ariadne
CONNECTING THE DOTS

User Guide (version 3.9)

Technical Specifications

Table of Contents

1 Document Overview

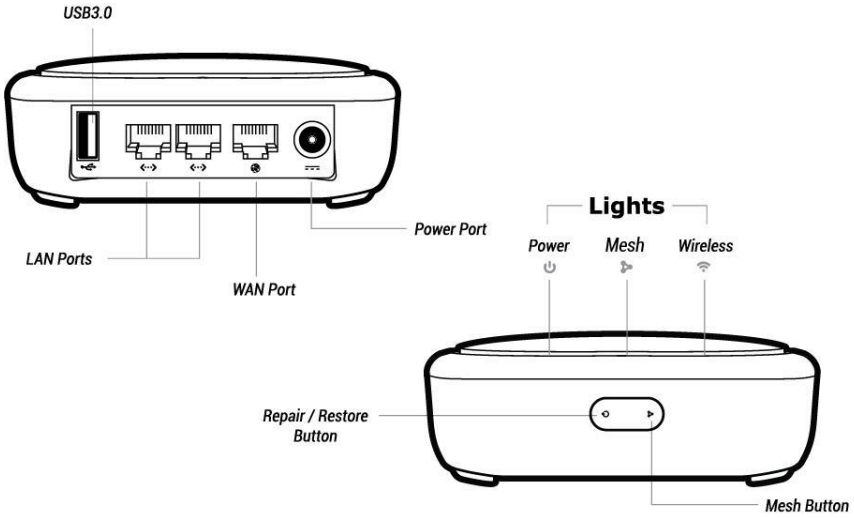
The proposed solution targets in deploying infrastructure, architecture, and technology needed to track the location of smartphones and other devices with wireless capabilities in real-time by Ariadne Maps.

This document presents the technical specifications and requirements for installing and using Ariadne devices, also called Surveyors. The terms “Ariadne device”, “surveyor”, “Surveyor device”, and “Ariadne sensor” are used interchangeably in this document. The general term “device” is used to refer to any device that can be tracked by Ariadne devices.

In Chapters 1.1 and 1.2, two distinct types of devices are introduced.

1.1 Ariadne Surveyor Devices

1.1.1 Device Specifications



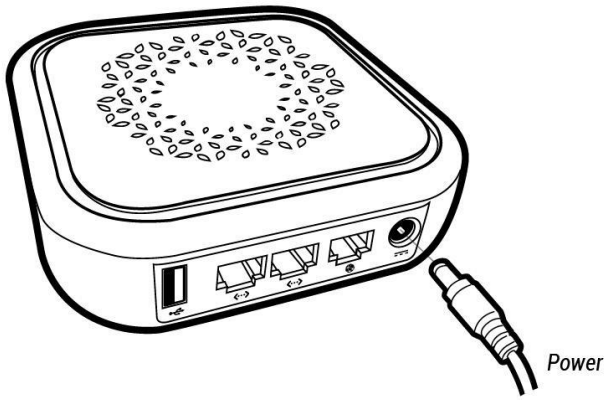
Interface	1 x WAN Ethernet port 2 x LAN Ethernet port 3 x LEDs 1 x USB 3.0 port
Memory / Storage	DDR3L 256MB / FLASH 32MB
CPU	IPQ4028 Quad-core ARM, @717MHz SoC
Antennas	Internal
Protocol	IEEE 802.11a/b/g/n/ac
Wi-Fi Speed	2.4GHz(400Mbps), 5GHz(867Mbps)
TX power	2.4GHz: 20dBm (11b) Max, 5GHz: 20dBm (11a) Max
Ethernet Port	3 x 10/100/1000M
LEDs	Wireless status indication / Mesh LED / Power supply
Power Input	12V/1.5A
PoE Support	PoE option works with either a standard based PoE switch OR power injector (48V). Upon request, Ariadne can provide the required PoE splitter for each device.
Power Consumption	<7W
Working Temperature	-20~40°C (-4~104°F)

Storage Temperature	-20~70°C (-4~158°F)
Dimension / Weight	117 x 117 x 35mm / 212

1.1.2 Device Installation

1.1.3 Power on

To use Ariadne's devices, it is required to plug the power cable into the power.



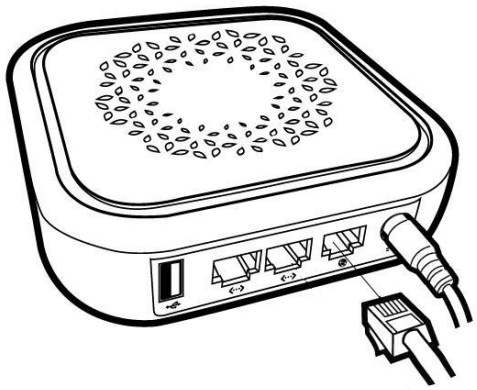
1.1.4 Connect

To send the captured data to the Cloud you need connect the Ariadne devices to the internet via Ethernet cable or Wi-Fi, or both, in which case one will be used as a backup. (Ethernet is prioritized)

You can connect an Ariadne device to a router via Ethernet cable or Wi-Fi.

1.1.4.1 Ethernet Connection

This step indicates how to connect your Ariadne devices to the internet through the local area network. All Ariadne devices are pre-configured to transmit data securely through the MQTT protocol to Ariadne's IoT cloud. Connect your Ariadne device to the modem or main router via Ethernet cable to access the Internet according to the screenshot below.



1.1.4.2 Wi-Fi Connection

This step indicates how to connect your Ariadne devices to the internet through a Wi-Fi SSID.

