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1. How to produce for web viewing

If you wish to produce a scene for web viewing, you have to choose 3MX as the export format. You can do this in the Production dialog of ContextCapture Master (see image below).

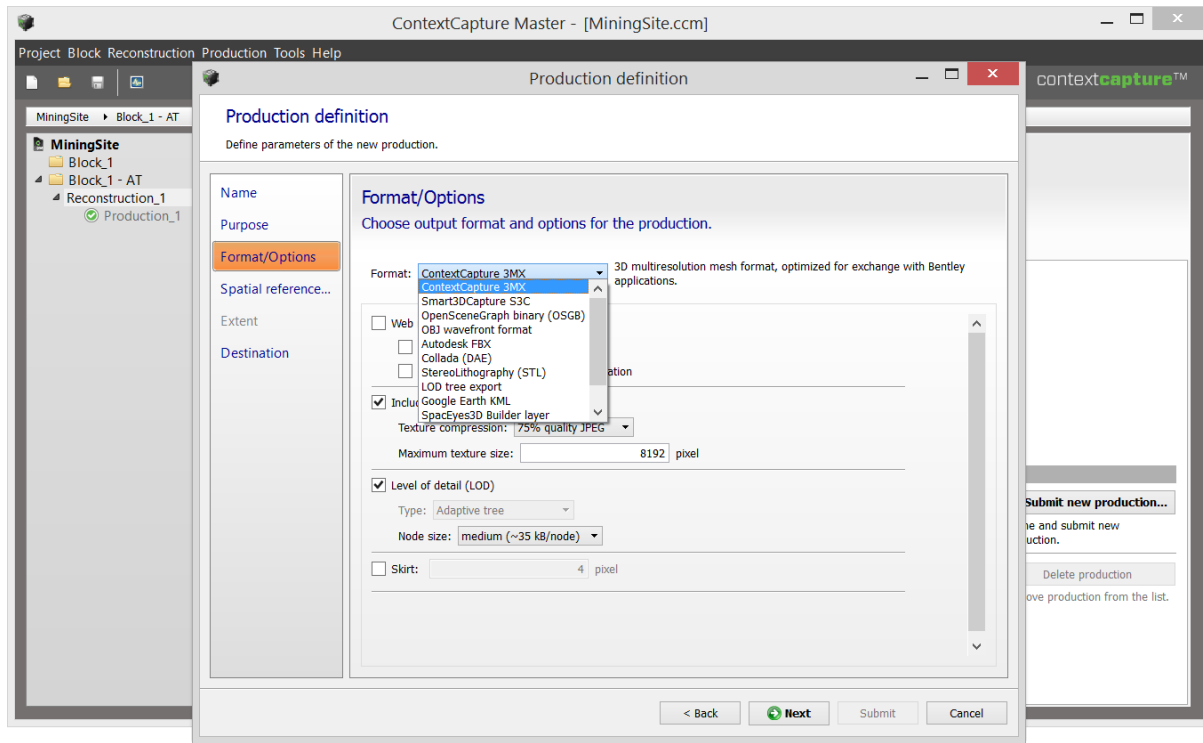


Figure 1: Choosing the web format at production time.

1.1. The web format

The 3MX format is the format dedicated to web publishing, but not only. The intended usage of 3MX is threefold:

- Online distribution, by using our new Acute3D Web Viewer.
- Interoperability with other Bentley Systems products, such as MicroStation.
- Interoperability with 3rd party applications (3D GIS).

Since web publishing is not the only possible use of a 3MX production, certain options not suited for web are made available at the production level. You should choose the most appropriate configuration for your purpose; see the next section for more details.

If you are interested in knowing more about 3MX, we refer you to the 3MX specification documentation ([doc/3MX Specifications.pdf](#)).

1.2. The production options

When producing in 3MX format, you can set a number of options, shown in the screen capture below:

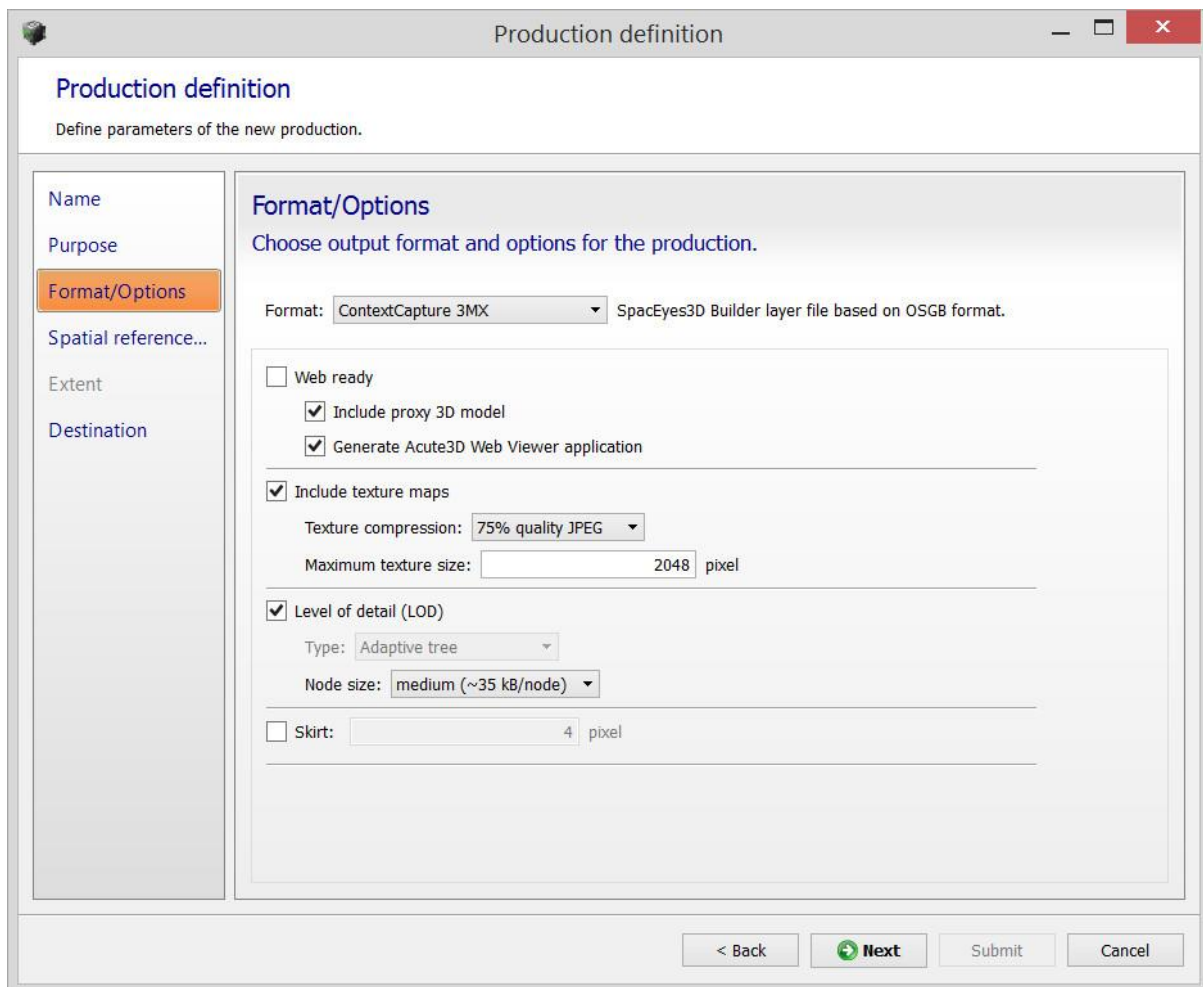


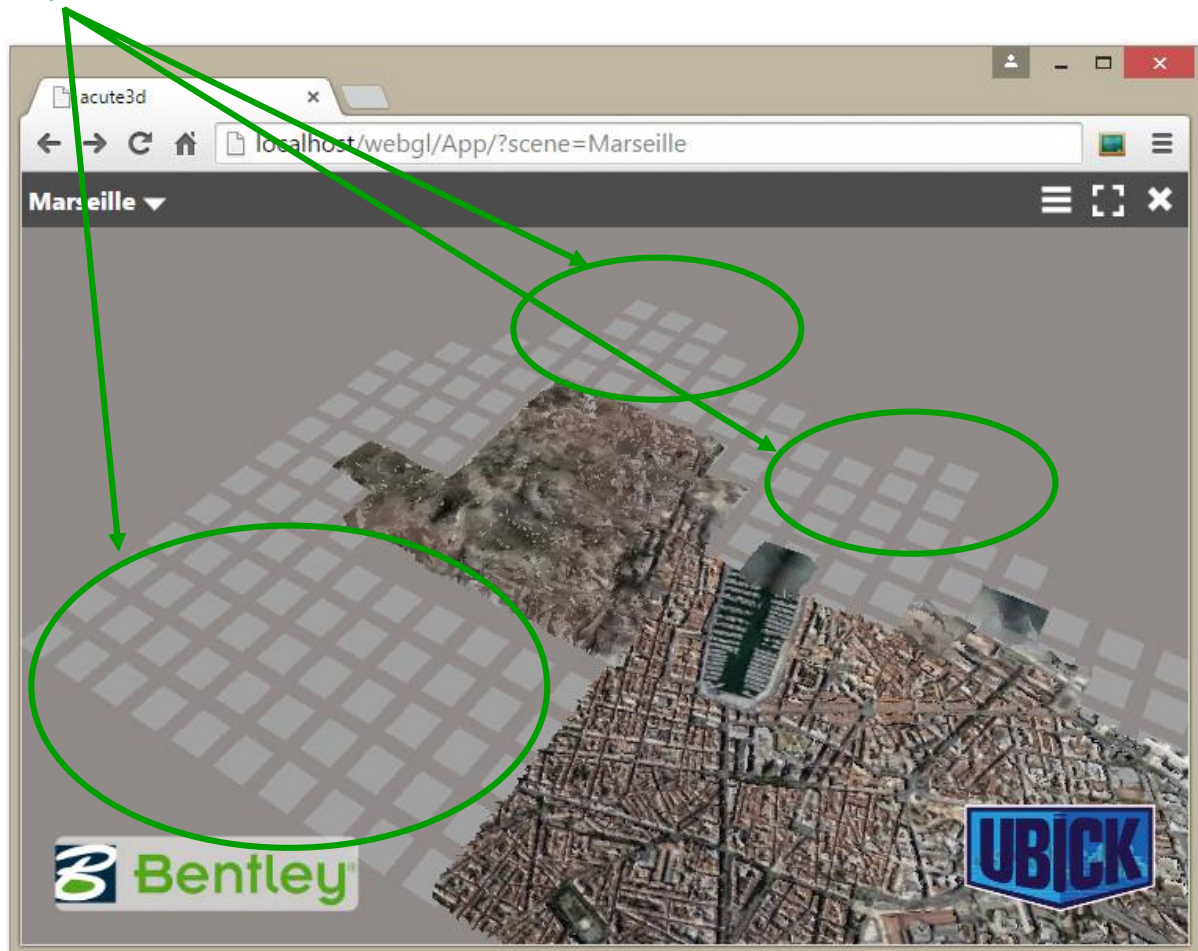
Figure 2: 3MX production options

As the 3MX is an exchange format with a broader use than just web publishing, certain options are not appropriate for web use. Inversely, exporting for web requires a certain set of options that are not necessarily needed if the intent is interoperability with other software.

