



# VANTIQ Back-to-Work Accelerator User Guide

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## About

VANTIQ Accelerators are working applications that are designed to be imported into the VANTIQ platform as a new project and then customized by users who are looking to create applications with a similar purpose. The benefit of using an accelerator is starting off with an application that has a completed code base to bootstrap a new project being undertaken. Although accelerators are complete working applications, they are not intended to be used *as-is*, rather they are intended to speed up development of a new application by providing a completed and working set of base components and functionality to build upon and customize.

## How to Use This Document

This *User Guide* describes using the **Back-to-Work Accelerator** to setup a working application and user interface that provides digital visualizations for external data sources such as sensors, camera feeds, Real-Time Location Services, or BLE beacons. A user will be able to setup devices like sensors from the Back-to-Work client to define the data schema for the sensor, the rules that the sensor can trigger, and the visualizations for the sensor.

No technical skills are required to use this document and no changes to the application source code is covered. VANTIQ developers can refer to *the Back-to-Work Accelerator Developer Guide* for technical information regarding the internal application components.

**Technical Note:** Periodically throughout this document additional comments intended for VANTIQ developers are placed in a comment box to call attention to specific capabilities, design decisions, or reference material.

This document will cover using all the capabilities of the **Back-to-Work Accelerator** from a user's perspective, but it will not cover connecting sensor streams into the VANTIQ platform. This information is covered in *the Back-to-Work Accelerator Developer Guide*.

## Back-to-Work Accelerator Features

The **Back-To-Work Accelerator** allows the user to model an organization's workplace by creating a digital twin of that workplace. A digital twin is a computerized representation of a real-life physical object, in this case, an internal space within a building and the assets contained within those spaces. Digital twins are often connected to sensors, cameras and other data sources to provide real-time displays of the status a particular

object or space by capturing streams of data from these sources, analyzing the incoming data and monitoring for anomalies.

The value of the VANTIQ **Back-to-Work Accelerator** is to allow developers to quickly create their own unique models of their workplaces without spending a lot of time designing the user facing elements and visualizations. A complete set of user interfaces is provided along with the ability to create and define custom data schema's for sensors and devices.

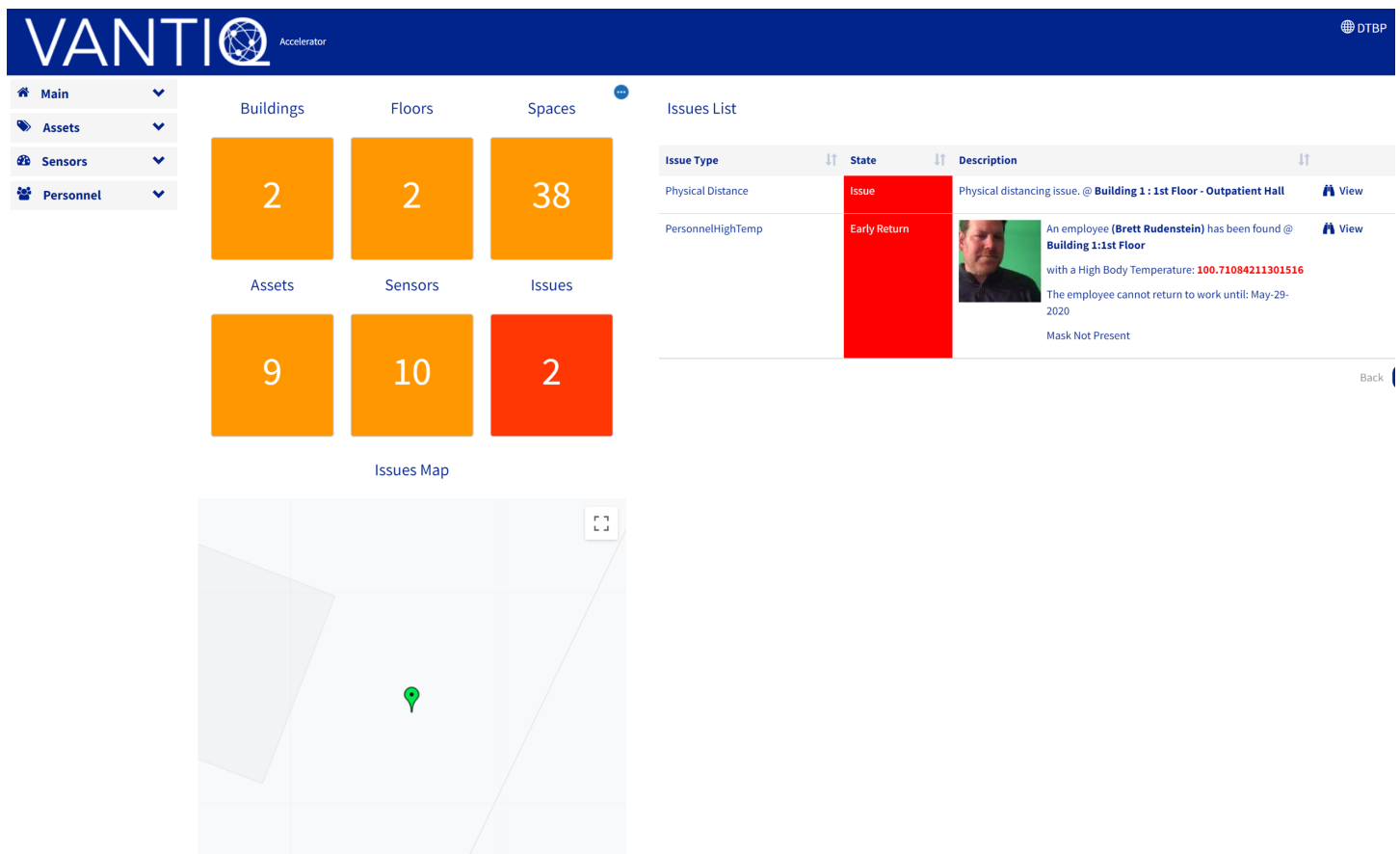


Figure 1 - Back-to-Work Accelerator main page.

