

# SmartSpaceAnalyser Walkthrough Examples

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## SmartSpaceAnalyser Examples

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SmartSpaceAnalyser is a highly intuitive tool to perform spatial analysis on a building or urban scale. It allows you to perform distance mapping, visibility analysis and connectivity analysis in seconds. As a Grasshopper plug-in for Rhino, SmartSpaceAnalyser provides real-time interaction in the modelling environment to quickly test a range of scenarios with instant visual feedback.

The component offers functionality in the form of five different analysers.

**Distance To** - How far away is everything from one or more locations?

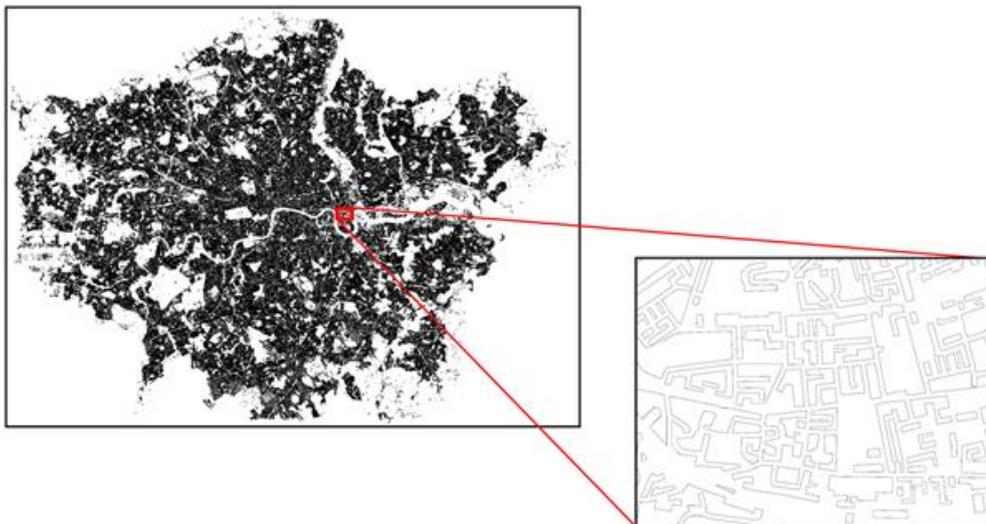
**Average Distance** - What is the average distance to all locations from all locations?

**Visibility** - What can I see from my current location?

**Field of View** - What is directly visible from my current location? What is in my peripheral vision?

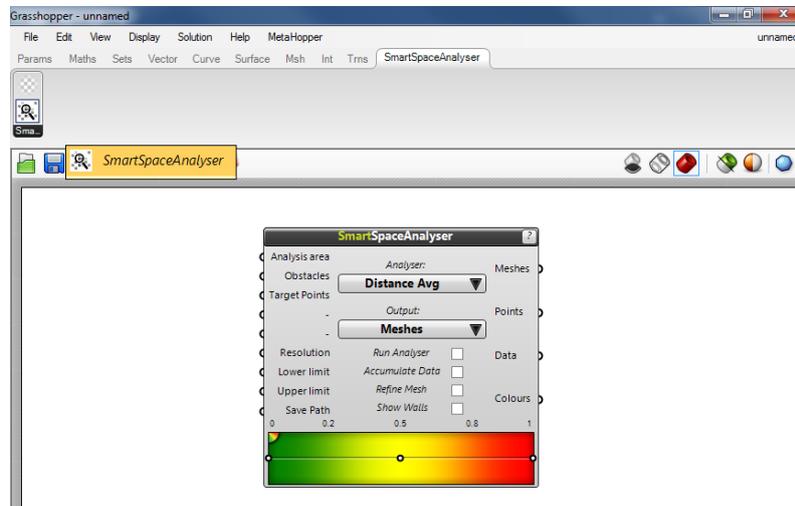
**Walkability** – How traversable is a space? How far am I from the nearest obstacle?

