SysML Hands-On Exercises

Exercise 3.2
SysML Use Cases and Use Case Diagrams

MagicDraw

August 2018

OBJECTIVES

The objectives of this exercise are to

- Create a Use Case Diagram
- Populate Diagram with System, Actors and Use Cases (pre-existing)
- Create Associations between Actors and Use Cases
- Create a new Use Case
- Create an Extend Relationship between Use Cases

PREPARATION

1. This exercise assumes the student has Cameo System Modeler 19.0 (or MagicDraw 19.0 with SysML plug-in) installed correctly on his or her machine with a valid license for use.
2. The student should load the Part 3 course materials onto the computer.
3. The student should view the video Introduction to SysML Part 3 Exercise 3.2 in its entirety before attempting the exercise. In lieu of putting many screenshots in this document, we recommend reviewing portions of the video, as needed, during the exercise.

Note that additional software tools will need to be installed to complete Part 5, including a parametric solver and math engine to execute the parametric models created. If not already installed, the student should begin the process of obtaining and installing these tools. For assistance, contact info@intercax.com.

NOTES AND CAUTIONS

We recommend that the student watch the video demonstration of this exercise in its entirety before beginning their own work. The video includes background and explanatory material that is not repeated in the written instructions.

We also recommend that the student read the material carefully. The most common source of error is confusion between blocks, packages and diagrams, some of which have similar names. When the student is not sure what an element is, either in the browser or in a diagram, select that element and look in the Properties tab for the gray label that identifies the element type. Also, be careful in reading the instructions in realizing when an instruction should be carried out in the browser or in a diagram.

Finally, we urge the student to identify an experienced MagicDraw user for questions, especially where the videos and screenshots we provide don't correspond with what the student is seeing. The setting of a preference or a filter that hides a necessary control or element can be a frustrating source of confusion that an experienced user may be able to resolve quickly.

EXERCISE

3.2.1 Start Cameo System Modeler

3.2.2 Open a MagicDraw Project

- Left-click File in menu bar
- Select Open Project
- Browse to Exercise 3.2 Starter UAV.mdzip
- Click Open

3.2.3 Create a SysML Use Case diagram

- In the Containment Browser, right-click the package **UAV Use Cases** and select Create Diagram → SysML Use Case Diagram.
- Name the diagram **UAV UC**.
- Drag the **UAV** block from the **UAV Design** package into the diagram.
- Resize the **UAV** block in the diagram so that it is large enough to hold the use cases.
- Drag the four use cases inside the **UAV Use Cases** package inside the **UAV** block into the diagram.
- Drag the actors in **UAV Domain** package, **Pilot** and **Observer**, into the diagram.
- Rearrange and resize all the elements roughly as shown in Figure 1.