When choosing the export options, you should consider what will be the main use for your production.

1. The first option is the “**Web ready**” flag. When this flag is checked, all settings are optimized for a web production. In addition, the production will include the Acute3D Web Viewer application, so all is ready for a (quasi-)direct use of the production on a website. Unchecking the “Web ready” can still produce a valid web scene, but you have to take more care on setting the appropriate options.
2. “**Include proxy 3D model**” creates a geometry indicating the footprint of your scene (see image below). This geometry will be shown while waiting for the true geometry to be loaded. If you uncheck this option, nothing will mark the area where the scene is.

Proxy models



3. The **“Generate Acute3D Web Viewer application”** option produces the Acute3D web application next to the 3D scene in 3MX format. The application is used to display the scene in a browser, as described in the “How to deploy the production” section.
4. If **“Include texture maps”** is checked, the model textures will be generated, and a single texture will be at most of the **“maximum texture”** size. If “Include texture maps” is unchecked, no texture will be generated for the model. For web viewing, it is important that textures should not surpass 2048 pixels in size (either width or height).
5. **“Keep untextured regions”** will generate geometry for areas that were reconstructed, but with no texture recovered from the images. If unchecked, the untextured regions will be replaced by holes.
6. The **“Level of detail”** technology permits the decrease in the complexity of the scene as it moves away from the viewer. If this option is checked, simplified versions of the scene are generated alongside the most refined reconstruction. Moreover, the geometry is split into parts that are faster to load. The **node size** indicate how big a geometry part should be.
7. Lastly, the **“Skirt”** option adds an additional border around each geometry node and around each tile, to avoid cracks between the different parts of the mesh. The skirt is not tangent to the 3D model: it lies in the boundary of the 3D region of the node, and it is oriented towards the interior of the 3D model.

1.3. The production reference system

For a georeferenced project, choosing the spatial reference system is important for the web application. The spatial reference systems impacts the 3D visualization and the coordinates' management in the web application.

You must select a spatial reference system with metric coordinates, appropriate for 3D visualization. We recommend to use ENU systems, or standard UTM/WGS 84 projections.

For coordinates' management, the Acute3D web application has its own, fairly limited, spatial reference system (SRS) database. The web viewer SRS database is limited to ENU systems and standard EPSG projections, and **does not handle vertical datum**. The Z value will be displayed as is in the web application, in the general case using the ellipsoid as reference.

If you want the web application to display **orthometric heights**, you should produce the 3MX with a spatial reference system with a suited vertical datum (eg. EGM96).

1.4. The production result

When using the default settings, a 3MX production is a web-ready production. In this case, the production result is split in 2 parts.

First, the scene in 3MX format is in the Scene folder, as you can see in Figure 3. The scene is organized in a tree-like structure, very similar to the native S3C scene. The root of the scene is the Scene/YourProductionName.3mx file. In Figure 3, the production is called WebGL, so the root 3MX file is Scene/WebGL.3mx. If you wish to know more about the 3MX organization, we refer you the 3MX specification documentation (*doc/3MX Specifications.pdf*).

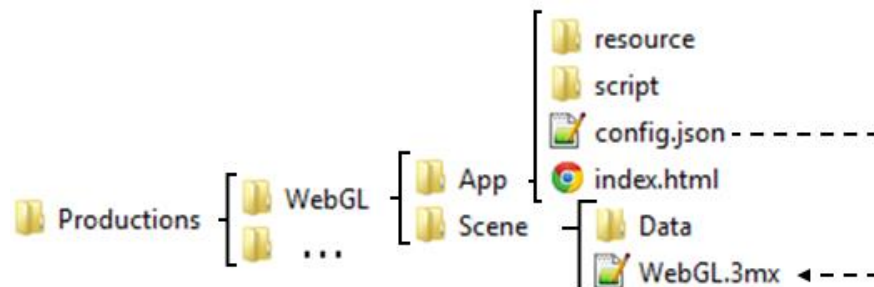


Figure 3: A webGL-ready production

A second folder is included in a default 3MX production: the App folder. This contains the Acute3D web application. Note that the App folder exists only if the option “Generate WebGL application” is checked at production time.

The files you need to care about in the App folder are:

- The `index.html` file. It is the root file for the application
- The `config.json` file. This file points to the `Scene/YourProductionName.3mx` file, so the Acute3D web viewer knows what scene to load.

WARNING

If you double click on `index.html` file, you will not see the application. Your preferred browser should open the file and display a warning message like the one shown in the image below. This is due to browser security settings.

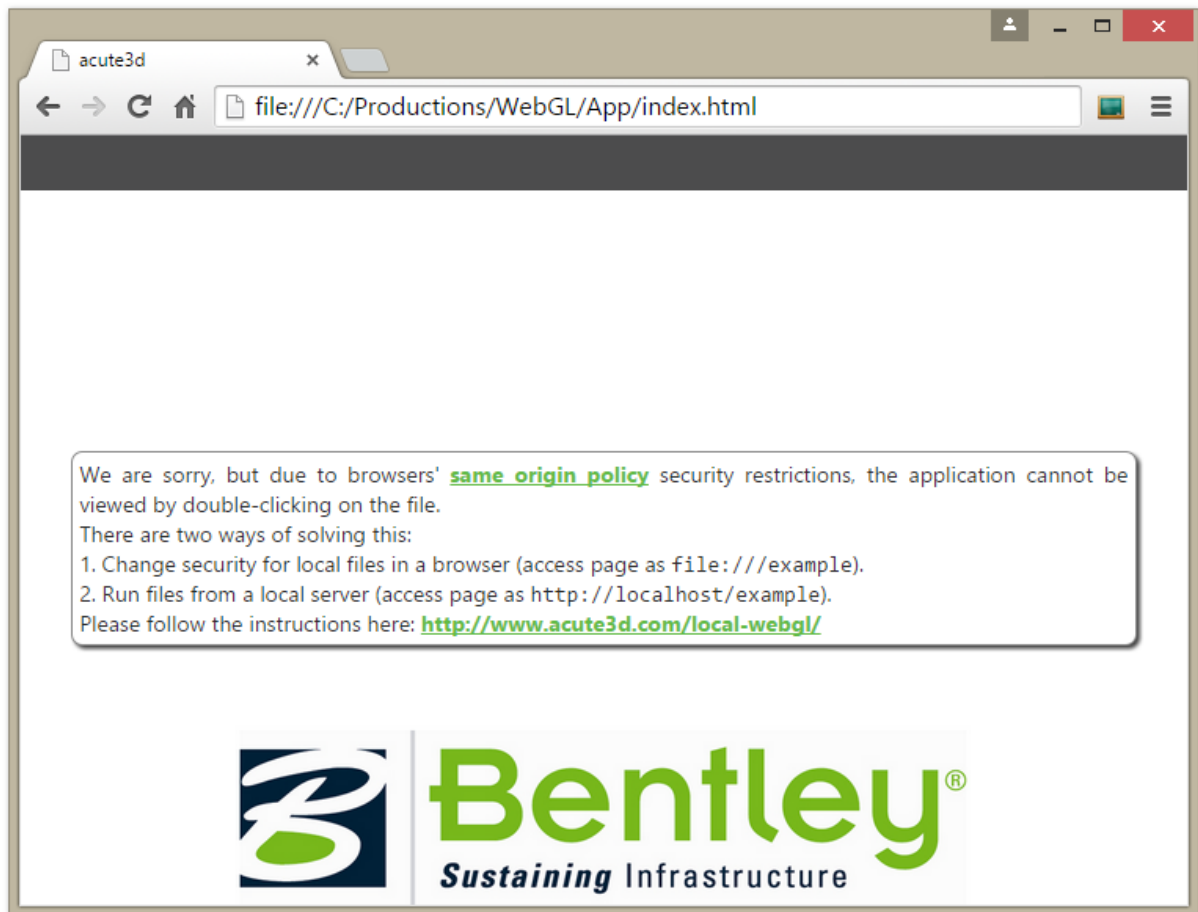


Figure 4: Double clicking on the web application (index.html) shows a warning in the browser, because of the same origin policy all browsers implement.

Displaying locally your WebGL production requires an amount of technical expertise. If you only wish to verify your 3MX production, you can open it with the Acute3D Desktop Viewer. You just need to choose 3MX as the type of file to open, and navigate to your `Scene/YourProductionName.3mx` file (see Figure 5 for a screenshot).