When setting up a **Back-to-Work** application for the first time, a user should step through and setup items in the following order:

- **Organizations** – Specifies the name of the company using this workplace model.
- **Buildings** – Name and Address of each location where sensors are located.
- **Assets** – Define the physical items to which sensors are applied or attached.
- **Sensors** – The different types of devices generating data to monitor and track. Rules and Pages will then be setup to determine when to trigger actions and display new visualizations.
- **Personnel** – Setup users (internal VANTIQ users) and roles. Actions are applied to users based upon their roles.

## Data Definitions

The **Back-to-Work Accelerator** allows users to define different types of data objects such as sensors, users, and buildings. These data objects correlate to VANTIQ Types and can be modified by developers. The workplace model is designed to use a spatial hierarchy to represent different layers and categories that are common in the model and uses that concept in the visualizations and data configurations.

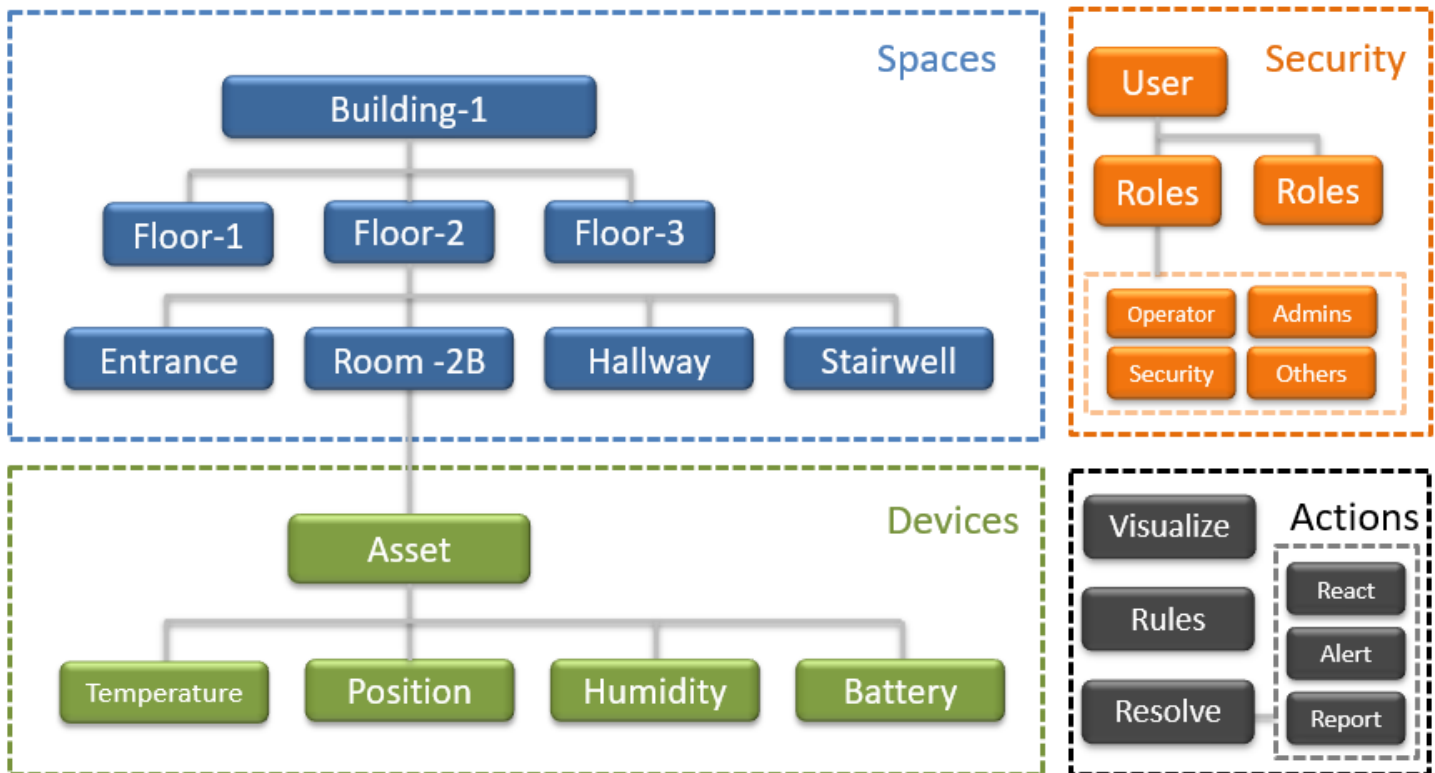


Figure 2 - Data is represented in hierarchical form.

When setting up an application for the first time a user can define each of the data elements in the topology starting with an Organization and then a Building. Each Building contains one or more Floors. Each Floor contains one or more device such as an Asset and then Sensors. An Asset is a physical device or item that can be connected by one or many Sensors. An asset tracking tag might be connected to one physical item like a wheelchair, the Asset is the wheelchair and the Sensor is the asset tracking tag. An HVAC unit is an Asset with many Sensors that measure its status (on/off), temperature, humidity and energy use.

A user will also be able to configure page displays for sensors to create dashboards, reports and other visualizations.

