Experience Builder – Presenting a Digital Twin

This exercise gives an introduction to the possibilities with the Experience Builder. We will start this exercise by creating a Scene in ArcGIS Online with data from the Living Atlas. When the webscene is ready, this can be presented with the Experience builder.

The exercise consists of the following steps (stap):

Stap 1:   Log in to ArcGIS Online

❑ Sign into ArcGIS Online (www.arcgis.com) with the Esri credentials provided by the instructor.

– Username: Student_NL_<number>
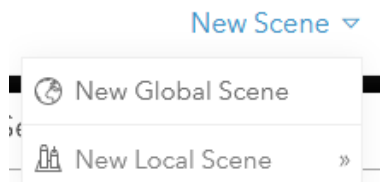– Password: will be distributed during the session

We will start our exercise in the Scene Viewer where the 3D Scene will be prepared.
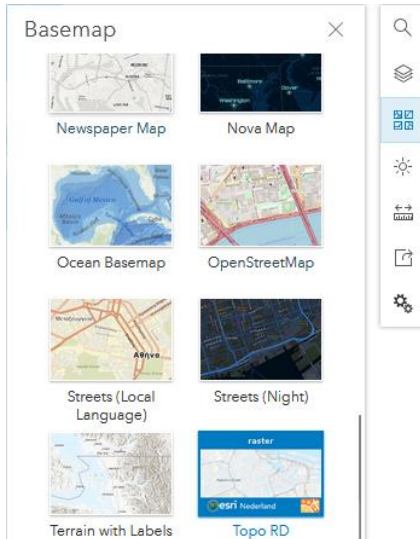
Stap 2:   Create a Scene

❑ Navigate to the **Scene** tab in the ArcGIS Portal.

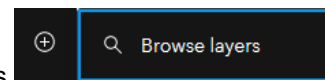The Scene Viewer opens and a global scene opens with a pop-up.

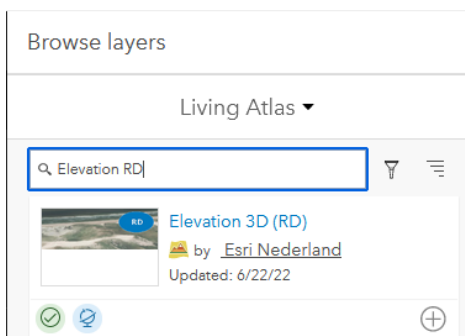❑ Close the pop-up and in the upper right corner, choose **New Scene > New Local Scene:**

❑ In the right panel, click on the Basemap icon and scroll to the basemap **Topo RD** (blue bar in thumbnail).

❑ In the left panel, click on the **plus** button to browse layers

❑ Click on **My Content** and select **Living Atlas** to search for the layer **Elevation RD**

❑ Click on the **Plus** button to add the Elevation layer to the Scene.

The Elevation layer is used for visualization of 3D layers by creating relief in the 3D scene. In the Netherlands, this Elevation 3D layer is based on the latest AHN ('hoogtemodel'). Layers can be visualized in relation to the elevation layer. In a 3D scene (in ArcGIS Online and ArcGIS Pro), this elevation layer is added to the 'ground':
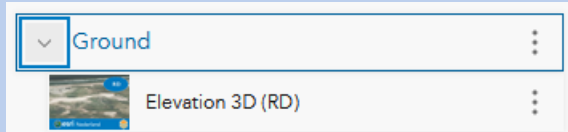
Outside of the Netherlands, the Terrain 3D can be used for a world global elevation. There are different Elevation layers available as a ground in a webscene:

https://www.arcgis.com/home/search.html?q=Elevation&focus=layers-weblayers-elevationlayers

❑ In the Living Atlas, search for **Bomen 3D RD** and add the layer to the Scene:

❑ Also add **Waterdeel** to the scene.
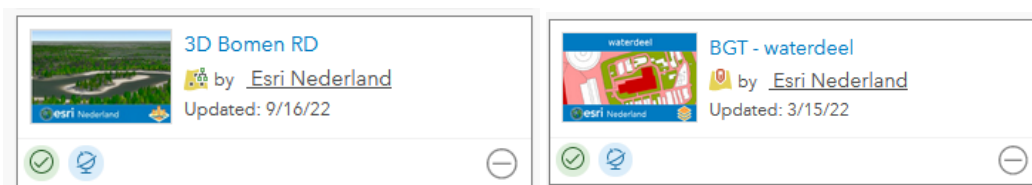
❑ Next, we will add layers from the Organization to the Scene. Change the search to **My Organization** and add the following layers:
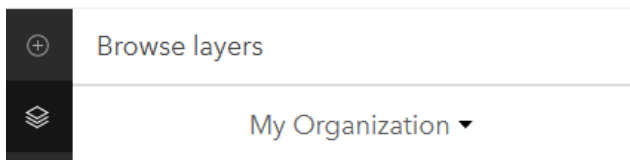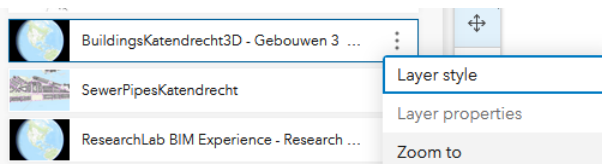