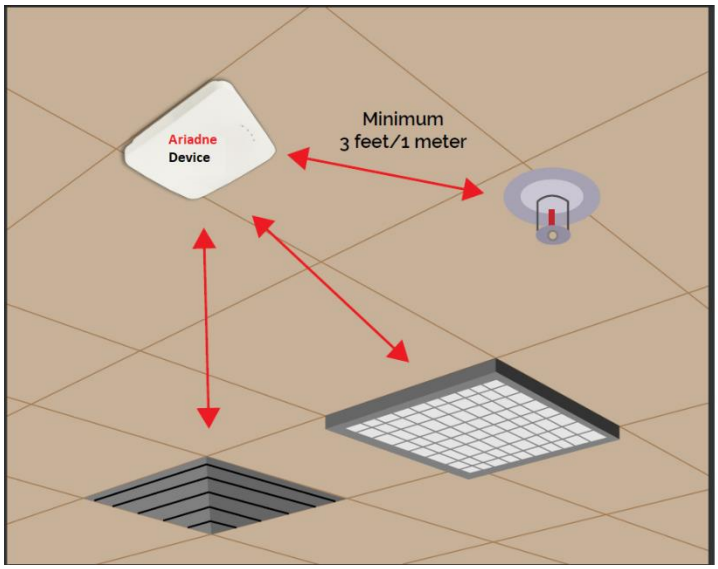
All Ariadne devices are pre-configured to connect to specific SSIDs for configuration and troubleshooting. The details and credentials for these SSIDs can be shared by Ariadne before the installation of the Ariadne devices in the areas of interest, so that you can create the corresponding Wi-Fi network infrastructure.

To connect the Ariadne devices to a different Wi-Fi network, the configuration and credentials for the desired network should be shared with the Ariadne team before the shipment of the Ariadne devices.

1.1.5 Device Location

Ariadne will provide surveyor devices to be installed in the desired location according to the floor plan.

It is suggested to place the Ariadne devices on the ceiling at clearly marked locations indicated on the floor plan.



If needed, Ariadne provides a mounting bracket for either ceiling or wall mounting that allows for optimal positioning of the Ariadne devices. It's a white square accessory that is easy to fix on the wall or ceiling.

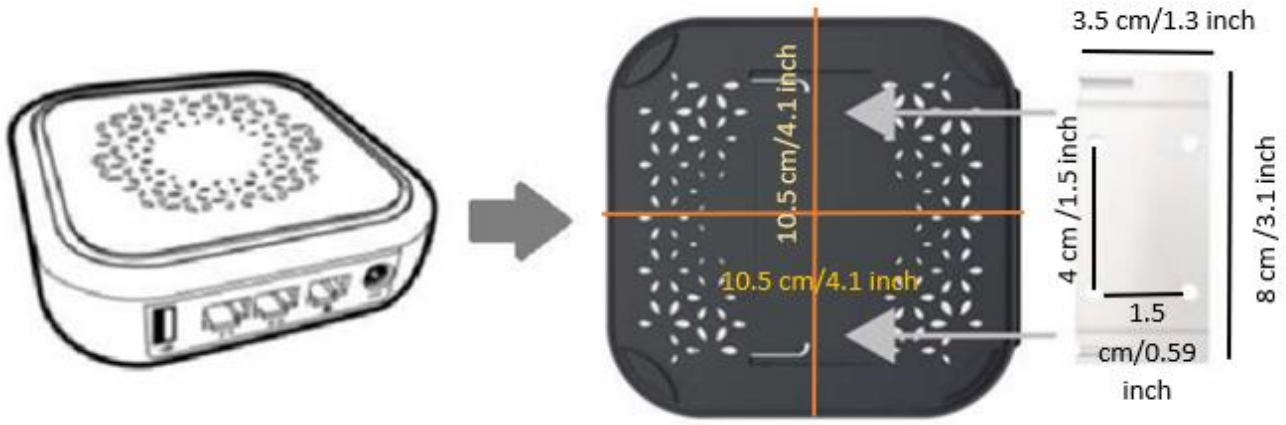


Figure 1 Wall Mount Measurement

If necessary, Ariadne also offers waterproof cases to ensure the protection of our devices.

Figure 2 Waterproof cases

1.1.6 Network Requirements

We have monitored the historical data in several projects, and we noticed that each of the Ariadne devices usually streams ~ 1kB per second. However, there are periods where a device may transmit a message up to 5kB. This number is related to the number and type of devices located inside an area.

It is recommended that, for X devices, the following requirements should be ensured:

Traffic consumption(M/S) * = X devices * 1kB/sec
Bandwidth requirement(M/S) * = X devices * 5kB/sec.

1.1.7 Firewall Requirements

The general firewall requirements are described below. A more specific firewall configuration can be shared by Ariadne before the shipment of the surveyors.

Preferably allow all outbound traffic. If that's not possible then the following outbound connections are necessary for the optimal operation of the corresponding device.

Allow TCP traffic to

- a2yr2xb63ny7rm-ats.iot.eu-central-1.amazonaws.com port 8883
- a2yr2xb63ny7rm-ats.iot.ca-central-1.amazonaws.com port 8883
- a2yr2xb63ny7rm-ats.iot.us-west-2.amazonaws.com port 8883
- mqtt.fra01.ariadnemaps.com port 8883
- dmma.ariadne.inc ports 443,4908

Allow UDP traffic to

- dmma.ariadne.inc ports 50000 to 53000
- 0.openwrt.pool.ntp.org port 123
- 1.openwrt.pool.ntp.org port 123
- 2.openwrt.pool.ntp.org port 123
- 3.openwrt.pool.ntp.org port 123

Also, NTP traffic: port 123/UDP to:
0.openwrt.pool.ntp.org,
1.openwrt.pool.ntp.org,
2.openwrt.pool.ntp.org,
3.openwrt.pool.ntp.org