## Organizations

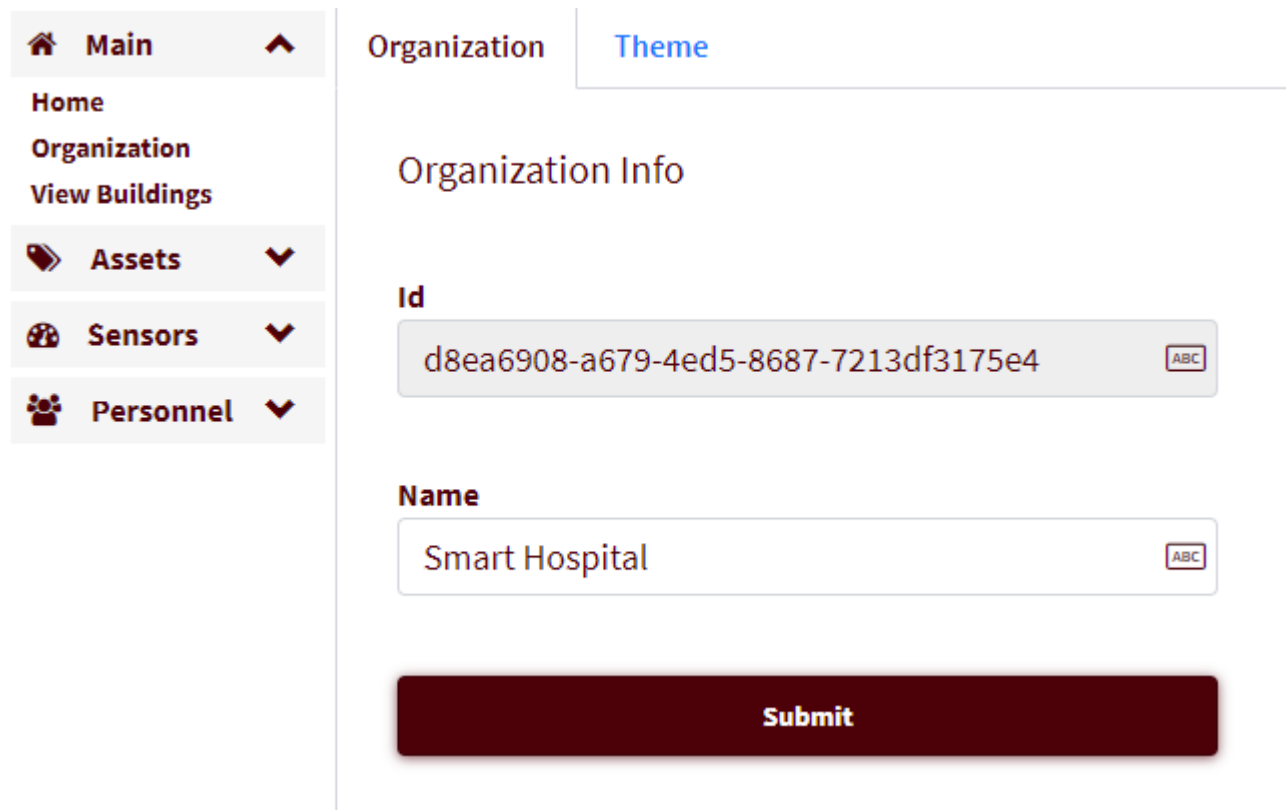
The top-level data element is the Organization. Organizations are used to group buildings by an entity, such as a Company. Organizations can customize the look of the **Back-To-Work Accelerator** by modifying the Theme

to utilize the Organization's color scheme and logo and have those be displayed on different pages of accelerator.

**Technical Note:** In the current version of the Back-to-Work Accelerator only one Organization is allowed at a time so every building will belong to the same organization. A VANTIQ developer can modify the project to support multiple organizations or to use a modified spatial hierarchy by changing Organization to represent something like a Country or Region.

To add an organization first click on the Main icon in the navigation bar and select Organization as shown in the image below:

1. Navigate to **Main** → **Organization**.
2. Fill out the **Name** field and click Submit.
3. The **Id** field is automatically generated. That field is read-only and cannot be edited by hand.



The screenshot shows the VANTIQ Accelerator interface. On the left is a navigation bar with a 'Main' icon and a list of options: Home, Organization, View Buildings, Assets, Sensors, and Personnel. The 'Organization' option is selected. The main content area has two tabs: 'Organization' and 'Theme'. Under the 'Organization' tab, there is a section titled 'Organization Info'. It contains two input fields: 'Id' with a generated value 'd8ea6908-a679-4ed5-8687-7213df3175e4' and 'Name' with the value 'Smart Hospital'. Both fields have a small 'ABC' icon on the right. At the bottom of the form is a large red 'Submit' button.

Figure 3 - Creating a new Organization

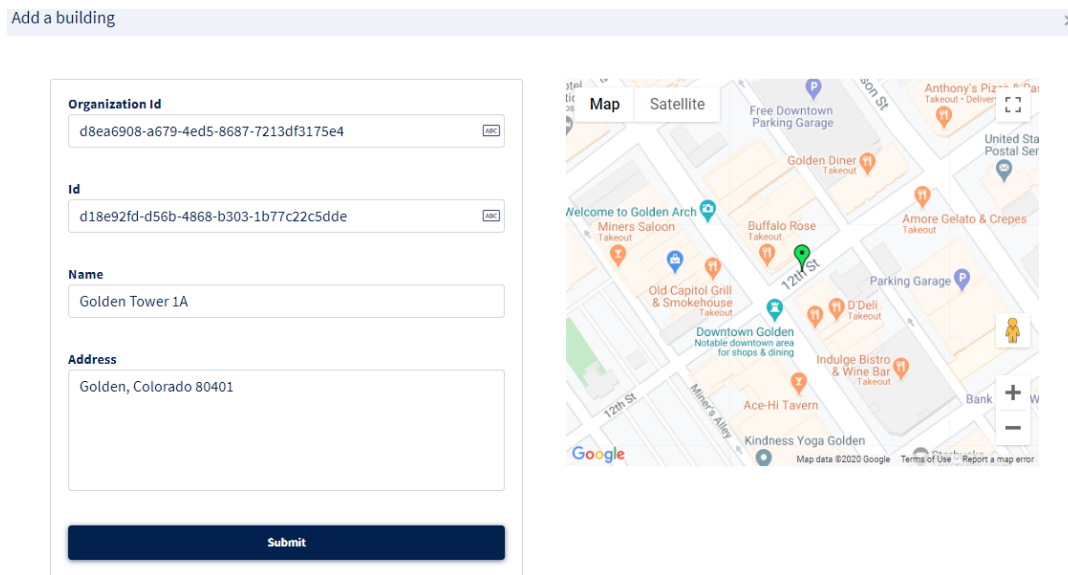
## Buildings

Buildings identify locations where assets and sensors will be located. An application can have one or more buildings. Assets and people can be tracked when moving between buildings. For example, if a pallet of goods

is moved from one building to another or a person with an RFID badge uses entrances at multiple buildings, that asset will be tracked as it leaves one building and enters another.