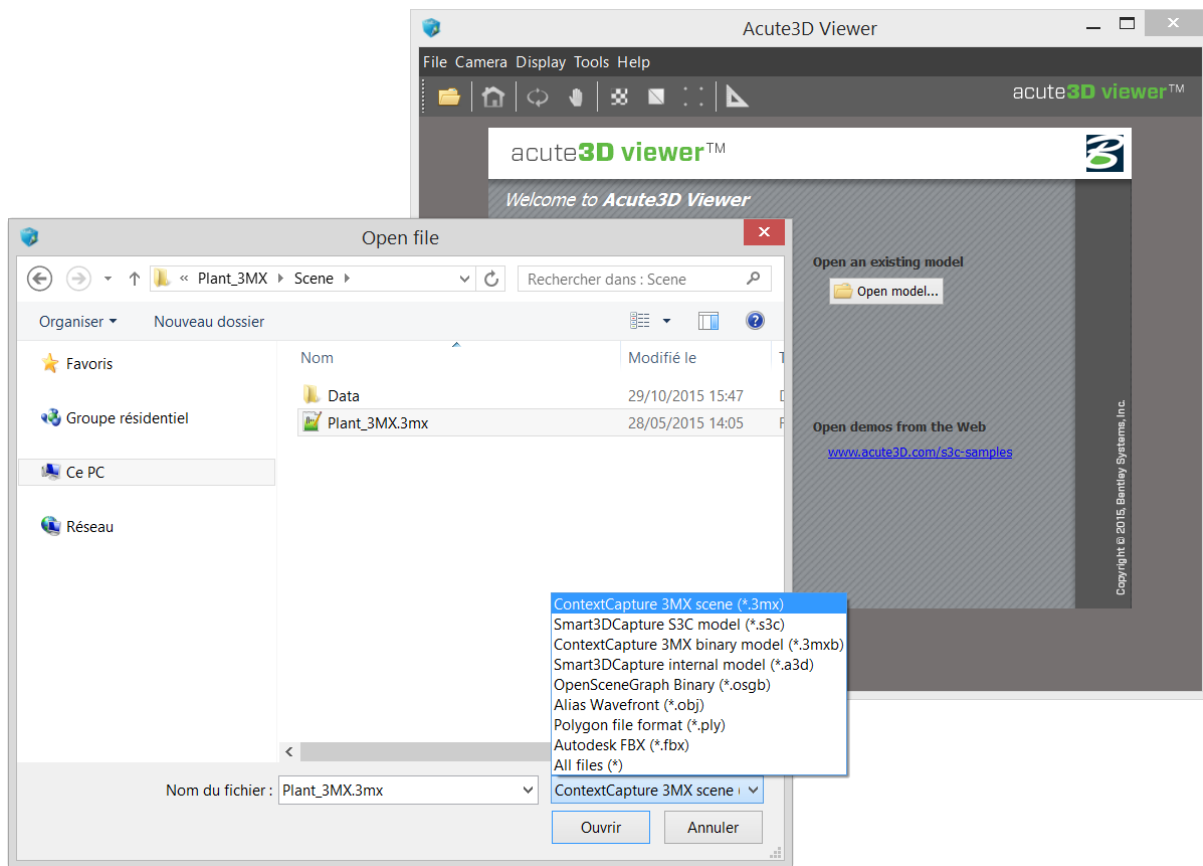


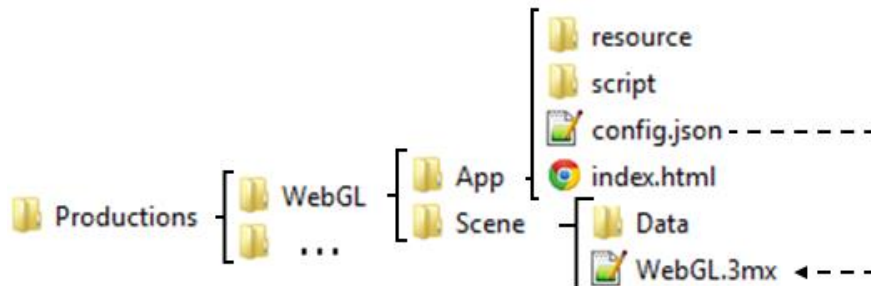
Figure 5: Opening a 3mx file in Acute3D Desktop Viewer

If you do however need to open the Acute3D Web Viewer locally, please see “Appendix A: View the Acute3D Web application locally” for step-by-step instructions.

2. How to configure the web application and scene

A default webGL production contains 2 different sets of data, each in a separate folder:

- The produced scene, in 3MX format, is in the Scene folder
- The webGL application, used to render the scene in a browser, is in the App folder.



2.1. Configuring the 3MX

There are 4 scene-specific pieces of data used by the web application, and that you should take care to define:

- Your logo, which will be displayed by the 3D viewer.
- A placeholder image that is shown by the web viewer whenever the 3D display is deactivated or there is an error. This image should represent the 3MX scene.
- The scene name and description, contained by the Scene/YourProduction.3mx and shown in the web viewer.
- The default navigation mode

All 4 pieces of data are contained in the Scene folder.

2.1.1. Add your logo

Your logo will be displayed by the Acute3D Web Viewer. To add it, you need to replace the image `logo.png` contained in the Scene folder with your own logo. You should **preserve the name** of the image, and use a small-sized logo, as the Acute3D Web application does not resize your logo.

2.1.2. Add the scene image

The scene image is shown by the web viewer whenever the 3D display is deactivated or there is an error. This image should represent the 3MX scene. To add it, you need to replace the image `placeholder.jpg` contained in the Scene folder with your own logo. Note that you should **preserve the name** of the image.

2.1.3. Add the scene description

The scene name and description are shown in the Acute3D Web viewer. The scene name and description can both be defined in the `Scene/YourProduction.3mx` file. You can open the file with a text editor, and replace the **name** and **description** tag.

For example, a production called “YourProduction” will have the default root `YourProduction.3mx` look like this:

```
{
  "3mxVersion": 1,
  "name": "YourProduction",
```



```

"description": "Scene generated by ContextCapture, copyright
<a href='http://www.bentley.com' target='_blank'>Bentley</a>",
"logo": "logo.png",
"sceneOptions": [{"navigationMode": "PAN"}],
"layers": [
  {
    "type": "meshPyramid",
    "id": "mesh0",
    "name": "YourProduction",
    "description": "Model generated by ContextCapture, copyright
    <a href='http://www.bentley.com' target='_blank'>Bentley</a>",
    "SRS": "- given SRS -",
    "SRSOrigin": [0,0,0],
    "root": "Data/YourProduction.3mxb"
  }
]
}

```

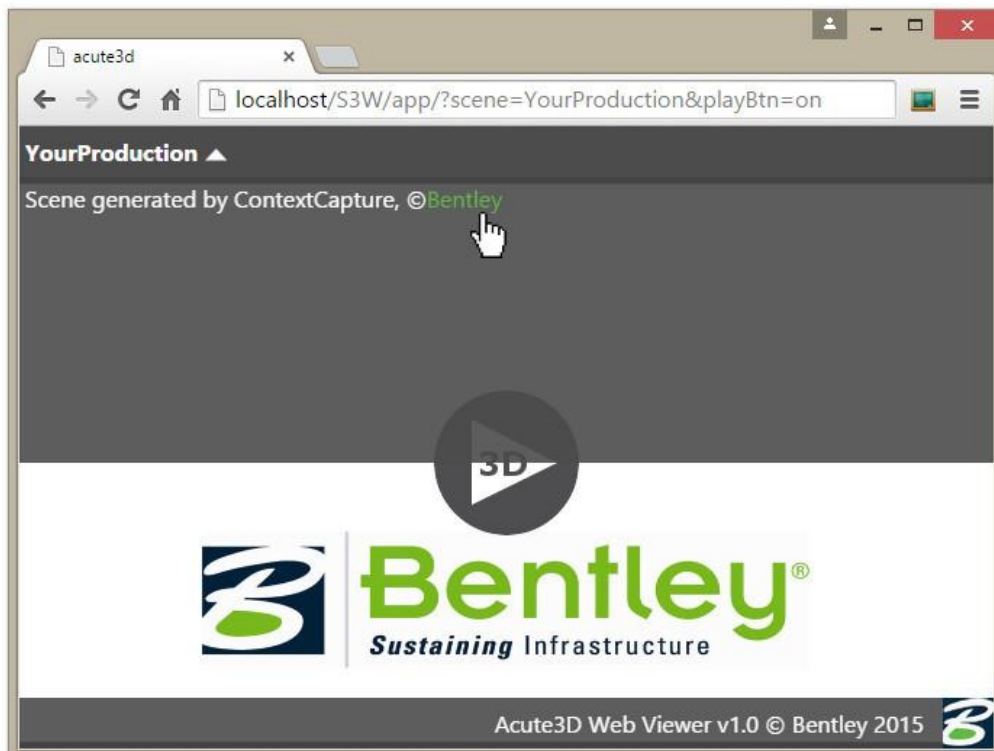
To customize the message shown in the web viewer, you have to modify the name and description tags, shown in bold characters. The web application supports **html tags** in the scene description. For example, this tag:

```

"description": "Scene generated by ContextCapture,
&copy;<a href='http://www.bentley.com' target='_blank'>Bentley</a>",

```

will be shown in the application like this:



Note that you should be **careful with quotation marks**. Because they signal the end of a tag, quotation marks should not be used inside a scene description. For example, this code will produce an error:

Error: `"description": "Scene generated by ContextCapture, copyright
Bentley"`

If you do wish to use quotation marks in your description, please use either ' or \":

OK: `"description": "Scene generated by ContextCapture, copyright
Bentley"`

2.1.4. Set the default navigation mode

The 4th setting you can define for a scene is the navigation mode. Just as the scene name and description, the navigation mode is defined in the root 3MX: the `Scene/YourProduction.3mx` file. You can open the file with a text editor.

To define the default navigation, you need to modify the tag **sceneOptions**. The line `"sceneOptions": [{"navigationMode": "PAN"}]` sets the default navigation to PAN. The other option you can use is "ORBIT".

2.2. Configuring the web viewer

The web viewer can be open in any browser – please see “How to deploy the production” for the necessary settings. The browser should show something similar to the image below:

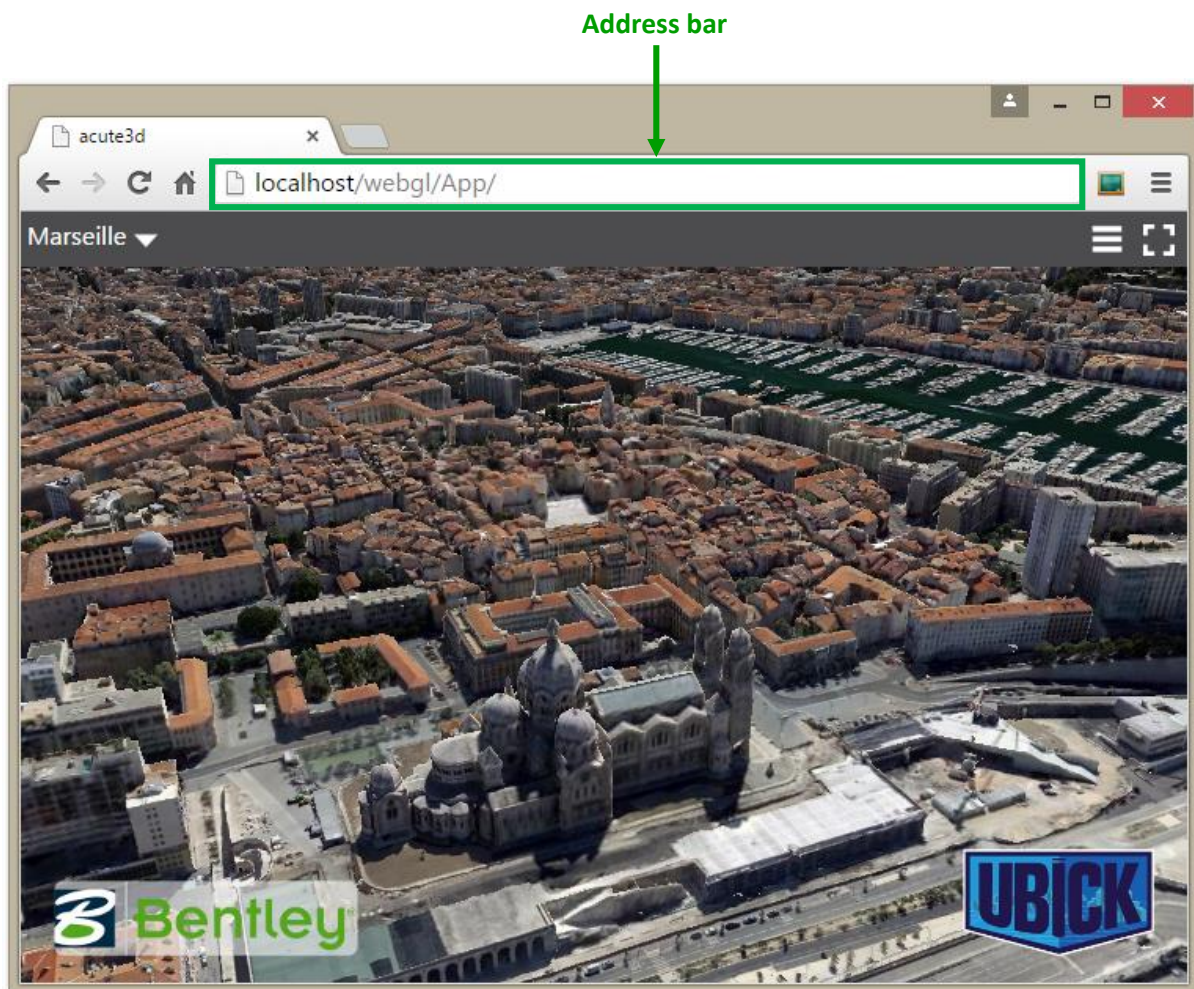


Figure 6: webGL viewer shown in a browser, by using a local server.

2.2.1. Address bar parameters

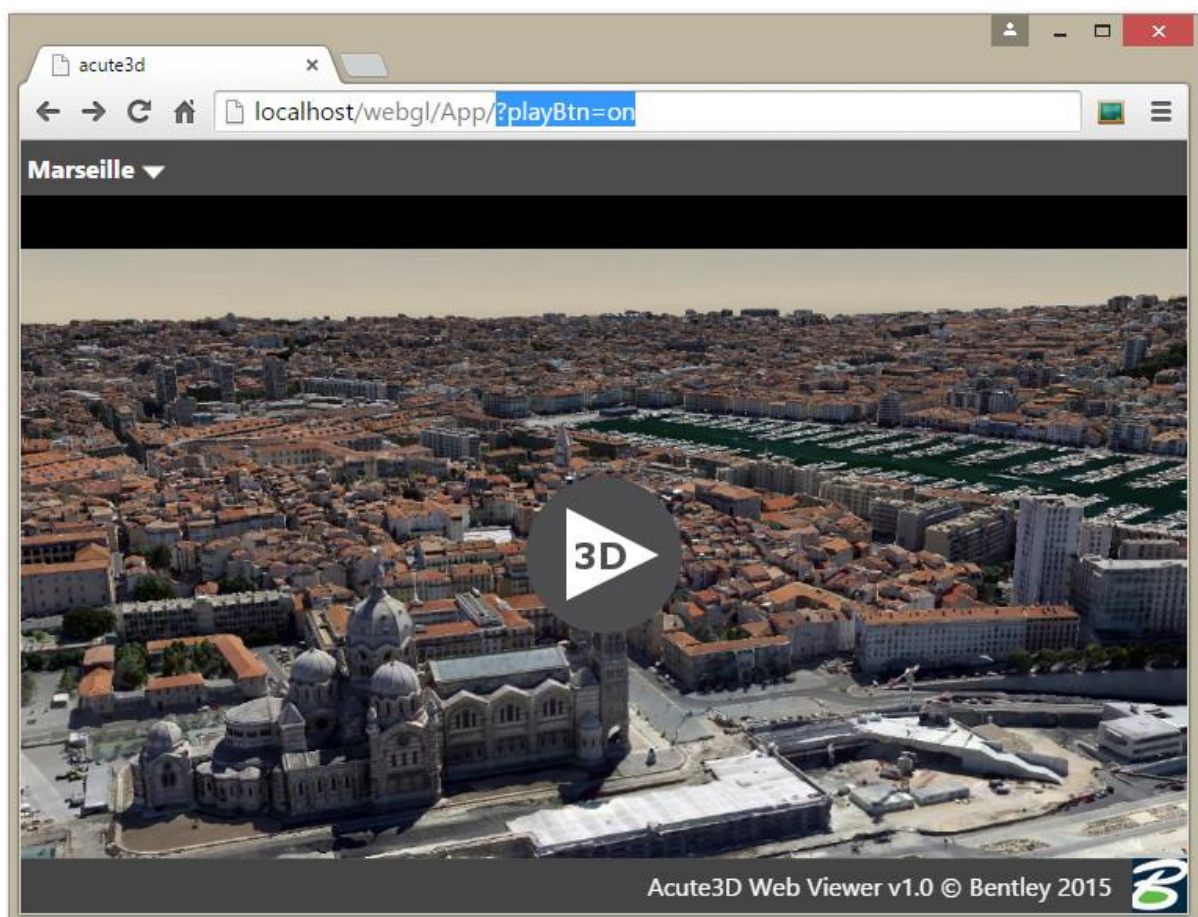
The first way of configuring the web viewer is **through address bar parameters**. The address bar is the place where we type the address for a chosen website, as indicated in the image above.

3 options can be passed to the web viewer by using the address:

- Add a play button to the screen. The application waits for the button to be pressed before showing the 3D scene.
- Set the 3D scene to be loaded
- Camera viewpoint

Add a play button to the screen

The play button screen option is turned on by adding **playBtn=on** to the browser address. The application waits for the button to be pressed before showing the 3D scene. An example of how to do this is shown below:



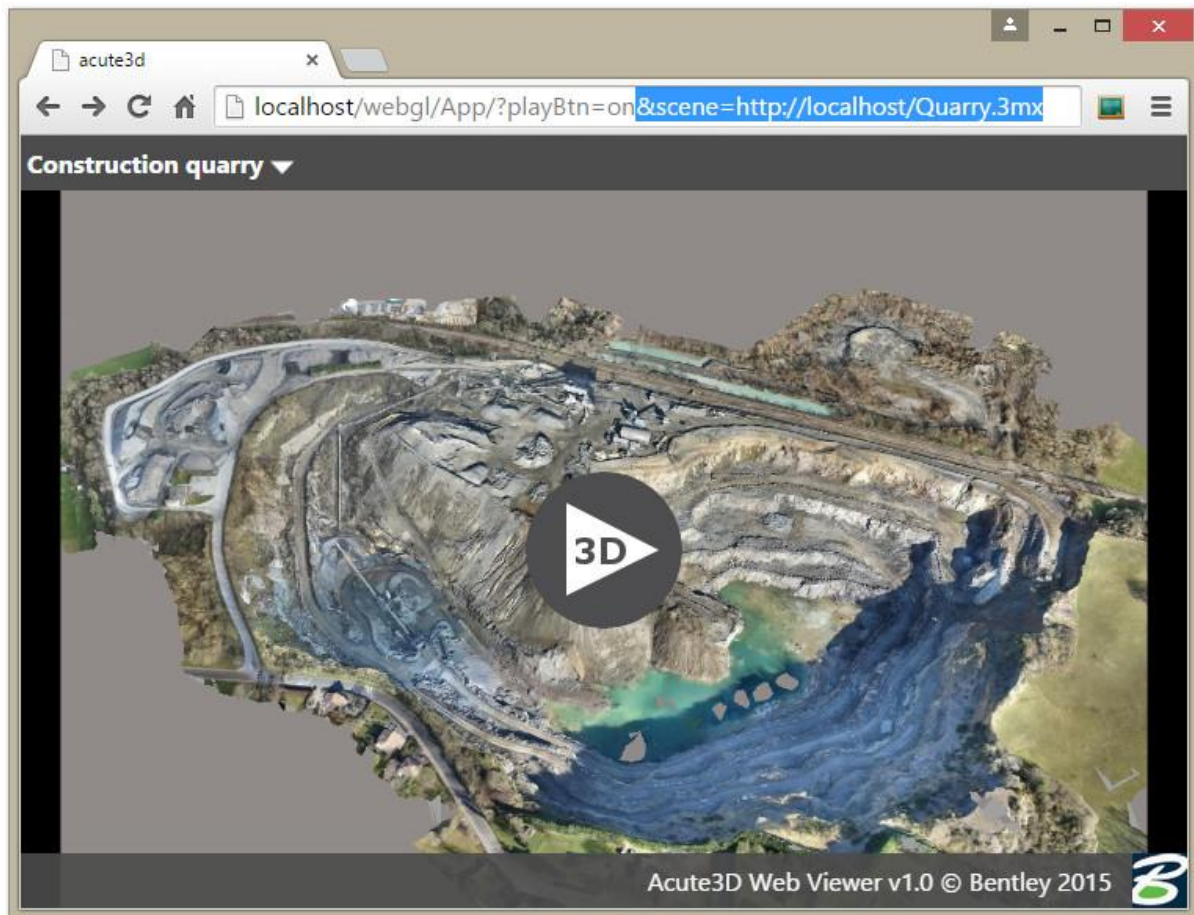
The background image shown under the play button is the scene placeholder image. You can define this image as described in “Configuring the 3MX

”.

Set the 3D scene to load

The second option you can define in the address bar is the **3D scene to load**. By default, the web viewer is attached to a WebGL production and stores as scene to load the production scene. But you can change the scene by giving the web viewer **the web address of a 3mx file**. In the example below,

the Quarry scene is loaded from the local server by setting the option `scene=http://localhost/Quarry.3mx`.



Please note that the address parameter string is preceded by the character `?` and the 2 options in the address are separated by the character `&`.

By exploiting the scene parameter, you can **use the same copy of the web application with all your productions**. We encourage you to do this for your deployment on the web.

To make easier the access to various scenes, the list of available scenes can all be defined in the web viewer folder, and accessed via aliases. This is done through to the 2nd method of parametrizing the web application — parameters given in the `config.json` file.

[Set the camera viewpoint](#)

If you want to share with your clients a particular view of your 3D model, special camera parameters in the address bar allow you to do this.

To obtain the current view's camera parameters, you can use the Acute3D Web Viewer's Link option. Please go to the web viewer's interface section "Link to the model" to see more.

