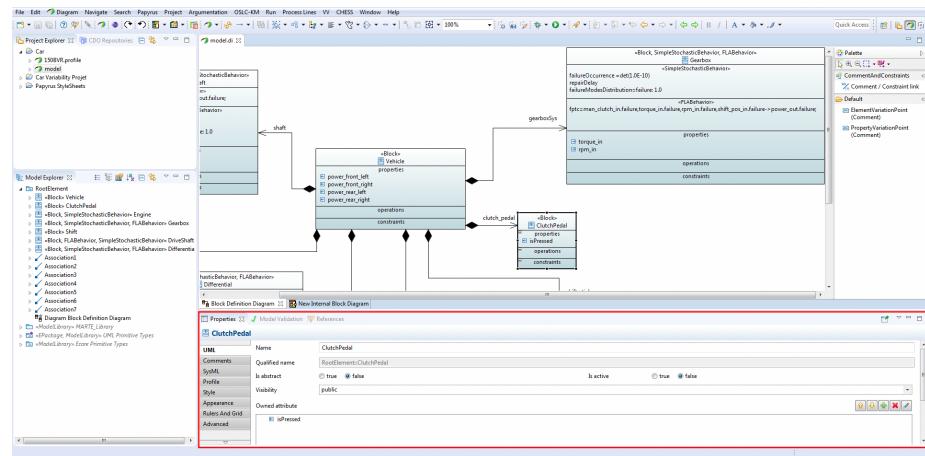


Figure 27: Step vii

viii. Select the 'UML' tab:

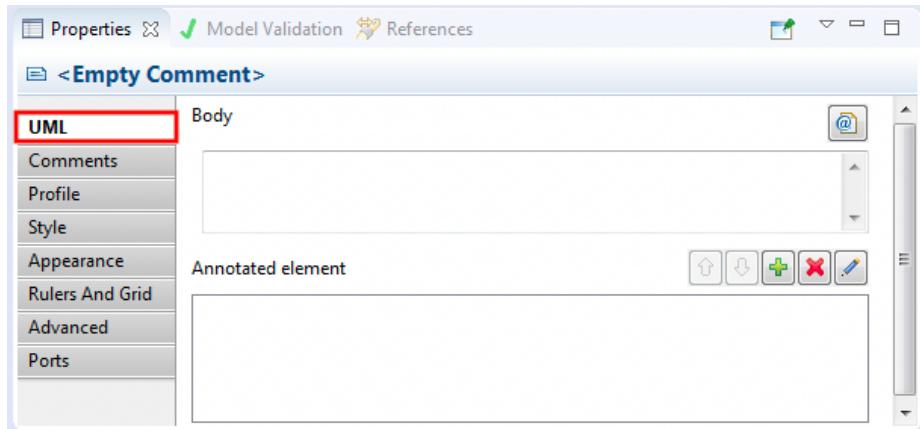


Figure 28: Step viii

ix. Select '+':

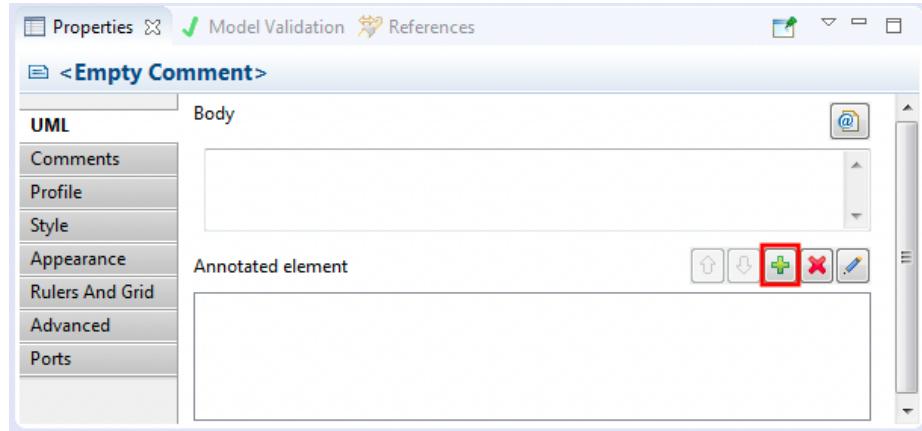


Figure 29: Step ix

- x. Select the desired model elements in the window that just opened (Window 3):

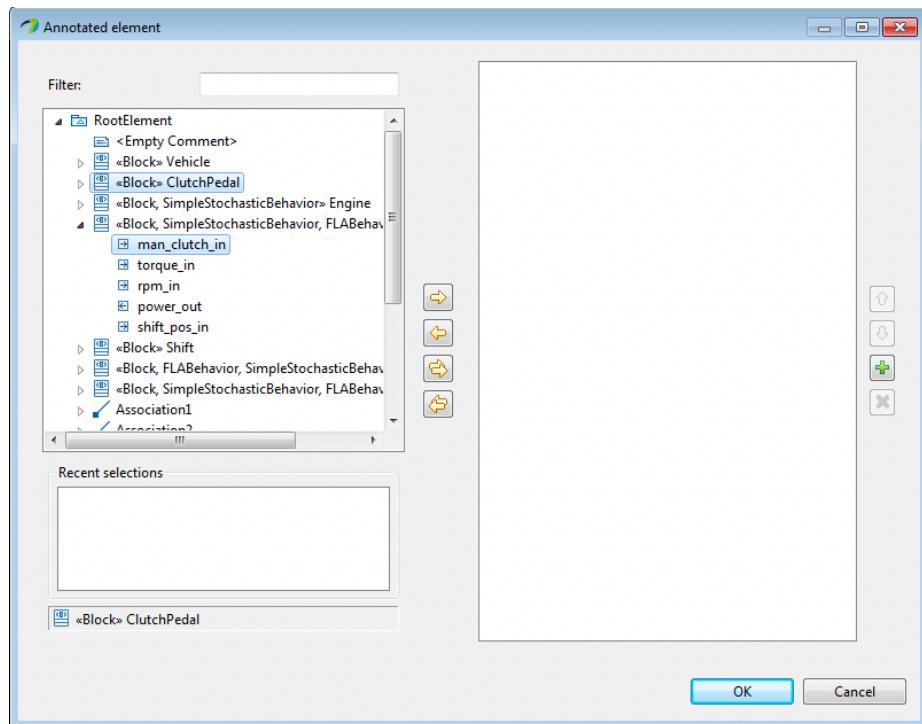


Figure 30: Window 3

xi. Select the '→' button on Window 3;