   – Type in **Buildings** and add **BuildingsKatendrecht3D**
   – Type in **Bridges** and add **BridgesRotterdam**
   – Type in **Research** and add **ResearchLab_BIM_Experience**
   – Type in **Sewer** and add **SewerpipesKatendrecht**

❑ Click **Done**. The following layers are added to the Scene:
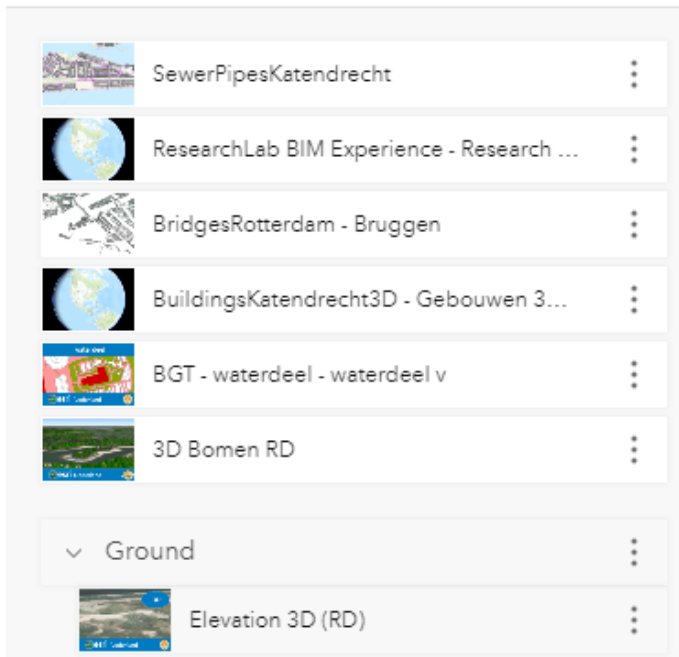
❑ Click on the three dots next to the Buildings, and choose **Zoom to**:

> **Tips for Navigating through a Scene**
> - Use the mouse wheel to zoom in or out
> - Navigate through the scene with the left mouse button
> - Use the right mouse button to tilt the scene (vertically).

❑ Before we continue, time to save the webscene. Click on the **Save button** on the left side and name it **Webscene Katendrecht <your initials>**

Stap 3:   Visualization of layers

There are many ways to visualize the layers in the webscene. We will look at two examples.

❑ Click on the three dots next to the **BGT waterdeel** layer and click **Layer style:**
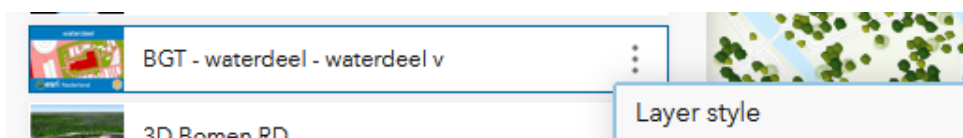
❏ Under *Choose the main attribute to visualize,* select **<none>:**
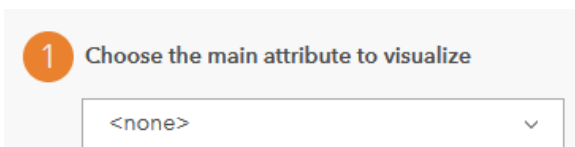
❏ Under *Choose a drawing style,* Choose **Water** by clicking on **Select.**

❏ Click **Done.**

Zoom in to see the visualization of the water (visibility range is set).

It is also possible to visualize the sewerpipes in 3D.

❏ Click the three dots next to the Sewerpipes layer and select **Layer Style.**

❏ Choose **3D Path** as a drawing style.

❏ Click **Options** when the drawing style is selected:

❏ Change the settings conform the following settings and click **Done** when ready:
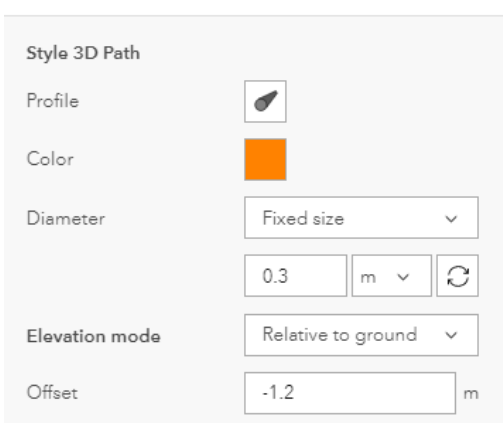
❏ The 2D layer will now be visualized as a 3D layer with an offset.

