



# Bintelan Module - HeatMap

User Manual  
Version 5.0

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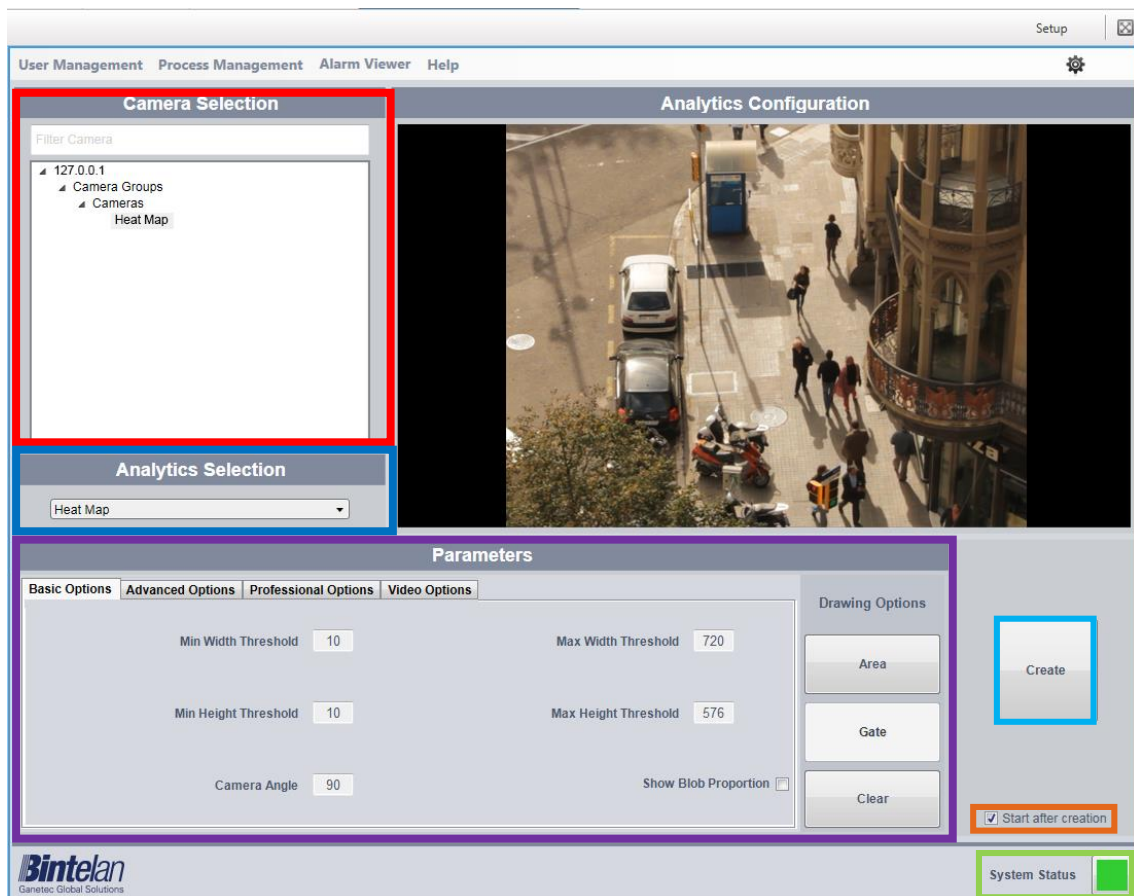


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# 1 Configuring HeatMap Analytics

## 1.1 Creating the process

The HeatMap video analytic is used for obtain a visual representation of the density movement of objects or persons in a specified area. In order to configure this type of video analytic, we must first **select the camera**, then **select the type** from a dropdown list. This selection will load its corresponding **configuration panel**. This panel contains three tabs: basic options, advanced options and professional options.



Once all the parameters are correctly configured, including the Basic, Advanced and Video options, we must create a new process. As depicted in the above image, below the **Create** button is a checkbox labeled as **Start after creation**. This checkbox ensures, if selected, that the process will be initiated after its creation. If you prefer to manually start the process simply uncheck this option.