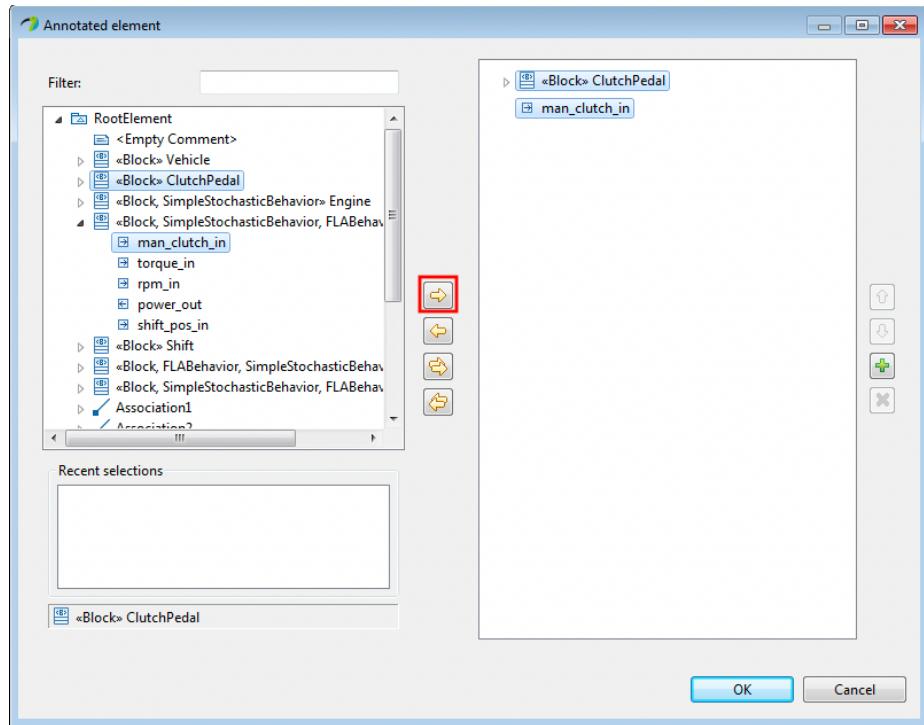


Figure 31: Step xi

xii. Select 'OK' on Window 3:

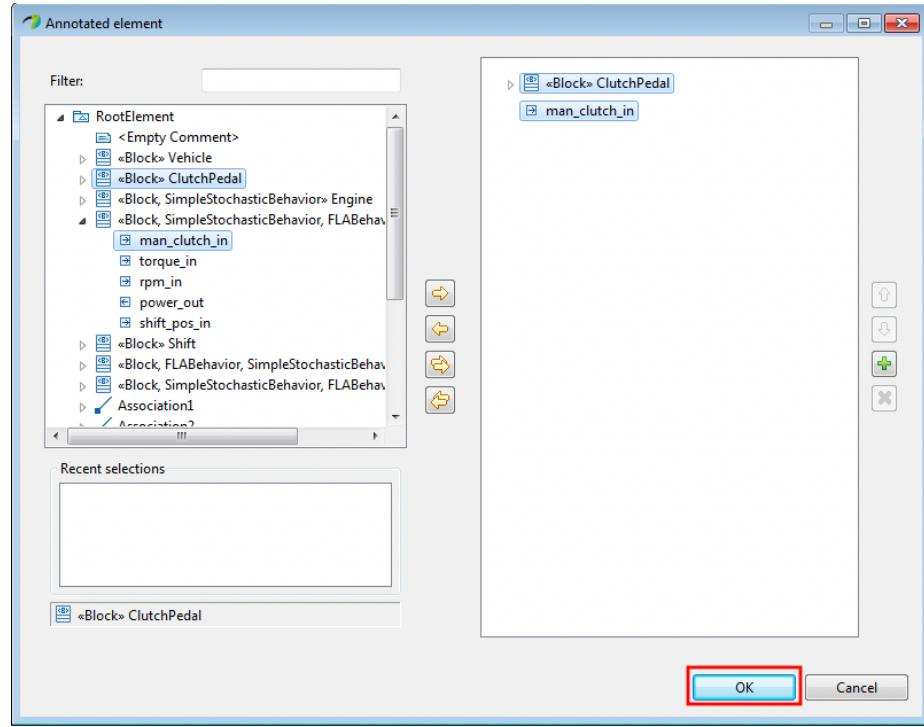


Figure 32: Step xii

2.2 Steps for Mapping Features to Safety Annotations Without a PropertyVariationPoint Comment)

Number of required steps: 6

- i. Select the desired element on the graphical editor of the targeting modeling language (Figure 18 a));

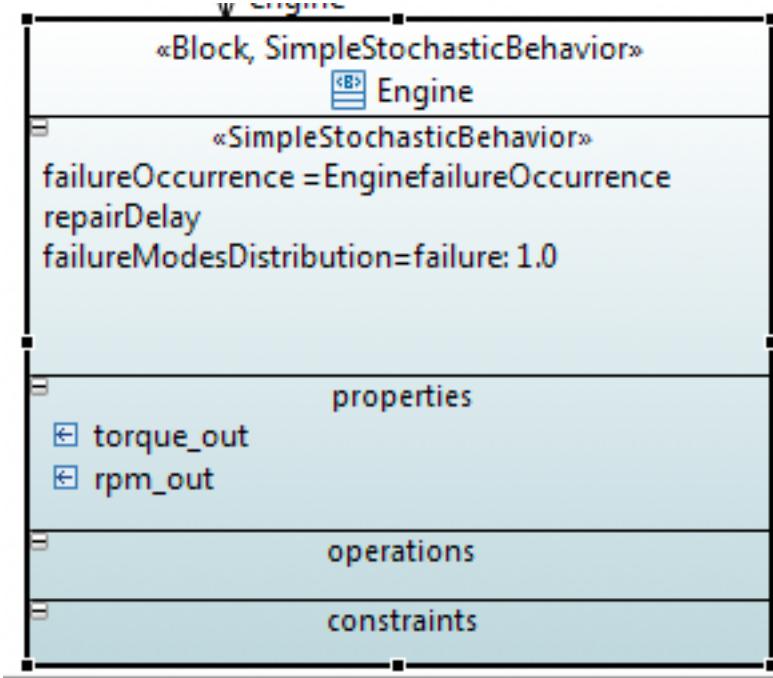


Figure 33: Step i

ii. Move to the 'Properties' view;

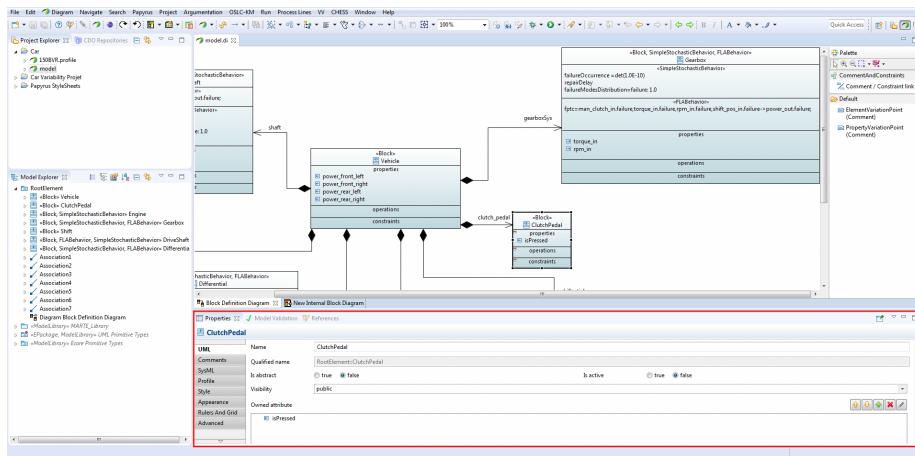


Figure 34: Step ii

iii. Select the 'Profile' tab:

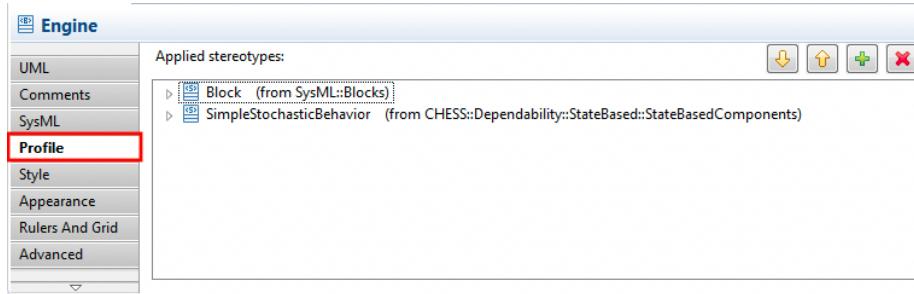


Figure 35: Step iii

iv. Select the desired stereotype;

