How to Add a New Workflow to the TMT Model

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1 Introduction

1.1 Overview

The templates can be utilized to make a new workflow.

To create and simulate a new workflow, we need to:

1. Utilize the template workflow to make your own workflow activities
2. Adjust operational scenario block properties as needed
3. Run Monte Carlo Simulations on these different scenarios

We will demonstrate these steps with the TMT Template Workflow activities.

2 Create New Workflow Activities

In order to create the template workflow, copy the template workflow and make necessary adjustments.

2.1 Logical Actual & Logical Timing Activities

Under the *TMT::01 TMT PO::System Model::TMT Observatory::01 TMT Observatory Operational Domain::03 Mission* package, create a new package called *[Workflow Name] Groups*. Under this new package, create a block called *[Workflow Name]*.

Inside the *[Workflow Name]* block, create an activity (and corresponding activity diagram) to represent the new workflow, and name the activity/diagram *[Workflow Name]- Logical Actual*. In **Figure 1** below, the name of the workflow is *TMT Mission Example Flow* so the name of the activity/diagram representing this flow is *TMT Mission Example Flow- Logical Actual.*

The *Logical Actual* activity will capture the actual steps/tasks of the new workflow.

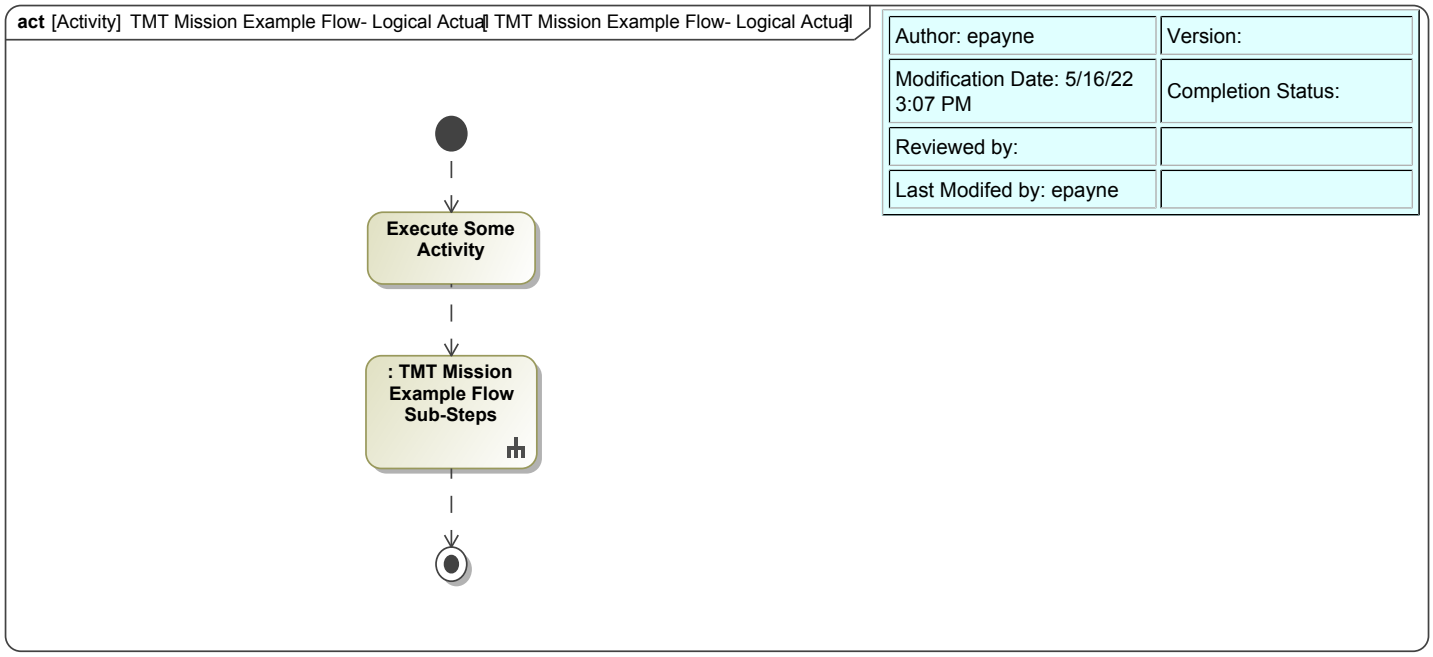

Figure 1. TMT Mission Example Flow- Logical Actual

However, in order to run simulations, we will also need to create another activity called the *Logical Timing* activity. Still within the *[Workflow Name]* block, create another activity (and corresponding activity diagram) and name the activity/diagram *[Workflow Name]- Logical Timing*. Create an initial node and an action. In this action type the name of the total time the new workflow will calculate- in this example, it is the *TotalAcqTime*. Set this time equal to *simtime*, as seen in **Figure 2** below.

Drag the *[Workflow Name]- Logical Actual* activity in next. Then create the last action- this should be setting the *[Total Time Name]* to the *simtime* subtracted by the *[Total Time Name]*. Then add the activity final node. Again, the last action and activity final node can be seen in **Figure 2** below in the *TMT Mission Example Flow- Logical Timing* activity. This activity will be executed by the simulations that we will define later.