[2.2.2. Configuration file parameters](#)

The `config.json` file is found in the App folder, where App is the web application. The file can be used to define the list of available scenes. A scene can then be accessed via an alias using the **address bar scene parameter**.

By default, the App folder is created during a webgl-ready production, and is stored next to the production's 3D data. In this case, `config.json` contains the relative address of the 3D data, and will look something similar to this:

```
{
  "URLs": [
    {
      "alias": "YourProduction",
      "scene": "../Scene/YourProduction.3mx"
    }
  ]
}
```

The configuration file is in JSON format. It indicates that there is a single 3MX scene the application can access, with the path to the root 3MX indicated by the “**scene**” tag. The **alias** is used to identify the scene by a name.

To create the list of available scenes, you need to modify the file `config.json`, by adding the web address and an alias for each scene. For example, the file below points to 2 scenes; the first scene is stored on the same server as the web application, while the 2nd one is stored on CloudFront:

```
{
  "URLs": [
    {
      "alias": "Quarry",
      "scene": "../DATA_3D/Quarry/Scene/Quarry.3mx"
    },
    {
      "alias": "Marseille ",
      "scene": "http://deh9aqlpmcj1j6.cloudfront.net/Marseille/Scene/Marseille.3mx"
    }
  ]
}
```

To switch between one scene or another in the web application, it is sufficient to give the alias as scene parameter in the address bar. For example,

- http://www.acute3d.com/s3c_resources/s3w-viewer/?scene=Quarry will show the Quarry scene above, and
- http://www.acute3d.com/s3c_resources/s3w-viewer/?scene=Marseille will show the Marseille scene stored on CloudFront.

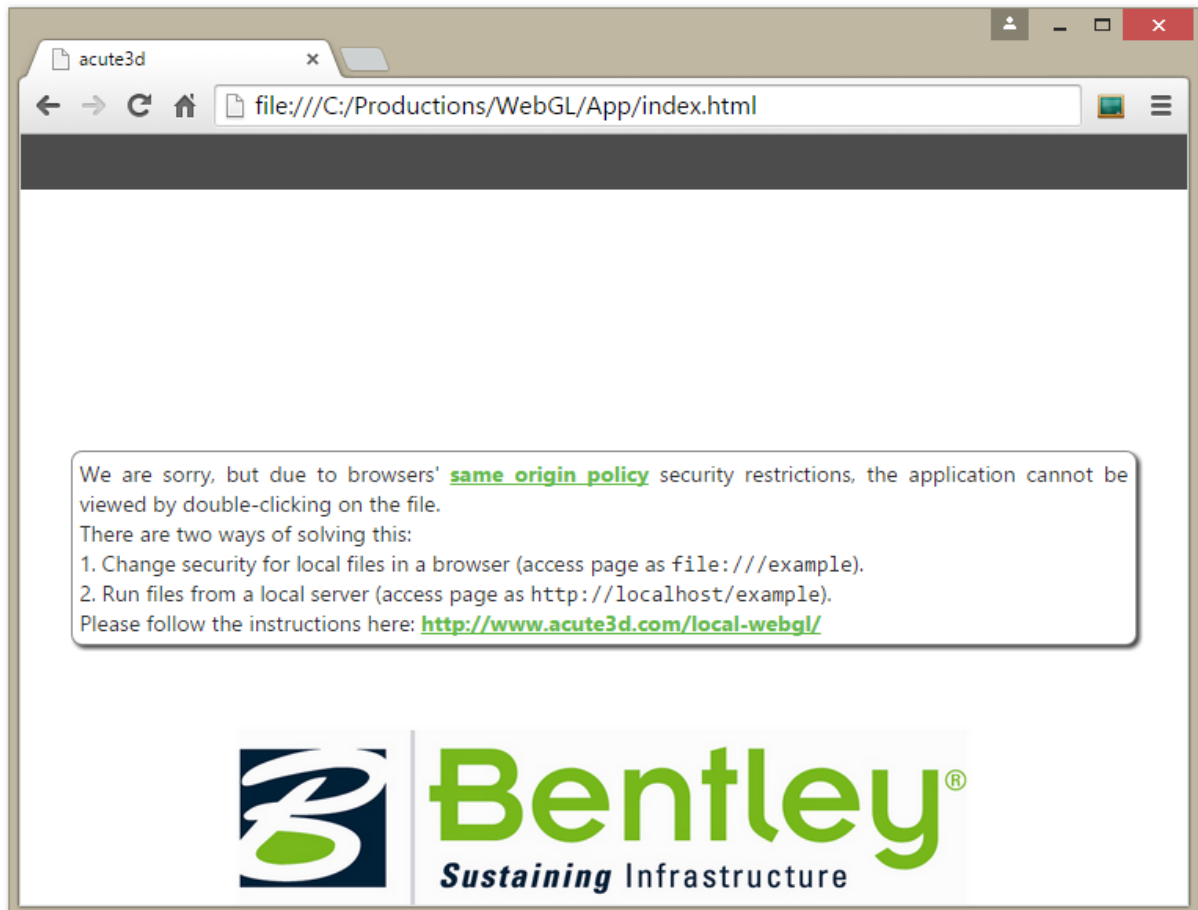
If you modify the `config.json`, you should make sure your modifications can be read by the web application by validating the JSON format of the file. You can do this by copy-pasting the entire content of the file in a JSON validator, such as: <http://jsonformatter.curiousconcept.com/>

3. How to deploy the production

Both local and remote 3MX productions can be seen in the Acute3D Desktop Viewer. This section describes how to set up the web viewer and how to visualize your 3D scenes in a browser.

3.1. How to view locally

Due to browsers' [same origin policy](#) security restrictions, loading from a file system will fail with a security exception, as in the screen capture below.



Bypassing this warning and viewing the Acute3D Web application locally requires an amount of technical expertise. We recommend you to use **Acute3D Desktop viewer** to visualize your scenes locally, and to use your **web server** for the Acute3D Web application.

However, if you do wish to view the Acute3D Web application directly from your local disk, you can refer to the "Appendix A: View the Acute3D Web application locally" instructions.

3.2. Deploy on the internet

There are 2 main options for you to deploy your productions on the internet:

- 1) Use your own server to host both the WebGL application and your productions.
- 2) Use a cloud hosting service for your productions, and only use your own server for the WebGL application.

3.2.1. Use your own server to host everything

In this case, the production folder can be used without change, if you took care to check the WebGL export options when producing your 3MX scene.

It should be sufficient then to:

- Copy the production folder on the server, at the appropriate location (next to your webpage index.html file, for example)
- Access the application by going to `your_site/your_production_folder_path/App`
- If the page cannot be accessed, it might be necessary for you to change the access rights for `your_production_folder`

The case described above is the simplest use-case, but it also results in the WebGL application being copied every time you create a new production.

Alternatively, you can use the same WebGL application for all your productions. It is sufficient to change its configuration options, as described in the “Configuring the web viewer” section.

In both cases, the setup should be very similar to your local server setup, if you chose to use one. It is sufficient to copy your data from the local to the remote server, in the same format.

Just remember that the `config.json` file in your application has to contain relative, and not absolute paths. In other words, scene paths like this: `“./Scene/Production.3mx”` will work for both the local and remote server. But scene paths like this: `“localhost/Scene/Production.3mx”` will only work for the localhost.

3.2.2. Use cloud services for hosting your production

For large scenes, you might wish to host the productions on dedicated cloud servers, such as Amazon S3. This is entirely possible, and your customers will still be able to access your demos using your site address.

To do this, you need to:

- Load only the production scene onto a cloud server, making sure **you enable cross-origin resource sharing** for the data.
- Copy the WebGL application on your own server, at the appropriate place.
- Change the `config.json` file of the application to access the scene hosted on the cloud.
- The demo will be accessible just as before, through `your_site/your_application_folder` address.

We describe below how to publish the 3MX scene using Amazon S3. If you have used other cloud services, please share with us the steps needed for publishing 3MX on the cloud server you use. We will complete our manual with your instructions (and give you the credit, of course!).

On Amazon S3 (cloud front)

- Create a dedicated bucket for WebGL, because the bucket needs to have special read/access rights. Make sure that the bucket name is in **lowercase** if you want to deploy it to the CloudFront.
- Go to bucket->Properties->Permissions->Edit bucket policy
 - Give read rights
- Go to bucket->Properties->Permissions->Edit CORS Configuration
 - Set the CORS Data as follows:


```
<?xml version="1.0" encoding="UTF-8"?>
<CORSConfiguration xmlns="http://s3.amazonaws.com/doc/2006-03-01/">
  <CORSRule>
    <AllowedOrigin>*</AllowedOrigin>
    <AllowedMethod>GET</AllowedMethod>
    <MaxAgeSeconds>2592000</MaxAgeSeconds>
    <ExposeHeader>Content-Length</ExposeHeader>
    <AllowedHeader>Date</AllowedHeader>
    <AllowedHeader>Authorization</AllowedHeader>
    <AllowedHeader>Content-Type</AllowedHeader>
    <AllowedHeader>Content-Length</AllowedHeader>
  </CORSRule>
</CORSConfiguration>
```

- Deploy to CloudFront:

- o Add **Forward Headers** option:

WhiteList: Origin, Access-Control-Request-Headers, and Access-Control-Request-Method.