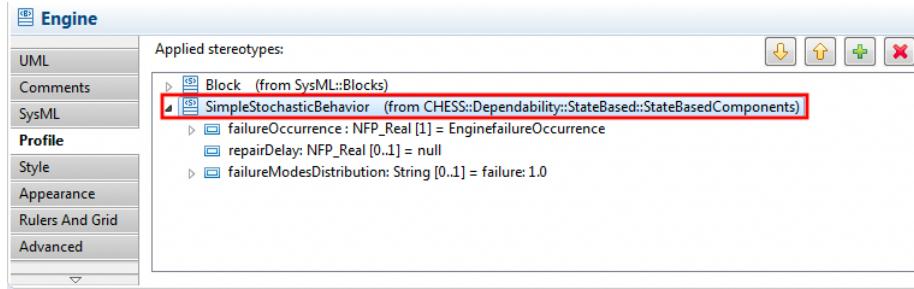


Figure 36: Step iv

v. Select the desired property within the selected stereotype;

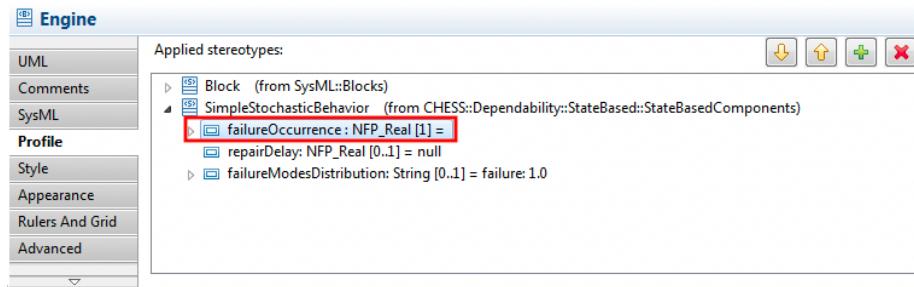


Figure 37: Step v

vi. Enter the appropriate variability expressions on the text box that opens on the right:



Figure 38: Step vi

2.3 Steps for Mapping Features to Safety Annotations With a PropertyVariationPoint Comment)

Number of required steps: 11

- Double click the PropertyVariationPoint element on the palette:

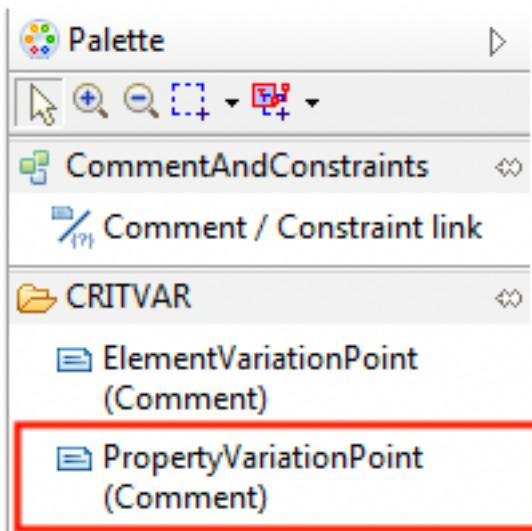


Figure 39: Step i

- Double click the 'subproperty' parameter on Window 1:

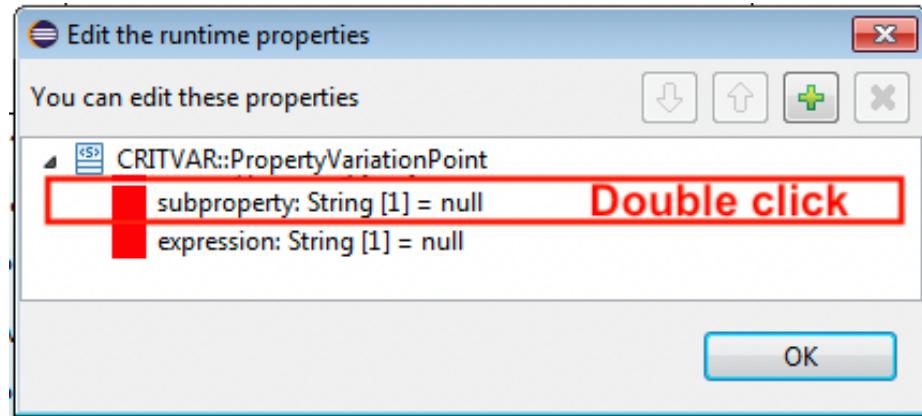


Figure 40: Step ii

- iii. Enter the desired subproperty name. If the subproperty is within a stereotype, specify the stereotype's name and the subproperty e.g., 'SimpleStochasticBehavior.failureOccurrence' or 'FLABehavior.fptc', in the window that just opened (Window 2);

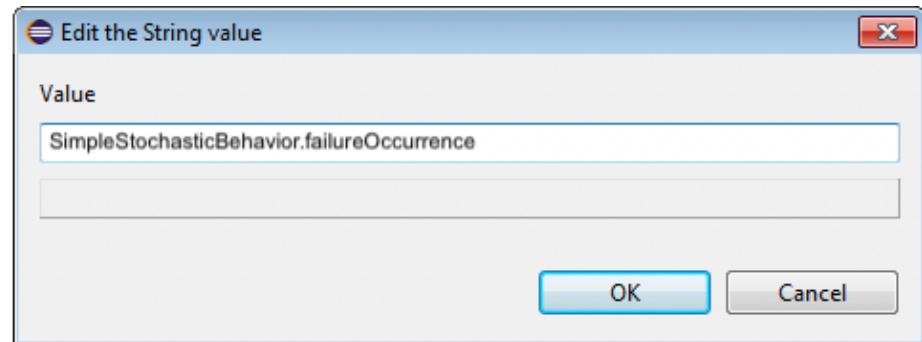


Figure 41: Window 2

- iv. Select 'OK' on Window 2 (Figure iii);

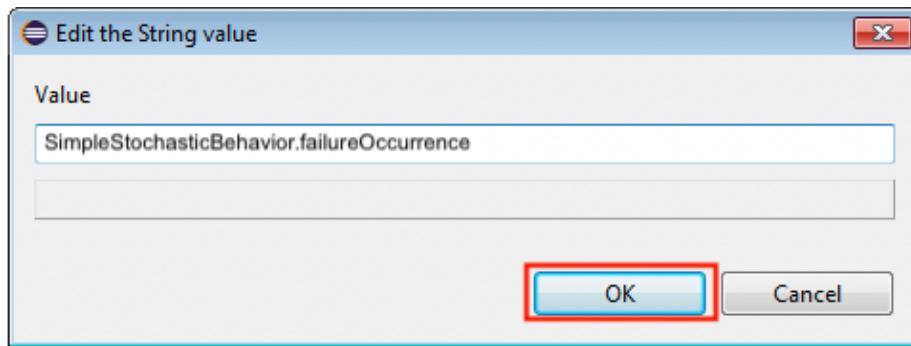


Figure 42: Step iv

v. Double click the 'expression' parameter on Window 1:

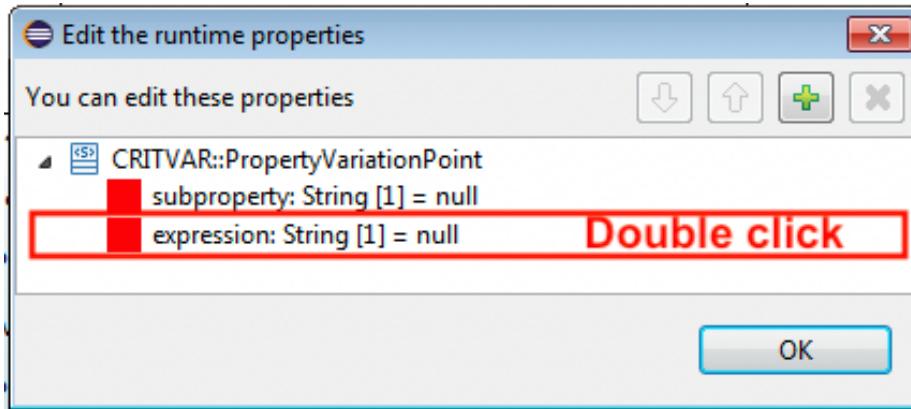


Figure 43: Step v

vi. Enter the desired expression in the window that just opened (Window 3);

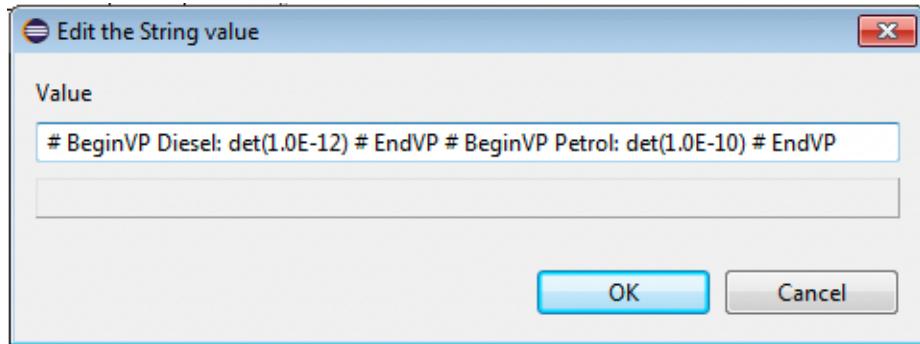


Figure 44: Window 3

vii. Select 'OK' on Window 3 (Figure vi);

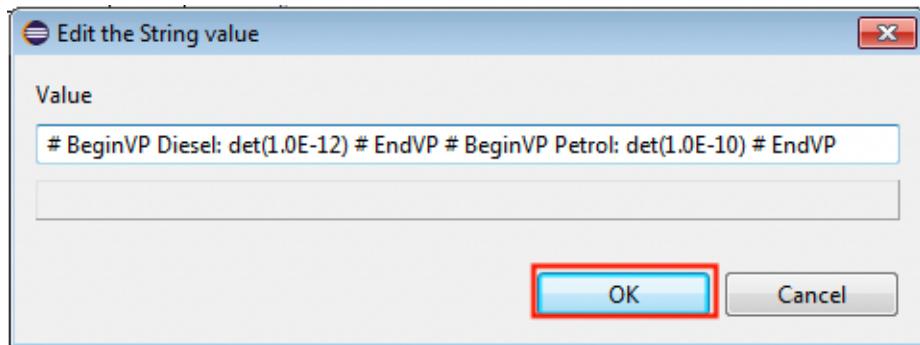


Figure 45: Step vii

viii. Select 'OK' on Window 1;

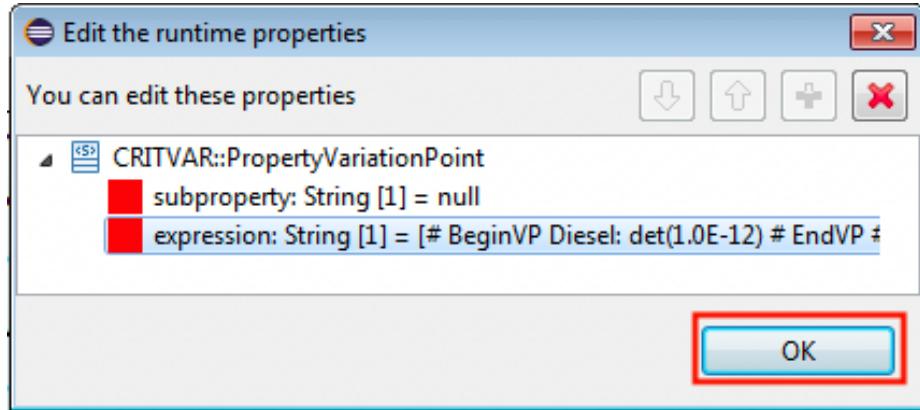


Figure 46: Step viii

ix. Select the 'Comment Link' element on the palette;

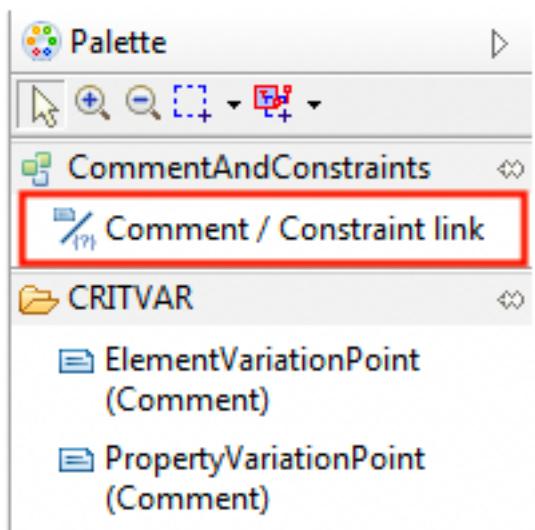


Figure 47: Step ix

x. Click on the PropertyVariationPoint comment created in step ii;

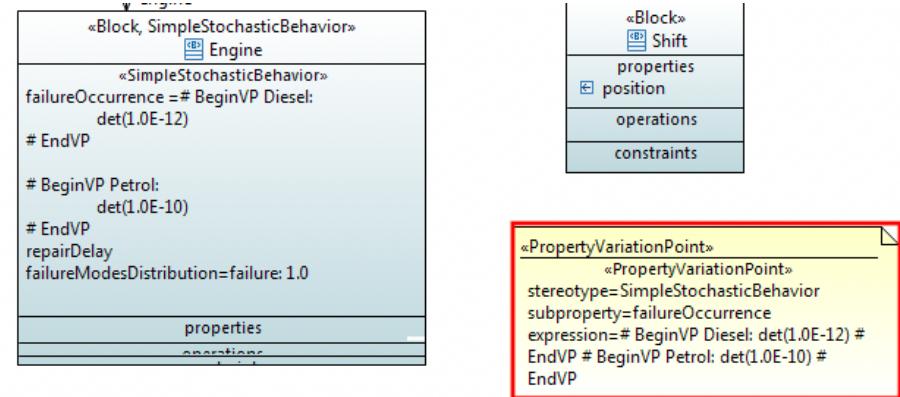


Figure 48: Step xx

- xi. Click on the desired element on the canvas to set it as an annotatedElement.

