Intermediate Editing

Charlie Macleod

ESRI EUROPEAN DEVELOPER SUMMIT 2019

Session Overview

- Review of Edit Operations + Inspector
  - Basic workflows and usage
- Edit tools
  - Modify + Construction
    - UI customizations

Edit Operations Review - Workflow

- Coarse grained API for editing in Pro
  - Instantiate a new EditOperation
  - Specify the edits to be performed
    - Creates, Updates, Deletes (in any combination)
  - Execute the operation
  - Check status (as needed)

Edit Operations Review - Example

```
var editOp = new EditOperation() {
     Name = "Simple edit2",
     ErrorMessage = "'Simple edit2' failed",
     SelectModifiedFeatures = true
};

editOp.Modify(polyLayer1, 1, buffer);
editOp.Reshape(polyLayer2, 1, reshape_poly);
editOp.Modify(pointsLayer1, 28, MapPointBuilder.CreateMapPoint(6057000, 2112600));

//Execute the operations
editOp.Execute();
if (editOp.IsSucceeded) { ...
```

Inspector Review – Recap

- Convenient utility class for ***MapMember*** feature attribute access and editing
  - Primary use:
    - Get and Set feature attributes (to include SHAPE)

Inspector Review – Usage Continued

- **Get and Set existing feature attributes:**
  - **Instantiate an inspector:**

```
using ArcGIS.Desktop.Editing.Attributes;

var inspector = new Inspector();
```

  - **Load the feature attributes:**

```
inspector.Load(pointsLayer1, 28); //or LoadAsync
```

  - **Make the change(s) and Apply:**

```
inspector["FACILITYID"] = “11055.00"; //Use dictionary-style setters
inspector["NAME"] = "BLDG 52";
inspector["DESCRIPT"] = inspector["NAME"];
```

```
inspector.Apply(); //or ApplyAsync
```

Inspector Review – Usage Continued

- Integrate with EditOperation to combine with other edits:
  - Use the relevant overload that takes an Inspector
    - Typically EditOperation.Modify
  - Use EditOperation.Execute()

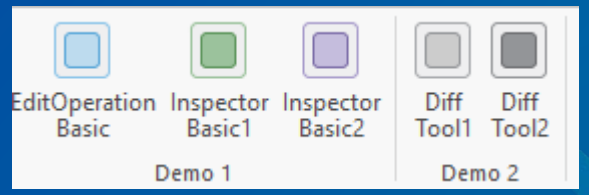
```
var inspector = new Inspector();
inspector.Load(pointsLayer1, 28);
inspector["FACILITYID"] = “11055.00";
inspector["NAME"] = "BLDG 52";

var editOp = new EditOperation() {
  Name = "Modify Facility Points",
  CancelMessage = "Modify Facility Points canceled"
};

editOp.Modify(inspector);
...
editOp.Execute();
```

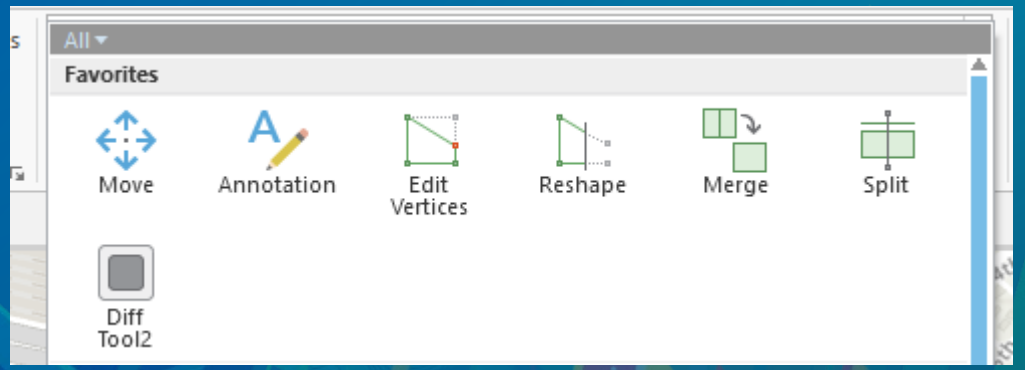
Editing Tools

- Modify
- Construction

Editing Tools - Modify

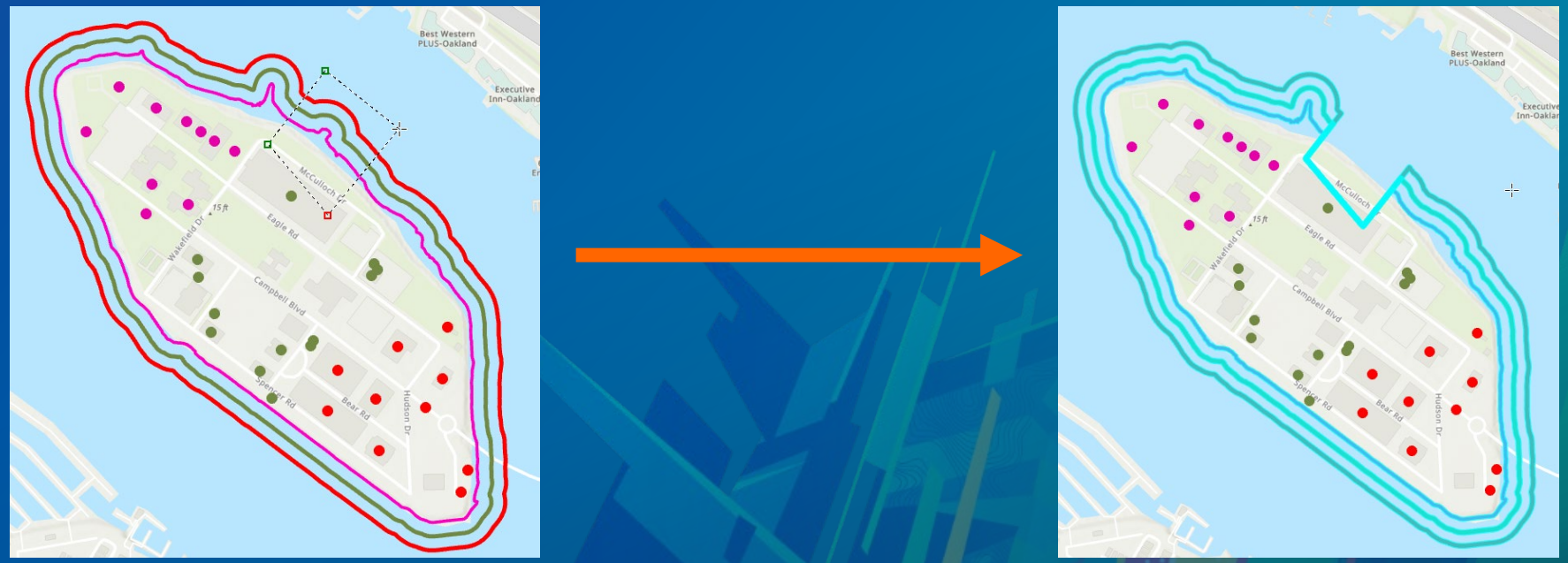
- Map Tool (aka “Sketch Tool”) used for editing features
  - By Convention, hosted on the ribbon
  - Uses the sketch to edit features
    - Integrate in Edit Operation, Inspector
  - Can host on the Editor 2D and 3D Galleries and Modify Features Dockpane
    - Via Config.daml





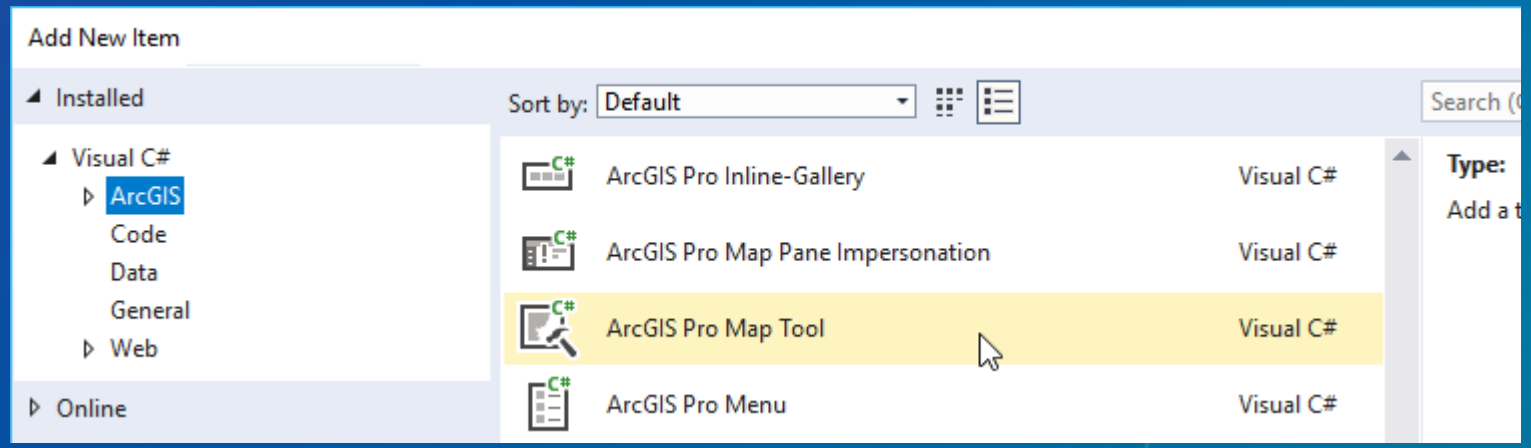
Editing Tool - Implementation

- We will be making a custom “Difference” tool
  - Edit polygon features performing a difference with the sketch
    - The “Intersection” is discarded
    - A Difference Tool is sometimes called a “Cookie Cutter”