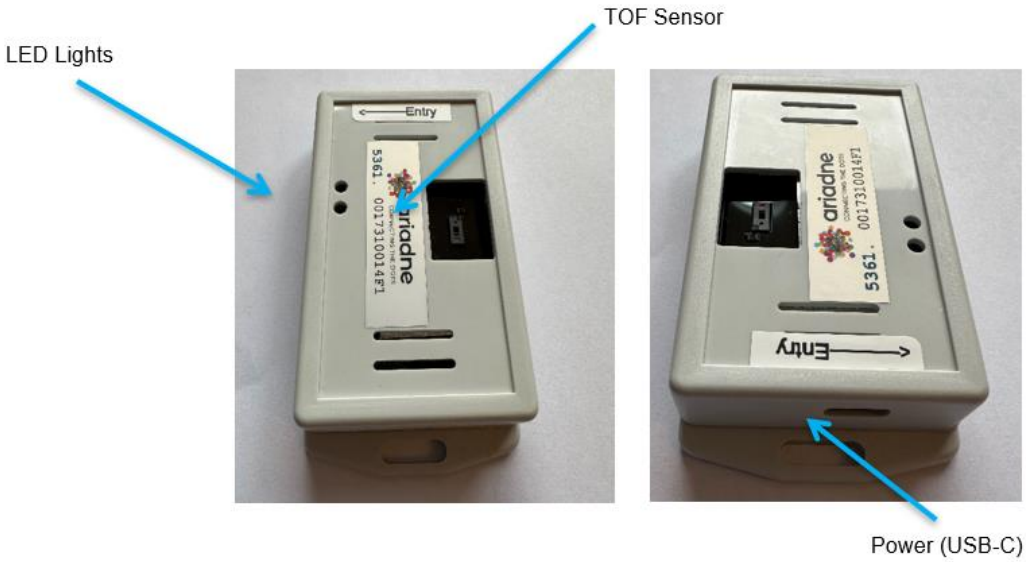
or *.openwrt.pool.ntp.org

1.2 Ariadne Time of Flight (ToF) Devices

Ariadne provided several types of ToF devices

1.2.1 Ar201mtof Device

1.2.1.1 Device Specifications



Interface:	1xUSB Power Input / USB-Ethernet Converter
CPU:	Mediatek MT7628A SoC @580Mhz
Memory / Storage:	128MB DDR2 / 16MB NOR Flash
Wireless protocol:	IEEE 802.11a/b/g/n/ac
Wi-Fi Speed:	400Mbps(2.4GHz), 867Mbps(5GHz)
Antennas:	2T2R, Internal
LEDs:	Power/Streaming Status, Internet Status
ToF Sensor:	VL53L5CX - Multizone ranging output with either 4x4 or 8x8 separate zones - Up to 300 cm ranging - Multitarget detection and distance measurement in each zone - 60 Hz frame rate capability - Fully integrated miniature module with wide field of view (FoV)
Power Input:	5V 1.5A
Power Consumption:	<7 W
Physical Dimensions:	88 x 45 x 15 mm

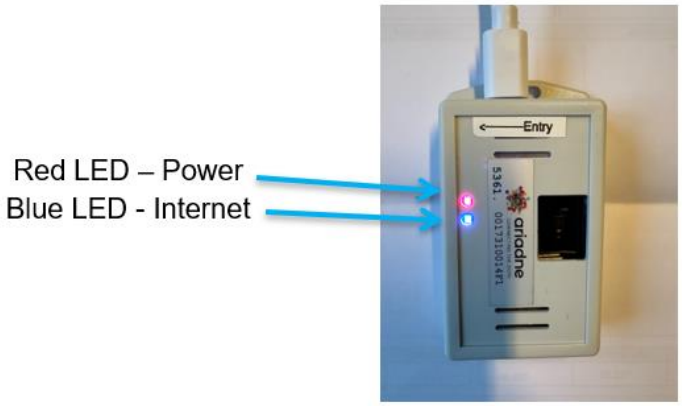
1.2.1.2 Power

The device must be connected to power to operate. Power is provided through the USB-C power port on one end of the device. Power may come from a standard USB-C cable or power over ethernet (POE) with the required POE to USB-C

splitter/adapter. When successfully connected to power, the LED closest to the power port will be lit **RED**.

1.2.1.3 Network Connection

To transmit data to the Ariadne solution, the device must be connected to the network with Wi-Fi, using the network credentials provided to Ariadne that provide access to the internet. When successfully connected to the designated Wi-Fi and internet, the LED next to the power LED will be lit Blue.



1.2.1.1 Firewall requirements

Allow TCP traffic to

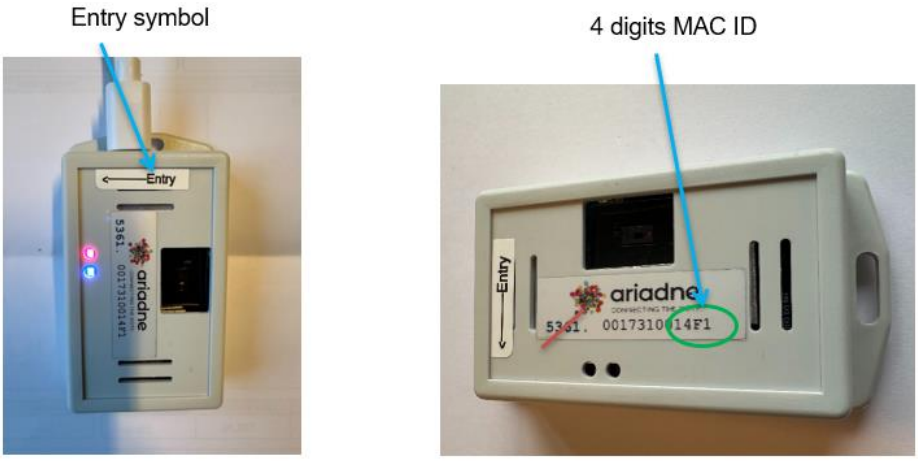
- 18.184.235.102 ports 80,443,5001
- a2yr2xb63ny7rm-ats.iot.eu-central-1.amazonaws.com port 8883

Allow UDP traffic to

- pool.ntp.org port 123
- de.pool.ntp.org port 123
- us.pool.ntp.org port 123

1.2.1.2 ToF Function-Specific Installation Requirements

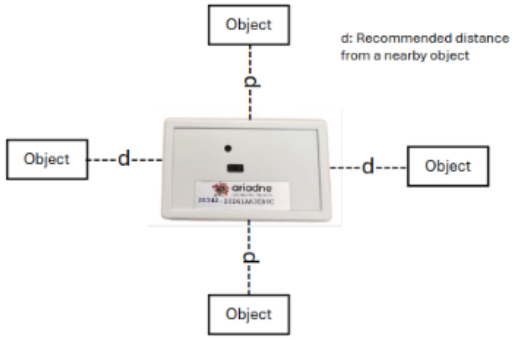
- The device should be installed between 2 to 2.8 meters above the floor. The field of view (FoV) for an installation that is 2.8 meters from the floor is approximately 1.6x1.6 meters. It is recommended to install sensors of a maximum of 1.8 meters of entrance width.
- Avoid installation in locations subject to direct sunlight.
- The device should be installed horizontally to the floor and level, being parallel to the floor.
- Avoid any stationary objects in the TOF field of view.
- The device should be installed with the “Entry” symbol aligned with the flow of traffic beneath the device.
- The last 4 digits of the MAC Address are the needed for our system, as shown in the picture.