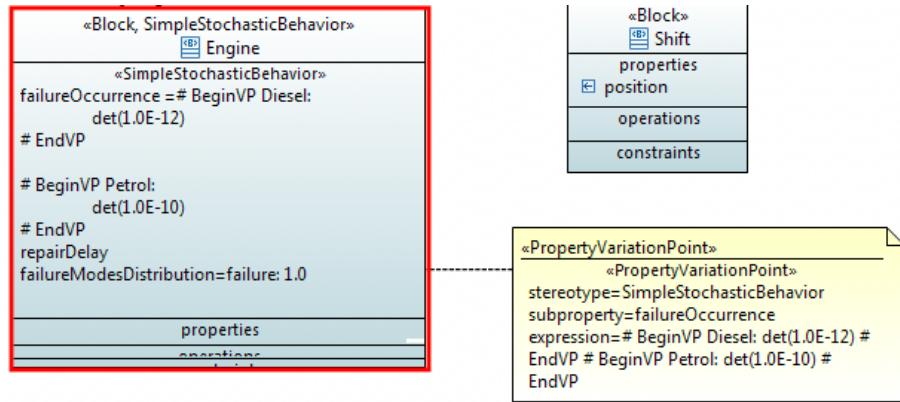


Figure 49: Step xi

3 pure::variants

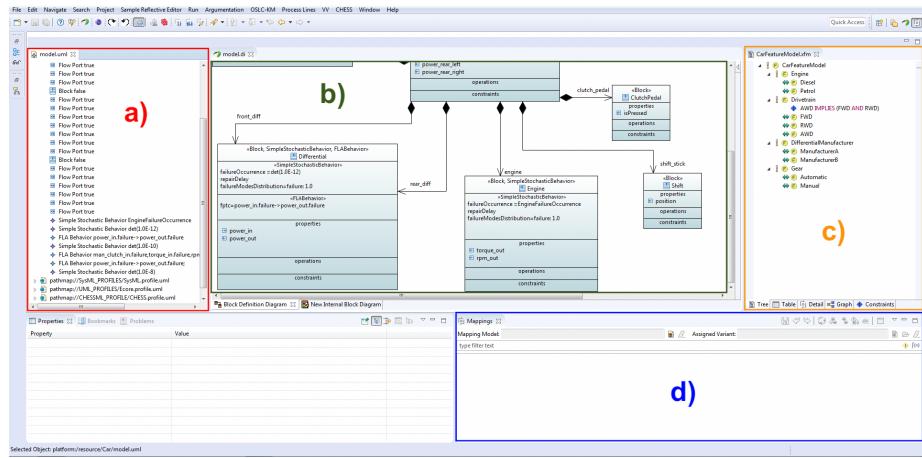


Figure 50: pure::variants Environment and its **a)** tree model editor of the targeting modeling language, **b)** graphical editor of the targeting modeling language, **c)** feature model view and **d)** mappings view

3.1 Steps for Mapping Features to Model Elements

Number of required steps: 9

- Right click in the Mappings view (Figure 50 **d**));

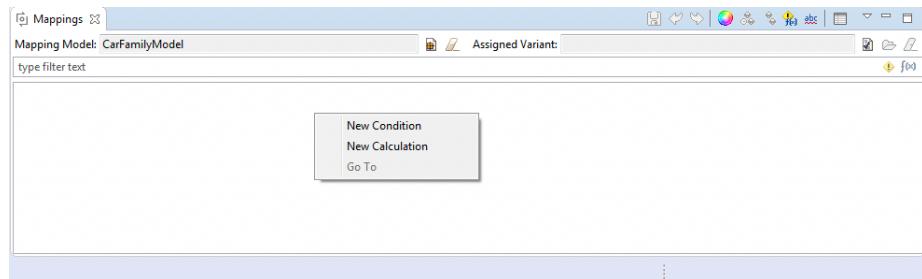


Figure 51: Step i

- Select 'New Condition';

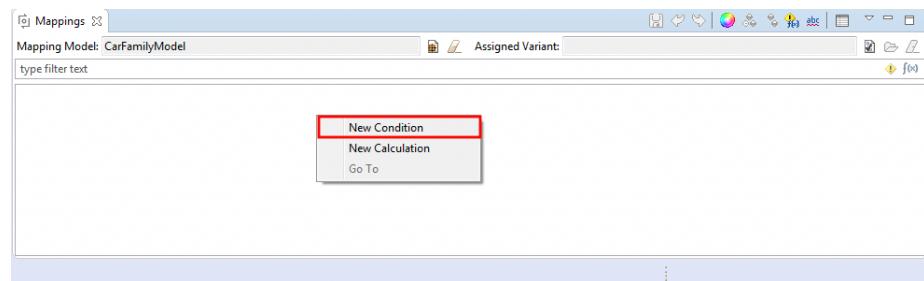


Figure 52: Step i

- iii. Enter the desired feature expression in the window that just opened (Window 1);

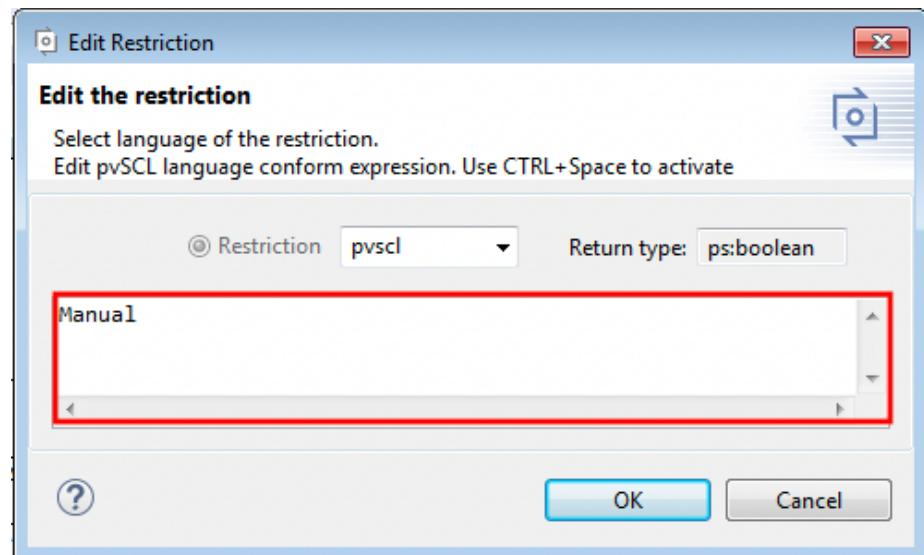


Figure 53: Window 1

- iv. Select 'OK' on Window 1;

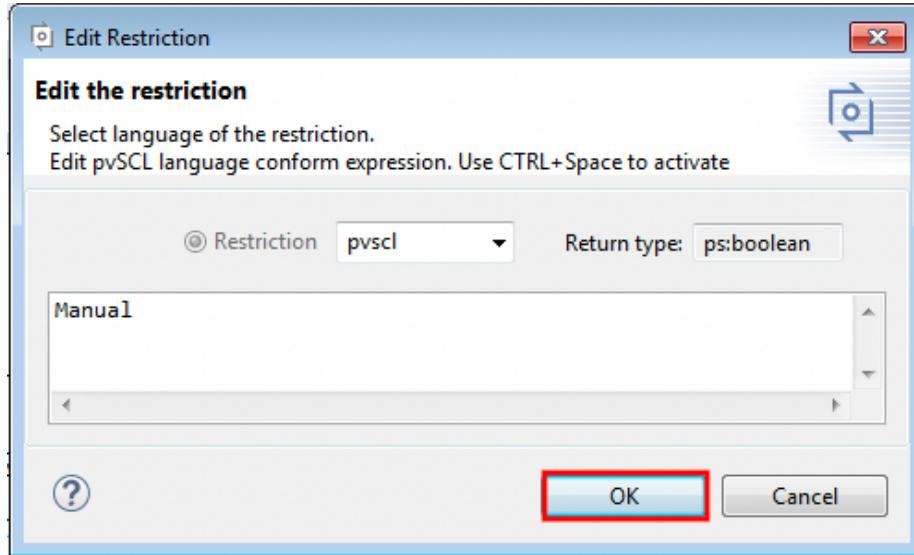


Figure 54: Step iv

- v. Move to the graphical editor of the targeting modeling language e.g. SysML:

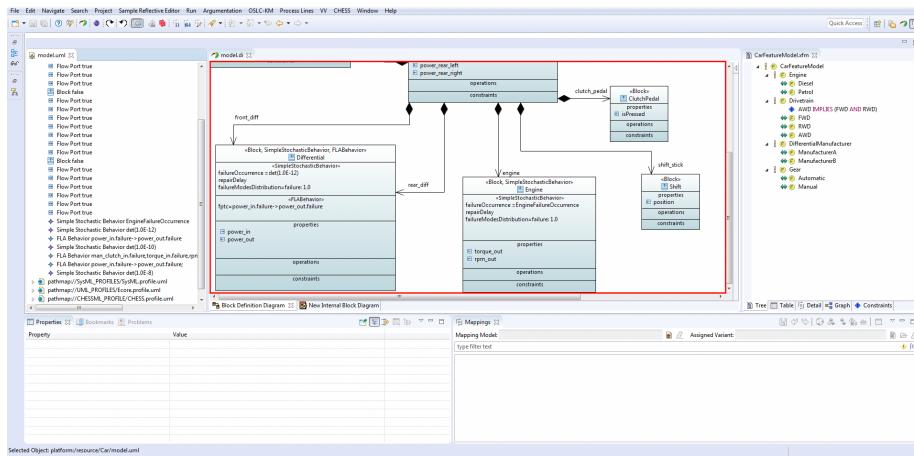


Figure 55: Step v

- vi. Select the desired model element(s) that will be kept in the model when the feature expression defined in Step iii is satisfied;

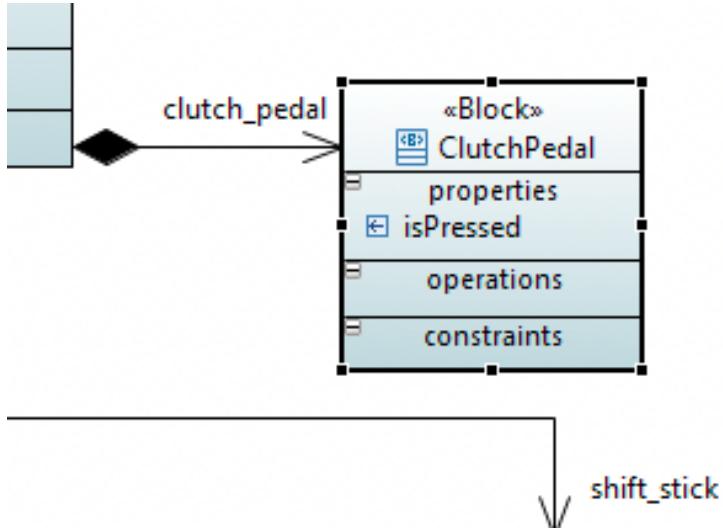


Figure 56: Step vi

vii. Move to the Mappings editor (Figure 50 d));

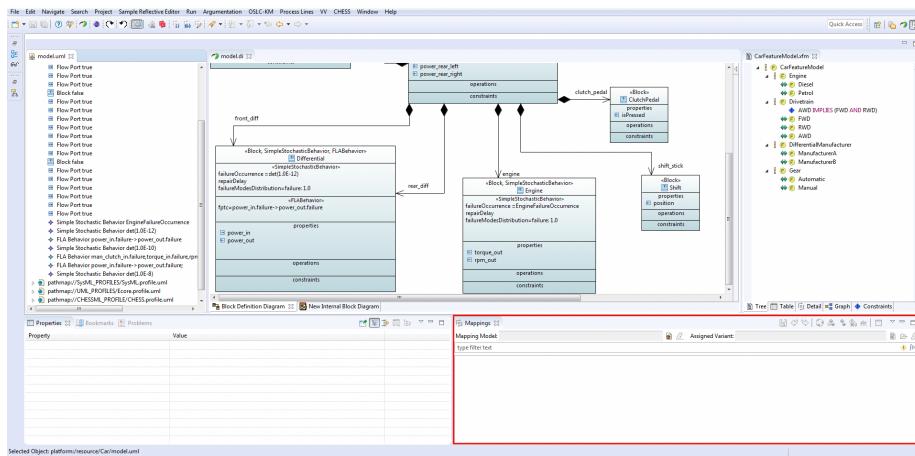


Figure 57: Step vii

viii. Right click in the condition created in step i;

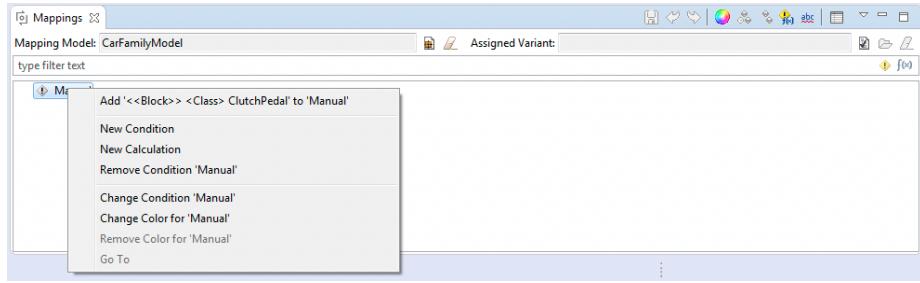


Figure 58: Step viii

ix. Select Add [Element] to [Condition].

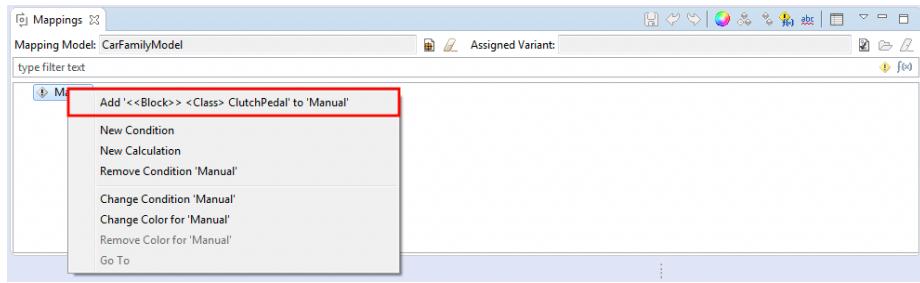


Figure 59: Step ix

3.2 Steps for Mapping Features to Safety Annotations

Number of required steps: 11

- i. Right click on the Mappings editor;

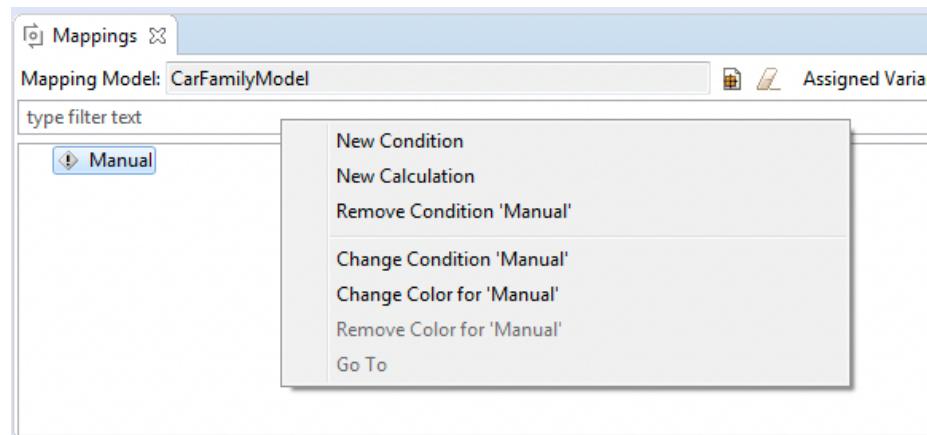


Figure 60: Step i

ii. Select 'New Calculation';