Editing Tool - Implementation

- Run the ArcGIS Pro Map Tool template



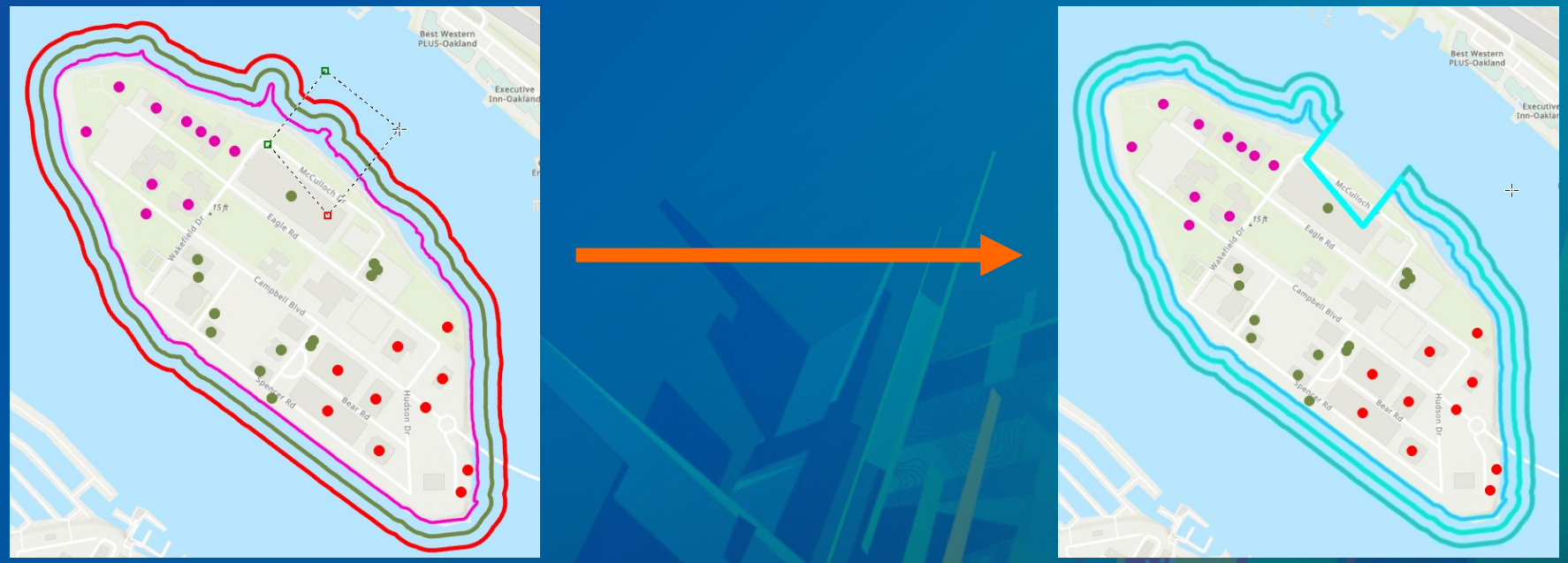
Editing Tool (Implementation continued)

- By default stubs out a map tool with `SketchGeometryType.Rectangle`
  - Change as needed to line, circle, polygon, lasso, etc.
- `OnSketchCompleteAsync(Geometry)` callback for the sketch geometry
  - Default logic calls base class (which is effectively a no-op)
  - Customize OnSketchCompleteAsync as needed with “your” editing logic

```
internal class DifferenceTool : MapTool {
   public DifferenceTool() {
      SketchType = SketchGeometryType.Rectangle;

   protected override Task<bool> OnSketchCompleteAsync(Geometry geometry) {
      // TODO – add editing logic
      return base.OnSketchCompleteAsync(geometry);
```

Editing Tool (Implementation continued)

- In our particular case – to implement our "Difference" tool:
  - Change SketchType to `SketchGeometryType.Polygon`
  - In `OnSketchCompleteAsync` we:
    - Select polygon features that intersect our sketch
    - Modify each feature shape with the "difference" between "it" and the sketch polygon



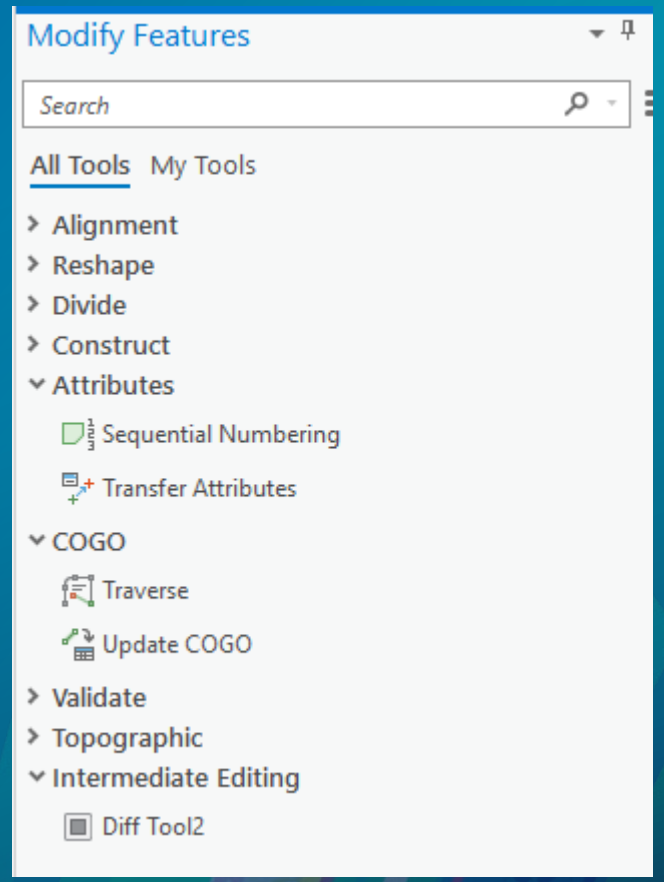
Editing Tool (Implementation continued)

```
protected override Task<bool> OnSketchCompleteAsync(Geometry sketchGeometry) {
   var poly_layers = ...;//select polygon features

   QueuedTask.Run(() => {
      var editOp = new EditOperation() { ... };

      foreach(var kvp in poly_layers) {//"poly_layers" is a Dictionary<BasicFeatureLayer, List<long>>
         var layer = kvp.Key;  var oids = kvp.Value;

         foreach(var oid in oids) {
           //get the feature shape
           var insp = new Inspector();
           insp.Load(layer, oid);
           //do the difference
           var geom = GeometryEngine.Instance.Difference((Geometry)insp["SHAPE"], sketchGeometry);
           insp["SHAPE"] = geom;
           //do the update
           editOp.Modify(insp);
         }
      }
      editOp.Execute();
```

Editing Tool – UI Integration

- Edit Config.daml to add our editing tool to the Modify Features pane:
  - Set CategoryRefID attribute to “esri_editing_CommandList”
  - Set “L_group” attribute in content element

```
<controls>
   <tool id="IntermediateEditing_Modify_DifferenceTool2" caption=“Diff Tool2" ...
         categoryRefID="esri_editing_CommandList">
      ...
      <content L_group="Intermediate Editing"/>
   </tool>
</controls>
```



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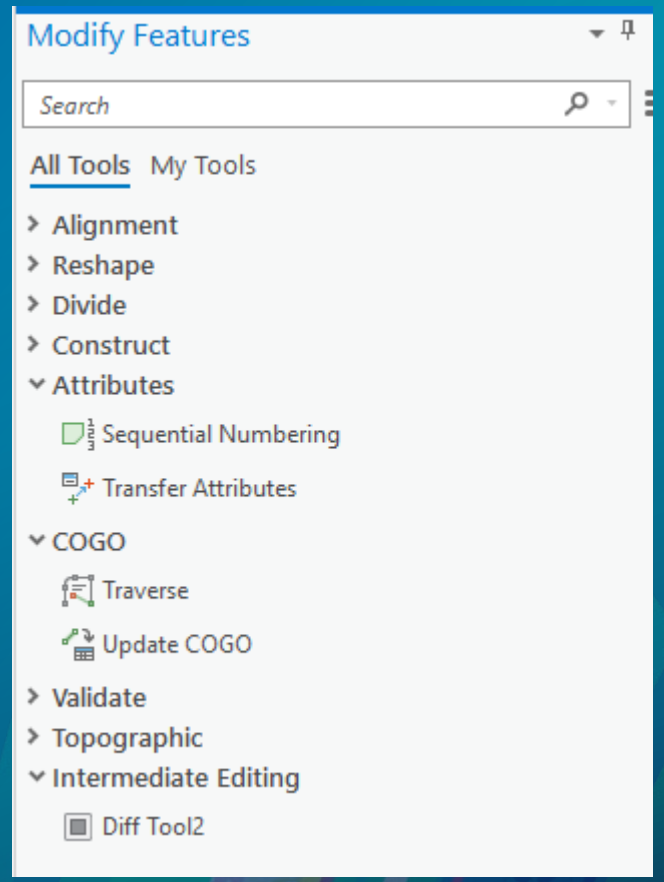

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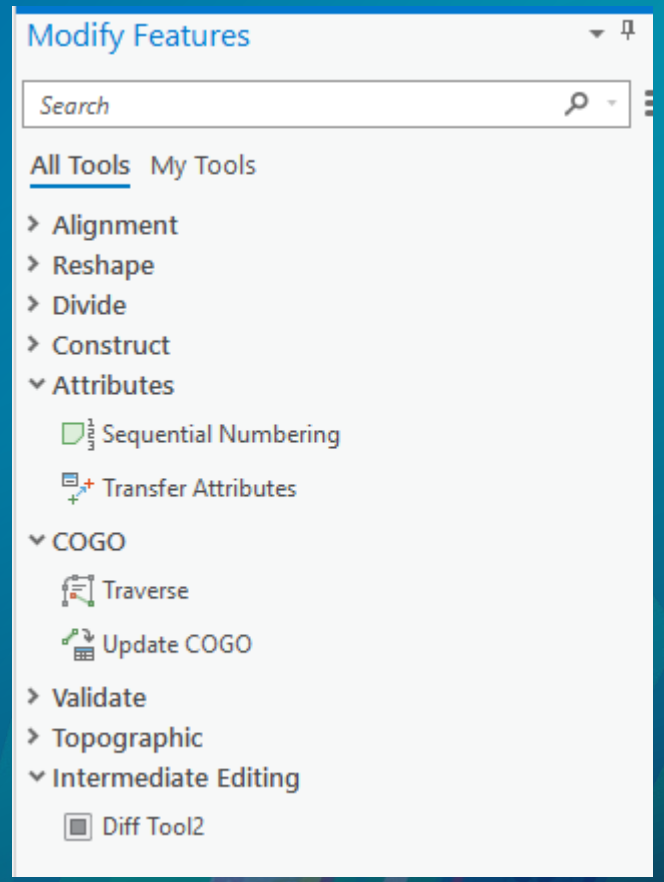