To create a new building navigate to **Main → View Buildings** and use the **Add Building** button at the bottom of the list of buildings to setup a new building:

1. Navigate to **Main → View Buildings**.
2. Click **Add Building**.
3. Enter a **Name** for the building
4. Fill in the **Address** as you would for any mapping application



The image shows a web interface for adding a new building. On the left is a form titled "Add a building" with the following fields:

- Organization Id:** d8ea6908-a679-4ed5-8687-7213df3175e4
- Id:** d18e92fd-d56b-4868-b303-1b77c22c5dde
- Name:** Golden Tower 1A
- Address:** Golden, Colorado 80401

Below the form is a blue "Submit" button. To the right of the form is a Google Map of downtown Golden, Colorado, with a green map pin placed on 12th St. The map shows various landmarks and businesses like "Golden Diner", "Buffalo Rose", and "Downtown Golden".

Figure 4 - Adding a new building

The map pin that is automatically places can be moved around the map to directly identify an entrance to a building.

#### Fields

- **Organization Id:** The UUID value for the Organization set in the previous step. This value is automatically populated and should not be modified.
- **Id:** Randomly generated UUID value. This field needs to be unique for each building and its recommended to use the automatically generated UUID value.
- **Name:** Enter a unique name used to identify the building.
- **Address:** Enter the property address, the pin on the map will update automatically to match the address location.

Once the building has been added it will show up on the list of buildings.

## Buildings

Name	Address	
Building 21	100 main st Stoughton Ma	 View
Building 22	100 main st nevada	 View
Building 23	100 main st delaware	 View
Building Alpha	468 Crawford St, Golden CO 80401	 View

Back 1 2 Next

Figure 5 - Listing of Buildings

Use the **View** button to open the building details and complete the next steps to upload floorplan and to add floors to the building.

Building

Floorplans

Building

Floors

Admin

Detail

Building Name

Building Alpha

Address

468 Crawford St, Golden CO 80401

Map

Satellite

Fort Collins

Denver

United States

Colorado

Colorado Springs

Grand Junction

Google

Map data ©2020 Google, INEGI

Terms of Use

Back

Edit Building

Add Floor

Figure 6 - Viewing Building Details

## Floorplans

Floorplans are 2d images that can be uploaded to the system to display the layout of each floor in a building. Floorplans are an important part of the accelerator as it can display where people, equipment, devices and other assets are currently located.

Use the **Floorplans** tab at the top of the page to see the list of floorplan images that have been uploaded and to add a new floorplan image.

1. Click on the **Add Floor Plan** button at the bottom of the list to upload a new floor plan
2. Select a path to the floorplan image on your local computer
3. Fill in a **Description** of this specific floorplan

Add a floorplan

Floor Plan

Building Id

546663c3-6821-4ae3-88c9-3e98a5754c0a

Id

d62bef95-7808-409d-90f9-54b07fee3862

Path

public/images/floorplans/546663c3-6821-4ae3-88c9-3e98a5754c0a/restaurant-floor-plan.png

Upload

Description

Bart's Cafe Floor Plan

Submit

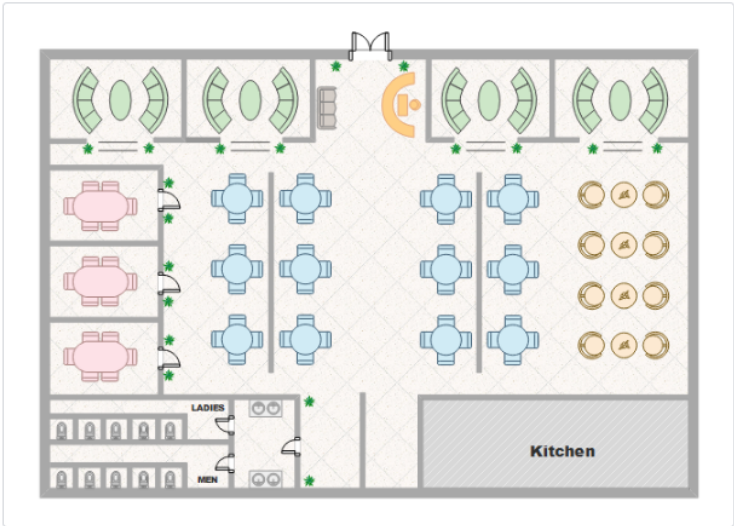


Figure 7 - Adding the Floorplan of a Restaurant

### Fields

- **Building Id:** A read-only field that is tied to the building being edited.
- **Id:** UUID automatically generated number that is used internally to keep track of each floorplan.
- **Path:** Upload path of the image file indicating where in VANTIQ the image is stored.
- **Description:** User readable description of the floorplan image.

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**Technical Note:** Floorplans use map pins to indicate the position of an asset which can be fixed or can move. Moving assets are tracked using BLE beacons, RFID or similar RTLS systems which rely on distance and X-Y coordinate readings. Using GPS with indoor or outdoor locations is also possible for asset tracking but would require switching the application from using X-Y coordinates to GPS.

## Floors

A **Floor** can be created using the **Add Floor** button, which is located on the **Buildings** page and shown on page 8. Every building must have at least one floor. **Floors** can be added in any order and given any name, but it is recommended using a name that corresponds to the actual floor number such as “Floor 2” or “2<sup>nd</sup> Floor”.

Add a floor

Building Id

546663c3-6821-4ae3-88c9-3e98a5754c0a

ABC

Floor Plan Id

913a2ded-0795-4476-9e95-7e5ee94fedbb

ABC

Name

1st Floor

Submit

Floor Plan

Bart's Cafe Floor Plan

Figure 8 - Adding a Floor to a Building

## Fields

- **Building Id:** A read-only field that is tied to the building being edited.
- **Floor Plan Id:** A UUID for the floor being added.
- **Name:** The user readable name for the floor.
- **Floor Plan:** This dropdown contains the list of previously uploaded images to select from.

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## Spaces

**Spaces** represent an area on a floor. This could be a room, or an area that is contained inside a larger room. Looking at the example restaurant floor plan, it would be possible to define spaces for the kitchen, bathrooms, individual booths or tables and the entrance.