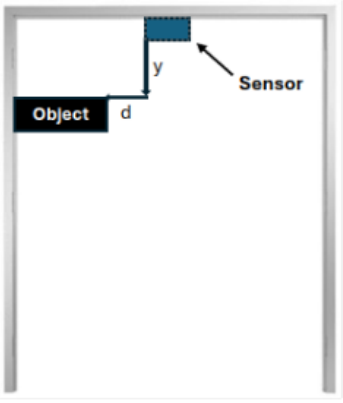


To achieve optimal performance, it is essential to install the sensor in a way that ensures its field of view remains unobstructed by any objects. The table below outlines the recommended clearances required to maintain a "no object" zone, depending on the distance from the sensor.

Recommended installation distance for ToF devices from a nearby object

Object Distance (y in millimeter)	Recommended distance (d in millimeter) from a nearby object
100	102
200	143
300	184
400	226
500	267
600	309
700	350
800	392
900	433
1000	474
1100	516
1200	557
1300	599
1400	640
1500	682
1600	723
1700	764
1800	806
1900	847
2000	889
2100	930
2200	972
2300	1013
2400	1054
2500	1096





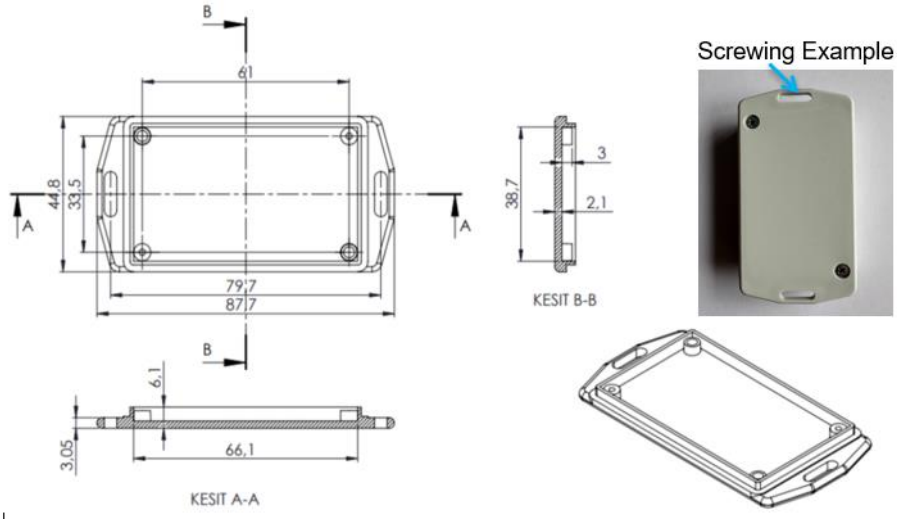
1.2.1.3 ToF Wall Mounting Process

The device is easy to mount, due to its small size and weight. Installation can be done in several ways.

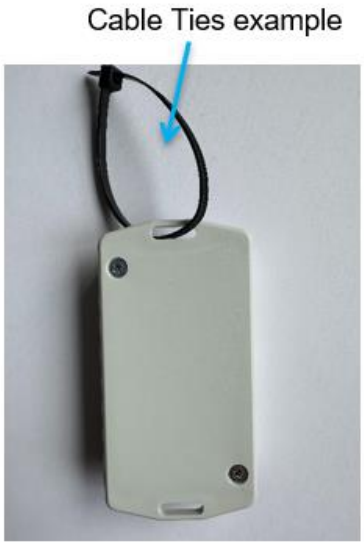
1. Use double-sided tape as shown below, or other desired installation methods. Initially, the device can be placed in the ceiling or other required place by using Double-Sided Tape as mounting accessories.

Double-sided tape example

2. We can also use a small screw to screw up the devices in the ceiling or other required places. The devices have both side screwing holes.



3. We can also use cable ties for the installation of the devices instead of using screws. This installation process we can not use for celling installation but we can tie the devices to other required places.



1.2.2 VS135-P Device

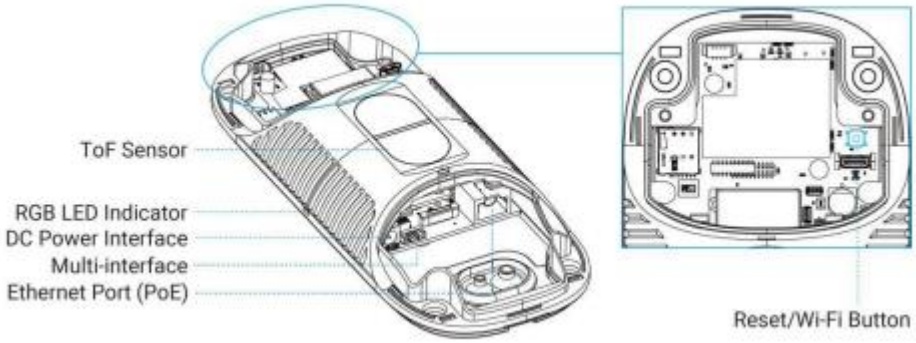
1.2.2.1 Device Specifications

Interface:	1 × Wi-Fi/Reset Button / 1 × DC Jack Connector/ 1 × RJ45 (PoE PD)
Network protocol:	HTTP, HTTPS, MQTT, MQTTS, NTP, 802.1x, SSH, LLDP, etc.
Wi-Fi Speed:	10/100 Mbps (PoE PD)
LEDs:	1 × RGB LED Indicator