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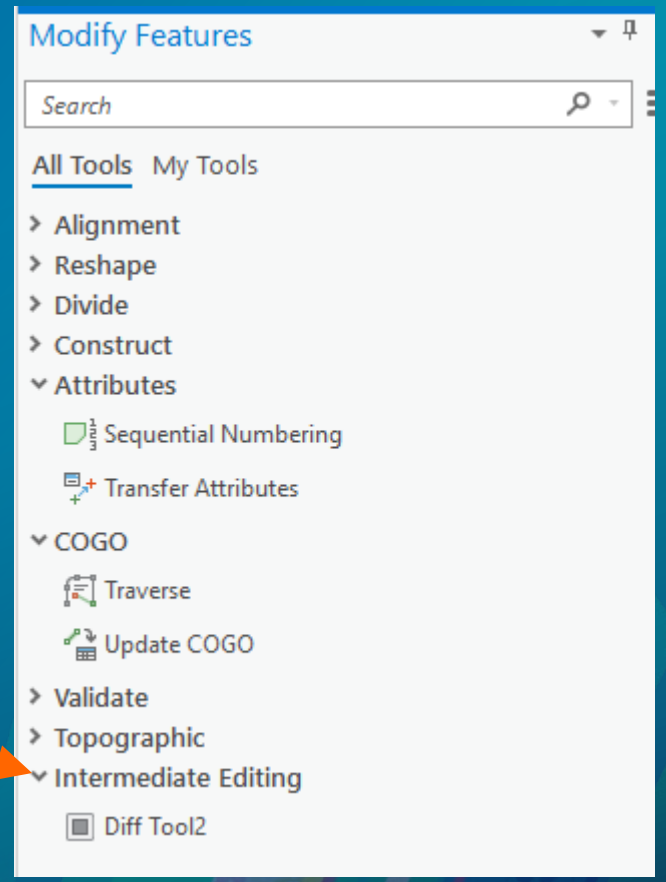
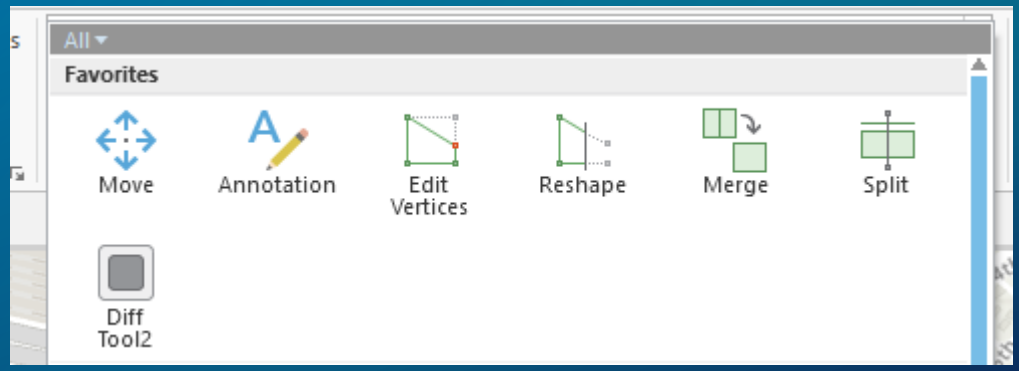
         categoryRefID="esri_editing_CommandList">
      ...
      <content L_group="Intermediate Editing"/>
   </tool>
</controls>
```



Editing Tool (UI Integration continued)

- To add the our editing tool to the Edit Tools gallery…
  - Set values for gallery2d and gallery3d attributes in content element

```
<controls>
   <tool id="IntermediateEditing_Modify_DifferenceTool2" caption=“Diff Tool2" ...
         categoryRefID="esri_editing_CommandList">
      ...
     <content L_group="Intermediate Editing“ gallery2d="true" gallery3d="false"/>
   </tool>
</controls>
```



Editing Tool (UI Integration continued)

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<controls>
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         categoryRefID="esri_editing_CommandList">
      ...
     <content L_group="Intermediate Editing" gallery2d="true" gallery3d="false"/>
   </tool>
</controls>
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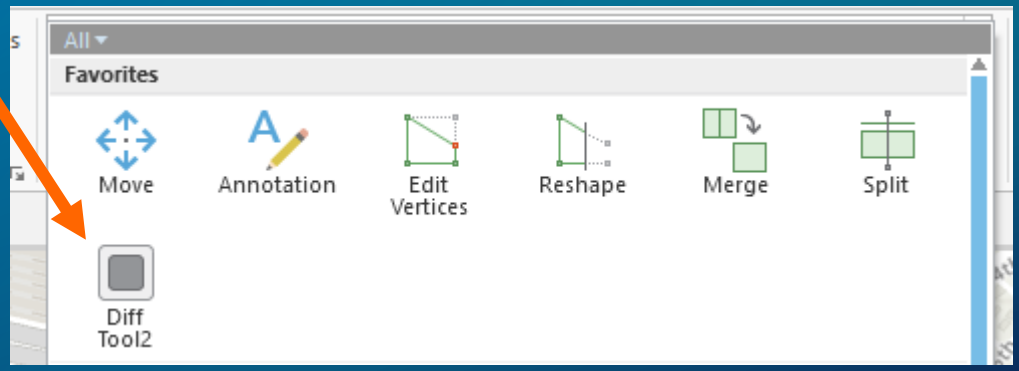
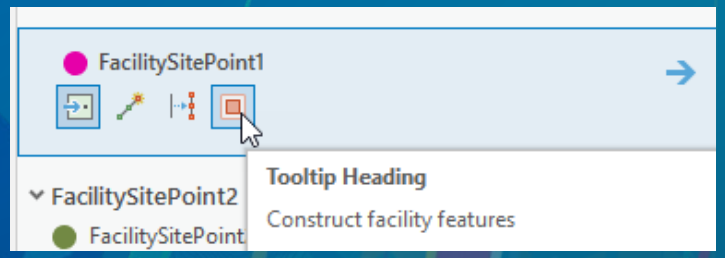


Intermediate Editing

Demo – Editing Tool

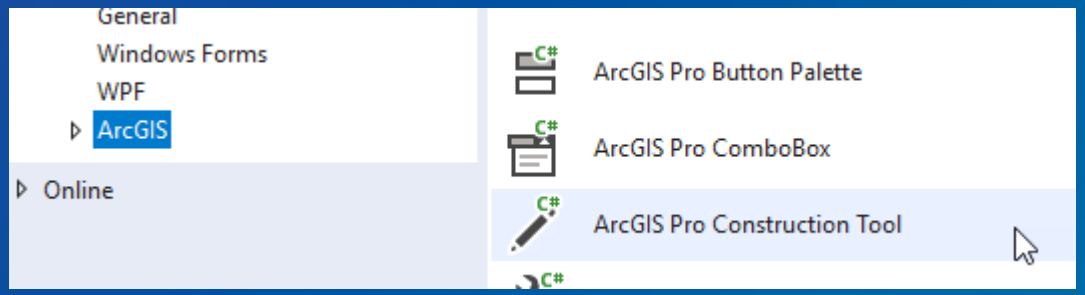
Editing Tool - Construction

- Construction Tools
- Use for creating features
  - Derived from Map Tool same as our Editing Tool for Modify
  - By Convention, hosted on the Create Features dockpane tool palette(s)
  - Uses the sketch to create features
  - Can enhance with “extra” UI for configurable options (eg buffer distance)
  - Associated with a “CurrentTemplate” for assigning default attributes



Construction Tool - Implementation

- Implement using the Pro SDK “Construction Tool” Item Template:



Construction Tool (Implementation continued)

- By default stubs out a Creation tool for Point features
  - Change as needed for line, polygon, etc.
- `OnSketchCompleteAsync(Geometry geometry)` callback for the sketch geometry
  - Default creation logic to create a new feature
  - Has access to current template for assigning default attributes

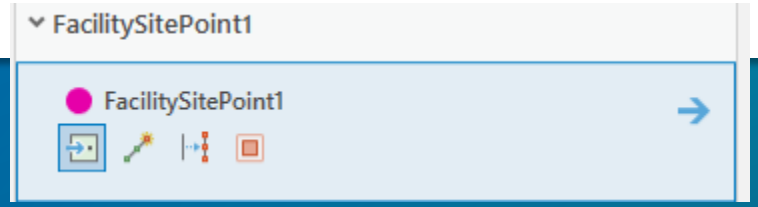
```
internal class ConstructionFacilitiesTool : MapTool {
   public ConstructionFacilitiesTool() {
      ...
      SketchType = SketchGeometryType.Point;
   }
 protected override Task<bool> OnSketchCompleteAsync(Geometry geometry) {
      ...
      // Create an edit operation
      var createOperation = new EditOperation();
      createOperation.Name = string.Format("Create {0}", CurrentTemplate.Layer.Name);
      createOperation.SelectNewFeatures = true;

      createOperation.Create(CurrentTemplate, geometry);
      return createOperation.ExecuteAsync();
```

Construction Tool - Palette Placement

- In the Config.daml, tool is registered in the relevant construction tool category via *categoryRefID*
  - Adds your tool to the correct Create Pane construction tool palettes
  - Category should match your Sketch geometry type (and that of the destination feature class).