We can also check if the **global system state** is correct. Click on the colored square at the right of the message system status for additional details. There are three possible states of the system, represented by colors:


- **Ok:** all Bintelan Analytics Platform modules and services are working properly.
- **Warning:** one or more modules or services in the Bintelan Analytics Platform is showing a warning. Warnings do not affect the correct performance of the system, but should be verified and resolved to avoid future errors.
- **Error:** one or more of the modules or services in the Bintelan Analytics Platform is having problems. By clicking the icon you can check the source of the problem.



## 1.2 Manage Analytics

Additionally, you can view and manage the processes created. Select the "**Manage Analytics**" from the "**Process Management**". You will obtain a detailed view of all the processes created and their current status. A process can have up to seven different states:

- **Launching**: the process has just been created.
- **Scheduling**: the process is queued and will start soon.
- **Initializing**: the process is starting and configuring.
- **Processing**: the process is running correctly. The process output should now appear.
- **Stopping**: the process is stopping.
- **Hold**: there something missing and the process cannot be started. Usually this happens when you need a hardware license to be placed in the Licenses folder under Bintelan installation path.
- **Failed**: the process could not execute properly. Check the logs or contact support.
- **Empty state**: if this field is empty the process is ready to be started. Currently the process is stopped.

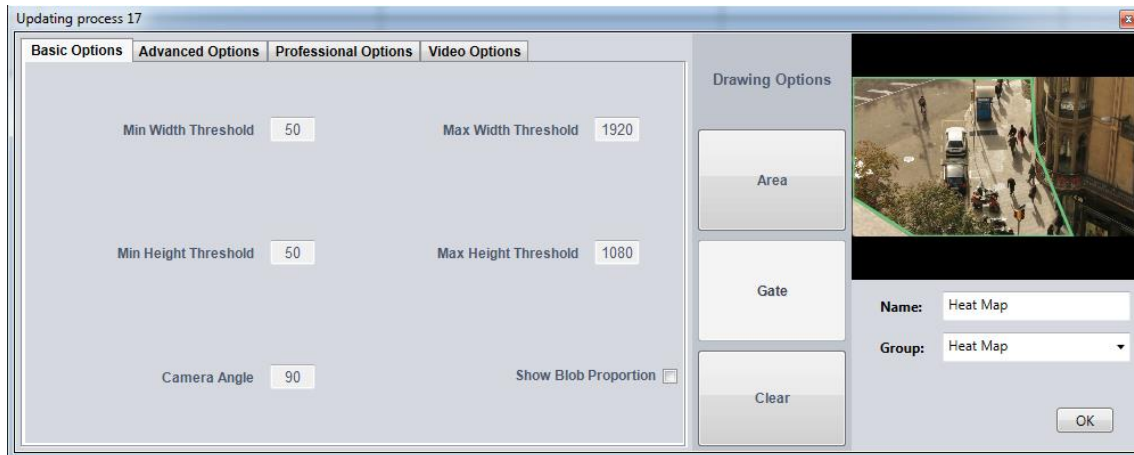


The screenshot shows a software interface with a menu bar containing 'User Management', 'Process Management', 'Alarm Viewer', and 'Help'. Under 'Process Management', there is a sub-menu 'Start Analytics' with 'Manage Analytics' selected. Below this is a table with columns: 'Group', 'Analytic', 'Source', 'Status', and 'Options'. The table lists several processes with their respective statuses: Launching, Scheduling, Initializing, Processing, Stopping, Hold, and Failed. The 'Options' column for each row contains four icons: a play button, a square, a gear, and a cross. In the 'Processing' row, the play button is highlighted with a green box, the square with an orange box, the gear with a purple box, and the cross with a red box.

	Group	Analytic	Source	Status	Options
<input type="checkbox"/> Select all					▶ ■ ⚙ ✕
<input type="checkbox"/> Face Detection - Restaurant	Testing	Face Detection	Restaurant	Launching	▶ ■ ⚙ ✕
<input type="checkbox"/> License Plate - LPR	Testing	License Plate	LPR	Scheduling	▶ ■ ⚙ ✕
<input type="checkbox"/> Face Detection - Restaurant	Testing	Face Detection	Restaurant	Initializing	▶ ■ ⚙ ✕
<input type="checkbox"/> Face Recognition - Enroll	Testing	Face Recognition	Enroll	Processing	▶ ■ ⚙ ✕
<input type="checkbox"/> Intrusion - LPR	Testing	Intrusion	LPR	Stopping	▶ ■ ⚙ ✕
<input type="checkbox"/> Area Counting - LPR	Testing	Area Counting	LPR	Hold	▶ ■ ⚙ ✕
<input type="checkbox"/> Gate Flow - LPR	Testing	Gate Flow	LPR	Failed	▶ ■ ⚙ ✕
<input type="checkbox"/> Face Recognition - Enroll	Testing	Face Recognition	Enroll		▶ ■ ⚙ ✕

Furthermore, you can **Start**, **Stop** and **Delete** any process from this pane. You will only have to press the desired button in each case. You should take into account that you will only be able to delete a process if it has been previously stopped.