To create a new **Space**, first view a **Building** then a **Floor**:

1. Click on the **Spaces** menu and use the **Add Space** button.
2. Click on the location in the floorplan that indicates the approximate center of that space
3. A marker is placed on the floorplan image to indicate the center of that space

Add a space

Space

Floor Id

e03b03b7-de0a-44ae-873e-896caef68538

Space Id

e02ea4c5-f0b4-4f6c-be1b-0b77164e6936

Space Name

Kitchen

☐

Restricted

Submit

Figure 9 - Creating a new Space on a Floorplan

## Fields

- **Floor Id:** The UUID for the floor that the space belongs too.
- **Space Id:** A UUID for the space.
- **Space Name:** A readable name for the space.
- **Restricted:** Toggle to true to make a restricted space. Restricted spaces can be used to trigger alerts when an unauthorized person has entered the space.

## Assets

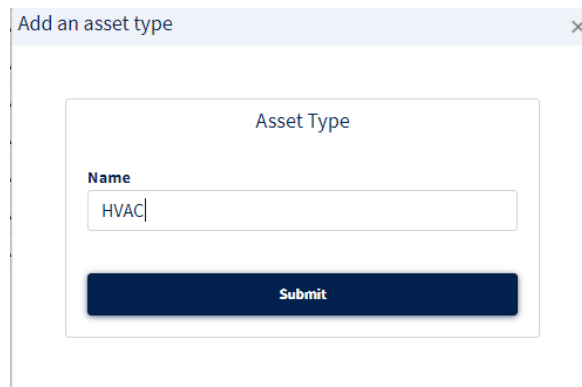
An asset represents an object, person or item that is being tracked and displayed in the accelerator. A mobile phone, thermal camera, hospital bed, weather station, HVAC system, pump or edge server are all examples of assets.

Each asset will be able to support a list of one or more sensors. A mobile phone might provide just one sensor reading, the GPS location, while an HVAC system may have temperature, humidity and voltage sensors. There may be a one-to-one relationship between sensors and assets and if so, it is still necessary to define the **Asset** and then define the **Sensor** for that **Asset**.

Assets can be in a fixed location, such as a large industrial machine or a camera near an entrance. Assets may be mobile and move around and these can be monitored using sensors that generate GPS location or generate an indoor position as BLE beacon and RTLS systems would provide. **Assets** that move will automatically appear in the **Building, Floor** and closest **Space** based on the last reading generated. This means an asset tracking tag on a wheelchair's location can be seen moving between rooms and even floors.

To create an asset, click on the **Assets → View Asset Types** menu in the nav bar:

1. select **Add Asset**.
2. Provide a **Name** for the asset type and click Submit.



The screenshot shows a modal window titled "Add an asset type" with a close button (X) in the top right corner. Inside the modal, there is a form titled "Asset Type". The form has a label "Name" above a text input field. The input field contains the text "HVAC". Below the input field is a dark blue button labeled "Submit".

Figure 10 - Adding a new Asset Type

Once a new **Asset Type** has been created, the list of defined assets can be viewed from the **Assets → View Asset Types**



The screenshot shows the "View Asset Types" page. On the left is a sidebar with a navigation menu. The "Assets" menu item is selected and expanded, showing "View Assets" and "View Asset Types". The main content area is titled "Asset Types" and contains a table with the following data:

Name	
Pump	✕ Remove
Computer	✕ Remove
Thermal Camera	✕ Remove
Mobile Phone	✕ Remove
Medical Refrigeration Unit	✕ Remove
Workstation	✕ Remove
HomeMonitor	✕ Remove
HVAC	✕ Remove

At the bottom right of the table, there are pagination controls: "Back", "1", "2" (highlighted), and "Next".

Figure 11 - Viewing a List of Defined Asset Types

Once an asset has been added it can then be assigned to a space, but before going on to that step first setup sensors.

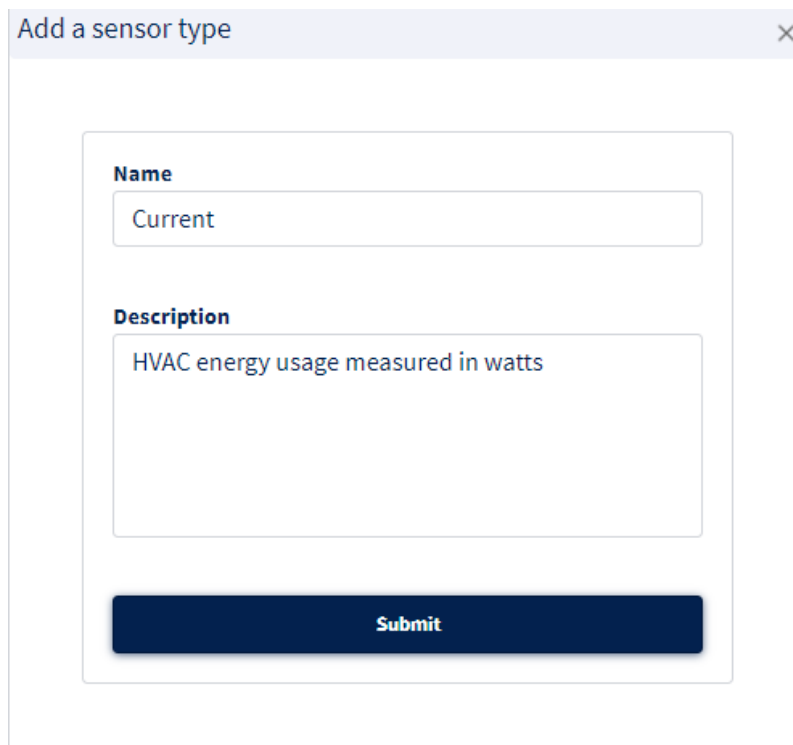
## Sensors

A sensor represents a source of information being broadcast from the asset. Sensors provide a way to define the data being generated and analyzed by the **Back-to-Work Accelerator**. The sensors allow data sources to be broken up into individual types even if there is a single piece of hardware that generates the sensor readings. This means if you have an HVAC system that produces three readings for temperature, humidity and energy usage, it is possible to setup three different sensor configurations to analyze those readings independently.