```
<controls>
   <tool id="ConstructionFacilitiesTool" categoryRefID="esri_editing_construction_point"
            caption="ConstructionFacilitiesTool" ...>
   </tool>
<controls>
```



- Supported categories are
  - esri_editing_construction_point, esri_editing_construction_polyline
  - esri_editing_construction_polygon, esri_editing_construction_multipoint
  - esri_editing_construction_annotation, esri_editing_construction_dimension

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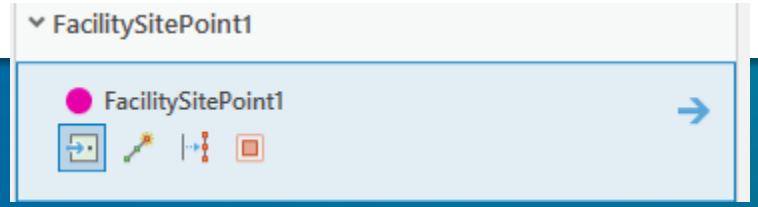

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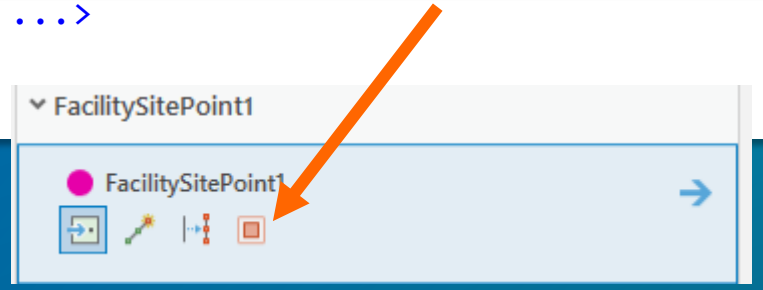

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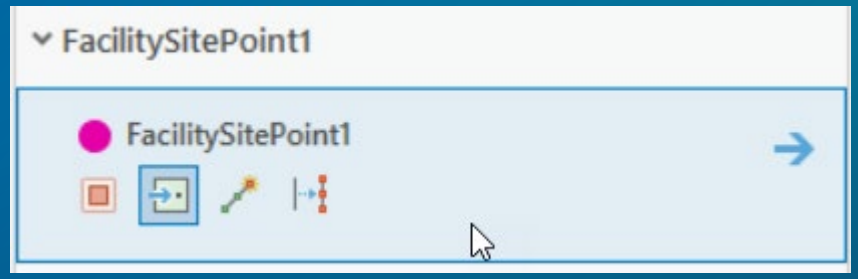
  - esri_editing_construction_annotation, esri_editing_construction_dimension

Construction Tool - Palette Placement

- Control placement on the palette with a `<content … />` child element in the Config.daml
  - Add a `placeWith=daml_id`, `insert=before | after` attribute
    - Default placement is “after” if no insert attribute is specified.

```
<controls>
   <tool id="ConstructionFacilitiesTool" categoryRefID="esri_editing_construction_point"
         caption="ConstructionFacilitiesTool" ...>
     <content insert="before" placeWith="esri_editing_SketchPointTool"/>
   </tool>
<controls>
```



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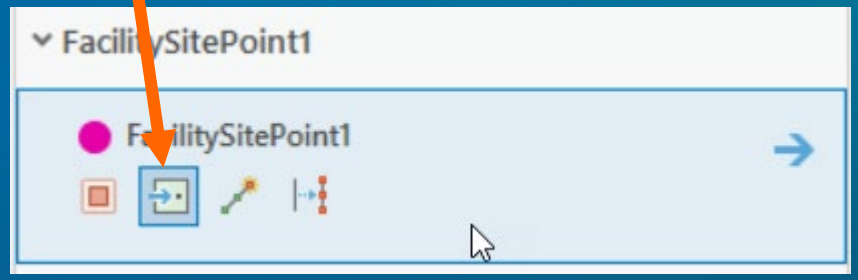

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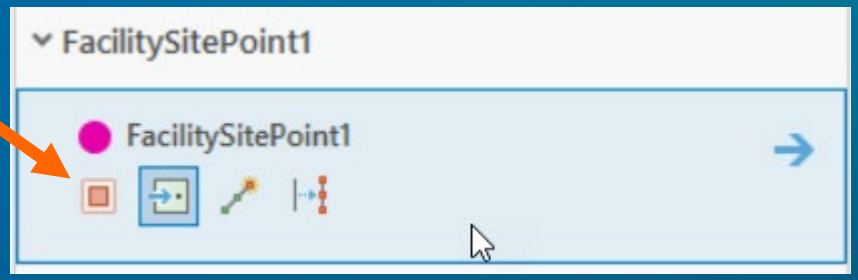


Intermediate Editing

Demo – Construction Tool (1)

Construction Tool – CurrentTemplate, Defaults and “Overrides”

- A construction tool has access to the currently activated template via `this.CurrentTemplate`
  - Primary use for “defaults” is when creating features
    - Default values are stored *within* the template
    - Applied “implicitly” via `EditOperation.Create(EditingTemplate,…)`

```
var createOperation = new EditOperation();
...
createOperation.Create(CurrentTemplate, geometry);
```

Construction Tool – Defaults

- Access Defaults via the template's "Definition"
  - Definition is retrieved using `CurrentTemplate.GetDefinition()`
- Stored as a .NET Dictionary property called "`DefaultValues`"
  - Not all fields may have defaults stored – only those whose default is *non-null*
    - (i.e. if a default value is "missing", it is *assumed to be null*)
  - `DefaultValues` property can be null (no defaults stored)
  - Use "standard" .NET to get and set the defaults
    - [Note: Changes are applied using `CurrentTemplate.SetDefinition(templateDef)`]

```
//Template definition
public abstract class CIMFeatureTemplate : CIMBasicFeatureTemplate {

   // Gets or sets the default values – inherited from CIMBasicFeatureTemplate
   public Dictionary<string, object> DefaultValues { get; set;}
```

Construction Tool – Defaults

```
//Get the template definition
var templateDef = this.CurrentTemplate.GetDefinition() as CIMFeatureTemplate;

//Get Defaults (note – DefaultValues can be NULL)
string ownerVal = string.Empty;
if (templateDef.DefaultValues?.ContainsKey(“owner") ?? false) //use lower-case when
   ownerVal = (string)templateDef.DefaultValues[“owner"];   //when getting default values

// Set defaults on the template definition
if (templateDef.DefaultValues == null)
   templateDef.DefaultValues = new Dictionary<string, object>();
templateDef.DefaultValues[“OWNER”] = “US Coast Guard”;
templateDef.DefaultValues[“FACILITY”] = “BLDG 54”;

//Apply the changes back
this.CurrentTemplate.SetDefinition(templateDef);
```

Construction Tool – Overrides

- Default values can be overridden via “Overrides”
  - Access or change overrides via the Inspector property on the template
    - (not the template definition where the DefaultValues reside)
  - Overrides are initialized to the same values as the defaults each time the template is activated
    - Changes to the overrides are temporary – not persisted.
      - Lost when the tool is deactivated
  - Note: Call `Inspector.Cancel()` to manually reset overrides back to their original defaults.

```
public abstract class EditingTemplate {
   // Gets the Inspector that contains the Attributes associated with this EditingTemplate
   public abstract Inspector Inspector { get; }
```

Construction Tool – Overrides

- We use the template Inspector to assign overrides

```
// Set overrides on the template Inspector “manually”
 CurrentTemplate.Inspector[“SUBTYPEFIELD”] = 790;
 CurrentTemplate.Inspector[“FEATURECODE”] = “Building General”;

 //…or Transfer from an existing feature
 CurrentTemplate.Inspector.Load(CurrentTemplate.Layer, 11);//Use Load function

 //Applied via Create with Template
 createOperation.Create(CurrentTemplate, geometry);

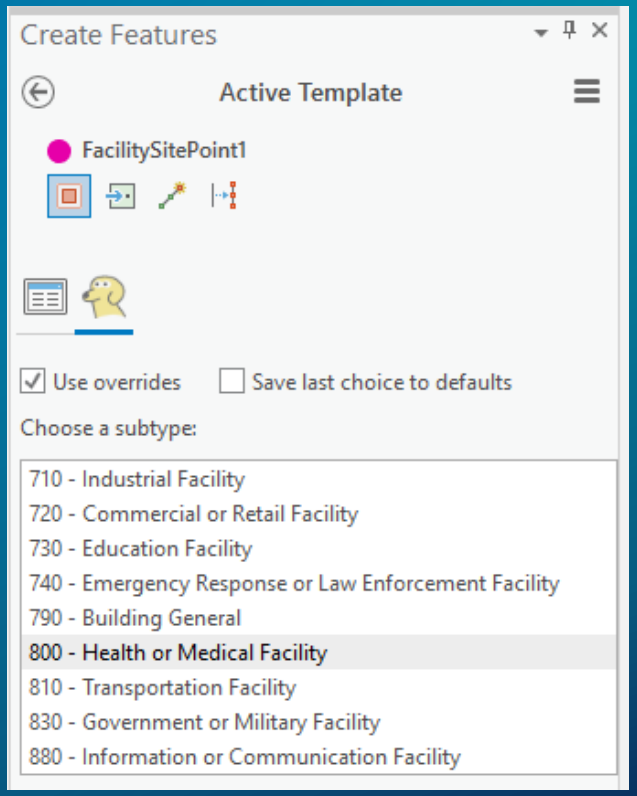
 //”Manually” reset
 CurrentTemplate.Inspector.Cancel();
```

Intermediate Editing

Demo – Construction Tool (2)

Construction Tool – Tool Option UI

- Custom UI for providing configurable “settings” for use with your construction tool edits
  - Eg default buffer distance, proximity distance, use of overrides, etc.
  - Hosted on the Active Template pane when its related construction tool(s) is/are activated*
  - Implement using an Embeddable Control (Pro SDK item template)



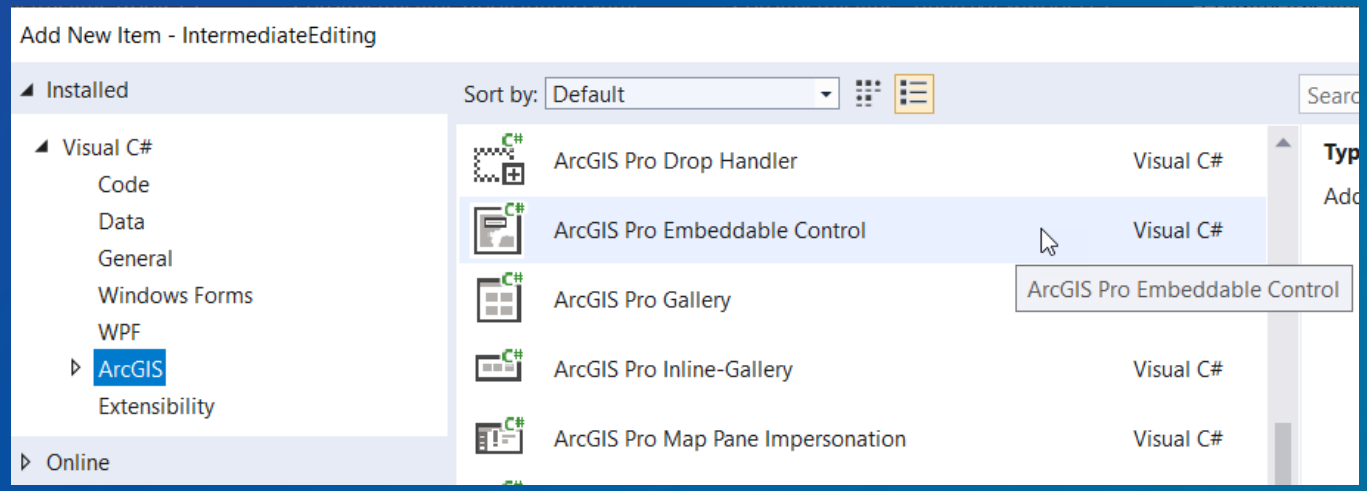
  - *And/or on Template Properties Dialog to persist custom settings in the template

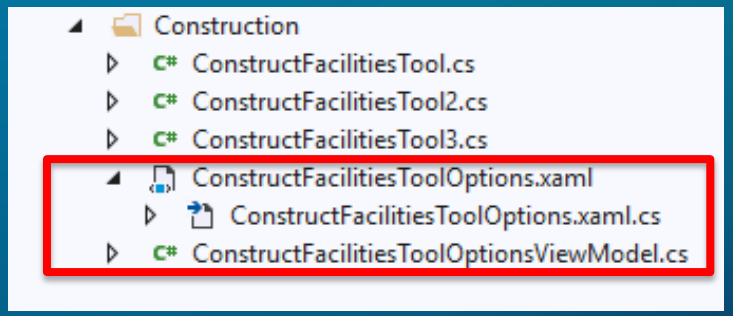
Construction Tool – Tool Option UI continued

- Procedure
  - Add an Embeddable Control (run the Pro SDK item template)
  - Register Embeddable control in the **`esri_editing_tool_options`** category in the Config.daml
  - Implement the UI (standard WPF)
  - Implement `IEditingCreateToolControl` (on the embeddable control)

Construction Tool – Tool Option UI continued

- Procedure
  - Add the Embeddable Control (via Pro SDK item template) to your VS project





Construction Tool – Tool Option UI – Config.daml

- Register Embeddable control in the **`esri_editing_tool_options`** category in the Config.daml
  - Find the embeddable control declaration
  - Change `refID` from `esri_embeddableControls` to `esri_editing_tool_options`