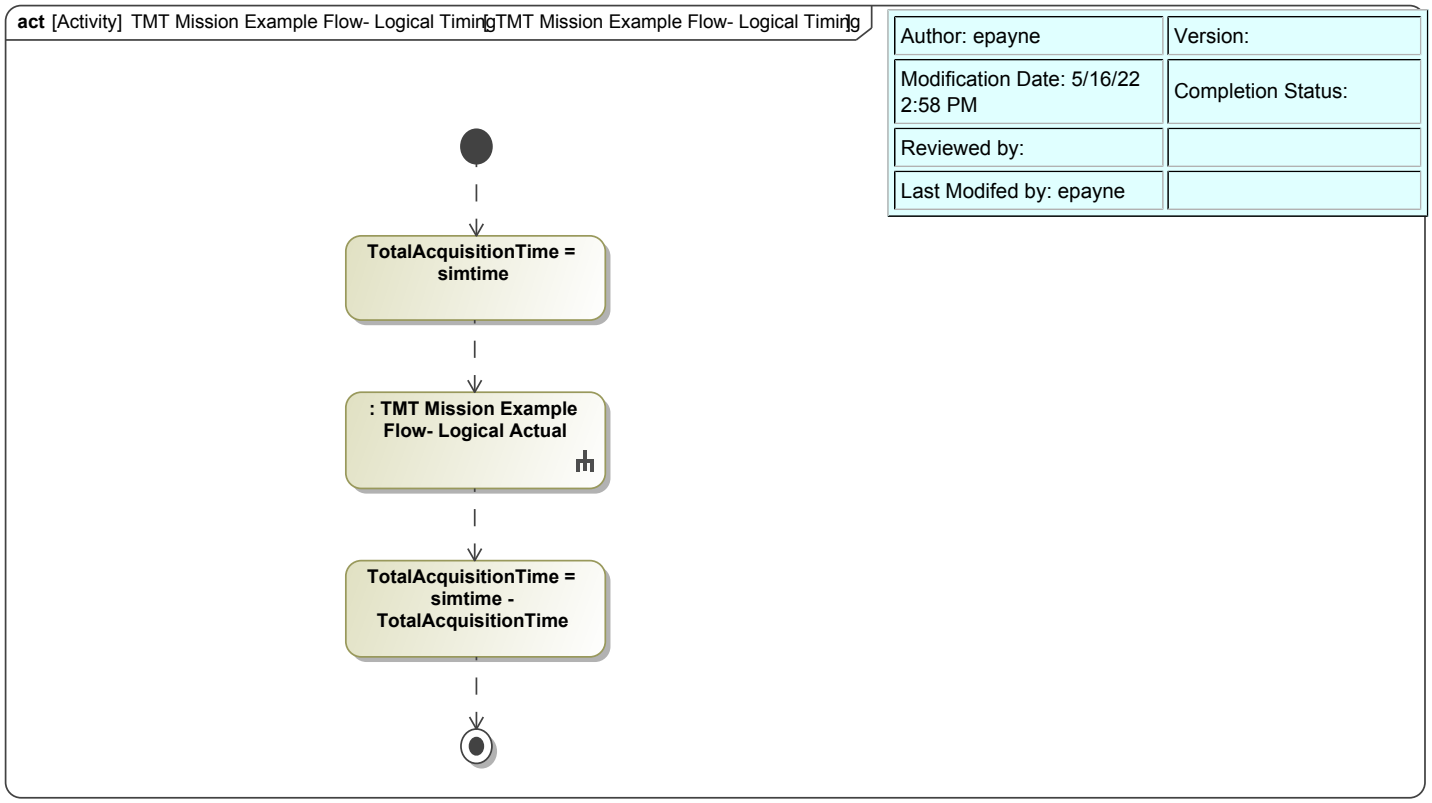

Figure 2. TMT Mission Example Flow- Logical Timing

2.2 Further Decompose Workflow Steps

If there is a step of the new workflow that needs to be broken down further into sub-steps, we can create another activity/activity diagram to capture these sub-steps. This time, create the activity under the *TMT Observatory System Logical* block called *[Workflow Name]- Logical Timing* in the *TMT::01 TMT PO::System Model::TMT Observatory::01 TMT Observatory Operational Domain::TMT Observatory System::Logical Design* package- or under another logical component of TMT stored in this package.

Within this new activity, capture what sub-steps the workflow step/activity decomposes into. From the *TMT Mission Example Flow*, the *TMT Mission Example Flow Sub-Steps* activity decomposes into the steps shown in **Figure 3** below.