This guide provides simple step-by-step instructions to use each of these different analysers. Each example uses a small section of a Rhino model of the London area to demonstrate how to use the analysers. For more details on advanced features, please refer to the SmartSpaceAnalyser Help Documentation.



## Getting Started

Open Rhino and Grasshopper. If your installation of SmartSpaceAnalyser has been successful (see help documentation), you will see a tab of that name at the top of the page. Select the SmartSpaceAnalyser component from this tab and place it on the Grasshopper canvas.



For all analyser types, the first two steps in using the tool are to define your analysis area and your obstacles.

### Define your Analysis area

1. Draw a bounding box (curve) around the area to be analysed in the Rhino window. This can be any closed planar curve. Alternatively, you can use an existing closed curve in your model and move to Step 2.
2. On your Grasshopper canvas, add a Geometry component by double clicking the canvas and typing 'geometry'. Connect the geometry output to the **Analysis area** input of the SmartSpaceAnalyser component.
3. Right click the geometry component and click 'set one geometry'.
4. Select your bounding curve in the Rhino window, drawn in Step 1. This curve is now set as your **Analysis area**. To change it simply repeat Steps 3 and 4 selecting an alternative geometry.

### Define your Obstacles

5. Draw your set of obstacles in the Rhino window. This can be any number of closed or open planar curves. Alternatively, you can use an existing set of geometry in your model and move to Step 6.
6. On your Grasshopper canvas, add another Geometry component as in Step 2. Connect the geometry output to the **Obstacles** input of the SmartSpaceAnalyser component.
7. Right click the geometry component and click 'set multiple geometries', or 'set single geometry' if you only have one obstacle.
8. Select your obstacle curves in the Rhino window, drawn in Step 5, and press enter. These curves are now set as your obstacles. To change them simply repeat Steps 7 and 8 selecting an alternative set of geometry. It is also possible to add extra obstacles by plugging in a second or third geometry component and attaching additional geometries to them.

**Top Tip:** Your **Analysis area** must also be one of your **Obstacles**.

Subsequent steps vary with the type of analyser selected, detailed over the following pages.

## Distance To

The **Distance to** analyser produces a colour map showing how far all accessible points are from a chosen target point. If multiple target points are chosen the colour map will display the shortest distance to any one of the target points.

In the example below, a single target point is defined (blue circle). Green indicates a short distance from the target, red indicates a long distance from the target and grey indicates areas that are inaccessible. Note that the distance is not simply shortest straight-line distance but accounts for avoiding obstacles (buildings in this case).



### How do I use it?

Before starting, make sure you have **Distance To** selected in the Analyser drop down menu.

#### Define your Target point

9. Draw a point in the Rhino window. In the image above, this is the red cross and is the point from which your distance analysis will be measured.
10. On your Grasshopper canvas, add a Point component by double clicking the canvas and typing 'point'. Connect the point output to the **Target point** input of the SmartSpaceAnalyser component.
11. Right click the point component and click 'set one point'.
12. Select your point in the Rhino window, drawn in Step 9. This point is now set as your **Target point**. To change the target at any time simply repeat steps 11 and 12 selecting an alternative point. It is also possible to include multiple target points by choosing 'select multiple points' in Step 11. In this case, the distance analysis will display the shortest distance to any target point.
13. You are now ready to click 'Run analyser' and observe your analysis output in Rhino. Remember, the output visualised in Rhino will depend on the output type you have selected in the **Output** drop down menu.

All other features of the **Distance to** analyser are optional. Please refer to the section '[The Component](#)' in the SmartSpaceAnalyser Help Documentation for more details.

**Top tip:** Analysis areas, obstacles and target points can be dragged to new locations in the Rhino window but be aware that moving any of these objects will cause the analysis to rerun if the 'Run Analyser' check box is ticked.

## Average Distance

The **Average Distance** analyser produces a colour map showing the average distance from each location to all other locations.

Green indicates areas from which all other areas of the map can be accessed in the smallest average distance, red indicates areas from which all other areas of the map are accessed in the longest average distance. Note that the distance is not simply shortest straight-line distance but accounts for avoiding obstacles (buildings in this case). In the example below, a single target point (blue circle) is only used to choose which areas are accessible, i.e. its location in the street indicates that the areas inside buildings should not be considered.