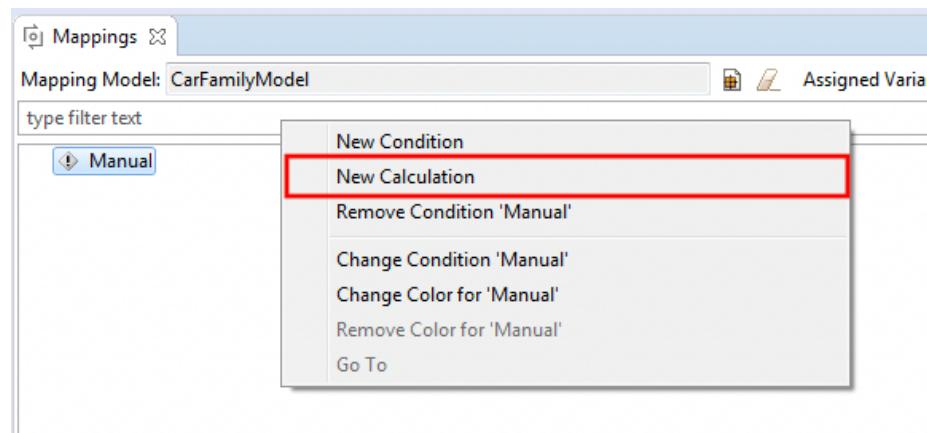


Figure 61: Step ii

iii. Enter the desired variability expression on the window that just opened (Window 1);

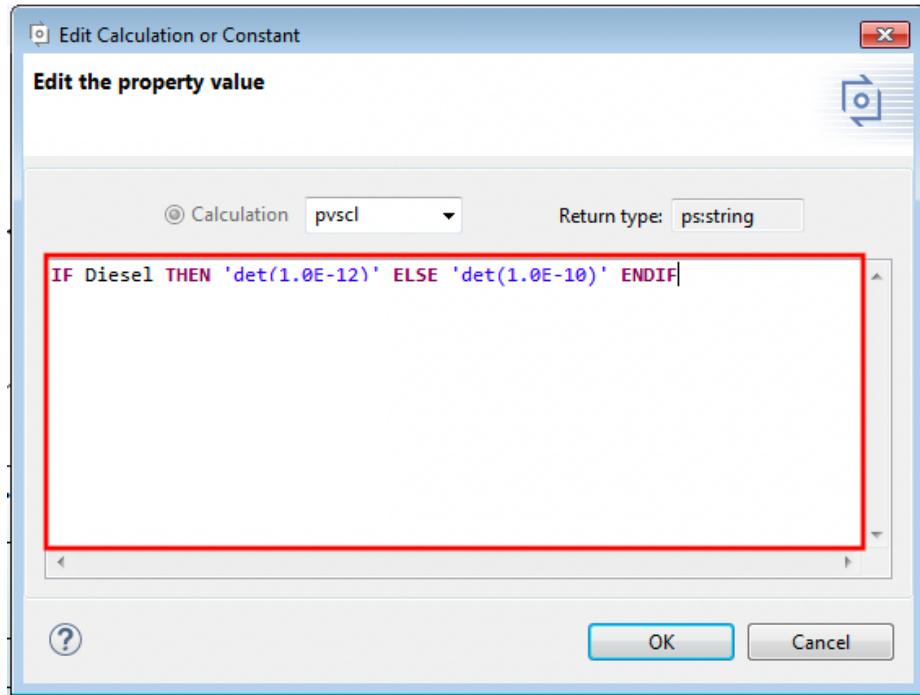


Figure 62: Window 1

iv. Select 'OK' on Window 1;

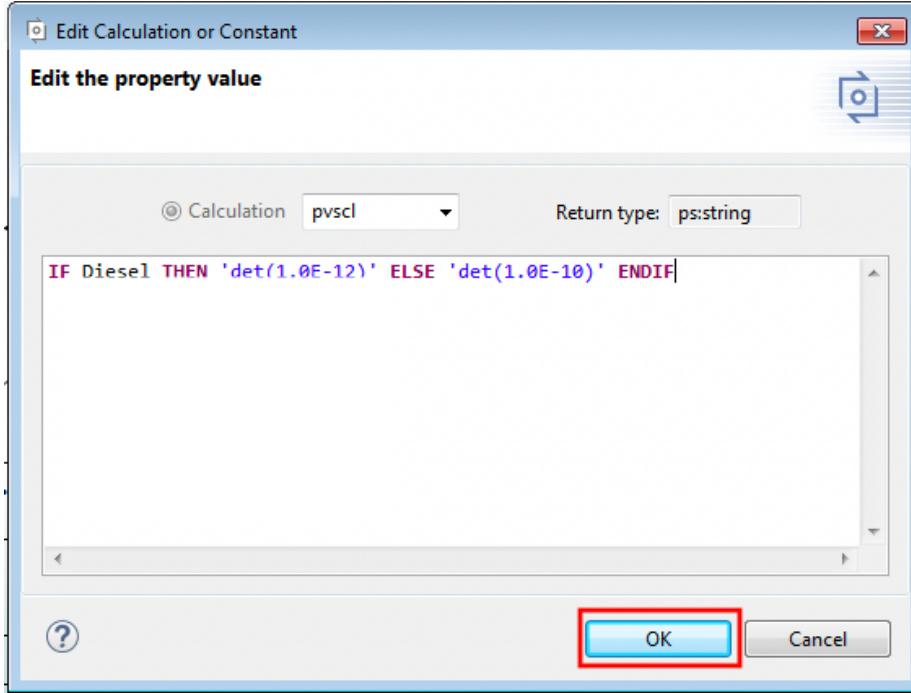


Figure 63: Step iv

v. Move to the tree view model editor:

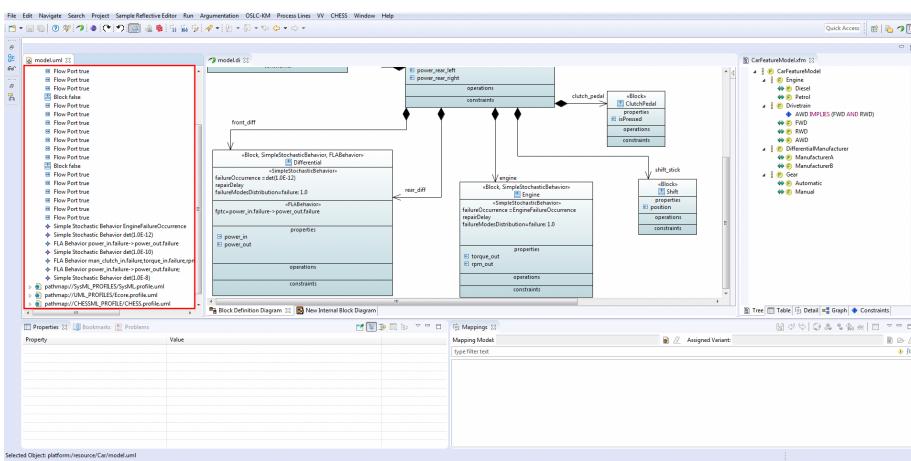


Figure 64: Step v

vi. Select the desired property (can be either within a stereotype or not);