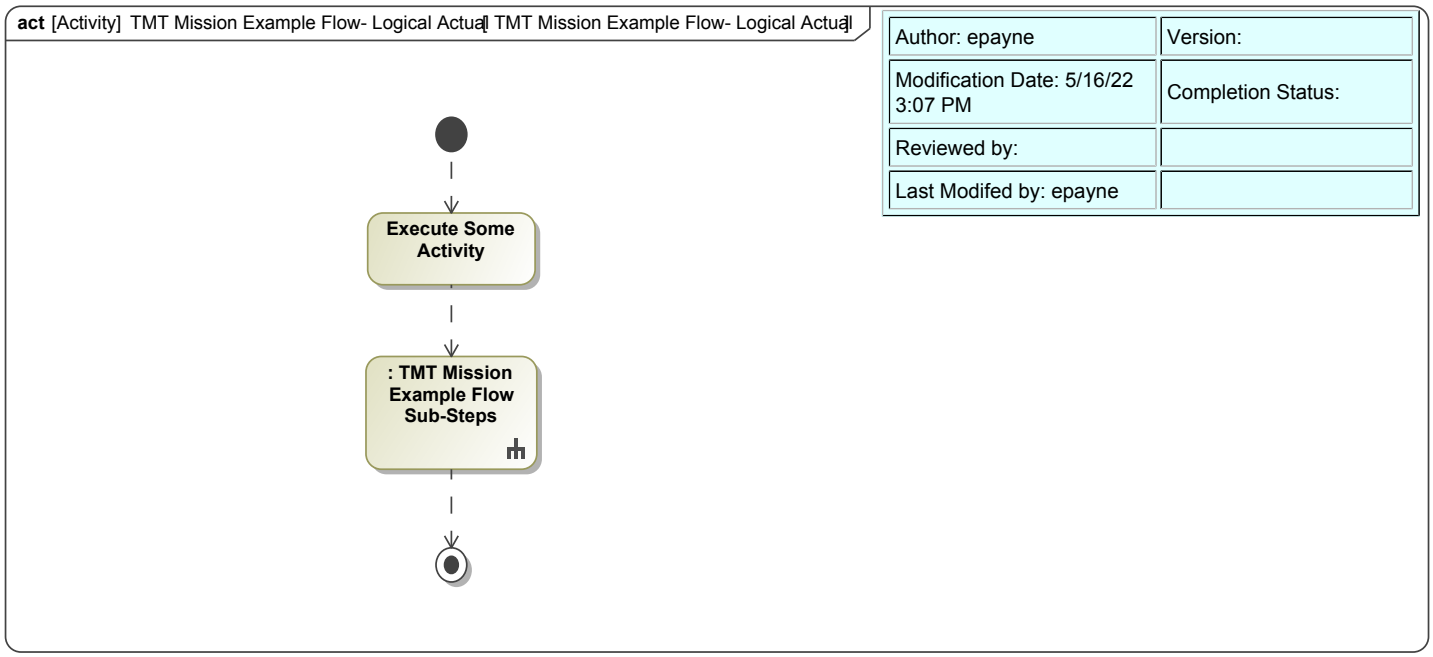

Figure 3. TMT Mission Example Flow- Logical Actual

After the sub-steps activity is fully specified, go back to the *TMT Mission Example Flow- Logical Actual* activity and drag the sub-steps activity into the diagram, as seen in **Figure 4** below.

Figure 4. TMT Mission Example Flow Sub-Steps

2.3 Allocate Actions/Activities to Part Properties

If the new workflow requires that certain actions/activities be allocated to part properties in the TMT Observatory, then create a new activity diagram with swimlanes in the workflow activity, have *Allocation Mode* set to *Usage*, and drag or check part properties from the *TMT Observatory System Logical* block- as seen in **Figure 5** below, in the *TMT::01 TMT PO::System Model::TMT Observatory::01 TMT Observatory Operational Domain::TMT Observatory System::Logical Design::TMT Observatory System Logical* package.

An example of a workflow activity using swimlanes is shown in **Figure 6** below- one of the activities from the TMT Observatory Flow.