How do I use it?

Before starting, make sure you have **Average Distance** selected in the Analyser drop down menu.

### Define your Target point

**9.** Draw a point in the Rhino window. In the image above this is the blue circle. For **Average distance** analysis the purpose of the **Target point** is simply to define accessible areas, it does not represent the location from which distances are measured. For example, in the example image the **Target point** has been placed in an open street area so **Average distance** analysis is calculated in the accessible open areas only. Alternatively, the **Target point** could have been placed inside a building and the analysis would only be calculated for the accessible areas inside that building. Note that moving the **Target point** in the example image to any other open street area would have no effect on the output.

**10.** On your Grasshopper canvas, add a Point component by double clicking the canvas and typing 'point'. Connect the point output to the **Target point** input of the SmartSpaceAnalyser component.

**11.** Right click the Point component and click 'set one point'.

**12.** Select your point in the Rhino window, drawn in Step 9. This point is now set as your **Target point**. To change the target at any time simply repeat Steps 11 and 12 selecting an alternative point.

**13.** You are now ready to click 'Run analyser' and observe your analysis output in Rhino. Remember, the output visualised in Rhino will depend on which output type you have selected in the **Output** drop down menu.

All other features of the **Average Distance** analyser are optional. Please refer to the section '[The Component](#)' in the SmartSpaceAnalyser Help Documentation for more details.

**Top tip:** Analysis areas, obstacles and target points can be dragged to new locations in the Rhino window but be aware that moving any of these objects will cause the analysis to rerun if the 'Run Analyser' check box is ticked.

## Visibility

The **Visibility** analyser produces a colour map showing which areas can be seen in a 360° view from a chosen location. The result is true/false, an area either can be seen or can't be seen. If multiple target points are chosen the colour map will display areas as visible if they can be seen from any one target point.

In the example below, a single target point is defined (blue circle). Green indicates areas that are visible from the target point, red indicates areas that are not visible and grey indicates inaccessible areas (in this case buildings).



How do I use it?

Before starting, make sure you have **Visibility** selected in the Analyser drop down menu.

### Define your Target point

**9.** Draw a point in the Rhino window. In the image above, this is the blue circle and is the point from which your visibility analysis will be measured.

**10.** On your Grasshopper canvas, add a Point component by double clicking the canvas and typing 'point'. Connect the point output to the **Target point** input of the SmartSpaceAnalyser component.

**11.** Right click the Point component and click 'set one point'.

**12.** Select your point in the Rhino window, drawn in Step 9. This point is now set as your **Target point**. To change the target at any time simply repeat Steps 11 and 12 selecting an alternative point. It is also possible to include multiple target points by choosing 'select multiple points' in Step 11. In this case, the visibility analysis will display the areas visible from any one **Target point**.

**13.** You are now ready to click 'Run analyser' and observe your analysis output in Rhino. Remember, the output visualised in Rhino will depend on which output type you have selected in the **Output** drop down menu.

All other features of the **Visibility** analyser are optional. Please refer to the section 'The Component' in the SmartSpaceAnalyser Help Documentation for more details.

**Top tip:** Analysis areas, obstacles and target points can be dragged to new locations in the Rhino window but be aware that moving any of these objects will cause the analysis to rerun if the 'Run Analyser' check box is ticked.

## Field of View

The **Field of View** analyser produces a colour map showing which areas are directly visible and which are in peripheral vision from a chosen target line facing in a chosen direction. If multiple target lines are chosen the colour map will display areas based on the target from which they are most directly visible.

In the example below, a single target line is defined (blue arrow). Green-yellow indicate areas that visible and in direct line of sight from the target line. Orange-red indicates areas that are visible only in the periphery and grey indicates areas that can't be seen from the target line.



How do I use it?

Before starting, make sure you have **Field of View** selected in the Analyser drop down menu.

### Define your Target line

**9.** Draw a single straight line in the Rhino window. In the image above, this is the blue arrow. The first drawn point of the line is the location from which the visibility analysis will be computed, the second point of the line defines the direction in which the observer is looking.