ToF Sensor:	- ToF FoV : 98 ° Horizontal, 80 ° Vertical - Up to 4 counting lines for bi-directional people counting - Detection Range from 1.84x1.34 meters - Up to 4 detection areas (up to 10 sides for each area) - ToF Light Beam 940nm (Invisible) - Fully integrated miniature module with wide field of view (FoV)
Power Input:	802.3at PoE+or DC 12V/2A
Power Consumption:	Standard Version: Avg. 8W, Max. 17W. High Ceiling: Avg. 10W, Max 24W
Physical Dimensions:	200 × 35 × 85 mm

1.2.2.2 Network Connection

This step indicates how to connect your Ariadne devices to the internet through the local area network. All Ariadne devices are pre-configured to transmit data securely through the MQTT protocol to Ariadne's IoT cloud. Connect your Ariadne device to the modem or main router via Ethernet cable to access the Internet according to the screenshot below.



Firewall Requirements:

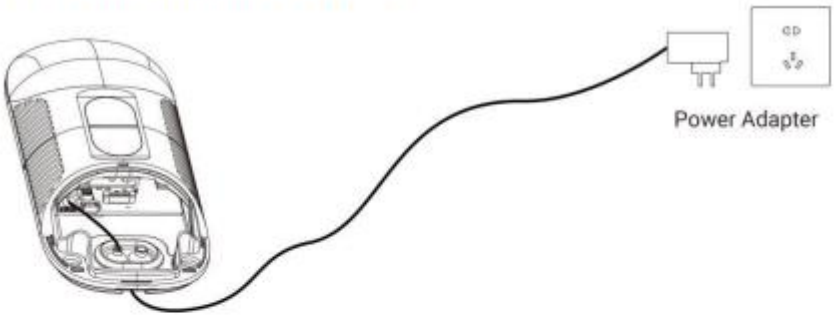
Allow TCP traffic to
- 18.184.235.102 ports 80,443
- a2yr2xb63ny7rm-ats.iot.eu-central-1.amazonaws.com port 8883

Allow UDP traffic to
- pool.ntp.org port 123

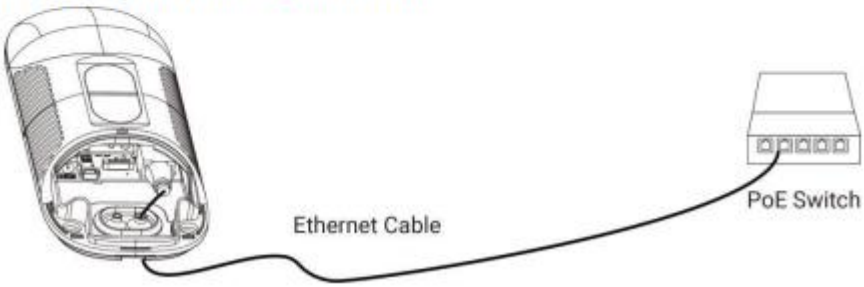
1.2.2.3 Power

The device must be connected to power to operate. Power is provided through the DC interface on one end of the device. The VS135-P can be powered by PoE Switch (802.3at standard), with a DC Power Adapter (12V,2A) or by PoE Injector (802.3at standard). Choose one of the following methods to power up the device.

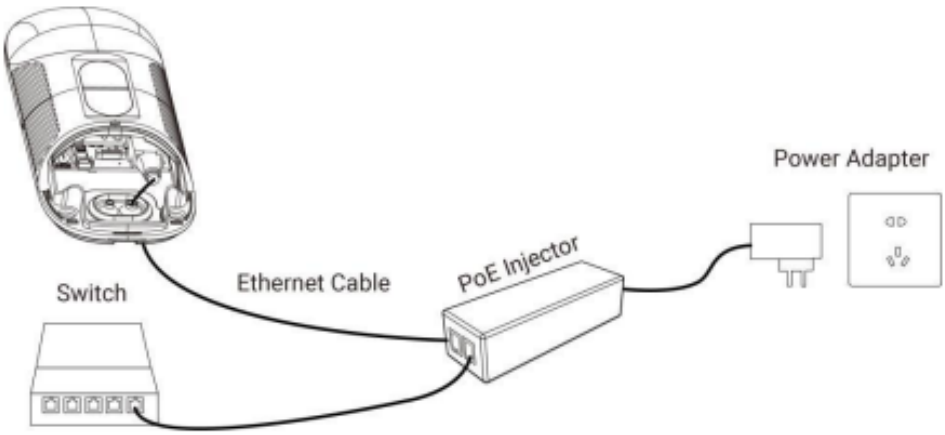
- **Powered by DC Power Adapter (12V, 2A)**



- **Powered by PoE Switch (802.3at standard)**

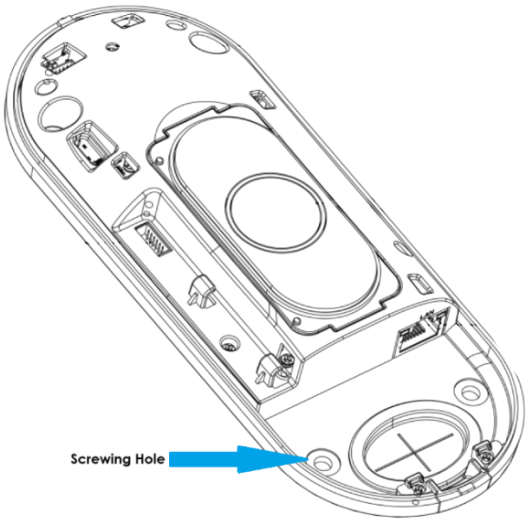


- **Powered by PoE Injector (802.3at standard)**

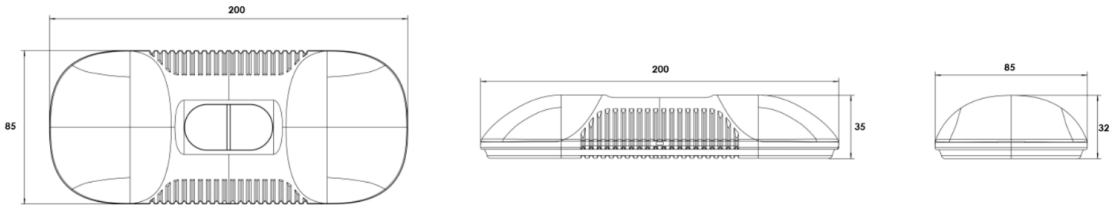


1.2.2.4 TOF Wall Mounting Process

The device is easy to mount, due to its small size and weight. Installation can be done using the screws we have in the package to screw up the devices in the ceiling or other required places. The devices have both side screwing holes.