```
<tool id="IntermediateEditing_Construction_ConstructFacilitiesTool3"
       categoryRefID="esri_editing_construction_point" ...>
   <content insert="before" placeWith="esri_editing_SketchPointTool“ />
</tool>

<categories>
    <updateCategory refID="esri_embeddableControls">
      <insertComponent id="IntermediateEditing_Construction_ConstructFacilitiesToolOptions"
 className="IntermediateEditing.Construction.ConstructFacilitiesViewModel">
        <content className="IntermediateEditing.Construction.ConstructFacilitiesView" />
      </insertComponent>
    </updateCategory>
 </categories>
```

Construction Tool – Tool Option UI – Config.daml

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  - Find the embeddable control declaration
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    <updateCategory refID="esri_embeddableControls">
      <insertComponent id="IntermediateEditing_Construction_ConstructFacilitiesToolOptions"
 className="IntermediateEditing.Construction.ConstructFacilitiesViewModel">
        <content className="IntermediateEditing.Construction.ConstructFacilitiesView" />
      </insertComponent>
    </updateCategory>
 </categories>
```

Construction Tool – Tool Option UI – Config.daml

- Register Embeddable control in the **`esri_editing_tool_options`** category in the Config.daml
  - Find the embeddable control declaration
  - Change `refID` from `esri_embeddableControls` to `esri_editing_tool_options`

```
<tool id="IntermediateEditing_Construction_ConstructFacilitiesTool3"
       categoryRefID="esri_editing_construction_point" ...>
   <content insert="before" placeWith="esri_editing_SketchPointTool“ />
</tool>

<categories>
    <updateCategory refID="esri_editing_tool_options">
      <insertComponent id="IntermediateEditing_Construction_ConstructFacilitiesToolOptions"
 className="IntermediateEditing.Construction.ConstructFacilitiesViewModel">
        <content className="IntermediateEditing.Construction.ConstructFacilitiesView" />
      </insertComponent>
    </updateCategory>
 </categories>
```

Construction Tool – Tool Option UI – Config.daml

- Add a **content** element to the tool daml (if one is not already there)

```
<tool id="IntermediateEditing_Construction_ConstructFacilitiesTool3"
       categoryRefID="esri_editing_construction_point" ...>
   <content insert="before" placeWith="esri_editing_SketchPointTool“ />
</tool>

<categories>
    <updateCategory refID="esri_editing_tool_options">
      <insertComponent id="IntermediateEditing_Construction_ConstructFacilitiesToolOptions"
 className="IntermediateEditing.Construction.ConstructFacilitiesViewModel">
        <content className="IntermediateEditing.Construction.ConstructFacilitiesView" />
      </insertComponent>
    </updateCategory>
 </categories>
```

Construction Tool – Tool Option UI – Config.daml

- Add a **content** element to the tool daml (if one is not already there)

```
<tool id="IntermediateEditing_Construction_ConstructFacilitiesTool3"
       categoryRefID="esri_editing_construction_point" ...>
   <content insert="before" placeWith="esri_editing_SketchPointTool“ />
</tool>

<categories>
    <updateCategory refID="esri_editing_tool_options">
      <insertComponent id="IntermediateEditing_Construction_ConstructFacilitiesToolOptions"
 className="IntermediateEditing.Construction.ConstructFacilitiesViewModel">
        <content className="IntermediateEditing.Construction.ConstructFacilitiesView" />
      </insertComponent>
    </updateCategory>
 </categories>
```

Construction Tool – Tool Option UI – Config.daml

- Add a toolOptionsID specifying the id of the embeddable control in the `esri_editing_tool_options` category

```
<tool id="IntermediateEditing_Construction_ConstructFacilitiesTool3"
       categoryRefID="esri_editing_construction_point" ...>
 <content ... toolOptionsID="IntermediateEditing_Construction_ConstructFacilitiesOptions" />
</tool>

<categories>
    <updateCategory refID="esri_editing_tool_options">
      <insertComponent id="IntermediateEditing_Construction_ConstructFacilitiesToolOptions"
 className="IntermediateEditing.Construction.ConstructFacilitiesViewModel">
        <content className="IntermediateEditing.Construction.ConstructFacilitiesView" />
      </insertComponent>
    </updateCategory>
 </categories>
```

Construction Tool – Tool Option UI – Config.daml

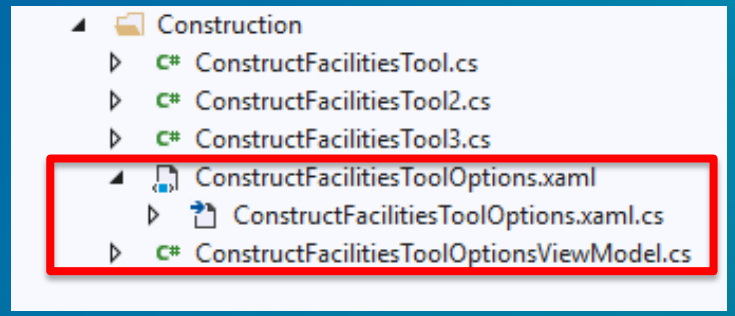
- Add a toolOptionsID specifying the id of the embeddable control in the `esri_editing_tool_options` category

```
<tool id="IntermediateEditing_Construction_ConstructFacilitiesTool3"
       categoryRefID="esri_editing_construction_point" ...>
 <content ... toolOptionsID="IntermediateEditing_Construction_ConstructFacilitiesOptions" />
</tool>

<categories>
    <updateCategory refID="esri_editing_tool_options">
      <insertComponent id="IntermediateEditing_Construction_ConstructFacilitiesToolOptions"
 className="IntermediateEditing.Construction.ConstructFacilitiesViewModel">
        <content className="IntermediateEditing.Construction.ConstructFacilitiesView" />
      </insertComponent>
    </updateCategory>
 </categories>
```

Construction Tool – Embeddable Control

- Implement UI
  - Standard WPF/XAML to design View UI - .xaml
  - Code-behind goes in View Model - .cs

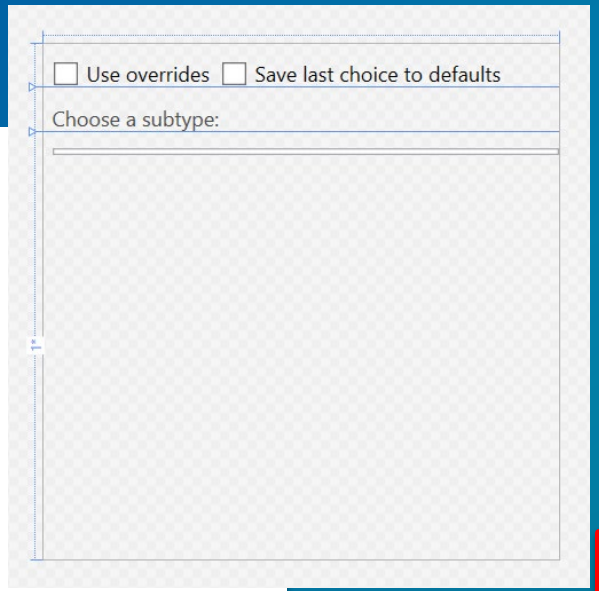


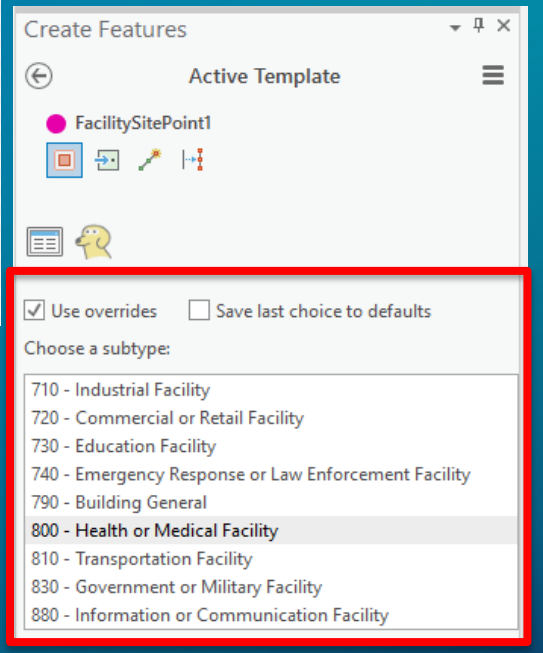
Construction Tool – Embeddable Control

- Implement UI

```
internal class ConstructFacilitiesToolOptionsViewModel:
              EmbeddableControl,
              IEditingCreateToolControl {

   public bool SaveLastSubtypeChoiceToDefaults {
      get => Module1.Current.SaveLastSubtypeChoiceToDefaults;
      set =>
       Module1.Current.SaveLastSubtypeChoiceToDefaults = value;
   }
   public bool UseSubtypeChoiceOverride {
      get => Module1.Current.UseSubtypeChoiceOverride;
      set =>
       Module1.Current.UseSubtypeChoiceOverride = value;
   }
  public List<SubtypeChoice> SubtypeChoices => Module1.Current.SubtypeChoices;
```