**10.** On your Grasshopper canvas, add a Geometry component by double clicking the canvas and typing 'geometry'. Connect the point output to the **Target line** input of the SmartSpaceAnalyser component.

**11.** Right click the Geometry component and click 'set one geometry'.

**12.** Select your line in the Rhino window, drawn in Step 9. This line is now set as your target line. To change the target at any time simply repeat Steps 11 and 12 selecting an alternative line. It is also possible to include multiple target lines by choosing 'select multiple geometries' in Step 11. In this case the visibility analysis will colour areas based on the target line from which they are most directly visible.

**13.** You are now ready to click 'Run analyser' and observe your analysis output in Rhino. Remember, the output visualised in Rhino will depend on which output type you have selected in the **Output** drop down menu.

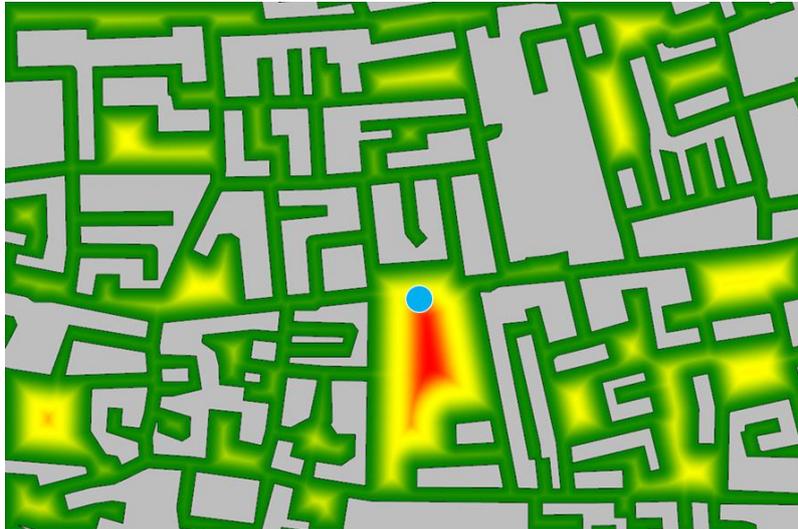
All other features of the **Field of view** analyser are optional. Please refer to the section '[The Component](#)' in the SmartSpaceAnalyser Help Documentation for more details.

**Top tip:** Analysis areas, obstacles and target points can be dragged to new locations in the Rhino window but be aware that moving any of these objects will cause the analysis to rerun if the 'Run Analyser' check box is ticked.

## Walkability

The **Walkability** analyser produces a colour map showing how far all accessible areas are from the nearest obstacle.

In the example below, a single target point is used to define the accessible region for analysis (blue circle). Green-yellow indicate areas that are closest to an obstacle. Orange-red indicates areas that are furthest from an obstacle. As with all other analysers, this default colour scale can be edited within the component.



How do I use it?

Before starting, make sure you have **Walkability** selected in the Analyser drop down menu.

### Define your Target point

9. Draw a single point in the Rhino window. In the image above, this is the blue circle.
10. On your Grasshopper canvas, add a Point component by double clicking the canvas and typing 'geometry'. Connect the Point output to the **Target point** input of the SmartSpaceAnalyser component.
11. Right click the Point component and click 'set one point'.
12. Select your point in the Rhino window, drawn in Step 9. This point is now set as your target point. To change the target at any time simply repeat Steps 11 and 12 selecting an alternative point.
13. You are now ready to click 'Run analyser' and observe your analysis output in Rhino. Remember, the output visualised in Rhino will depend on which output type you have selected in the **Output** drop down menu.

All other features of the **Walkability** analyser are optional. Please refer to the section '[The Component](#)' in the SmartSpaceAnalyser help documentation for more details.

**Top tip:** Analysis areas, obstacles and target points can be dragged to new locations in the Rhino window but be aware that moving any of these objects will cause the analysis to rerun if the 'Run Analyser' check box is ticked.

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