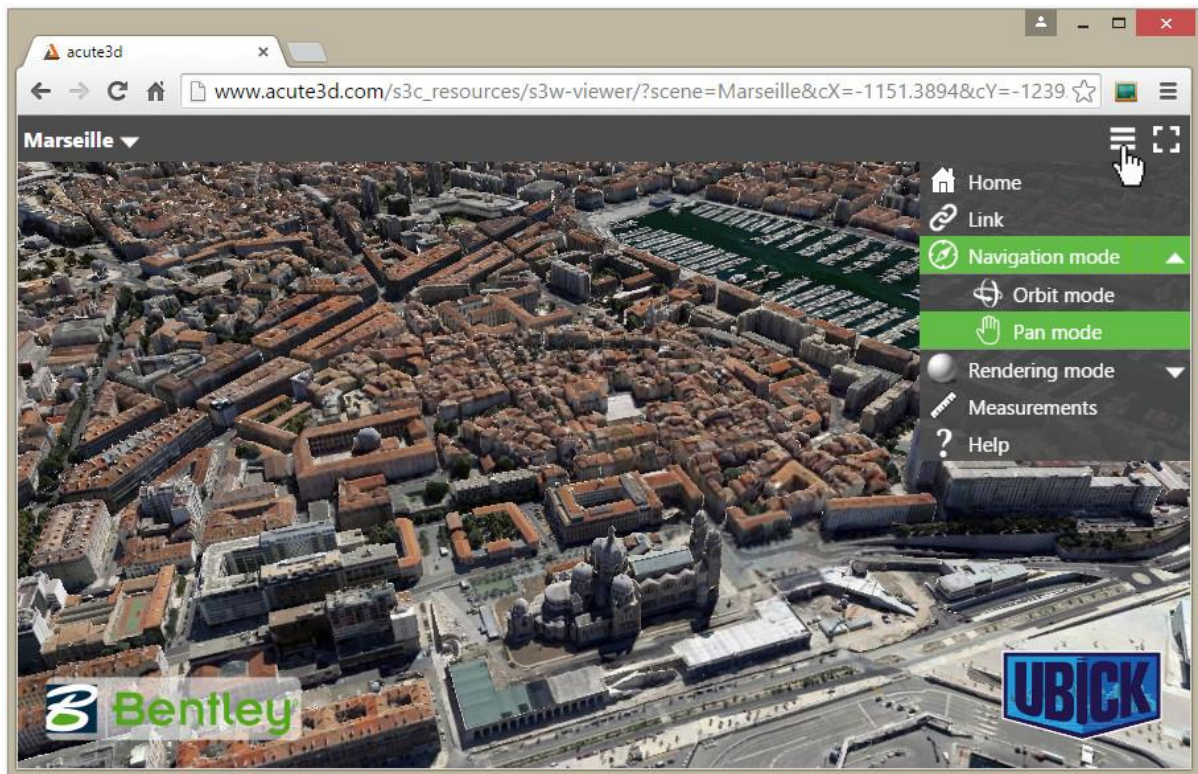
4. The Acute3D Web Viewer interface

The Acute3D Web Viewer is the visualization software that allows users to view and navigate ContextCapture models directly on the web. 3D models are loaded and displayed using level-of-detail (LOD), paging and streaming, and users can measure distances and pick GPS coordinates.





Most of the viewer's options can be accessed by clicking on the Main menu ☰






4.1. Navigation

There are 2 types of 3D navigation in our web viewer: **orbit** and **pan**. You can switch between the 2 modes by going to Menu → Navigation mode (see screen capture below).












Orbit mode navigation

Mouse action	Event
 <i>Left click + drag</i>	Rotate
 <i>Right click + drag</i> Also works with CTRL + Left click + drag, or Mouse wheel scroll	Zoom
 <i>Middle click + drag</i> Also works with SHIFT + Left click + drag	Pan
 <i>Double click</i>	Bring the clicked point to the center of the screen

Touch action	Event
 <i>One finger drag</i>	Rotate and tilt
 <i>Two finger pinch</i>	Zoom
 <i>Two finger drag, same direction</i>	Pan
 <i>Two finger rotate</i>	Rotate left and right
 <i>Double tap</i>	Bring the tapped point to the center of the screen

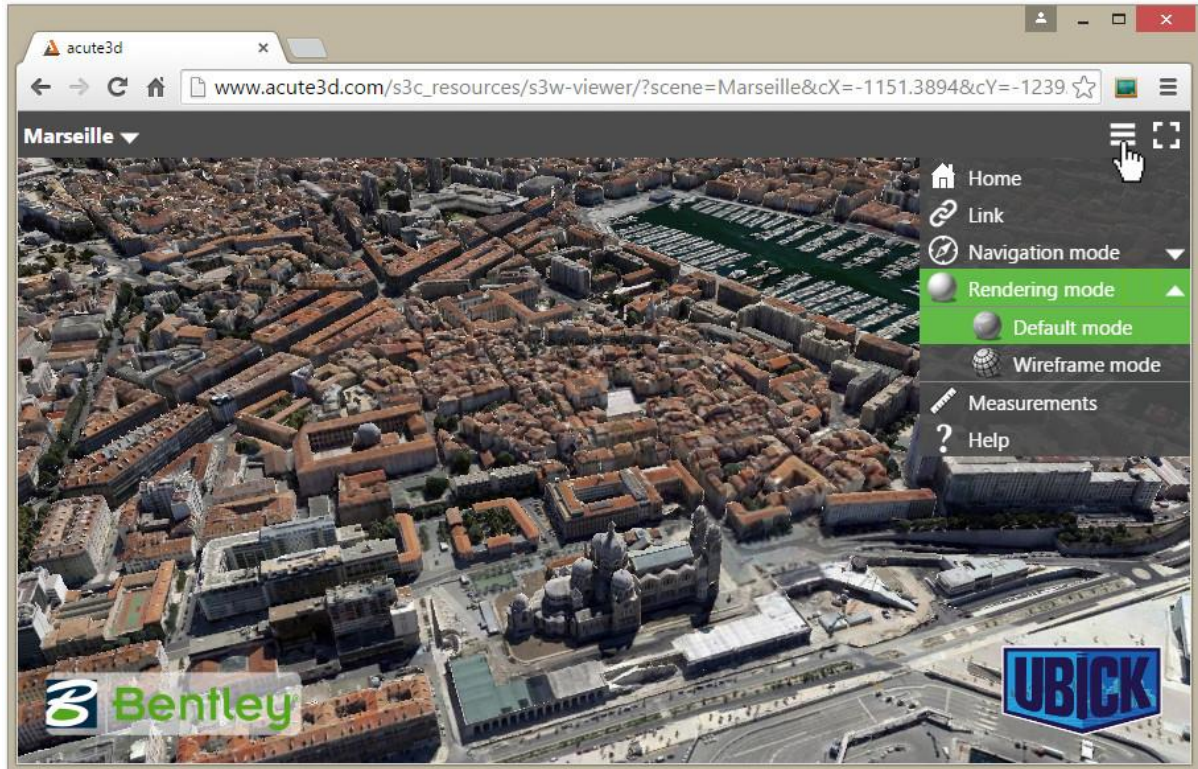
Pan mode navigation

Mouse action	Event
 Left click + drag	Pan
 Right click + drag Also works with CTRL + Left click + drag, or Mouse wheel scroll	Zoom
 Middle click + drag Also works with SHIFT + Left click + drag	Rotate
 Double click	Bring the clicked point to the center of the screen

Touch action	Event
 <i>One finger drag</i>	Pan
 <i>Two finger pinch</i>	Zoom
 <i>Two finger drag, same direction</i>	Rotate and tilt
 <i>Two finger rotate</i>	Rotate left and right
 <i>Double tap</i>	Bring the tapped point to the center of the screen

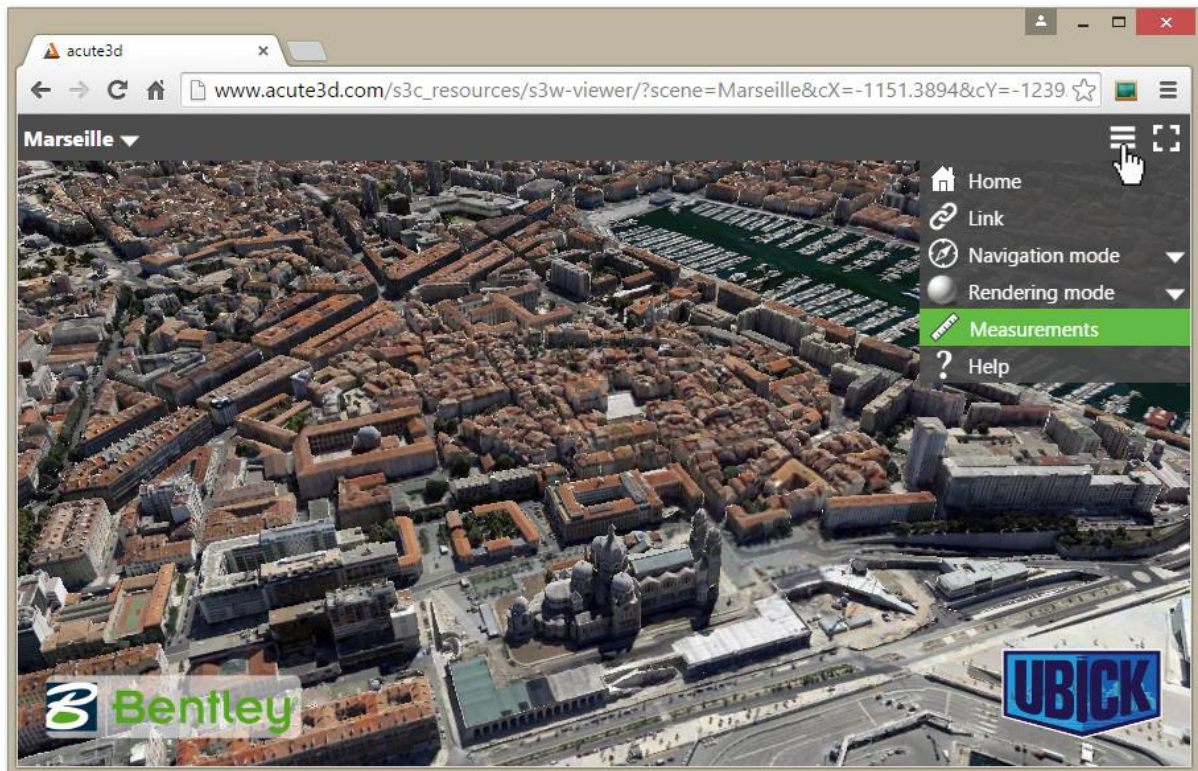
4.2. Rendering

Rendering options can be accessed by going to Menu → Rendering mode (see screen capture below). The **wireframe** mode can be turned on and off using these options.