❏ Navigate underground to see the result:

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Tips for Navigating through a Scene
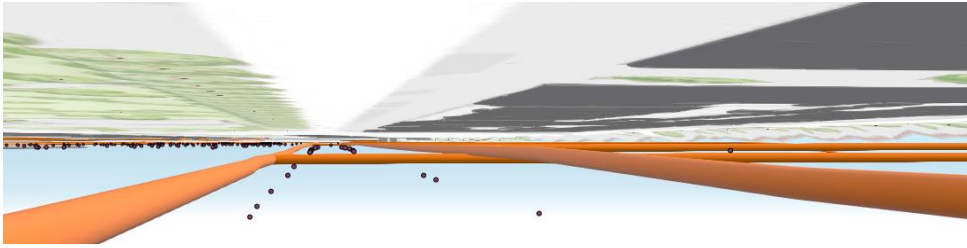- Use the mouse wheel to zoom in or out
- Navigate through the scene with the left mouse button
- Use the right mouse button to tilt the scene (vertically).

Stap 4: Performance webscene

There are a few ways to optimize the webscene:
- ➢ Spatial filter on a layer
- ➢ Clip the webscene to a current view
- ➢ Visibility range

❑ Click on the three dots next to the **3D Bomen RD** and click on **Layer properties.**

❑ Click on **Configure Spatial filters** at the bottom.

❑ Click on **Include** and draw a similar polygon like below.

❑ Double click to finish the polygon.
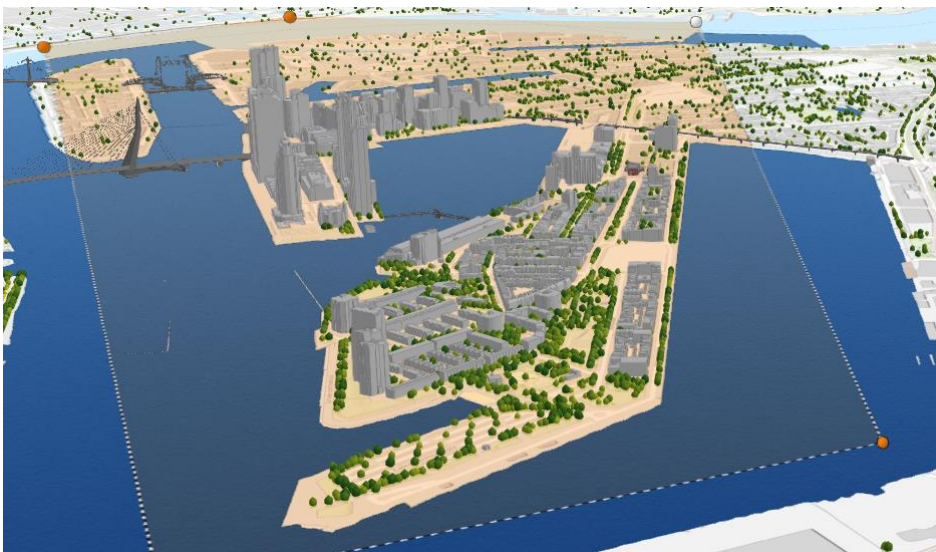
❑ Click **Done** to save the filter.

❑ Option two is to clip the extent of the webscene to a current view.

❑ In the left panel, click on the **Properties**

❑ Turn on the **Clip to Extent** and check the result.

❑ Optionally, zoom in or out to clip a bigger or smaller area.

❑ You must click on **Update to Current View** to actualize the clip:

❑ The clipped extent should at least include the Erasmusbrug and the BIM model:

❑ Do not forget to save the webscene

Stap 5:   Create Slides

To make the Scene Viewer more user friendly, we will create a few slides (dia's). These slides will also be used in the Experience.

Tips for Navigating through a Scene
- Use the mouse wheel to zoom in or out
- Navigate through the scene with the left mouse button
- Use the right mouse button to tilt the scene (vertically).

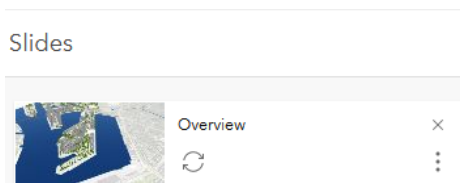We will create a few slides to highlight some features in our webscene. The first slide will provide us with an overview.