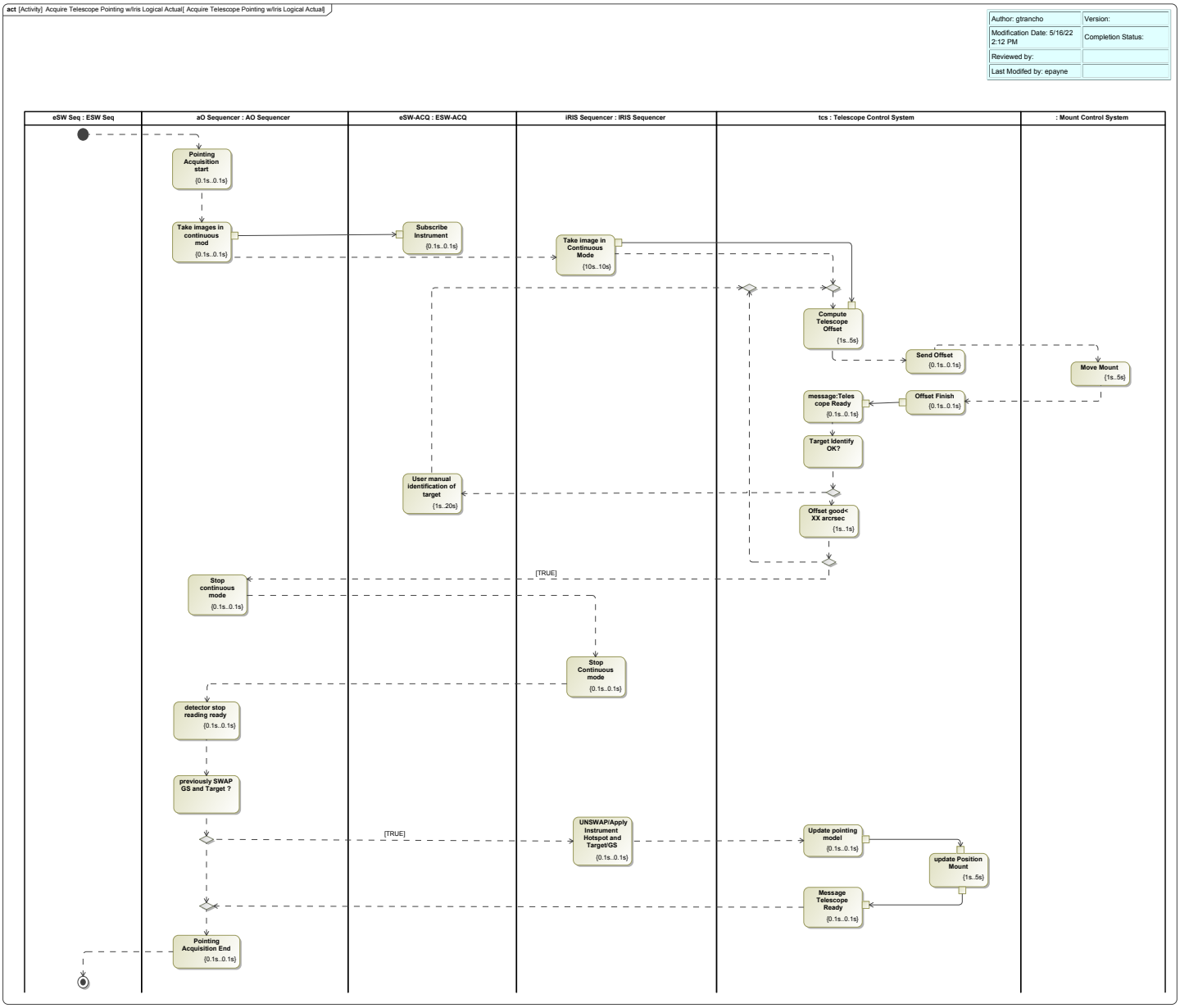

Figure 6. Acquire Telescope Pointing w/Iris Logical Actual

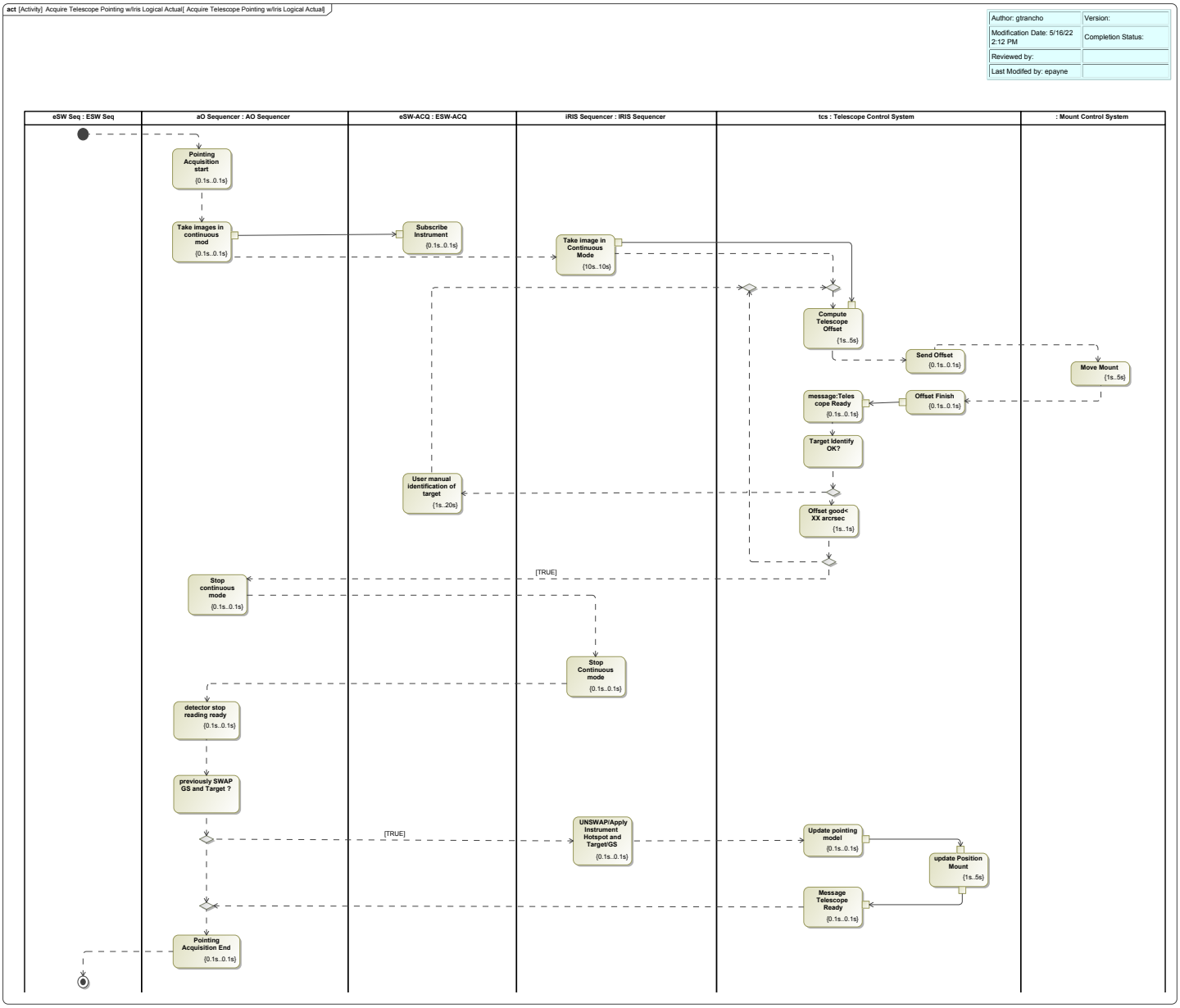

Figure 7. Acquire Telescope Pointing w/Iris Logical Actual

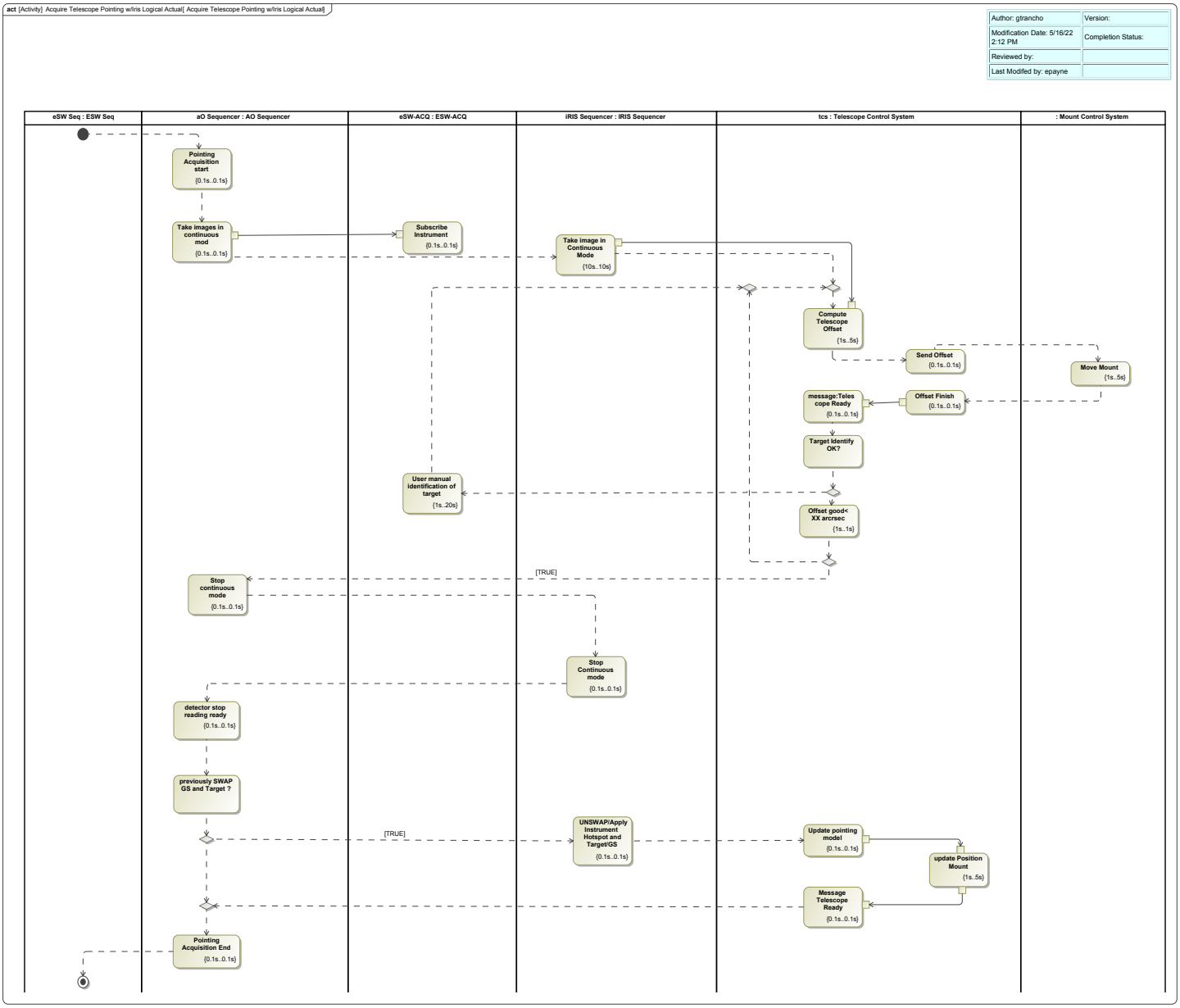

Figure 8. Acquire Telescope Pointing w/Iris Logical Actual

3 Capture Plausible Scenarios

In this section, we will specialize the *TMT Mission Example Flow* block into six different groups of plausible scenarios- using a block to represent each group. Begin by creating a block-definition diagram (bdd) under the *TMT::01 TMT PO::System Model::TMT Observatory::01 TMT Observatory Operational Domain::03 Mission::TMT Mission Example Flow Groups* package and name the diagram the same name as the workflow. Drag the *TMT Mission Example Flow* block onto this new diagram.

Now we need to create six new blocks, each called *[Workflow Name] Group [n]* where n is 1-6. Generalize these 6 blocks to the *TMT Mission Example Flow* block. Then, draw a generalization relationship from each of the *[Workflow Name] Group [n]* blocks to the block with the corresponding group number in the *TMT::01 TMT PO::System Model::TMT Observatory::01 TMT Observatory Operational Domain::03 Mission::TMT Observatory Flow Groups* package. For example, we would draw a generalization relationship from *TMT Mission Example Flow Group 1* to *TMT Mission To-Be Group 1*. Then this would need to be done for the remaining 5 group blocks. Once this is done, right click all of the blocks on the bdd we created earlier in this step, and select *Symbol Properties*, then check the *Show Inherited* box so that it's true. At this point, the bdd should look like the one in **Figure 7** below.

