

# Extending ISO 26262 elements with new properties

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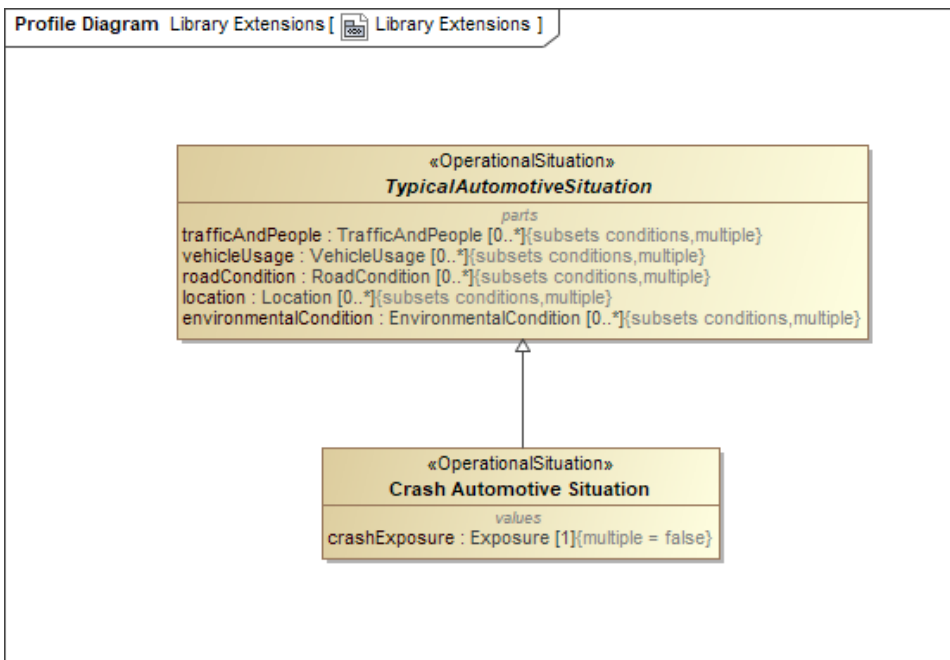
You can extend the default ISO 26262 library by adding new properties to ISO 26262 elements. In this chapter, you will learn how to add Value Properties and Part Properties by analyzing specific use cases.

## Case study: Adding new Value Properties

You can add new Value Properties to an element by creating a custom element type with these properties. Let's analyze the workflow of adding a custom Exposure property to an Operational Situation. Since you cannot edit the default Operational Situation from the ISO 26262 library, you will have to create a custom Operational Situation with a new Value property, as described below.

To add a custom Exposure property to an Operational Situation

1. In your model, create a Profile Diagram.
2. In the Profile Diagram, create a Class and name it, e.g., *Crash Automotive Situation*.
3. Apply the «OperationalSituation» stereotype to the Class.
4. In the ISO 26262 Library, find the *TypicalAutomotiveSituation* element and drag it to the Profile diagram.
5. Create a Generalization relationship from the Class created in step 2 to *TypicalAutomotiveSituation*.
6. Create a Value Property for the Class and name it, e.g., *crashExposure*.
7. Set the **Type** property of the newly created Value Property to Exposure.
8. Set the **Multiplicity** property of the Value Property to 1.
9. Apply the «InputField» stereotype to the Value Property.
10. In the Specification window of the Value Property, select the **Tags** property group and set the **multiple** property to *false*. Now your Profile Diagram should look as displayed below.



11. Save and reload the project.

You have created a new type of Operational Situation (e.g., *Crash Automotive Situation*) with a custom Exposure property (e.g., *crashExposure*). Now you can [add new columns](#) for this property in an Operational Situations Table as displayed in the following figure.



### Justification for Value Properties

When you create a new Value Property, the column for justification of that property is automatically created as well and you can add to a table.

| Operational Situations             |  |  |   |                              |                    |                    |                  |                           |                |  |
|------------------------------------|--|--|---|------------------------------|--------------------|--------------------|------------------|---------------------------|----------------|--|
| Criteria                           |  |  |   |                              |                    |                    |                  |                           |                |  |
| Element Type: OperationalSituation |  | Scope (optional): TypicalAutomotiveSituation |   | Filter: <input type="text"/> |                    |                    |                  |                           |                |  |
| #                                  | Name   | Exposure                                     | Justification Of Exposure   | Vehicle Usage                | Traffic And People | Location           | Road Condition   | Environmental Condition   | Crash Exposure | Justification Of Crash Exposure  |
| 1                                  | <input type="checkbox"/> TypicalAutomotiveSituation        |  |   |                              |                    |                    |                  |                           |                |  |
| 2                                  | <input type="checkbox"/> Crash Automotive Situation        |  |   |                              |                    |                    |                  |                           |                |  |
| 3                                  | <input type="checkbox"/> Colliding to another vehicle      |  |   | Driving at Speed             | Synchronized Flow  | Highway            | AnyRoadCondition | AnyEnvironmentalCondition | E4             | It is an extremely dangerous situation that most likely will cause injury or death |
| 4                                  | <input type="checkbox"/> Normal driving in curve           | E2   | Driving at high speed on slightly curvy roads is part of normal driving | Driving at Speed             | Traffic Free Flow  | Highway City Roads | AnyRoadCondition | AnyEnvironmentalCondition |                |  |
| 5                                  | <input type="checkbox"/> Highway Driving Straight at Speed | E4   | Everyday exposure to city roads, highways, freeways                     | Driving at Speed             | Traffic Free Flow  | Highway City Roads | AnyRoadCondition | AnyEnvironmentalCondition |                |  |

Filter is not applied. 5 rows are displayed in the table.