Moreover, you can also configure any process once it has been created. In this way you will be able to perform fine adjustments to the module in order to achieve better results or due to changes in the camera or the scene. To do so, click the **Settings** button, between the stop and delete buttons. A window containing all the module information will appear, as depicted in the next image. From it, you will be able to adjust all the parameters that correspond to the module selected.



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## 1.2.1 Basic Options

On the Basic tab, the following parameters can be configured:



Basic Options	Advanced Options	Professional Options	Video Options
Min Width Threshold	10	Max Width Threshold	720
Min Height Threshold	10	Max Height Threshold	576
Camera Angle	90	Show Blob Proportion	<input type="checkbox"/>

- **Parameters:**
  - **Min Width Threshold:** used to define the minimum width of the detected object in the image (in pixels).
  - **Min Height Threshold:** is used to define the minimum height of the object detected in the image (in pixels).
  - **Max Width Threshold:** used to define the maximum width of the detected object in the image (in pixels).
  - **Max Height Threshold:** used to define the maximum height of the object detected in the image (in pixels).
  - **Camera Angle:** this parameter allows you to notify the algorithm which is the angle of the camera. For the HeatMap Module we recommend an aerial position of the camera, 90 degrees.
  - **Visual Options (Show Blob Proportion):** The size of the object is depicted with a green and a red rectangle. **Green** depicts the smallest size of the object while **red** the biggest.

## 1.2.2 Drawing Options

This panel is used to draw and manage the areas where the analytic wants to be in the scene.



- **Area**: to set up an area or zone where the HeatMap will be calculated, follow these steps:
  1. Select the button **Area**.
  2. Draw the first point of the area in the image.
  3. Draw the remaining points of the area (at least 2 more).
  4. You can now select the following options:
    - a. **Clear**: Deletes the area that is being drawn and returns to the initial state (before step 1).
    - b. **Finish**: continue with the setup process (step 5).
  5. Insert the area name, this name is used to identify the area of the HeatMap
- **Gate**: this option is disabled for the HeatMap module.
- **Clear**: Deletes the last door or area configured.



## 1.2.3 Advanced Options

In the advanced settings tab you can configure more specific parameters of the module type selected.

Basic Options	Advanced Options	Professional Options	Video Options	
	Update Window (sec)	10	Sens Threshold	500
	Background Reset Percentage	0.5	Use Shadow Removal	No ▾
	Horizon Height	0	Blob proportion	1
	Min Persistence (sec)	0.2	Max missing (sec)	0.1

- **Background parameters:**

This section describes the low-level parameters related to updating the background image. These parameters must be set according to the "noise" of the scene, and to the areas within the image, such as vegetation on a windy day or an undulating water flow surface, which the algorithm should not identify as moving objects. If the scene is very noisy (usually outdoors), a faster update of the background is recommended ("Refresh Window" with a lower value) and higher sensitivity ("Threshold Sensitivity" high). On the other hand, if the scene is not noisy (as an indoor scenario), a slower update of the background may be required ("Refresh Window" with a higher value).

- **Update Window [sec]:** time to update the temporal background window (default 10 seconds).
  - The background starts to assimilate the scene changes, when a greater value than one third of this parameter is achieved. For example, if this value is set to 10 seconds, then after three seconds of background changes, the new background begins to merge these changes with the stored background. Additionally, if an object stands still for a minimum time equal to the value of this parameter, it ends up being completely assimilated by the reference image of the system. Therefore, it will belong to the background image.
- **Sens Threshold:** minimum sensitivity for foreground segmentation (default 500).
  - The system compares each image acquired by the video stream, with a reference image (background) in order to detect objects within the scene. The reference image is generated by a statistical pixel, in order

to work in a very "noisy" scene (such as vegetation in a windy day, the undulating surface of a water flow, etc ...) and continually updating the reference image.