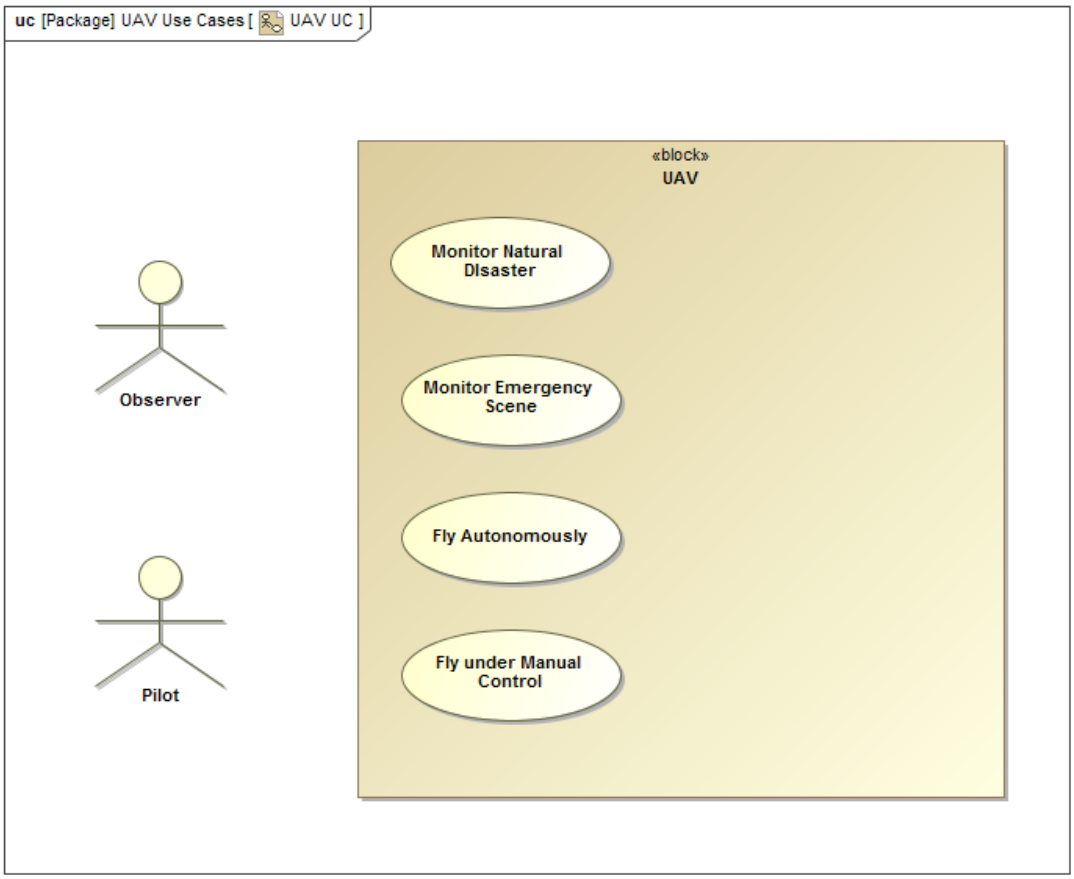

Figure 1 Creating a use case diagram, stage 1

3.2.4 Create Associations

- Click **Observer** in the diagram, select the Association icon (a plain line) in the floating toolbar, and drag and click the end of the association to the **Monitor Natural Disaster** use case.
- Repeat the process
  - From **Observer** to **Monitor Emergency Scene**
  - From **Pilot** to **Fly Autonomously**
  - From **Pilot** to **Fly under Manual Control**
- Double-click the association from **Observer** to **Monitor Natural Disaster** to open the Specification window.
- Scroll down to the section with the heading Role of Observer (see Figure 2).
- Set the Multiplicity as 1..*.
- Repeat for the association from **Observer** to **Monitor Emergency Scene**.

3.2.5 Create a New Use Case

- Click Use Cases in the Diagram Toolbar (in the Use Case Diagram section), then click inside the **UAV** block borders in the diagram.
- Name the use case **Return to Base Autonomously**.