In some cases, there will be just one sensor for an asset, an example being a digital temperature device. In other cases, there may be many sensors associated with a device, such as a smart hospital bed that might transmit information about the presence of a patient (pressure), the health of the patient (vitals), and the health of the devices on the bed (battery, signal strength, voltage).

To create a sensor, navigate to **Sensors → View Sensor Types**

1. Click the **Add Sensor** button
2. Give the sensor a **Name**
3. Provide a **Description** for the sensor.



The screenshot shows a web form titled "Add a sensor type" with a close button (X) in the top right corner. The form contains two text input fields. The first field is labeled "Name" and contains the text "Current". The second field is labeled "Description" and contains the text "HVAC energy usage measured in watts". Below these fields is a dark blue button with the text "Submit" in white.

Figure 12 - Adding a Sensor Type

Repeat this step for all the sensor types that will be used in the application. Some examples might include:

- Camera
- Humidity
- Temperature
- IndoorLocation
- OutdoorLocation
- Volume
- Current

**Sensor Types** can be added continuously. As more sensors are brought online, they can be incorporated into the existing application framework using the same steps.

### Sensor Configurations

With one or more sensor types now created, a new sensor can be created. Sensors can optionally have a configuration added to them that specifies details of how that sensor is displayed and used in the accelerator.

Sensor configurations allow a user to define how sensors readings are displayed in the **Back-to-Work Accelerator** and can also create rules that are used to detect situations of interest from the sensor data readings. When a **sensor** is added, a user has the option to specify the sensor configuration as a JSON object. If left blank then there will be no display page for the sensor readings, only its location will be visible from the floorplan views and no rules will be defined.

A sensor configuration that is used more than once can be saved under **View Sensor Configs** and reused many times as new sensors are added of the same type.

### Create a Sensor Configuration

To create a sensor configuration navigate to **Sensors → View Sensor Configs**.

1. Click the **Add Sensor Config** button.
2. Provide a **Name** for the sensor and select its type from the **Sensor Type** dropdown menu.

The sensor **Configuration** is a JSON object that takes the following fields.

```
{
  "display": {
    "page": "...",
    "config": {...}
  },
  "rules": {...}
}
```

### Fields

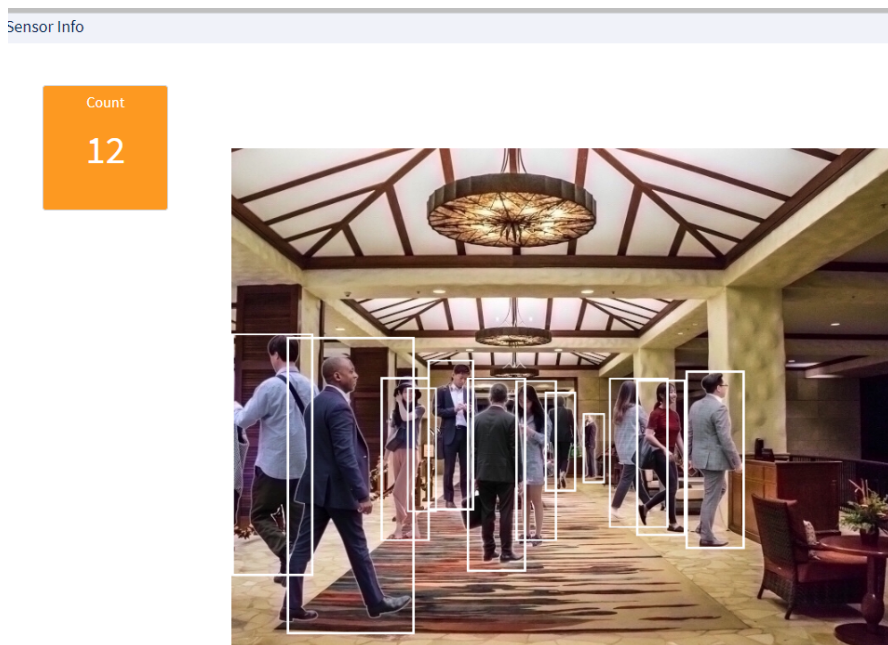
- display: This JSON object is used to define how the sensor will be displayed.
  - page: The name of the page setup in the Client Builder for the sensor display
  - config (optional): Any additional properties used to load widget settings for that page

- rules: The conditional expressions used to identify situations of interest for the sensor reading

Here is a simple example of a configuration for an optical camera that is capable of providing a count of people in its view.

```
{
  "display": {
    "page": "CameraDisplay",
    "config": {}
  },
  "rules": {
    "high": {
      "lte": 15
    }
  }
}
```

In this example, the page *CameraDisplay* was added by a VANTIQ developer to the accelerator as shown here:



*Figure 13 - Example CameraDisplay Page Added to the Accelerator*

This page was created to show the last image from the camera sensor and display the count of people detected in the image using VANTIQ's Object Recognition software.

**Technical Note:** Sensor Configurations get a little technical and do require a VANTIQ developer to make changes suitable for each sensor type you define before the application will work fully. This means setting up a VANTIQ App and Collaboration which will identify situations that are used to populate the Issues table on the main page and create Collaborations which are used to react to situations of interest.

## Rules

The rules section of the JSON configuration is used to determine the conditional elements for identifying a situation. There is no pre-set template for rules. **Rules** are associated with a sensor and are used to analyze each reading from the sensor. The field names themselves used in these examples are first defined by a developer building the VANTIQ IDE and then fields like the limit values can be set by the user through screens in the **Back-To-Work Accelerator**.

For the HVAC monitor, we may have a rule that looks for a high level of current:

```
{
  "display": {
    "page": "EnergyUse",
    "config": {
      "title": "Energy Use (watts)"
    }
  },
  "rules": {
    "high": {
      "gte": 55
    }
  }
}
```

Each current reading generated from the HVAC system is then evaluated to see if it measures higher or lower than 55 watts. The accelerator is then using the conditional expression “greater than or equal too 55” to determine when to create a situation upon which to act.