Device Dimension



Monitored Area per Installation Height (m).

The detection area varies based on the sensor's installation height, as outlined in the table below. For accurate counting, the sensor can only operate within the designated detection area specified for a given height. Note that the device should be installed at a height between 2.5 meters and 3.5 meters.

Standard Version:

Installation Height (m)	Monitored Area (m)	Detection Area(m)
2.5	5.75 × 4.20	1.84 × 1.34
2.6	5.98 × 4.36	2.07 × 1.51
2.7	6.21 × 4.53	2.30 × 1.68
2.8	6.44 × 4.70	2.53 × 1.85
2.9	6.67 × 4.87	2.76 × 2.01
3.0	6.90 × 5.03	2.99 × 2.18
3.1	7.13 × 5.20	3.22 × 2.35
3.2	7.36 × 5.37	3.45 × 2.52
3.3	7.59 × 5.54	3.68 × 2.69
3.4	7.82 × 5.71	3.91 × 2.85
3.5	8.05 × 5.87	4.14 × 3.02

High Ceiling Version:

The detection area varies based on the sensor's installation height, as outlined in the table below. For accurate counting, the sensor can only operate within the designated detection area specified for a given height. Note that the device should be installed at a height between 3.5 meters and 6.5 meters.

Installation Height (m)	Monitored Area (m)	Detection Area(m)
3.5	4.04 x 2.90	2.08 x 1.49
3.7	4.27 x 3.07	2.31 x 1.66
3.9	4.50 x 3.23	2.54 x 1.82
4.1	4.73 x 3.40	2.77 x 1.99
4.3	4.97 x 3.56	3.00 x 2.15
4.5	5.20 x 3.73	3.23 x 2.32
4.7	5.43 x 3.89	3.46 x 2.49
4.9	5.66 x 4.06	3.70x 2.65
5.1	5.89 x 4.22	3.93 x 2.82
5.3	6.12 x 4.39	4.16 x 2.98
5.5	6.35 x 4.56	4.39 x 3.15
5.7	6.35 x 4.72	4.62 x 3.31
5.9	6.81 x 4.89	4.85 x 3.48
6.1	7.04 x 5.05	5.08 x 3.65
6.3	7.27 x 5.22	5.31 x 3.81
6.5	7.51 x 5.38	5.54 x 3.98

1.2.3 VS133-P Device

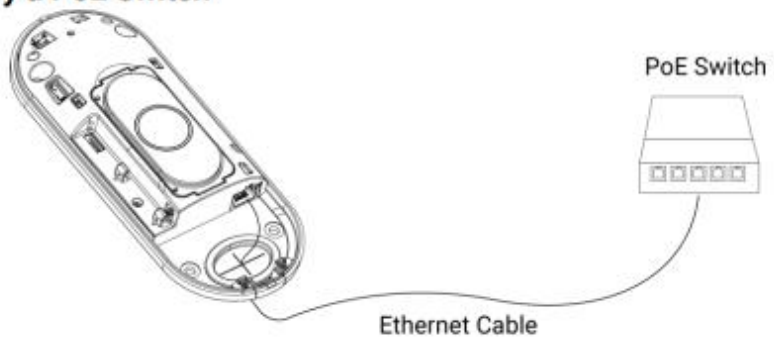
1.2.3.1 Device Specifications

Interface:	1 x Reset Button / 1 × RJ45 (PoE PD)
Network protocol:	HTTP(S), MQTT(S), NTP, 802.1x, SSH, LLDP, BACnet/IP, etc.
Wi-Fi Speed:	10/100 Mbps (PoE PD)
LEDs:	1 × RGB LED Indicator
ToF Sensor:	- ToF FoV : 98 ° Horizontal, 80 ° Vertical - Up to 4 counting lines for bi-directional people counting - Detection Range from 1.84x1.34 meters - Up to 4 detection areas (up to 10 sides for each area) - ToF Light Beam 940nm (Invisible) - Fully integrated miniature module with wide field of view (FoV)
Power Input:	802.3at PoE+
Power Consumption:	Typical 9.4W, max 23.8W
Physical Dimensions:	180 × 26 × 72 mm

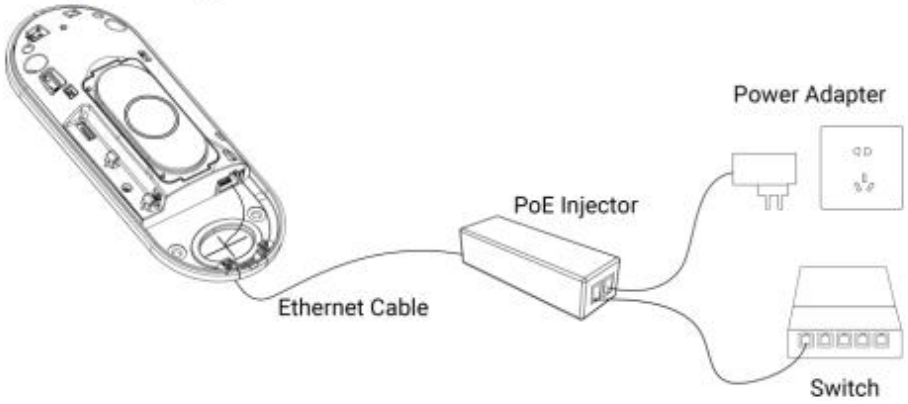
1.2.3.2 Power

The device must be connected to power to operate. Power is provided through the Ethernet interface (PoE) on one end of the device. The VS133-P can be powered by PoE Switch (802.3at standard) or by PoE Injector (802.3at standard). Choose one of the following methods to power up the device.