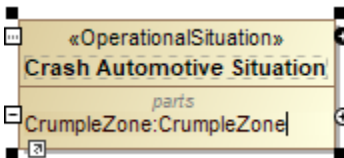
The example of an Operational Situations Table with two additional columns for a new Value Property.

## Case study: Adding new Part Properties

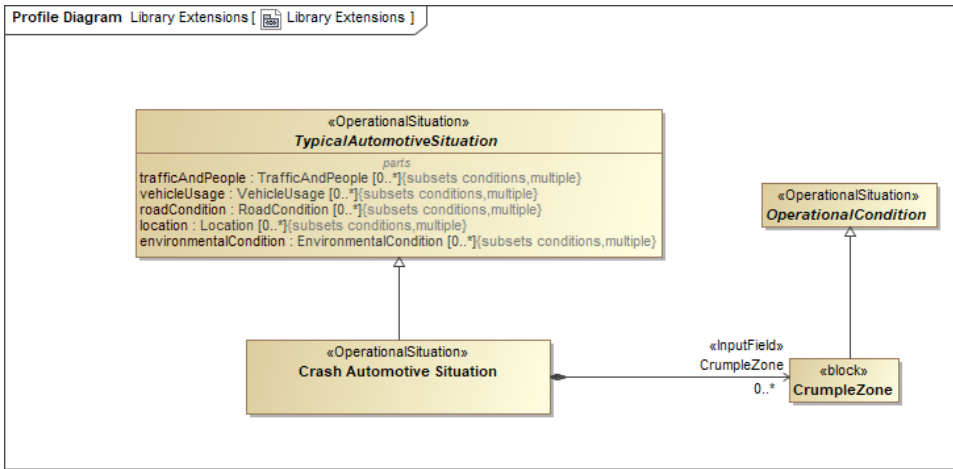
You can add new Part Properties to an element by creating a custom element type with these properties. Let's analyze the workflow of adding a new Part Property with multiple values to an Operational Situation. Since you cannot edit the default Operational Situation from the ISO 26262 library, you will have to create a custom Operational Situation with a new Part Property. In this workflow, the Part Property is based on Operational Condition.

To add a Part property to an Operational Situation

1. In your model, create a Profile Diagram.
2. In the Profile Diagram, create a Class and name it, e.g., *Crash Automotive Situation*.
3. Apply the «OperationalSituation» stereotype to the Class.
4. In the ISO 26262 Library, find the *TypicalAutomotiveSituation* element and drag it to the Profile diagram.
5. Create a Generalization relationship from the Class created in step 2 to *TypicalAutomotiveSituation*.
6. Create a Part Property for the Class, type its name followed by a colon and the name of the Part property type, e.g., *CrumpleZone:CrumpleZone*.



7. Set the **Multiplicity** property of the Part Property to 0..\*.
8. Apply the «InputField» stereotype to the Part Property.
9. Drag the Part Property from the Class created in step 2 to the diagram pane. The type of the Part property should be automatically displayed in the diagram.
10. In the ISO 26262 Library, find the *OperationalCondition* element and drag it to the Profile diagram.
11. Create a Generalization relationship from the type of the Part Property to *OperationalCondition*. Now your Profile Diagram should look as displayed below.



12. Save and reload the project.

You have created a new type of Operational Situation (e.g., *Crash Automotive Situation*) with a custom Part Property (e.g., *CrumpleZone*). Now you can add a new column for this property in an Operational Situations Table as displayed in the following figure.

The screenshot shows the "Operational Situations" table interface. The table has columns: #, Name, Exposure, Justification Of Exposure, Vehicle Usage, Traffic And People, Location, Road Condition, Environmental Condition, and **Crumple Zone** (highlighted with an orange circle). The table contains 5 rows of data. The first two rows are "TypicalAutomotiveSituation" and "Crash Automotive Situation". The next three rows are "Slipping off the road", "Normal driving in curve", and "Highway Driving Straight at Speed".

| # | Name                              | Exposure | Justification Of Exposure   | Vehicle Usage                                       | Traffic And People  | Location              | Road Condition   | Environmental Condition    | Crumple Zone       |
|---|-----------------------------------|----------|---|---|---------------------|-----------------------|------------------|----------------------------|--------------------|
| 1 | TypicalAutomotiveSituation        |          |   |   |                     |                       |                  |                            |                    |
| 2 | Crash Automotive Situation        |          |   |   |                     |                       |                  |                            |                    |
| 3 | Slipping off the road             |          |   | Steering Driving Straight<br>Steering while Turning | AnyTrafficAndPeople | Highway               | Ice<br>Snow      | Reduced Visibility         | Front Crumple Zone |
| 4 | Normal driving in curve           | E2       | Driving at high speed on slightly curvy roads is part of normal driving | Driving at Speed                                    | Traffic Free Flow   | Highway<br>City Roads | AnyRoadCondition | AnyEnvironmental Condition |                    |
| 5 | Highway Driving Straight at Speed | E4       | Everyday exposure to city roads, highways, freeways                     | Driving at Speed                                    | Traffic Free Flow   | Highway<br>City Roads | AnyRoadCondition | AnyEnvironmental Condition |                    |

Filter is not applied. 5 rows are displayed in the table.

The example of an Operational Situations Table with an additional column for a new Part Property.

### Specifying values for a new Part Property

To specify the values of the newly created Part Property, you need to create a custom stereotype and a Customization for that stereotype. You can find an example of such Customization in the [Functional Safety Analysis Sample.mdzip](#) sample model. To learn more about creating Customizations, see [Creating Customization Data](#).

## Creating tables for custom element types

If you need a table to display custom elements and their properties, use a [Generic Safety Table](#) which allows displaying all relevant elements depending on the selected scope.

### Sample model

To download the model used in the examples described on this page, click [Functional Safety Analysis Sample.mdzip](#).