Construction Tool – Embeddable Control

- Implement `IEditingCreateToolControl` on the EmbeddableControl
  - Handles behavior of the Tool Option UI when the Tool is activated*
  - *Also handles behavior of Tool Option UI if it is used on the Template Properties Dialog

Construction Tool – EmbeddableControl - IEditingCreateToolControl

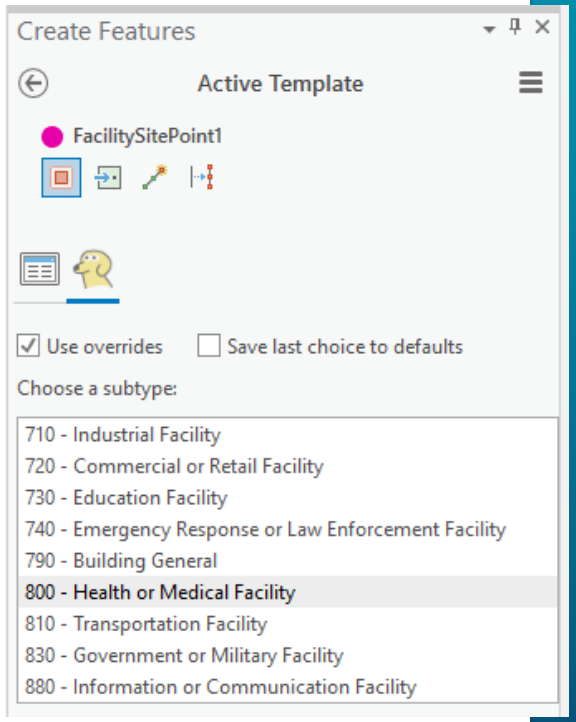
```
internal class ConstructFacilitiesToolOptionsViewModel: EmbeddableControl,
              IEditingCreateToolControl {

   public ImageSource ActiveTemplateSelectorIcon =>
      System.Windows.Application.Current.Resources["BexDog32"] as ImageSource;

   //Auto open on activate
   public bool AutoOpenActiveTemplatePane(string toolID) => true;

   public bool InitializeForActiveTemplate(ToolOptions options) => true;

   //These are for the Template Properties Dialog- leave at these defaults
   public bool IsValid => true;
   public bool IsDirty => false;
   public bool InitializeForTemplateProperties(ToolOptions options) => false;
```



Intermediate Editing

Demo – Construction Tool (3)

Intermediate Editing - Summary

- Recap of Edit Operation and Inspector
  - Edit Operations provide a coarse grained API for editing
  - Inspector is geared toward updates applied to single features

- Editing Tools
  - Modify
  - Leverage the sketch to edit existing features
  - Apply edits using a mix of edit operation and/or Inspector

  - Construction
  - Specialized “flavor” of Editing Tool
    - Focused on feature construction, hosted on Create Features pane
  - Has built-in access to the Layer Template(s)
  - Enhanced with custom UI and Tool Options

Intermediate Editing

Questions?

ArcGIS Pro SDK for .NET – Technical Sessions

Date	Time	Session	Location
~~Mon, Nov 04~~	~~1:00 pm – 1:45 pm~~	~~Learning Customization and Extensibility~~	~~Salon Durieux~~
Tue, Nov 05	~~9:00 am – 9:45 am~~	~~Understanding the CIM, a Guide for Developers~~	~~Salon Humboldt~~
	~~2:00 pm – 2:45 pm~~	~~Intermediate Editing~~	~~Salon Durieux~~
	4:00 pm – 4:45 pm	Advanced Customization Patterns	Salon Durieux
Thu, Mar 07	2:00 pm – 2:45 pm	Learning Customization and Extensibility	Salon Humboldt

Intermediate Editing

- Questions?
  - https://github.com/esri/arcgis-pro-sdk/wiki/tech-sessions#2019-berlin

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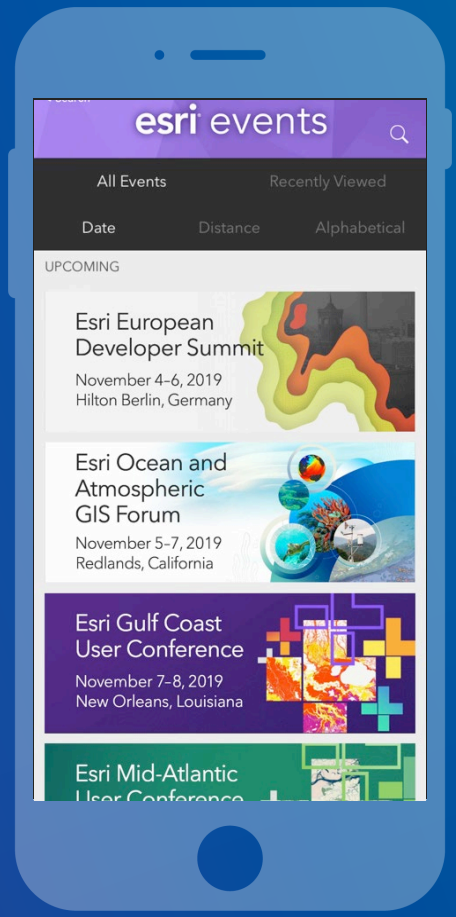
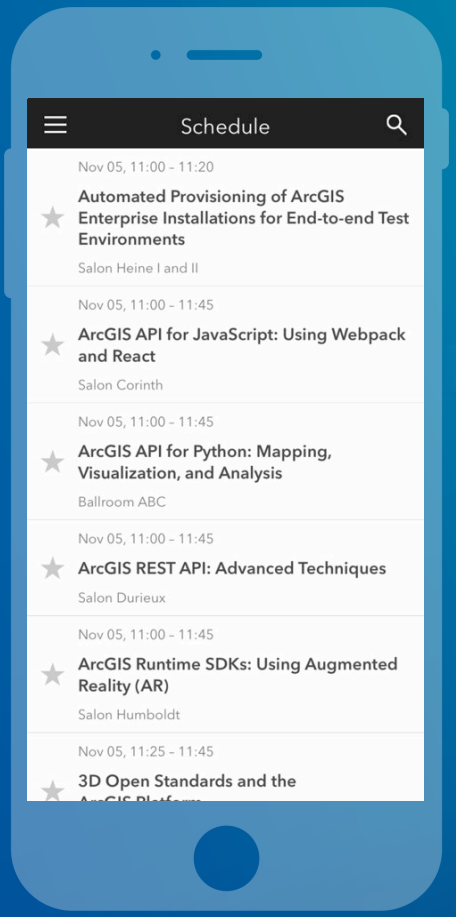
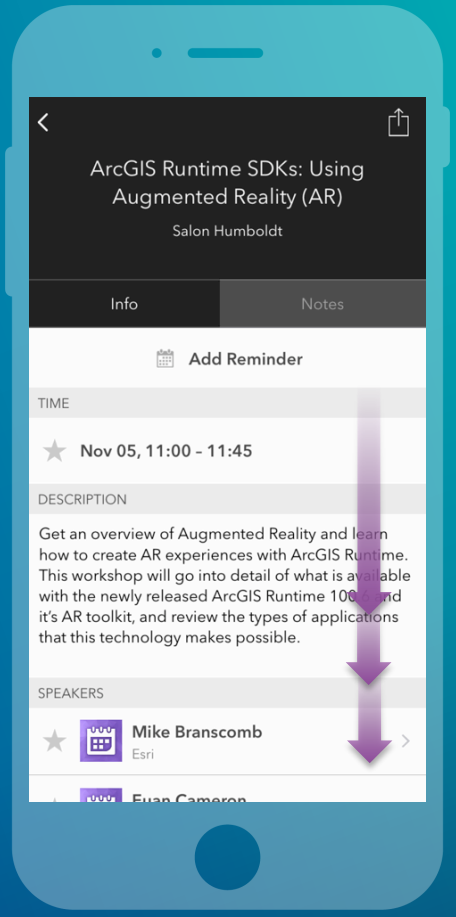


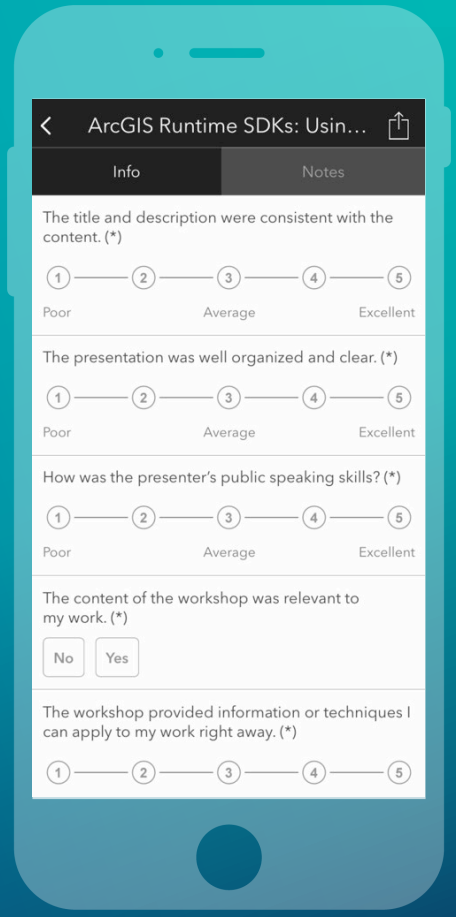
Select the session you attended



Scroll down to find the feedback section



Complete answers and select "Submit"