❏ Zoom out until we have a good overview of the project extent:

❏ Click on **Slides**

❏ Click on **Capture Slide** and name it *Overview*.:

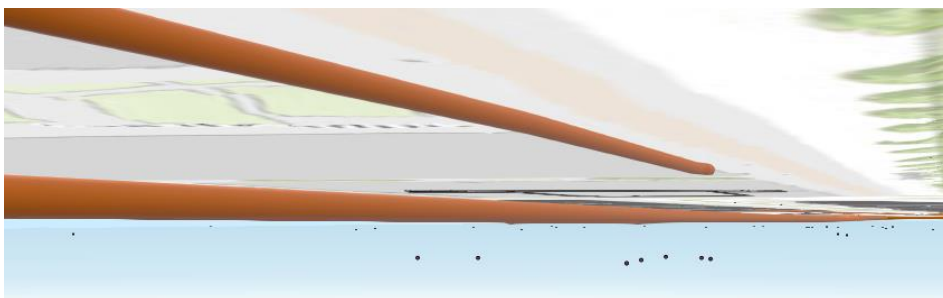❏ Zoom to the Erasmusbrug and click on **Capture slide** when you have a good view of the bridge:

❏ Navigate to the **Rijnhavenbrug** and capture a slide.
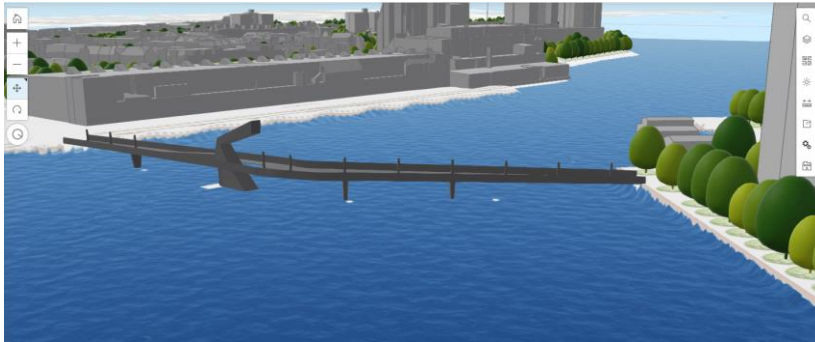
❑ Navigate to the BIM model and capture a slide

❑ Capture a last slide of the underground **Sewerpipes:**

❑ A total of 5 slides have been made. Close the Slides panel.

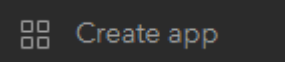❑ Double check the slides by clicking on them in the Webscene:

The webscene is now prepared to use in the Experience.

❑ Do not forget to save the webscene.

Stap 6: Start Experience Builder

In this part of the exercise we will create an experience for the created webscene.

❑ In the left menu select Create App [Create app] and then choose **Experience Builder**.
The environment to create Experiences opens.

> **Templates in Experience Builder**
> The Experience Builder allows us to create very flexible apps. You can choose a blank template or an existing template. Note that it is possible to choose from several categories of templates, for example the Classic web app builder templates, dashboard templates or entire web page templates. Instead of starting with a blank screen we will choose the Launchpad template.

❑ Search for the **Launchpad** template and then click **Create**.
This template is map-centric, so the scene is central and it is possible to add a number of widgets yourself that appear at the bottom of the map widget.

Before we continue with this exercise, let's briefly explain the interface of the Experience builder.

See the picture below with the letters that refer to the different parts:
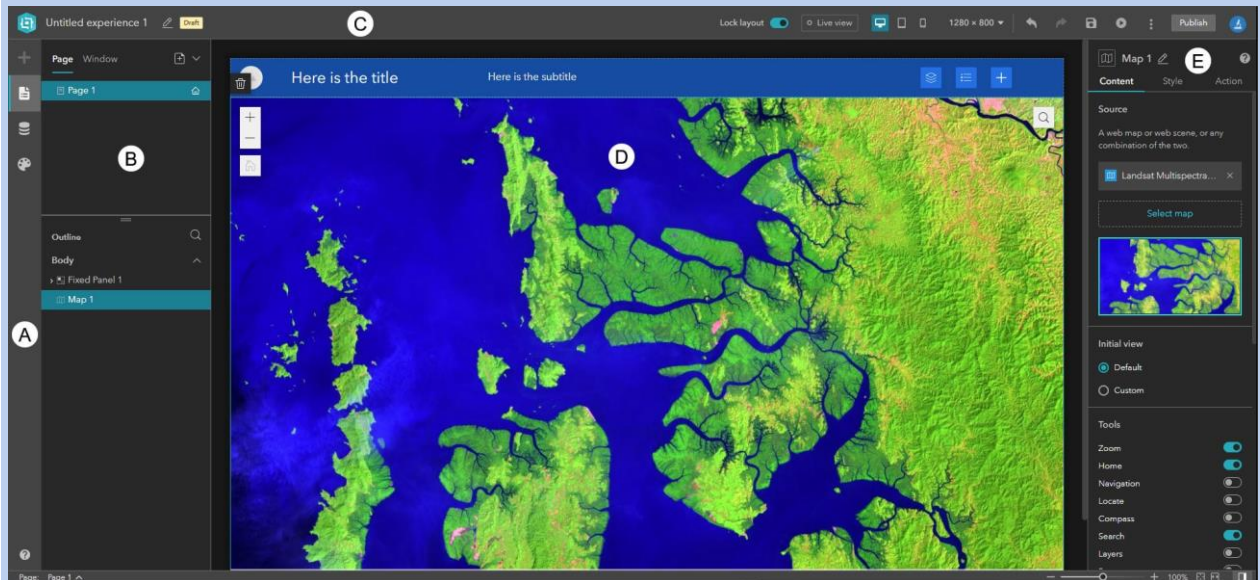

A – The **side bar** allows you to open the widget, page, data, and theme panels.
B – The **left panel** displays your pages and page outlines in searchable structured list. The outline contains an expandable list of all widgets in your app.
C – The **builder toolbar** displays tools that you use to lock the layout, preview your experience, save, undo/redo, publish, and more.
D – The **canvas** is where you design and build your app by adding and moving widgets around the canvas.
E – The **configuration panel** displays the settings for the selected widget or page.