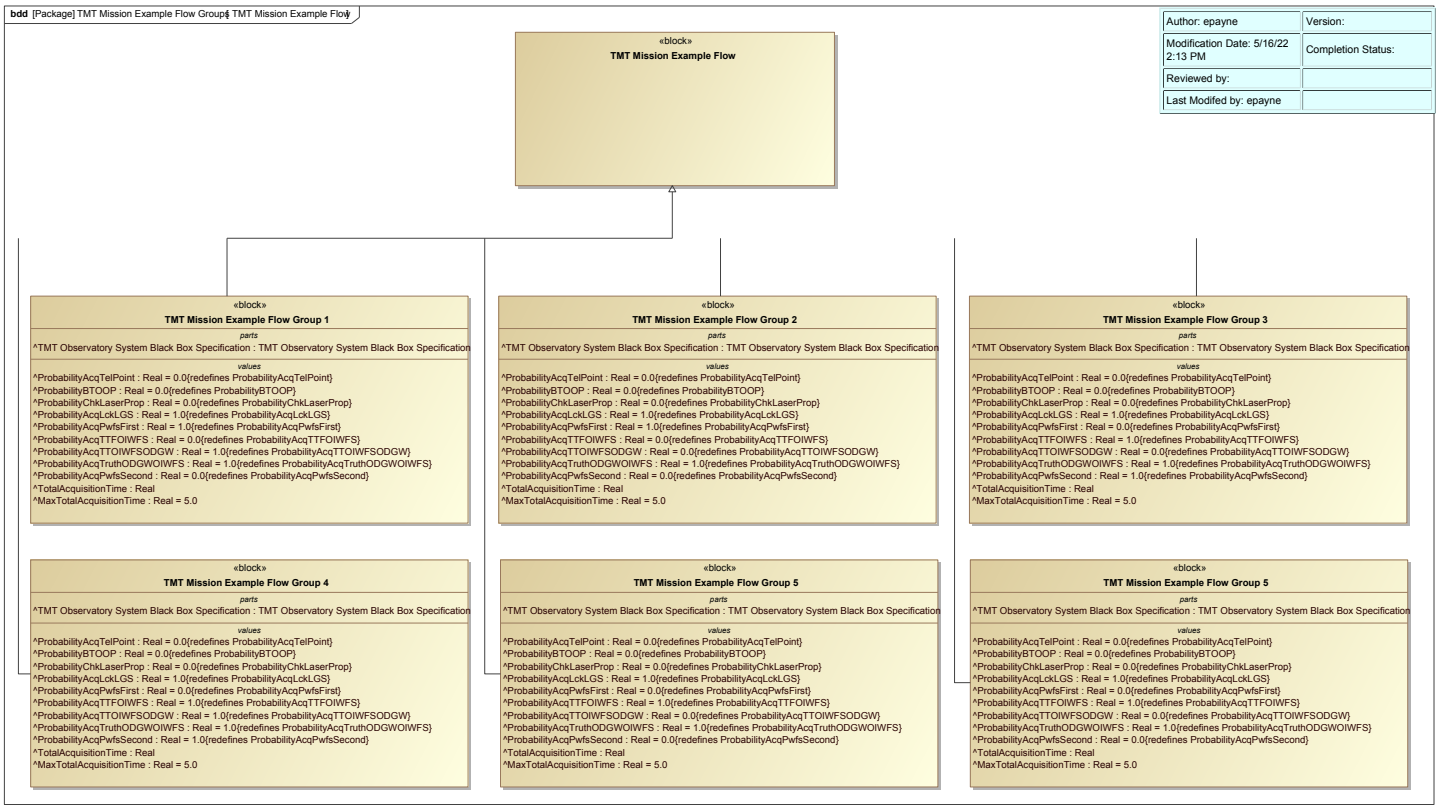

Figure 9. TMT Mission Example Flow

4 Run Simulations

4.1 Capture Results

Instructions