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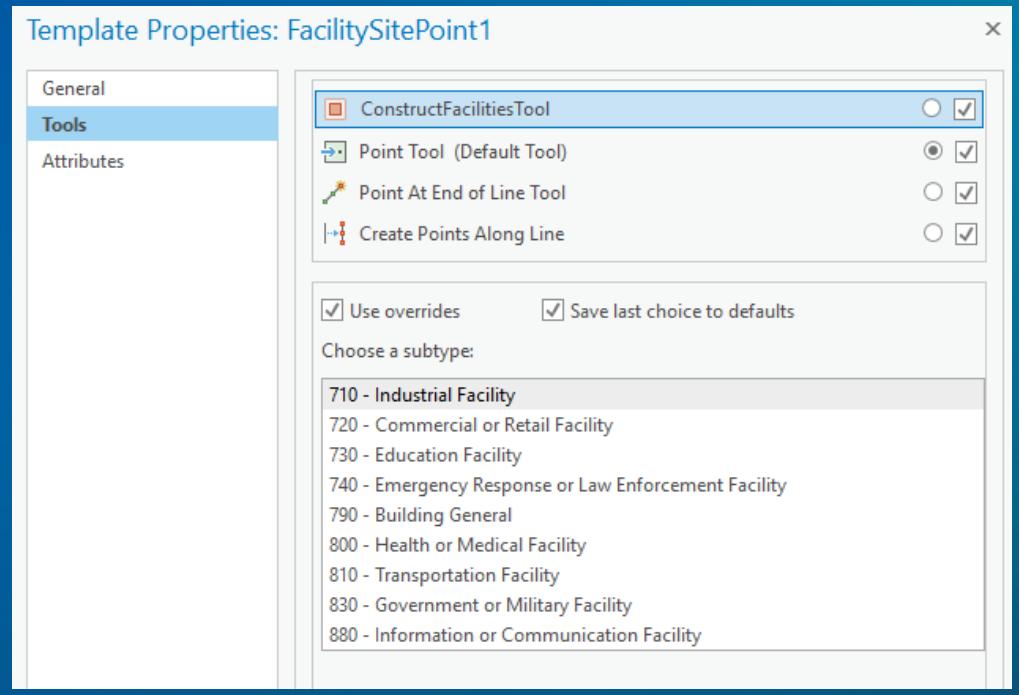
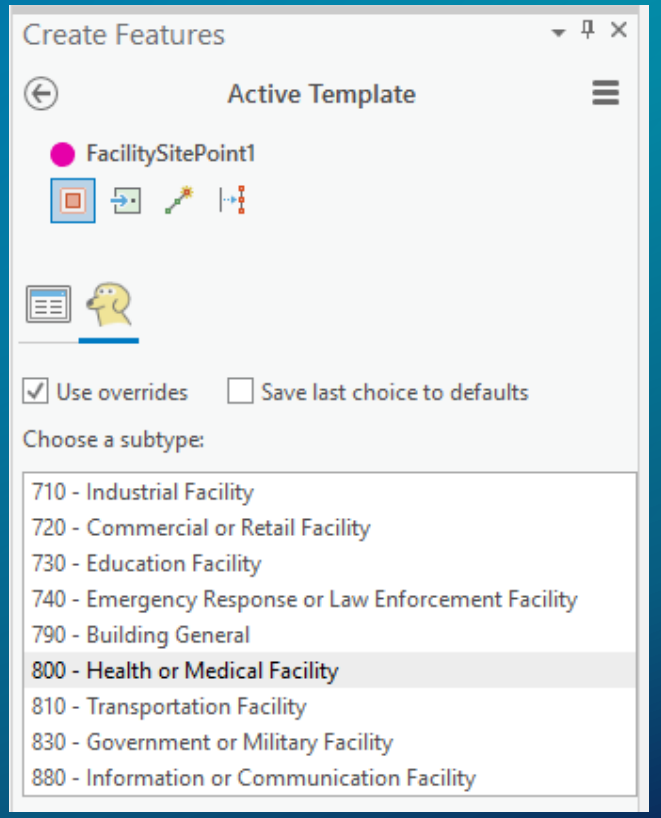
Edit Operations Review - Recap

- EditOperation is the primary pattern for Editing in the Pro API
  - Performs 3 key functions:
    - Provides a coarse grained API for editing.
    - Consolidate multiple edits into a single operation
    - Invalidates underlying caches for MapMembers edited by the operation
- Edit multiple datasets from the same datastore or different datastores
  - EditOperation ensures the required underlying edit sessions are established

Construction Tool – Tool Option UI

- Custom UI for additional tool options
  - Hosted on the Active Template pane and Template Properties
    - Active Template to use settings in our edits
    - Template Properties to persist settings in the template
  - Implement using an Embeddable Control (Pro SDK item template)





Construction Tool – ToolOptions UI - `IEditingCreateToolControl`

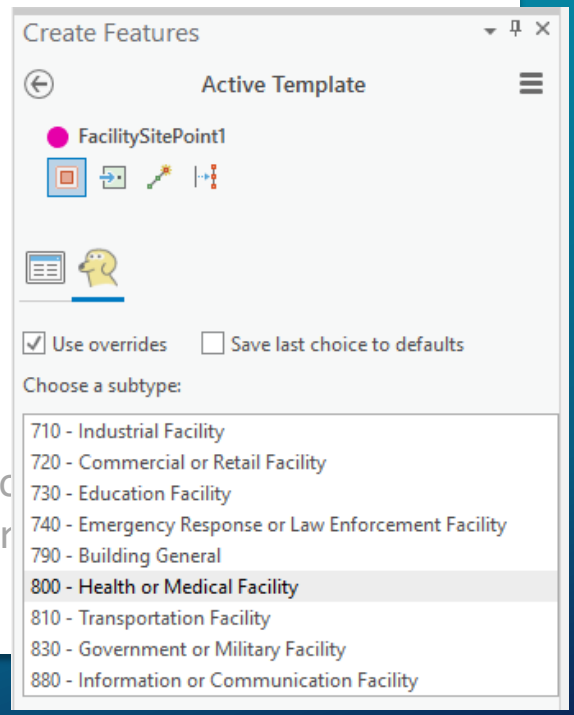
- Add implementation for `IEditingCreateToolControl` to your Embeddable Control
  - The interface is used to initialize your UI with your own “tool options”
    - “Tool Options” are provided as a .NET dictionary of key/value pairs
    - Tool options are persisted to the Template via the Template Properties dialog
      - Defaults applied on Tool activation

```
public sealed class ToolOptions : IDictionary<string, object>, ... {
   public object this[string key] { get; set; }
   public ICollection<object> Values { get; }
   public ICollection<string> Keys { get; }
```

Construction Tool – `IEditingCreateToolControl`

- Implementing **`IEditingCreateToolControl`** – For the Active Template

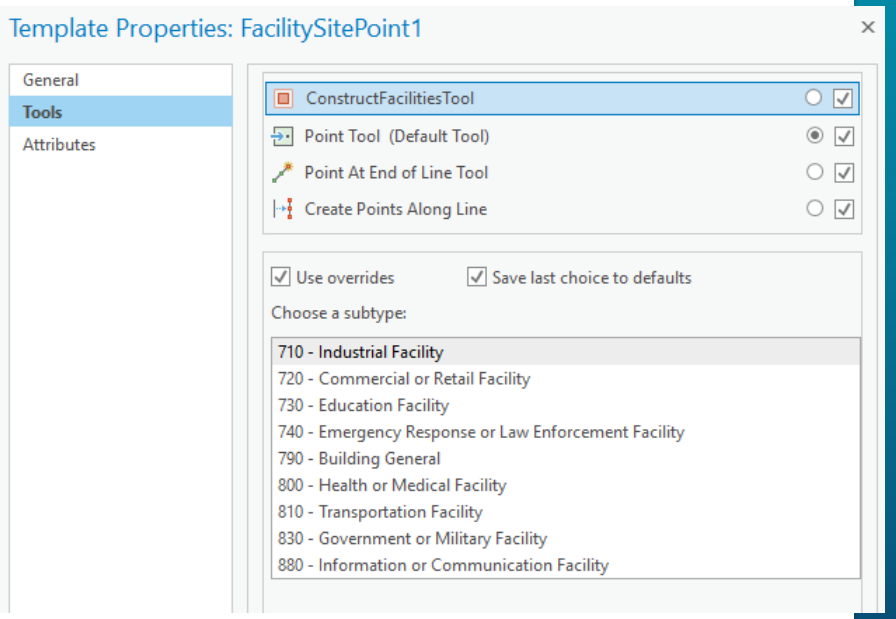
```
internal class ConstructFacilitiesToolOptionsViewModel: EmbeddableControl, IEditingCreateToolControl {
   //1. These are for the Active Template pane
   public ImageSource ActiveTemplateSelectorIcon =>
      System.Windows.Application.Current.Resources["BexDog32"] as ImageSource;

   public bool AutoOpenActiveTemplatePane(string toolID) //Auto open on activate
   public bool InitializeForActiveTemplate(ToolOptions options)//Consume tool
                                                              //options
   //2. These are for the Template Properties Dialog
   public bool IsValid => true; //False disables OK button
   public bool IsDirty => _dirty; //True indicates ToolOptions have been changed

   public bool InitializeForTemplateProperties(ToolOptions options) //Consume too
                                                                    //Template pr
```



Construction Tool – IEditingCreateToolControl

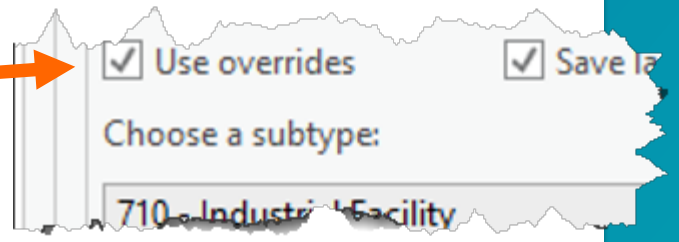
- Implementing **IEditingCreateToolControl** – for Template Properties Dialog