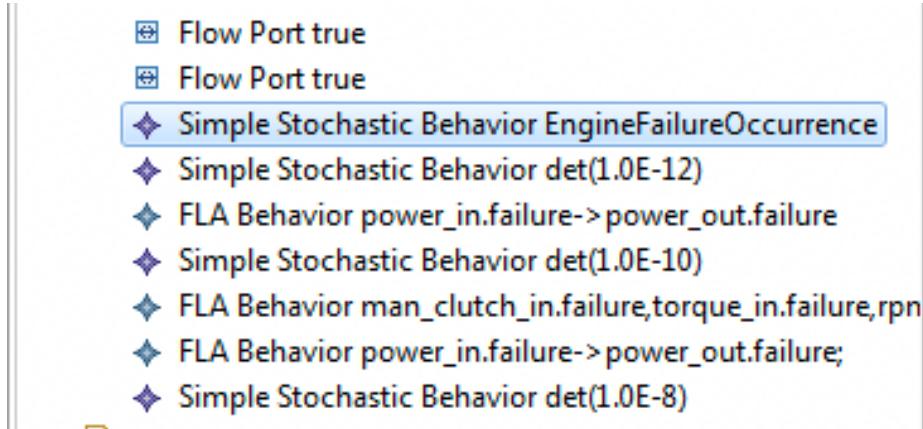


Figure 65: Step vi

vii. Move to the Mappings editor (Figure 50 d));

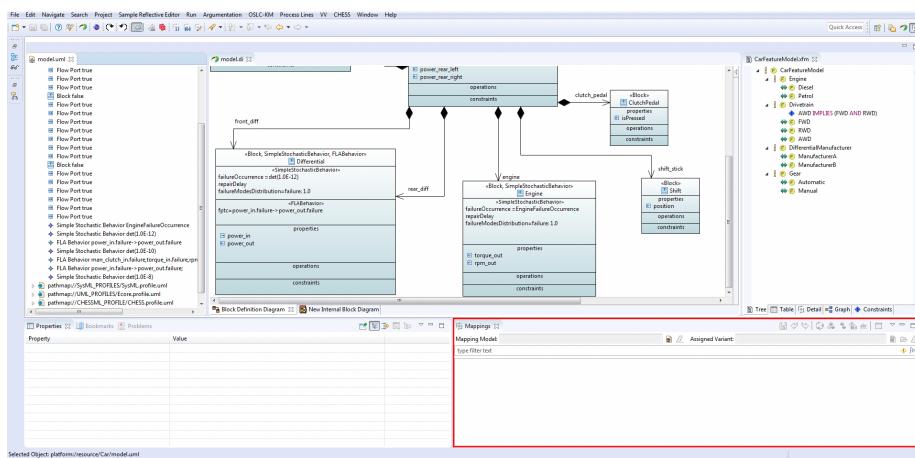


Figure 66: Step vii

viii. Right click on the calculation created in step xi;

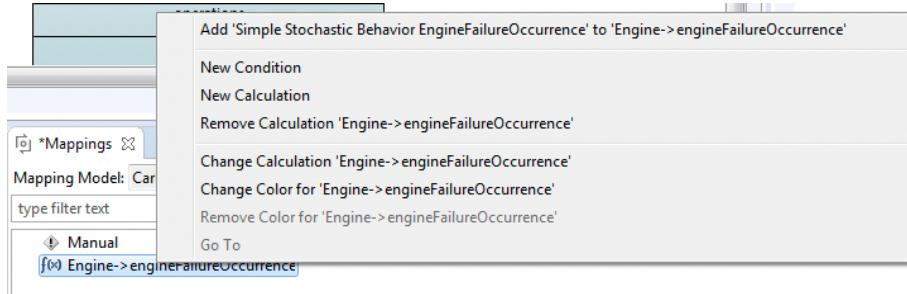


Figure 67: Step viii

ix. Select 'Add [Selected Property] to [Calculation Label]';

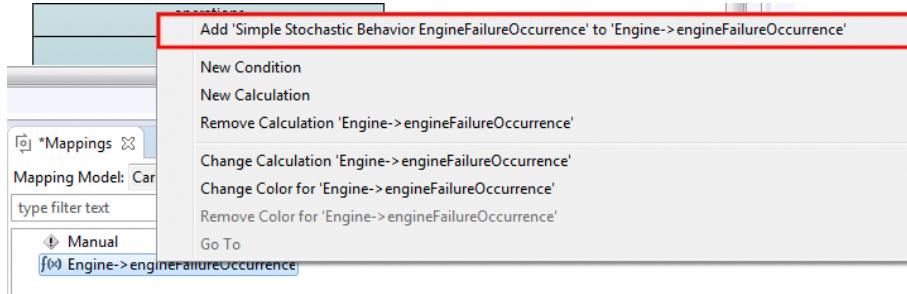


Figure 68: Step ix

x. Select the desired sub property on the window that just opened (Window 3);

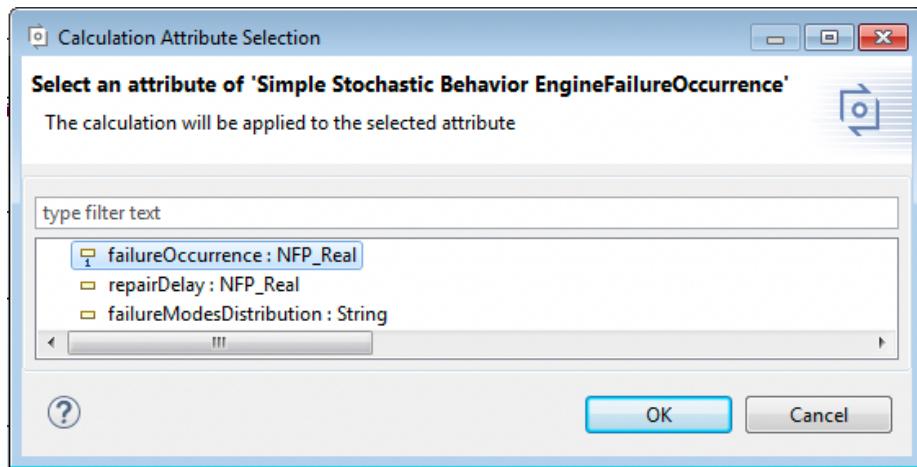


Figure 69: Window 2

xi. Select 'OK' on Window 2.

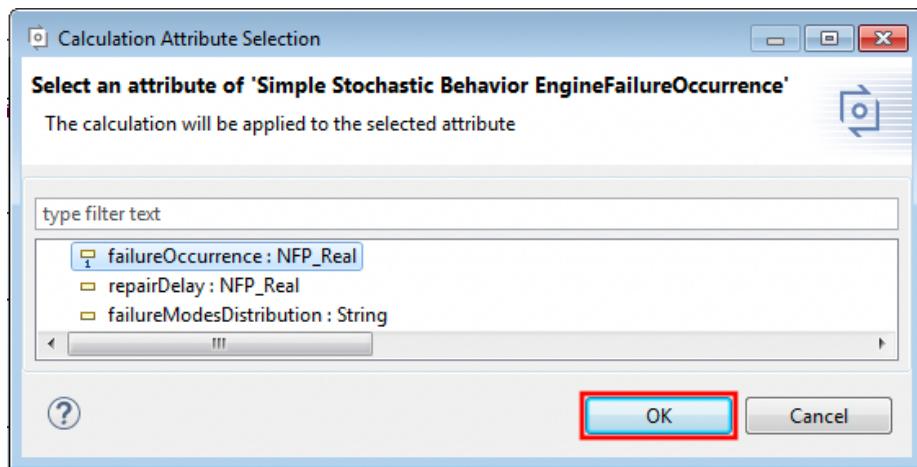


Figure 70: Step xi