At the canvas you can see what your experience will look like. It is possible to both select a widget from the left panel (B) and from the Canvas (D).

Stap 7:   Configuring the Launchpad template and adding widgets

❑ Top left at the builder toolbar, give the Experience the following name: *Katendrecht Digital Twin Experience _ <yourinitials>:*
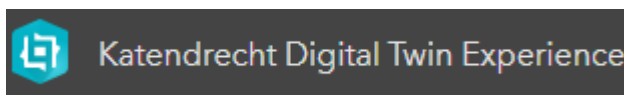
❑ At the canvas, in the top middle double click on **Here is the title** and change it to the following title: *Digital Twin van Katendrecht.*

❑ In the left panel, make sure that in the section **Body** the element **Map** is expanded and notice that there is also a widget controller present (see image below).
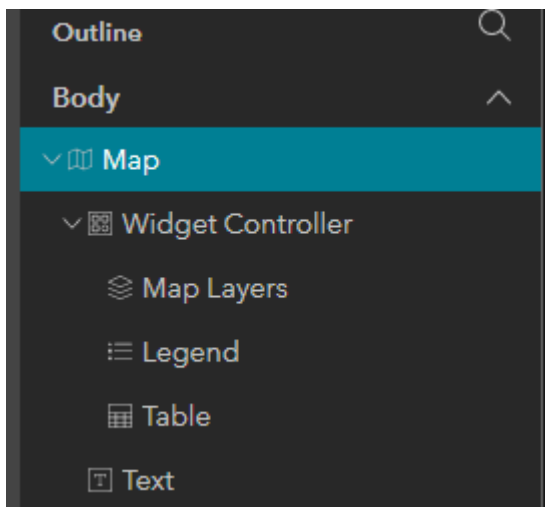
Within this widget controller we can add a number of widgets. We will do that in the remainder of this step.

When the widget controller in the left menu is selected, we also see a trash can icon and plus sign in the canvas:

❑ Click the **Plus sign** and add the **Bookmark** widget.
 This allows you to zoom to the slides created in a previous step.

❑ Also add a **3D toolbox** widget to the Widget controller widget.
 This new widget enables you to do, for example, daylight animations and line of sight analysis in the experience.

❑ In the canvas (center), select the **Bookmark widget**. In the right-side panel, the configuration panel, you can select the settings for this widget.
 The Bookmark widget's configuration panel appears and consists of two tabs: Content and Style. The content tab is activated automatically and we have to choose how our bookmarks will appear.

❑ Choose the **Simple** template and then click **Start** at the bottom of the configuration panel.

❑ Below **Select a Map Widget**, choose **Map**.
 Please note: in the Experience Builder to both maps and scenes will be referred to as maps.

❑ Check **Display bookmarks from the web map**.
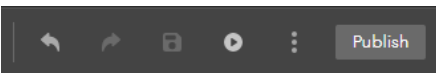 Note that the bookmarks from the previous steps are imported.

Now we will configure the 3D Toolbar widget.

❑ In the canvas, select the **3D Toolbar** widget.
The 3D Toolbox's configuration panel opens.

❑ On the **Content** tab, below **Select a Map Widget**, again choose **Map**.

❑ In the **Tools** section, make sure **Daylight**, **Shadow** and **Line of Sight** are checked.
Weather remains unchecked. This feature is not available yet with an RD spatial reference.

❑ Note that you can still create settings for a number of the tools:

❑ Click the gear icon behind **Daylight** and view the options.

❑ At the bottom of **Arrangement style**, choose **List**.
In the canvas, note that the list shows both titles and icons.

❑ In the **builder toolbar**, save the Experience.

❑ Check the preview of the Experience by clicking the **Preview button.**

An advantage of Experience Builder over Web App Builder is that the appearance of the experience can be completely adjusted to your own wishes. In the next few steps we will take a look at the appearance of our experience and adjust it to Royal Haskoning DHV settings.

❑ In the canvas, select the title (blue bar) and **delete** it.