The conditional syntax is intentional as it allows the VANTIQ developer to plug in the value and the condition from the sensor configurations “high” value. The name used for the conditional can change and the rule could be re-written as:

```
"rules": { "overLimit": { "gte": 55 } }
```

The VANTIQ developer would then identify the conditional using “overLimit” instead of “high” but the operators used in the conditional expression *gte* comes from a pre-set list that should always be used. Examples of these expressions include:

- *gt*: Greater than.
- *gte*: Greater than or equal.
- *lt*: Less than.
- *lte*: Less than or equal.

To see the full list of operators, see:

<https://dev.vantiq.com/docs/system/api/index.html#standard-operation-parameters>

#### Display – View Sensor Data

A display is always a pop-up page that is used to visualize the sensor data. The display parameter will include the “page” name to use in the pop-up and optionally a “config” section that is used to configure a VANTIQ widget with customizations specific for that sensor type.

The config section allows one page to be used for multiple sensors. For example, a page might include a Gauge Widget that is commonly used to show levels for a sensor reading. The same Gauge Widget can be used to display volume levels for a container, a battery level or other signal reading.

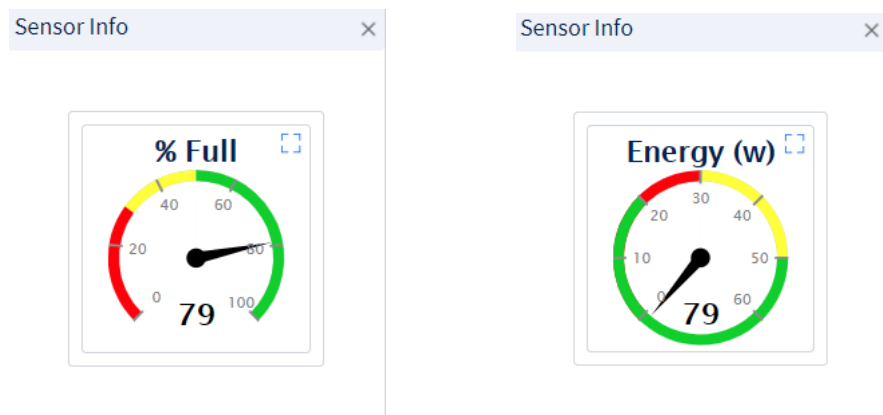


Figure 14 - Same page is used to display different sensors with different config properties.

```
{
  "display": {
    "page": " GaugeDisplay",
    "config": {
      "minimum": 0,
      "maximum": 100,
      "lowZones": "0:30",
      "lowColor": "#ff0000",
      "mediumZones": "30:50",
```

```

    "mediumColor": "#ffff00",
    "highZones": "50:100",
    "highColor": "#00cc00",
    "title": "% Full"
  }
},
"rules": {
  "low": {
    "lte": 29
  },
  "full": {
    "gte": 90
  }
}
}

```

In this configuration, the “config” section provides details for the Gauge Widget for a volume monitor sensor. The same “page: GaugeDisplay ” can be used to show the current reading from an HVAC system with its own high, medium, low readings (the green, yellow, red regions) by changing the configuration properties for the HVAC sensor.

This approach allows a VANTIQ developer to setup one page with a widget such as gauge, chart, calendar, number, map, image, or video. The specific details that can be used to configure the widget must be provided by a VANTIQ developer as they vary for each type.

### Complete the Setup

At this stage in the document the following items have been added. Buildings, Floors, Spaces, Assets and Sensors. There are two more remaining steps to configure the digital twin. Adding the sensors to the assets and then adding the assets to spaces.

#### Create a new Asset

Now that we have sensors types and asset types, we can add a list of sensors and assets using those pre-defined types.

1. Navigate to **Assets -> View Assets**.
2. Click the **Add Asset** button at the bottom of the page.
3. Provide the Asset Type, Asset Name and Location.
4. Click **Submit** to complete.

Add an asset

Asset

Asset Info

Asset Id

87d6bc65-42ac-443e-9428-5218f60ebd75

Asset Type

HVAC

Asset Name

HVAC1\_Kitchen

Location Info (optional)

Submit

Figure 15 - Adding an Asset

Use the VIEW button to the right of your newly created asset to open it back up and copy the Asset ID from the table list as it will be used in the next step.

#### Create a new Sensor

1. Create a new sensor by navigating to **Sensors → View Sensors**.
2. Click the **Add Sensor** button at the bottom of the page.
3. Paste in the Asset Id in the first field.
4. Provide a unique name or ID for the sensor in the Sensor Id field.
5. Select the type and configuration options and then Submit to complete.

### Sensor Modify

**Associated Asset Id****Sensor Id****Sensor Type****Sensor Configs (select to set config)****Sensor Configuration**

Figure 16 - Creating a Sensor

### Additional Setup Options

There are multiple ways to make the associations between sensors, assets and spaces. If you have a sensor that is not attached to a type you can go into the Asset and add the sensor from there.

Likewise, if you have an asset without a location you can open your Building view and then a Floor view. From this page, you can add an asset to a space on the floor. The space assigned will be the closest one to where you click on the floorplan map.