- The minimum sensitivity value is the minimum difference with which a pixel of the image is classified as part of the foreground. However, if the background is non-stationary, the threshold is affected by the "noise level" of this pixel. Thus, in the case of "too complex" scenarios, the minimum threshold set with this parameter, can be automatically increased by the processing algorithm. For example, in areas within the image where there is a greater variation per unit / time.
- **Background Reset Percentage:** fraction of the reset threshold background (default 0.5).
  - If the difference between the number of pixels from the image acquired by the video stream and the reference image (background), is greater than the resulting quotient (for example, more than half the default value), the background image is updated. This threshold parameter describes the difference between these two images. It also helps to detect some sudden light changes, like a light turn on (indoors), or if a cloud passes in front of the Sun (outdoors).
- **Use shadow Removal:** NONE by default.
  - With the "Shadow Removal" option, you can enable a video processing module to minimize the introduced noise by the shadows in the scene. Its use is recommended for outdoor scenes where there may appear long pointed shadows that can affect the correct object detection. There are three modes to enable this option: **color**, **geometric** or **both**. Depending on whether you want to remove shadows using color or geometric features, you should choose one option or another. Using both options simultaneously increasing the CPU usage of the system.

- **Parameters proportions:**
  - **Horizon Height:** used to set the boundary for the calculation of the object proportion (see next item).
  - **Blob proportion:** this ratio is related with the depth of field of the scene. For example, if the value is 5, then the object in the horizon is 5 times smaller than an object at the bottom of the image (default 1).
  
- **Tracking parameters:**
  - **Minimum persistence [sec]:** time interval that must elapse before a detected object is associated with a new tracking algorithm. Note that only the objects followed by the system can send alarms (default 0.8).
  - **Maximum missing [sec]:** time period that the algorithm requires to eliminate the tracking associated with a particular object (default 0.1).



## 1.2.4 Professional Options

In the professional options tab you can change some specific settings of this module.

Section	Parameter	Value
Morphological Filtering	Enable	<input type="checkbox"/>
	Minimum Width	10
	Minimum Height	10
	Threshold	75
Foreground Filtering	Enable	<input type="checkbox"/>
	Horizontal Search	10
	Vertical Search	10
	Threshold	3
Brightness Filtering	Enable	<input type="checkbox"/>
	Max. Target Brightness	127
	Max. Background Brightness	200
	Brightness (%)	50

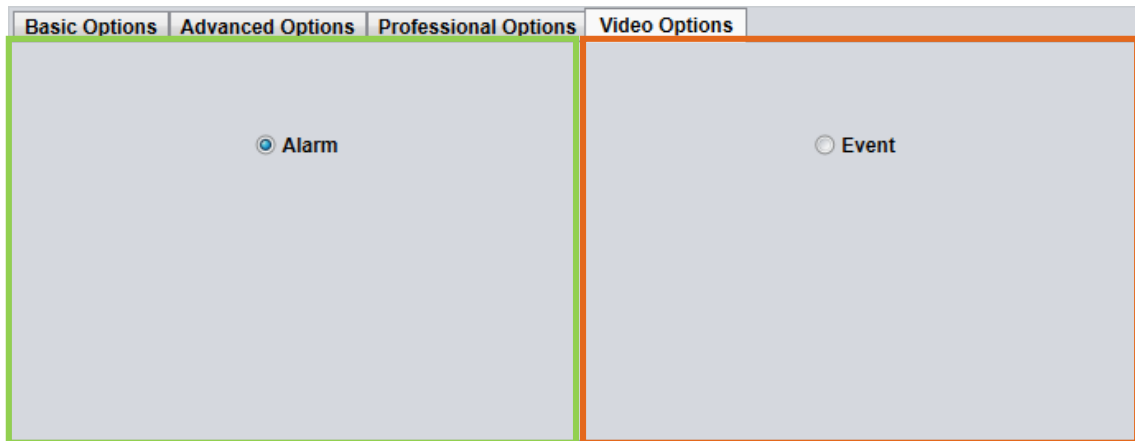
- **Morphological filtering:** A morphological filter that will be applied to the background can be enabled. This feature allows the removal of small noise artifacts, making the background model obtained more robust to fast changes produced by small objects. It uses two different functions: erosion and enlargement (dilation). Depending on the value of the segmentation threshold, one or the other is used. Take into account that using it increases the computational cost.
  - **Minimum width:** Minimum width of the object expressed in pixels (default 10).
  - **Minimum height:** Minimum height of the object expressed in pixels (default 10).
  - **Segmentation threshold:** Segmentation threshold value ranged between 0 and 100 (default 75). Lower than 50 corresponds to a dilation, higher than 50 corresponds to an object segmentation (erosion).
- **Foreground filtering:** A morphological filtering that will be applied to the foreground can be enabled. This feature allows you to remove small noise artifacts, increasing the robustness of the model from quick movements of small objects in the foreground. Therefore, limiting the problems due to moving objects in the background (trees, grass, trees' shadows, flags, flags' shadows ...) and light camera vibrations. The aim of this filter is to look for foreground pixels with correspondence between them and the ones on the background, tagging them. In this way, the problems described before are reduced. Keep in mind that their use increases the computational cost.
  - **Horizontal search:** Searching zone horizontal size (in pixels) (default 10).
  - **Vertical search:** Searching zone vertical size (in pixels) (default 10).
  - **Difference threshold:** Minimum difference between the foreground color pixels and the background pixels, in order to be able to delete the foreground ones (default 3).