- **Powered by a PoE Switch**



- **Powered by a PoE Injector**



1.2.3.3 Network Connection

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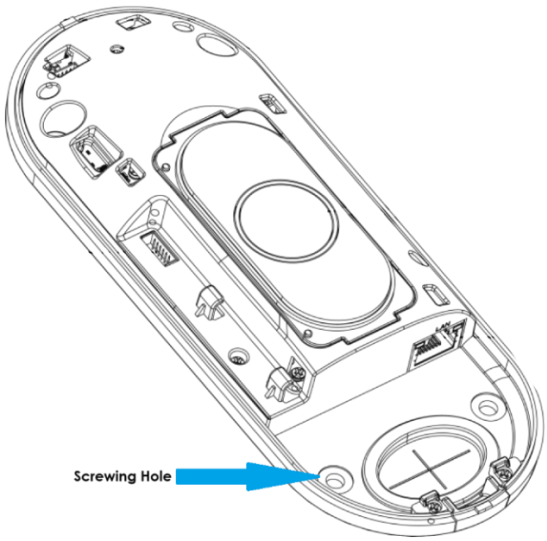
Firewall Requirements:

Allow TCP traffic to
- 18.184.235.102 ports 80,443
- a2yr2xb63ny7rm-ats.iot.eu-central-1.amazonaws.com port 8883

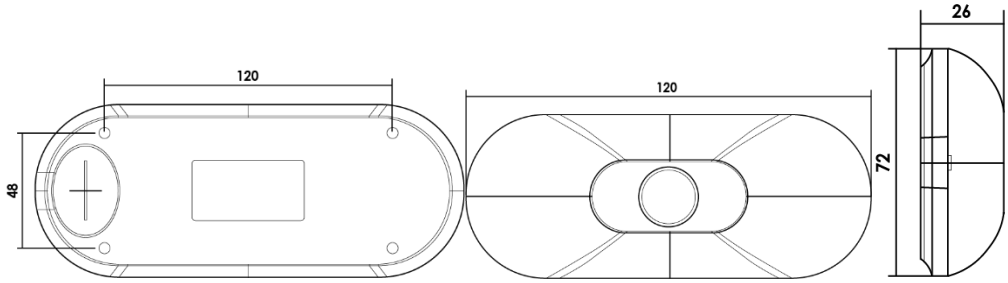
Allow UDP traffic to
- pool.ntp.org port 123

1.2.3.4 TOF Wall Mounting Process

The device is easy to mount, due to its small size and weight. Installation can be done using the screws we have in the package to screw up the devices in the ceiling or other required places. The devices have both side screwing holes



Device Dimension



Monitored Area per Installation Height (m).

The detection area varies based on the sensor's installation height, as outlined in the table below. For accurate counting, the sensor can only operate within the designated detection area specified for a given height. Note that the device should be installed at a height between 2.5 meters and 3.5 meters.

Installation Height (m)	Monitored Area (m)	Detection Area(m)
2.5	5.75 × 4.20	1.84 × 1.34
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3.4	7.82 × 5.71	3.91 × 2.85
3.5	8.05 × 5.87	4.14 × 3.02

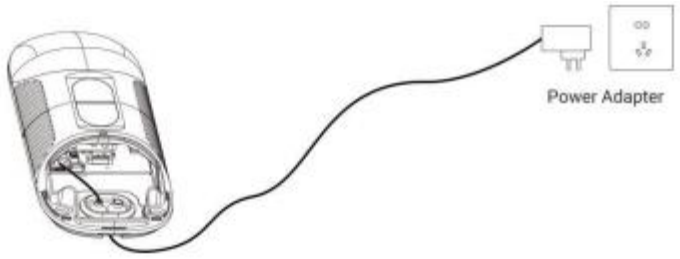
1.2.4 VS135-L08EU sim Device

1.2.4.1 Device Specifications

Interface:	1 x Reset / Wi-Fi Button / 1 × DC Jack Connector / 1 x Nano Sim Slot
Network protocol:	HTTP, HTTPS, MQTT, MQTTS, NTP, SSH, etc.
Wi-Fi:	IEEE 802.11 b/g/n, 2.4GHz (AP mode for configuration)
Frequency Band:	LTE (CAT 4): B1/B3/B7/B8/B20/B28 WCDMA:B1/B8 GSM:B3/B8
LEDs:	1 × RGB LED Indicator
ToF Sensor:	- ToF FoV : 98 ° Horizontal, 80 ° Vertical - Up to 4 counting lines for bi-directional people counting - Detection Range from 1.84x1.34 meters - Up to 4 detection areas (up to 10 sides for each area) - ToF Light Beam 940nm (Invisible) - Fully integrated miniature module with wide field of view (FoV)
Power Input:	DC12V/2A
Power Consumption:	Standard Version: Avg. 8W, Max. 17W. High Ceiling: Avg. 9W, Max 22W
Physical Dimensions:	200 × 35 × 85 mm

1.2.4.2 Power

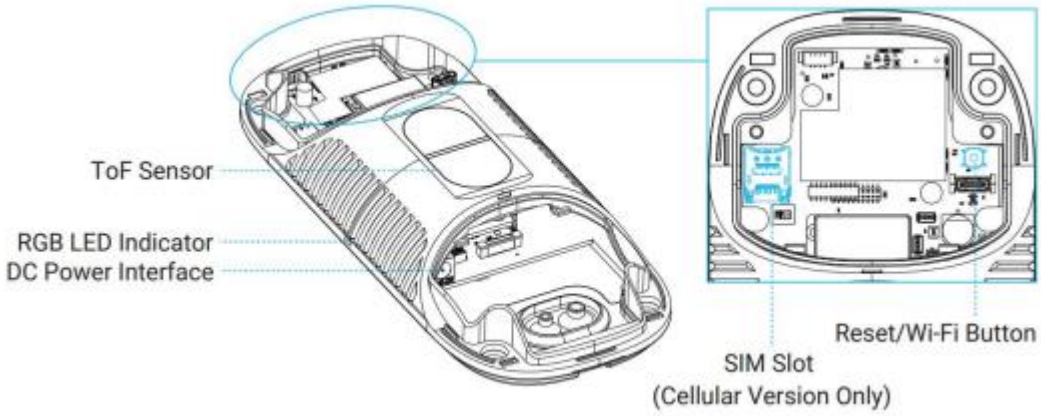
The device must be connected to power to operate. Power is provided through the DC interface on one end of the device. Can be powered by power adapter (12VDC, 2A)