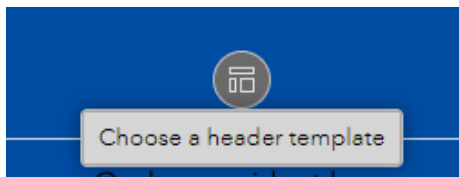❑ Left, in the side bar, select Pages and make sure Page is selected:
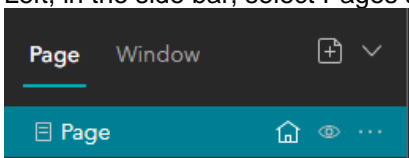
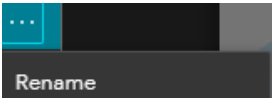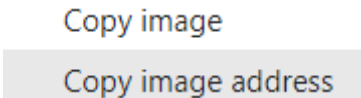❑ In the configuration panel turn on the **Header** and leave the settings unchanged:
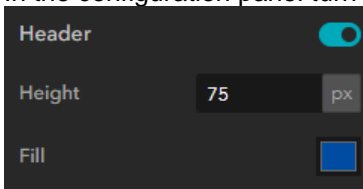
❑ In the builder toolbar make sure your Layout is unlocked:

❑ In the canvas, select the **Header** and choose **Edit header**.
After that, you can choose a template header with the little icon:

- Click **Choose a header template** and select **Header 2**.
  This element shows of an image to the left, a textbox in the middle and a menu button to the right.

- In the left (outline) panel select the **Image** and rename it to: *Company logo*.

- In the Company logo's configuration panel (right side) at the **Content tab**, below Image source, click **Select an image**.

- In the Select an image panel choose **URL**.

- In another tab search in Google for the Royal Haskoning's logo.

- Rightclick the image and select **Copy image address**.

- Paste the copied link address in **URL**.

- Next to **Position**, choose **Fit** instead of Fill.

- In the Company logo's configuration panel open the **Style** tab

- Change **Width** into **140 px** and **Height** into **60 px**.

- As a Background color choose a white background.

- In the left panel rename the **Text** in the Header section into **Title**.

- Change the title itself into: *Digital twin Katendrecht.*

- When the Title is selected in the canvas, note a small toolbar appears.
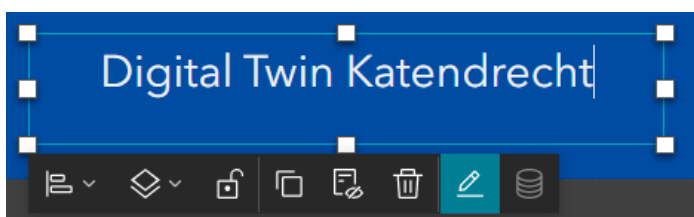
- The first button is useful to align elements:

- Click **Align** and select **Horizontal center**.

❑ In the sidebar (left) select **Theme** and click **Customize** in the panel that opens.
Now we can change the primary Theme color, by clicking the pencil.

❑ Behind HEX fill in the following colorcode: #00567d and click Back.

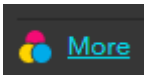The Header changes to the primary color. In all elements that you want to change, the first color is also changed into this new primary theme color:
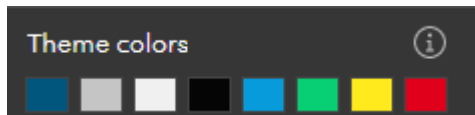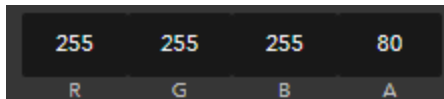

❑ In the left panel, return to **Page** and select the **Widget Controller.**
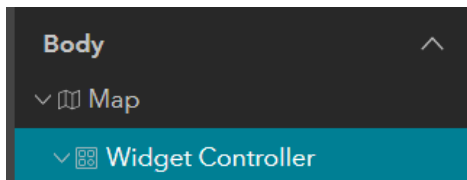
❑ At the right panel, in the bottom of the **Content tab**, click **Advanced**.

❑ Change the **Icon**'s color to the new primary color.

❑ Click the **Style** tab and expand the **Background** options and click the **Fill color.**

❑ Click the More button and make sure the codes below are as follows:

This results in a white background, with 80% transparancy.

❑ In the Builder toolbar save the changes to the Experience.

Stap 8:   Preview and publish the Experience

Next to the save button, it is possible to preview the Experience.

❑ Click the **Preview**

❑ Check if the different widgets work. If satisfied, close the Preview experience.

❑ Click **Publish** in the upper right corner to make the publish and share the Experience.

Stap 9:   Add a page to the experience (optional)

In this optional step we will add a new page to our experience and this will combine a 2D and a 3D map of our digital twin. Using several pages within an experience is another advantage of Experience builder over other webapps.

❑ Return to the configuration of the Experience.

❑ In the side bar select **Pages**.

❑ Select the current page and use the **more options button** (three little dots) and click **Duplicate**.

❑ Rename the new page into: *Katendrecht 2D - 3D*

❑ Rename the first page into: *Katendrecht Digital Twin*

❑ Make sure the Katendrecht 2D – 3D Page is selected.