- **Brightness filtering:** This type of filter limits the blob creation, due to strong lights detached from the target (for example light reflections on puddles). Its use is recommended mainly in bad light conditions (parameter set by the user "Max background brightness"). Its main function is to calculate the cumulative light higher than the "Max target brightness". If the blob value (%) compared to the number of cumulative light in pixels in the image, is higher than the light threshold, the blob stays invisible and the module does not follow it. Keep in mind that their use increases the computational cost.
  - **Max target brightness:** Minimum value from which the cumulative is calculated (default 127).
  - **Max background brightness:** Value below which the filter is activated (default 200).
  - **Brightness [%]:** Minimum cumulative percentage compared to the blob area, above which the bounding box is filtered (default 50).



## 1.2.5 Video Options

In the video options tab you can change some settings specific from the VMS and/or the output types of the module.



- **Alarm or Event:** we can select the output type of the process, through an alarm or event. This distinction is useful when working with Milestone because if we select the alarm option we avoid creating a specific event for each door or area.

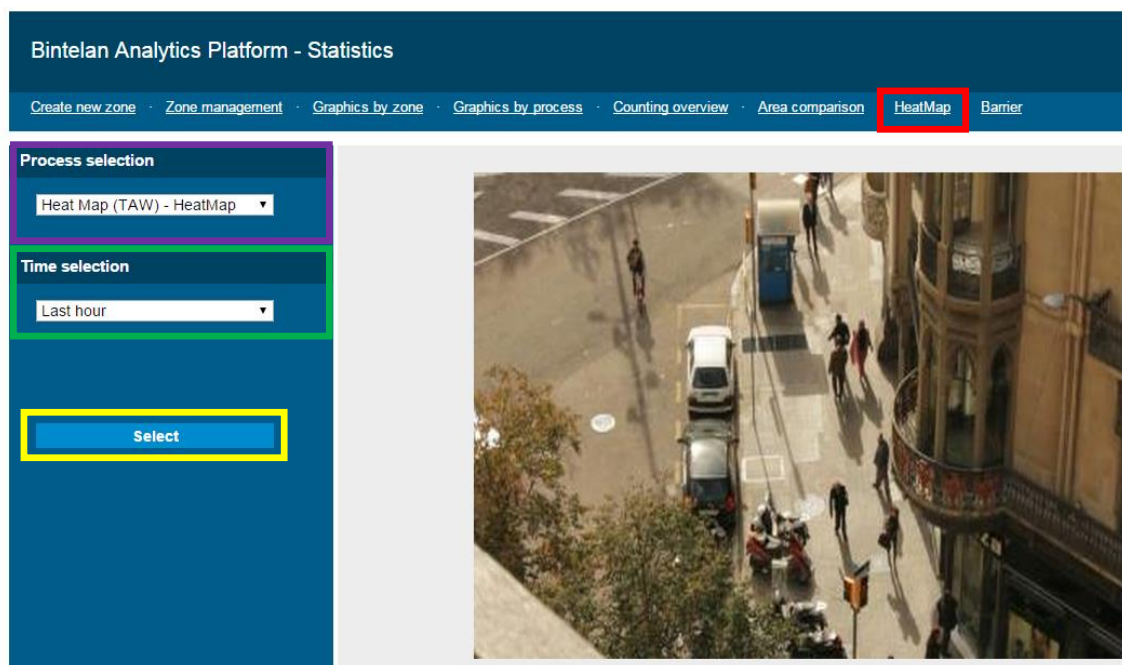
**NOTE:** Please note that the video options are only available if you are working with a VMS that supports them. When working with the Client StandAlone, this tab is not available.