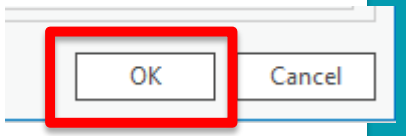
```
internal class ConstructFacilitiesToolOptionsViewModel: EmbeddableControl, IEditingCreateToolControl {
   //1. These are for the Active Template pane
   public ImageSource ActiveTemplateSelectorIcon =>
      System.Windows.Application.Current.Resources["BexDog32"] as

   public bool AutoOpenActiveTemplatePane(string toolID)
   public bool InitializeForActiveTemplate(ToolOptions options)


   //2. These are for the Template Properties Dialog
   public bool IsValid => true; //False disables OK button
   public bool IsDirty => _dirty; //True indicates ToolOptions
                                  //have been changed

   public bool InitializeForTemplateProperties(ToolOptions options) //Consume tool options for
                                                                    //Template properties
```



Construction Tool – Persisting ToolOptions *into* the Template

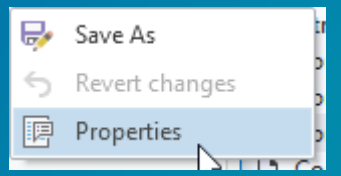
```
internal class DuplicatorOptionsViewModel: EmbeddableControl, IEditingCreateToolControl {

   private ToolOptions _toolOptions;
   public bool InitializeForTemplateProperties(ToolOptions options) {
      SetCheckboxes(options);
      _toolOptions = options; //"Capture" tool options


   public bool UseSubtypeChoiceOverride {
       get { return Module1.Current.UseSubtypeChoiceOverride; }
       set {
            Module1.Current.UseSubtypeChoiceOverride = value;
            if (_toolOptions != null) {
                 _dirty = true;//options have changed
                 _toolOptions["UseSubtypeChoiceOverride"] = value;
             }
           }

   private bool _dirty = false;
   public bool IsDirty => _dirty;//True indicates ToolOptions have been changed
```

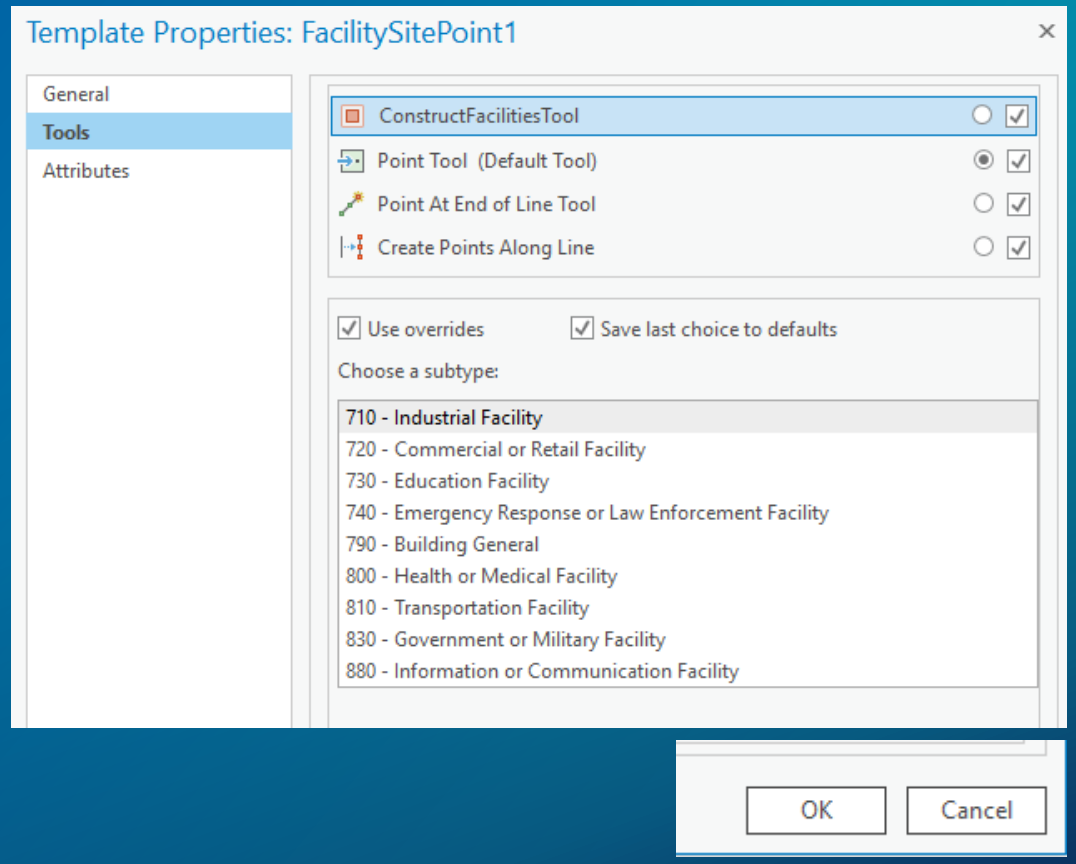




Construction Tool – Persisting ToolOptions *into* the Template

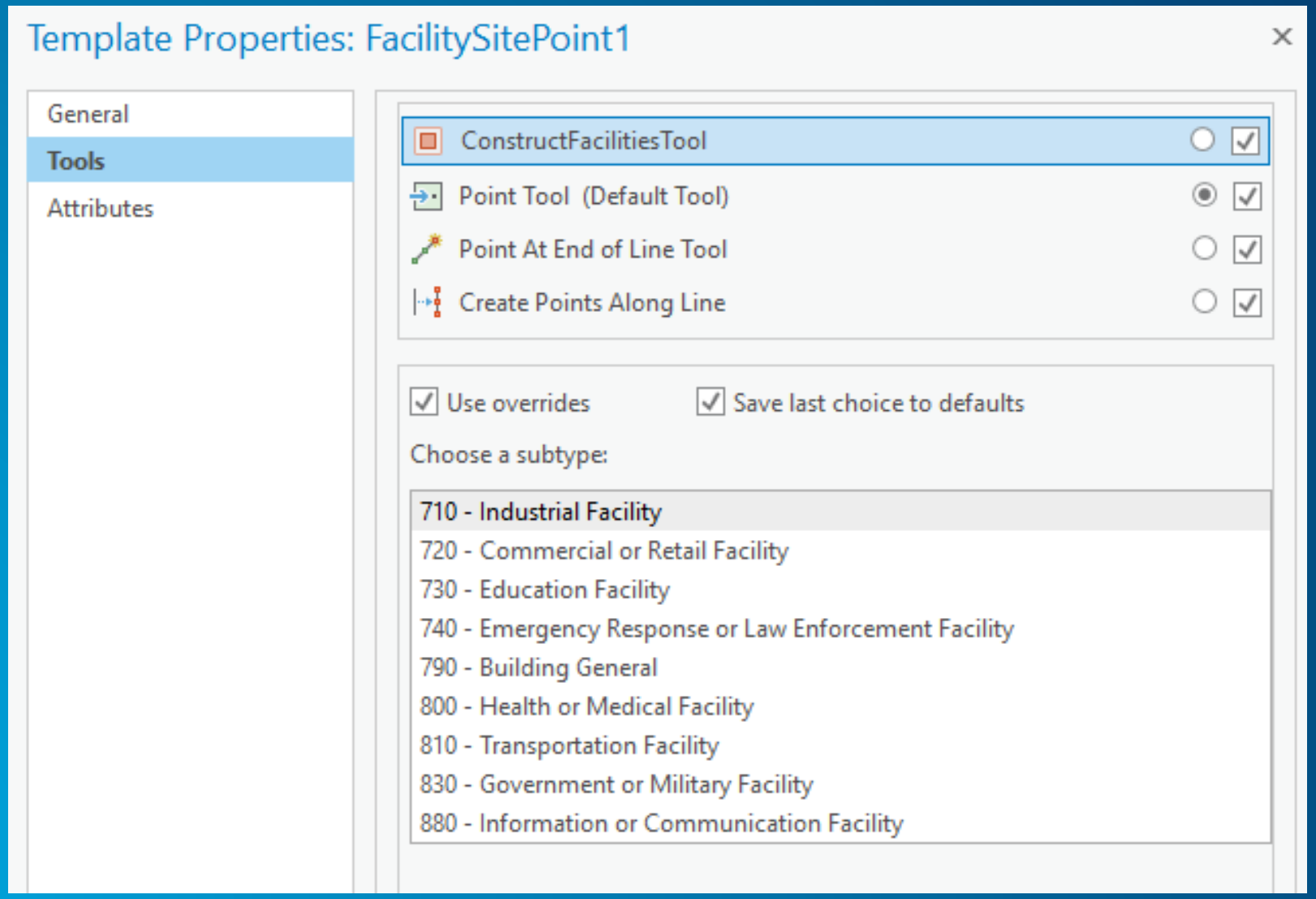
- Capture the reference to ToolOptions
  - Passed to you via `InitializeForTemplateProperties(…)`
  - E.g. store in an instance field variable
- Apply any changes to ToolOptions
- Flag the View Model as dirty
  - (recall IEditingCreateToolControl.IsDirty property…)
- On OK changes are persisted by the dialog





Construction Tool – IEditingCreateToolControl

```
internal class ConstructFacilitiesToolOptionsViewModel: EmbeddableControl, IEditingCreateToolControl {
   ....
   public bool InitializeForActiveTemplate(ToolOptions options) {//palette activation
       LoadToolOptions(options); //consume tool options
       return true; //return false to hide the UI
   }

   private ToolOptions _toolOptions;
   public bool UseSubtypeChoiceOverride { ...

   public bool InitializeForTemplateProperties(ToolOptions options) {//property dialog activation
      LoadToolOptions(options);
      _toolOptions = options; //Hold “onto” ToolOptions to persist changes!
      return true;
   }

   private void LoadToolOptions(ToolOptions options) {
     if (options.ContainsKey("UseSubtypeChoiceOverride"))
        this.UseSubtypeChoiceOverride = (bool)options["UseSubtypeChoiceOverride"];
   }
```


Template Properties: FacilitySitePoint1
General
Tools
Attributes
ConstructFacilitiesTool
Point Tool (Default Tool)
Point At End of Line Tool
Create Points Along Line
Use overrides
Save last choice to defaults
Choose a subtype:
710 - Industrial Facility
720 - Commercial or Retail Facility
730 - Education Facility
740 - Emergency Response or Law Enforcement Facility
790 - Building General
800 - Health or Medical Facility
810 - Transportation Facility
830 - Government or Military Facility
880 - Information or Communication Facility