❑ In the Body Section select **Map2** and Duplicate.
    A new map is added with the title Map3.
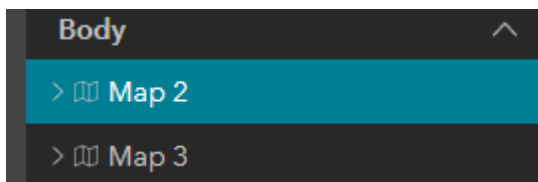
❑ Rename Map3 into: *Map Katendrecht 2D.*

❑ Rename Map2 into: *Scene Katendrecht 3D.*

❑ We need to reorder both map widgets to put them next to each other.

❑ Select the Map Katendrecht 2D and with the little toolbar, choose **Align** and then **Full width** and **Full Height**.
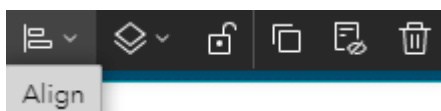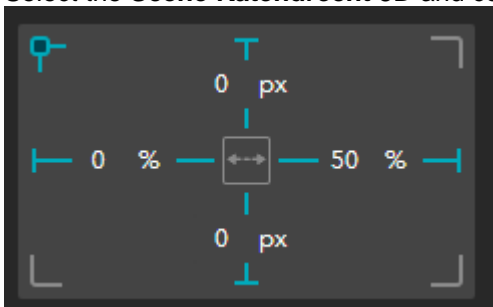

❑ In the configuration panel, click the **Style** tab. In the **Size and Position** section select the following settings:
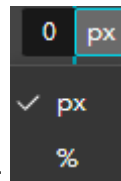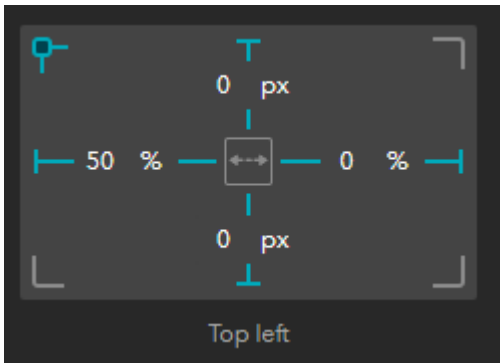
**Tip:** Click the px button to change px into percentage signs:

❑ As a result, Map Katendrecht 2D will be displayed at the right half of the page.

❑ Select the **Scene Katendrecht 3D** and configure the following **Size and Position** settings as follows:

❑ The Scene Katendrecht 3D is situated at the left half of the page.

Now the Map Katendrecht 2D still refers to the same scene as the other Map widget, so we will change the source of the Map Katendrecht 2D widget.
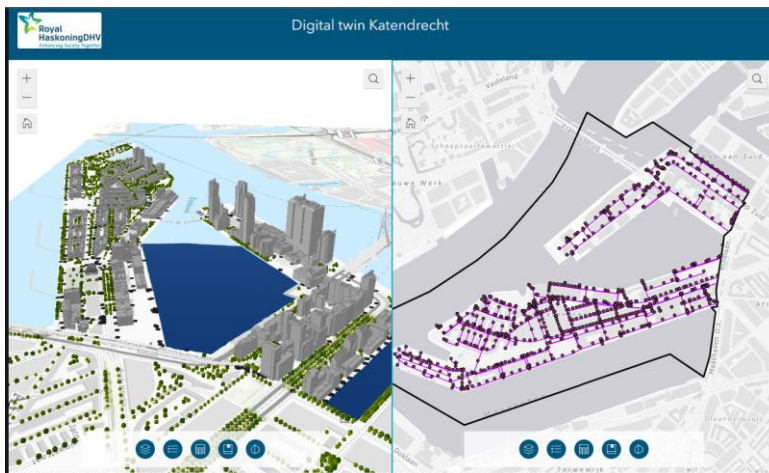
❑ Select the **Map Katendrecht 2D** and click the **Content** tab in the Configuration panel.
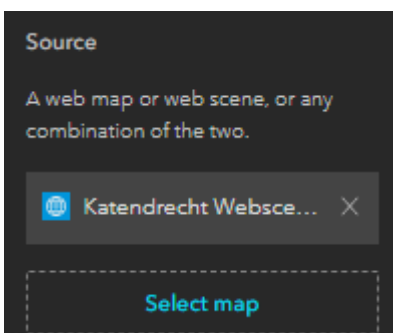
❑ **Remove webscene Katendrecht** and click **Select Map** .

❑ Click **Add new data** (tip: bottom page) and from **My Organization** select **Katendrecht Sewer Pipes and Manholes** and click **Done**.

❑ Select the webmap as a source for the Map Katendrecht 2D widget

The result would look like this:

❑ The following part we will link both map widgets together.

❑ Select the Scene Katendrecht 3D widget and in the configuration panel on the right, click the **Action** tab, then click **Add a trigger**.

❑ Select the **Extent changes** trigger.