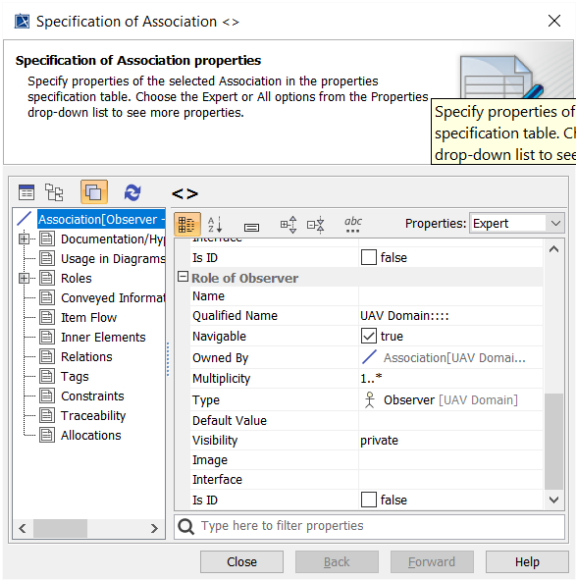

Figure 2 Setting an association multiplicity

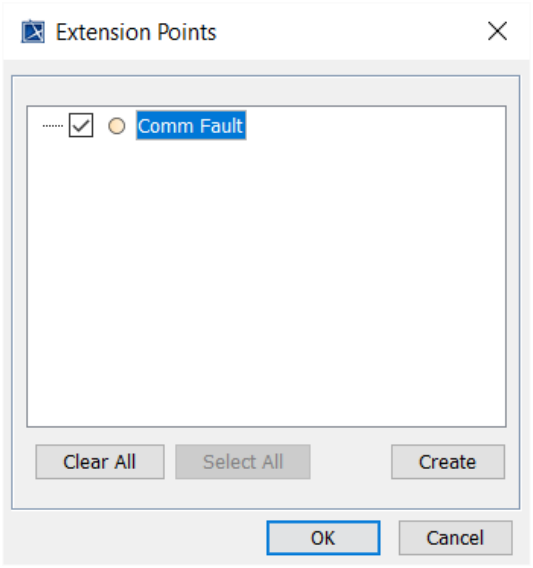

Figure 3 List of available extension points

3.2.6 Create an Extend Relationship

- Right-click **Fly under Manual Control** in the Containment Browser and choose Create Element → Extension Point.
- Name the extension point **Comm Fault**.
- Click the use case **Fly under Manual Control** in the diagram, select the Extend icon (a dashed line arrow with the letter E beside it) in the floating toolbar, and drag and click the end of the dependency to the **Return to Base Autonomously** use case.
- In the Extension Points window, check **Comm Fault**.
- Save and close the project.

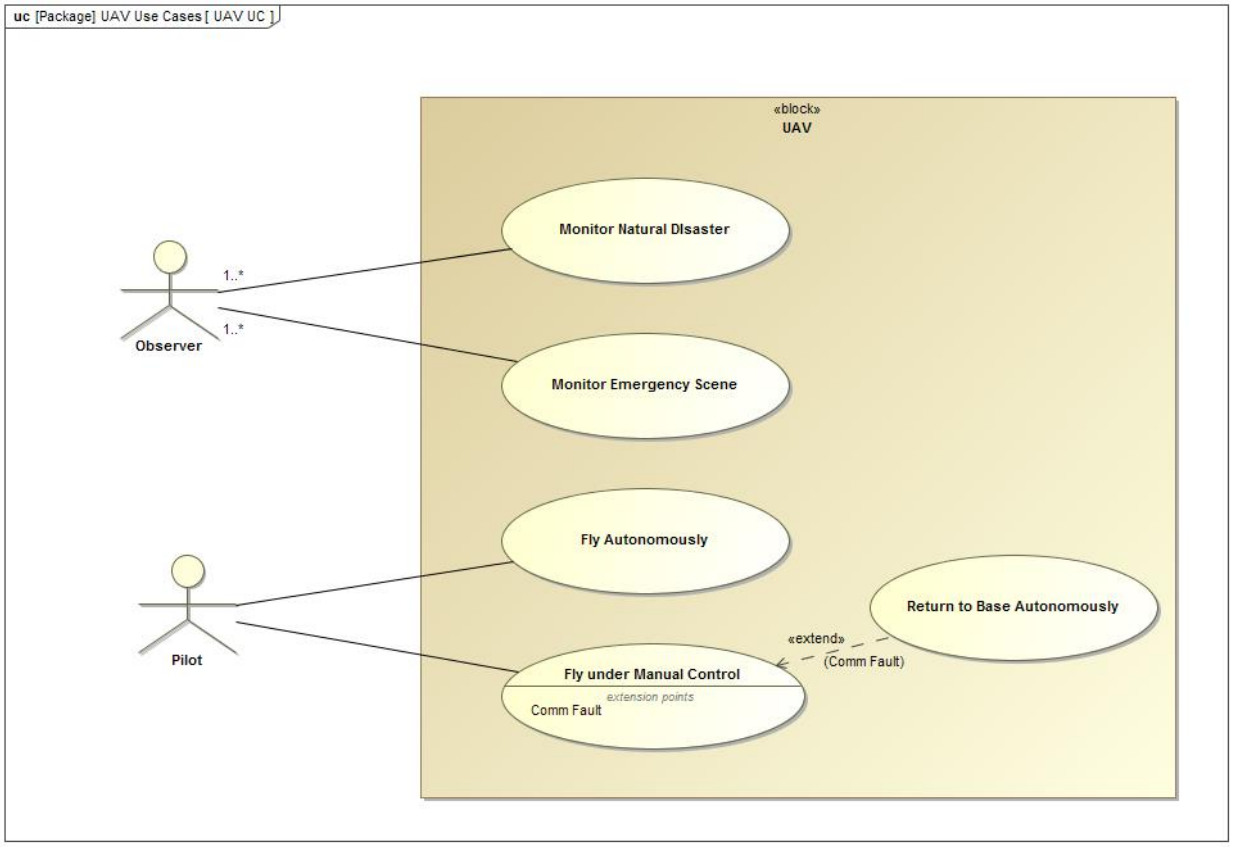

Figure 4 Final UAV UC diagram