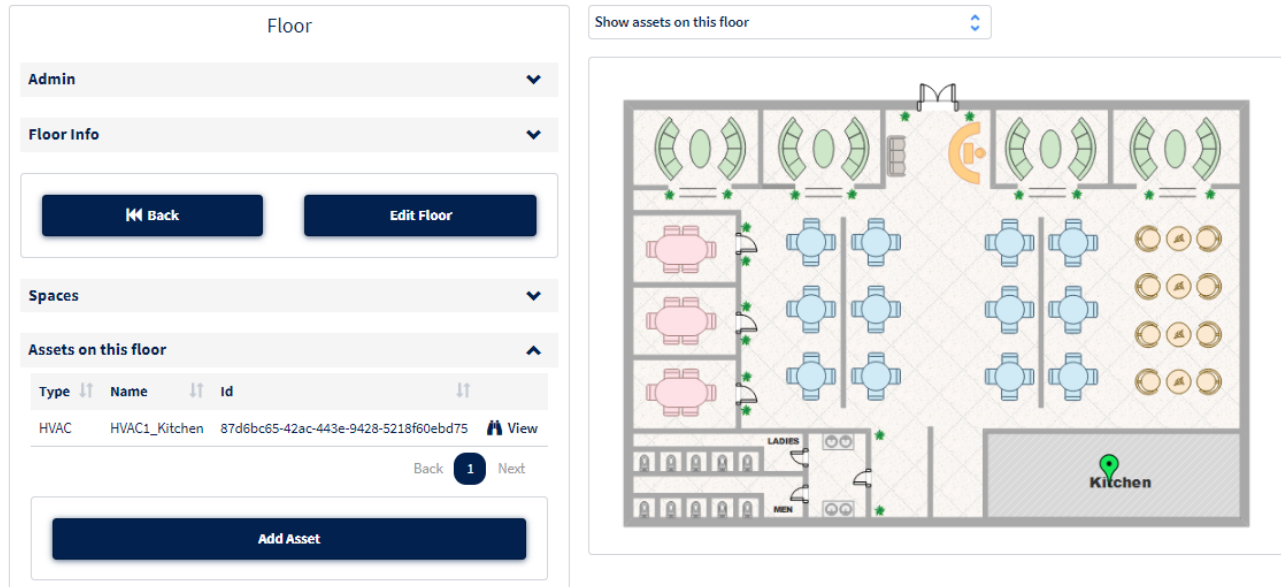


Figure 17 - Floor view showing Add Asset button.

## User and Security Management

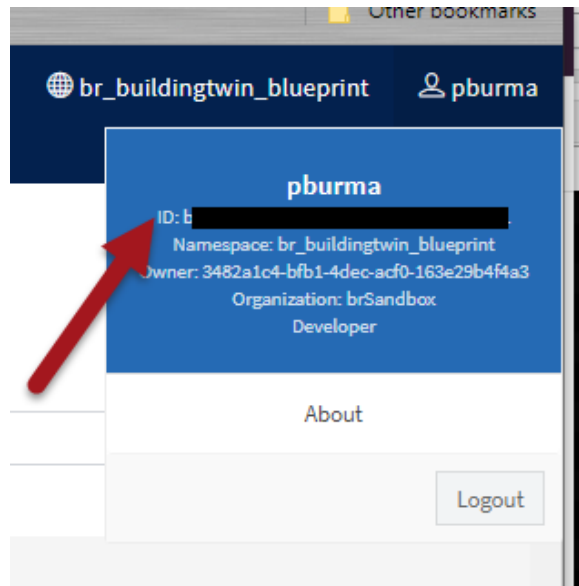
The Back-to-Work Accelerator offers a way to manage users or Personnel and groups, which are called Roles. The Personnel list is designated for use with VANTIQ actions. Actions represent how a response is made to a situation once its detected and often includes sending a notification to the VANTIQ mobile app on a user's mobile phone. The notification could come in the form of a SMS message, email, chat or using some other method.

Personnel are identified by setting an asset, like a mobile phone or RFID badge, which is used to uniquely identify that person. This will associate the Personnel details with the device readings from that asset so instead of showing badge\_number:123456 in the tracking details we can show "Last, First" name instead.

### Personnel


To add a new users navigate to **Personnel → View Users** and **click Add User**

Enter the VANTIQ user-id which can be obtained by the VANTIQ user under their About page



Enter the First and Last Name and optional add an asset id associated with this user.

*Note: Roles can be left blank initially if none exist or don't apply.*



**Unique Id**  
 74709af0-8005-11ea-af58-be6de27ea33c

☒ Collaborator

**VANTIQ User Id (For roles)**  
 aaa-aaa-aa-aa-aaa-aa

**First Name**  
 Pat

**Last Name**  
 Burma

**Asset Id (a location tracking asset id)**  
 aedbc810-ea02-43e7-8b92-7c2decf12543

Submit

-select-

Add

Name	
Doctor	<input checked="" type="checkbox"/> Remove
Security	<input checked="" type="checkbox"/> Remove

Back 1 Next

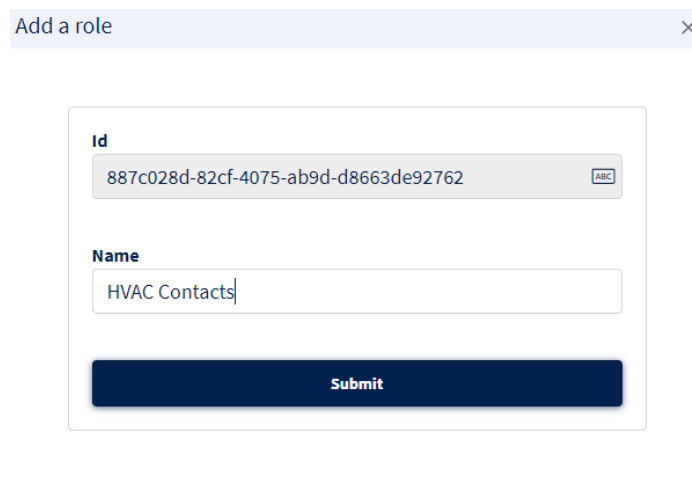


## Roles

Roles represent groups for the Personnel which can be used for notifications. For example, if a group of security personnel should be notified when an afterhours trespasser is detected. If in our HVAC example the facilities manager, restaurant manager and the owner should all be contacted when it fails a new Role can be created with these Personnel accounts added to it.

To create a role navigate to **Personnel** → **View Roles** and click **Add**

A Role is simple a name and an ID.



The screenshot shows a web form titled "Add a role" with a close button (X) in the top right corner. The form contains two input fields. The first field is labeled "Id" and contains the text "887c028d-82cf-4075-ab9d-d8663de92762". To the right of this field is a small button labeled "ABC". The second field is labeled "Name" and contains the text "HVAC Contacts". Below these fields is a dark blue button labeled "Submit".

Figure 18 - Adding a new Role

Once your roles are created you can go back to **View Users** and set the roles for the users. Each user can have multiple roles.