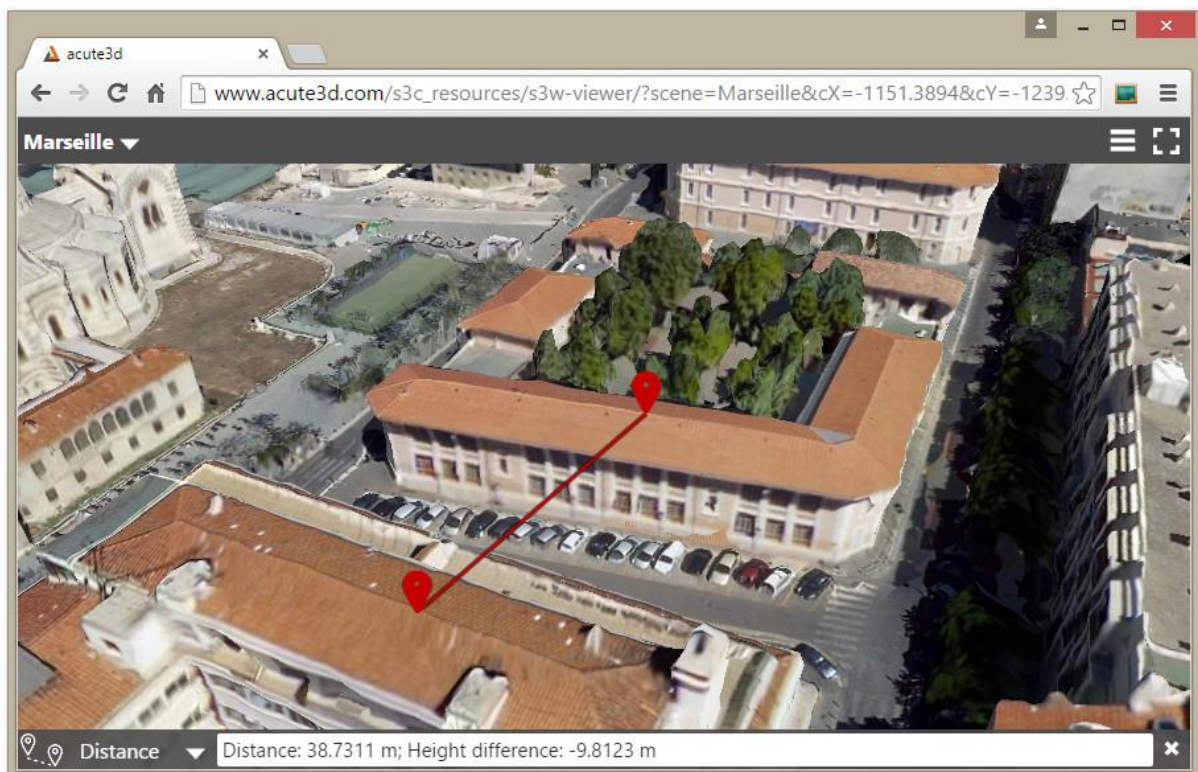


4.3. Measurements and GIS positioning

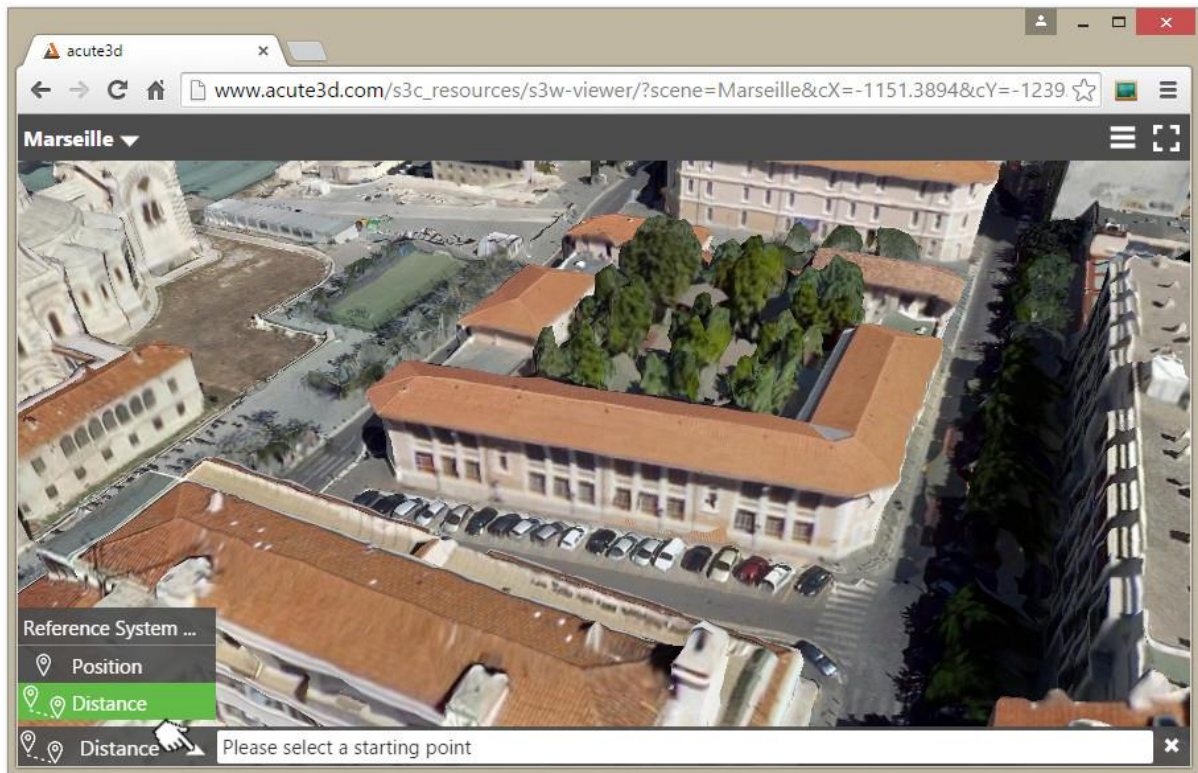
To measure distances and determine point positions, open the Measurements window by using the Menu → Measurements option.



If the model is georeferenced, then GPS coordinates are shown in the selected spatial reference system, as well as altitude, and distances are indicated in meters; otherwise distances and positions will be relative to the spatial reference system of the 3D model.



You can change the spatial reference system by clicking on the Measurements window options, and by choosing “**Reference System ...**” (see screenshot below).

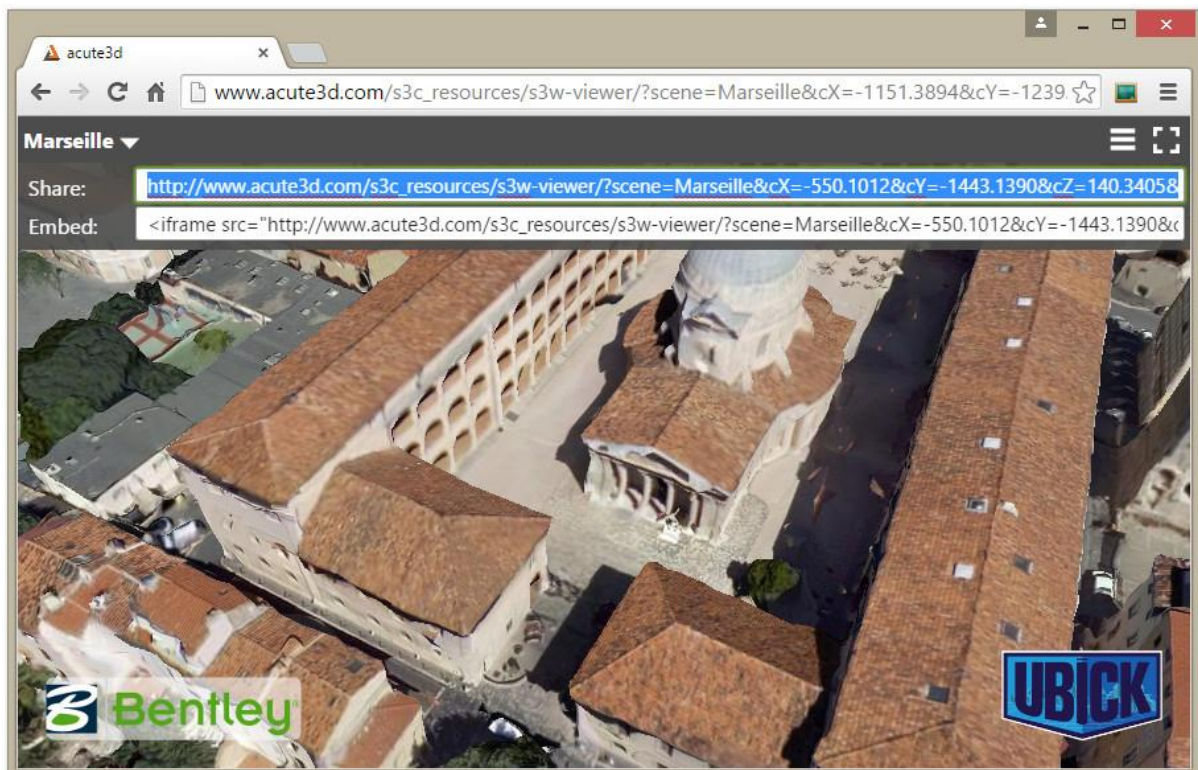
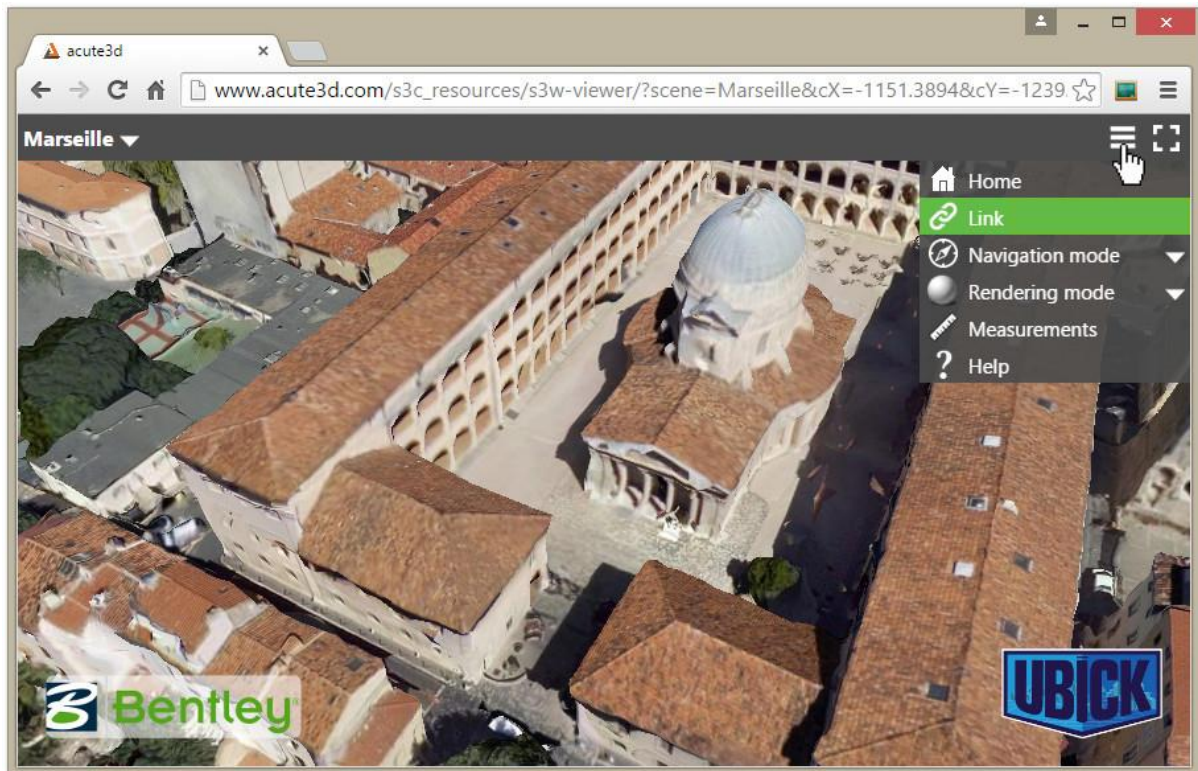


4.4. Link to the model

If you want to share with your clients a particular view of your 3D model, you can do this in the Acute3D Web Viewer by going to Menu → Link. This will open up a window with 2 links: one for **sharing**, and one for **embedding**.