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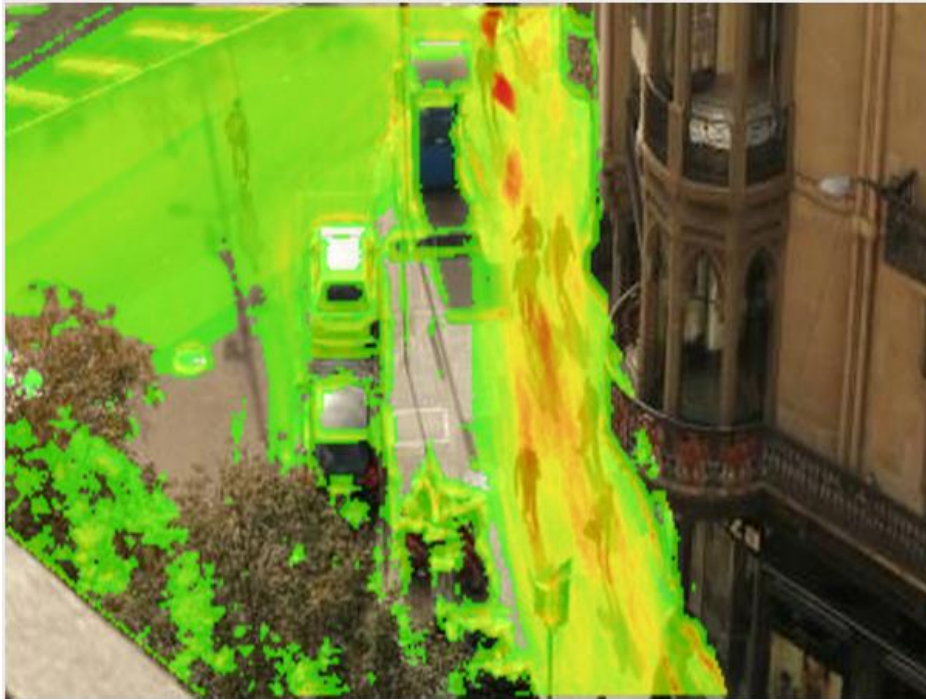
## 2 Viewing Statistics

The viewing of the HeatMap results is done through the **Statistics** interface. You can access this interface from any browser. The URL to access the statistics panel is: **http://localhost:8128/graphicsByProcess.php**

Once inside this panel, select from the top Menu the option **HeatMap**. Then you must select the process that you want to display statistics. To do this, select it from the dropdown **Process selection**. Any Heat Map process is valid. The next step is to choose the suitable time interval in which to display statistics, you can do it from the drop-down selection in the **Time selection**, by default it will be the **Last hour**. Finally, press the **Select** button to view the results.



The following HeatMap image will be shown on the right pane of the Statistics panel inside your browser.



Additionally, you can select a Custom time interval with which to view the statistics. Select the last option of the **Time Selection** dropdown and choose **Custom**. Then you could choose the **Start** and **End** dates from which you want the Heat Map to obtain its data. In this way, a Heat Map from only the selected interval will be depicted on the right image as shown below.

Bintelan Analytics Platform - Statistics

[Create new zone](#) · [Zone management](#) · [Graphics by zone](#) · [Graphics by process](#) · [Counting overview](#) · [Area comparison](#) · [HeatMap](#) · [Barrier](#)

**Process selection**

Heat Map (TAW) - HeatMap ▾

**Time selection**

Custom ▾

Start: 25/02/2015 09:00  
End: 25/02/2015 20:00

Select





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