❑ Select as a target the widget **Map Katendrecht 2D**.

❑ Select **Zoom to** as the action for Scene Katenrecht 3D when the trigger occurs.
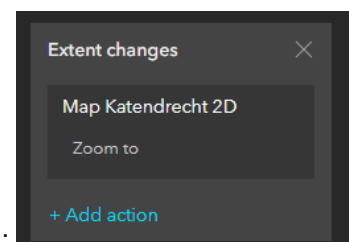
❑ The Action panel for Map **Katendrecht 2D** should show the following:

Note that Map Katendrecht 2D zooms when Scene Katendrecht 3D is zoomed, but not the opposite.

❑ To complete syncing both maps, repeat the steps above using Map Katendrecht 2D as the trigger and Scene Katendrecht 3D as the target:

Extent changes ✕

Scene Katendrecht 3D

Zoom to

+ Add action
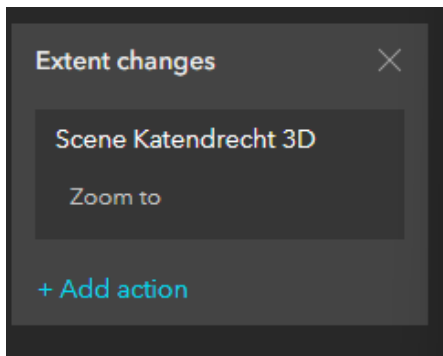
- ❑ Now the 2D and 3D map are connected both directions.

- ❑ Note that for example the Bookmark widget in the widget controller widget does not work yet.
  That is because the widget does not refer yet to the correct map. In case you have some time left, make the bookmark widget work.

- ❑ Save your changes to the Experience.

- ❑ In the Builder toolbar use the **Publish** button to publish your experience.

- ❑ If you want to reuse this template, in the builder toolbar you can click the **more options button** (three little dots) and click: 　Generate template　 .
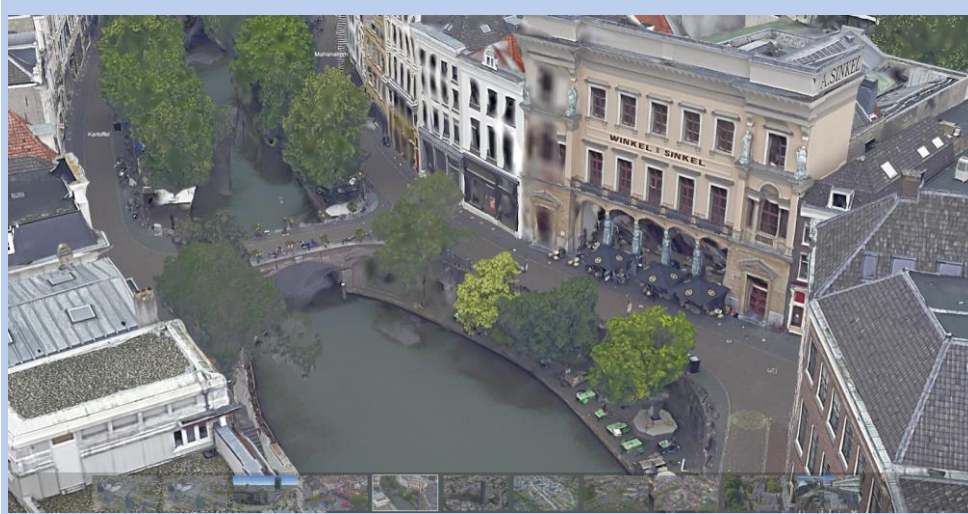
The template opens and you can change the map widget's sources and reuse this template for other digital twins or other topics.

- ❑ You can publish this experience.

Stap 10:   Add another page to show 3D Mesh (optional)

For this exercise we have added buildings in the form of multipatches from the Living Atlas. There are more ways to create a Digital Twin using different data. One of these is a 3D Mesh.

A mesh dataset is a photosurrealistic view of the surroundings. Configured with SURE for ArcGIS, it combines a pointcloud with aerial images. For more information, see https://pro.arcgis.com/en/pro-app/latest/help/mapping/layer-properties/the-integrated-mesh-scene-layer-in-arcgis-pro.htm
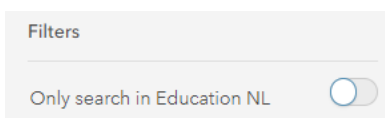
A demo webscene with a 3D Mesh is available in ArcGIS Online.

❑ Navigate to the search bar in ArcGIS Online:

❑ Type in **3D Mesh** and press enter.

❑ Uncheck the '**Only search**' button to search for data outside of the organization.

❑ Click on the **Webscene** and open it in the Sceneviewer.

❑ Use the different bookmarks to explore the dataset.

This example is of the center of Utrecht and is created together with Esri NL and Kavel10. For more information, see https://www.esri.nl/nl-nl/producten/data/premium-data/3d-mesh (Dutch).