The share link contains the current viewpoint for your scene, so you can send the 3D model in your chosen position to your clients and partners.

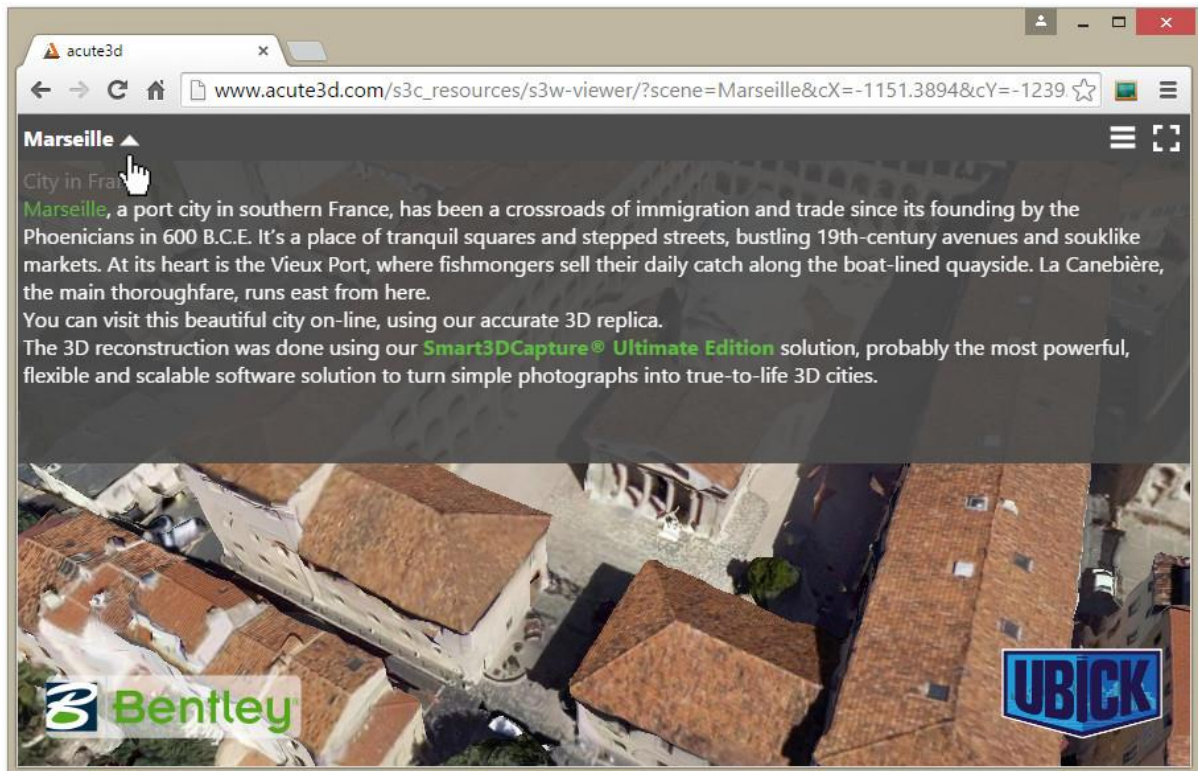
If you wish to include the 3D model inside your webpage, you only need to copy the embed code and paste it into the source code of your website or blog.



4.5. More information

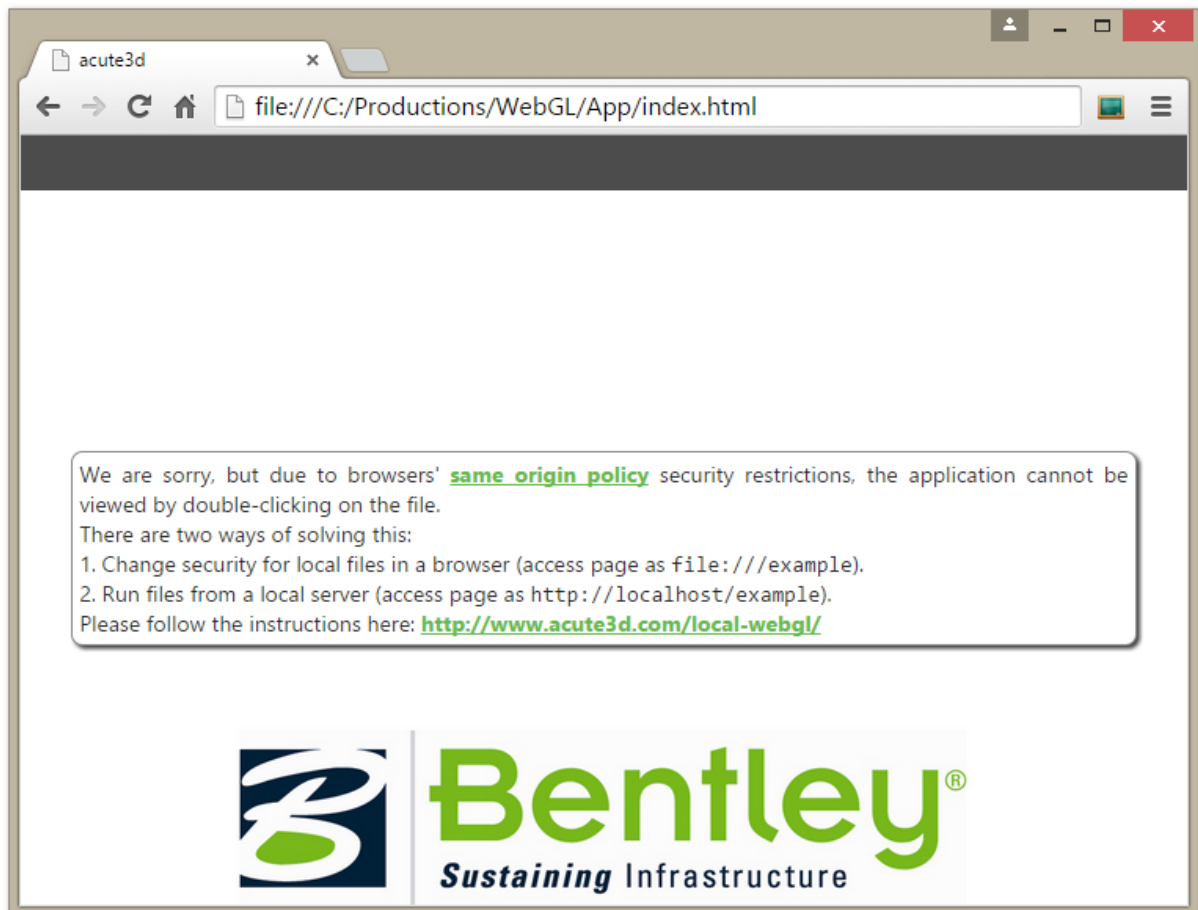
You can find extra information about the navigation in the **Help** window, accessed via Menu → Help.

The information about the 3D scene is found by clicking on the model title, in the upper left corner.



Appendix A: View the Acute3D Web application locally

Due to browsers' [same origin policy](#) security restrictions, loading from a file system will fail with a security exception, as in the screen capture below.



There are two ways of solving this:

1. Change security for local files in a browser (access page as `file:///example`)
2. Run files from a local server (access page as `http://localhost/example`)

If you use option 1, be aware that you may open yourself to some **vulnerabilities** if using the same browser for a regular web surfing. You may want to create a separate browser profile / shortcut used just for local development to be safe. Because of these security issues, we strongly recommend you to use option 2.

If you plan on regularly producing scenes for web viewing, using option 2 will not only be the secure way of visualizing the data, but it will also be less time consuming. The local server setup only needs to be done once, and then it will be ready for use every time you wish to view a new production.

1. Change local files security policy

Firefox

- Go to `about:config` (type the address in the Firefox navigation bar)
- Find `security.fileuri.strict_origin_policy` parameter
- Set it to false

Chrome

- Close all running Chrome instances first. The important word here is ‘all’. On Windows, you may check for Chrome instances using the Windows Task Manager. Alternatively, if you see a Chrome icon in the system tray, then you may open its context menu and click ‘Exit’. This should close all Chrome instances.
- Start a command prompt / terminal. On Windows, type Command Prompt in the **Search box**, and then, in the list of results, double-click Command Prompt.
- Find the Chrome executable folder. On Windows, search for the file chrome.exe in a Navigator windows.
- In the command prompt terminal, start the Chrome executable with a command line flag:
`path_to_chrome/chrome --allow-file-access-from-files`

Internet Explorer

Theoretically, Internet Explorer allows changes in the local files security policy. However, in our tests the options had no effect under Windows 8.0.

Safari

- Enable the develop menu using the preferences panel, under Advanced → “Show develop menu in menu bar”.
- Then from the Safari “Develop” menu, select “Disable local file restrictions”.
- If you are editing & debugging using Safari, it is advisable to also select the “Disable caches” option in the same menu.

2. Run local server

There are several options to choose from when installing a local server, for example [Apache](#), [Wamp](#), or [nginx](#). We are only going to suggest one, which has the advantage of being a zero-configuration server: [http-server](#).

Installation

- Install `Node.js` by using one of the installers from <https://nodejs.org/>.
- Start a command prompt / terminal. On Windows, type Command Prompt in the **Search box**, and then, in the list of results, double-click Command Prompt.
- Make sure the last version of `npm` is installed by running this command in the terminal: `sudo npm install npm -g`. In Windows, you can drop the `sudo` keyword, but you should run the command prompt as administrator.
- Run in command prompt / terminal: `npm install http-server -g`
- Create a folder where you wish to store all your server data, including the 3MX data.

Use

- Place your 3MX data and your web viewer copy inside your server folder (the folder you created in the Installation phase)
- Start a command prompt / terminal. On Windows, type Command Prompt in the **Search box**, and then, in the list of results, double-click Command Prompt
- In the terminal, go to your server folder
- Type `http-server`
- You can now access the server in any browser by typing <http://localhost:8080>. Navigate to the web viewer folder to visualize your productions. You can check the “Configuring the web viewer” section to see how to use the same web viewer for all your scenes.