1.2.4.3 Network Connection

To send the captured data to the Cloud, each device is equipped with a Nano SIM card. These SIM cards enable the devices to connect to cellular networks, ensuring reliable data transmission even in areas without Wi-Fi or Ethernet access. The pre-installed SIM cards are configured to work with the best available network, providing seamless and secure communication with Ariadne's IoT cloud.

Ensure the Nano SIM card is properly installed and activated to maintain continuous data flow and optimal device performance.



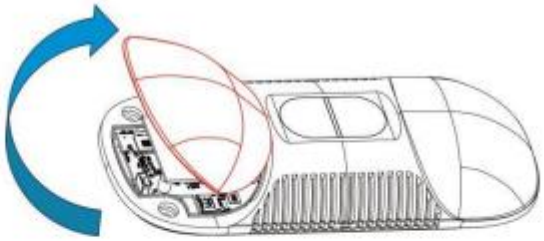
Firewall Requirements:

Allow TCP traffic to
- 18.184.235.102 ports 80,443
- a2yr2xb63ny7rm-ats.iot.eu-central-1.amazonaws.com port 8883

Allow UDP traffic to
- pool.ntp.org port 123

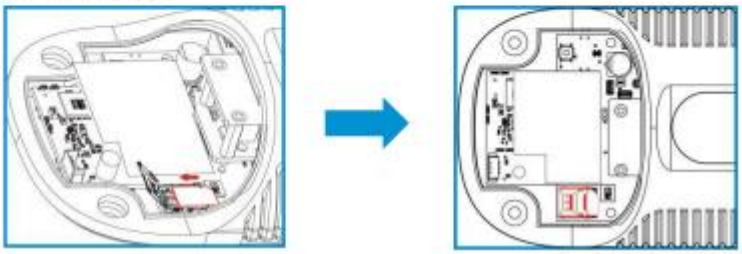
SIM card Installation

Step 1: Take down the side covers.



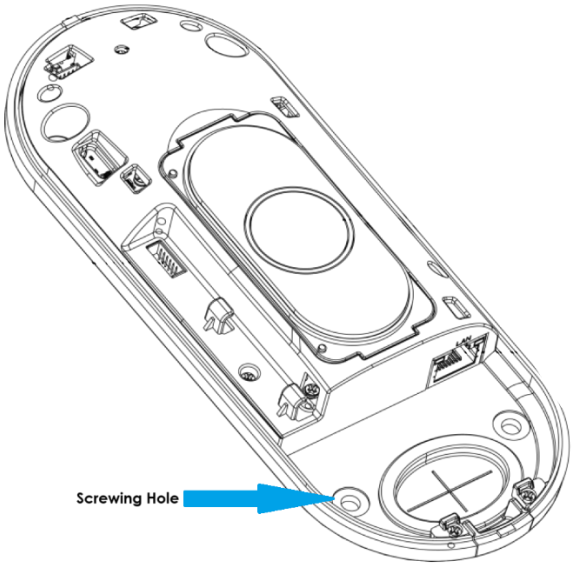
Step 2: Open the slot cover, insert SIM card (3FF).

Step 3: Restore slot cover back.

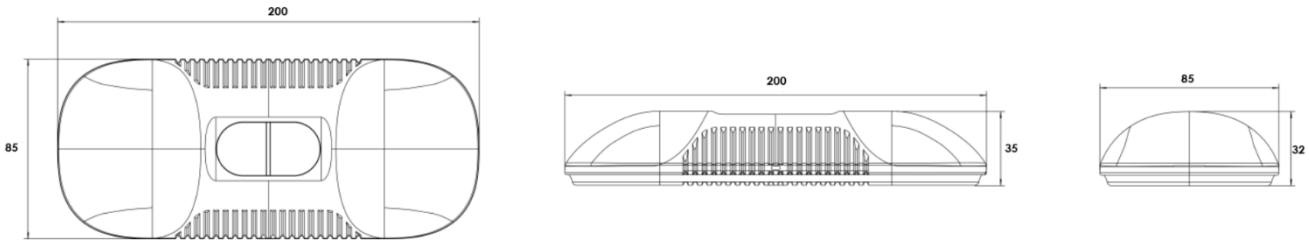


1.2.4.4 TOF Wall Mounting Process

The device is easy to mount, due to its small size and weight. Installation can be done using the screws we have in the package to screw up the devices in the ceiling or other required places. The devices have both side screwing holes



Device Dimension



Monitored Area per Installation Height (m).

Standard Version:

The detection area varies based on the sensor's installation height, as outlined in the table below. For accurate counting, the sensor can only operate within the designated detection area specified for a given height. Note that the device should be installed at a height between 2.5 meters and 3.5 meters.

Installation Height (m)	Monitored Area (m)	Detection Area(m)
2.5	5.75 × 4.20	1.84 × 1.34
2.6	5.98 × 4.36	2.07 × 1.51
2.7	6.21 × 4.53	2.30 × 1.68
2.8	6.44 × 4.70	2.53 × 1.85
2.9	6.67 × 4.87	2.76 × 2.01
3.0	6.90 × 5.03	2.99 × 2.18
3.1	7.13 × 5.20	3.22 × 2.35
3.2	7.36 × 5.37	3.45 × 2.52
3.3	7.59 × 5.54	3.68 × 2.69
3.4	7.82 × 5.71	3.91 × 2.85
3.5	8.05 × 5.87	4.14 × 3.02

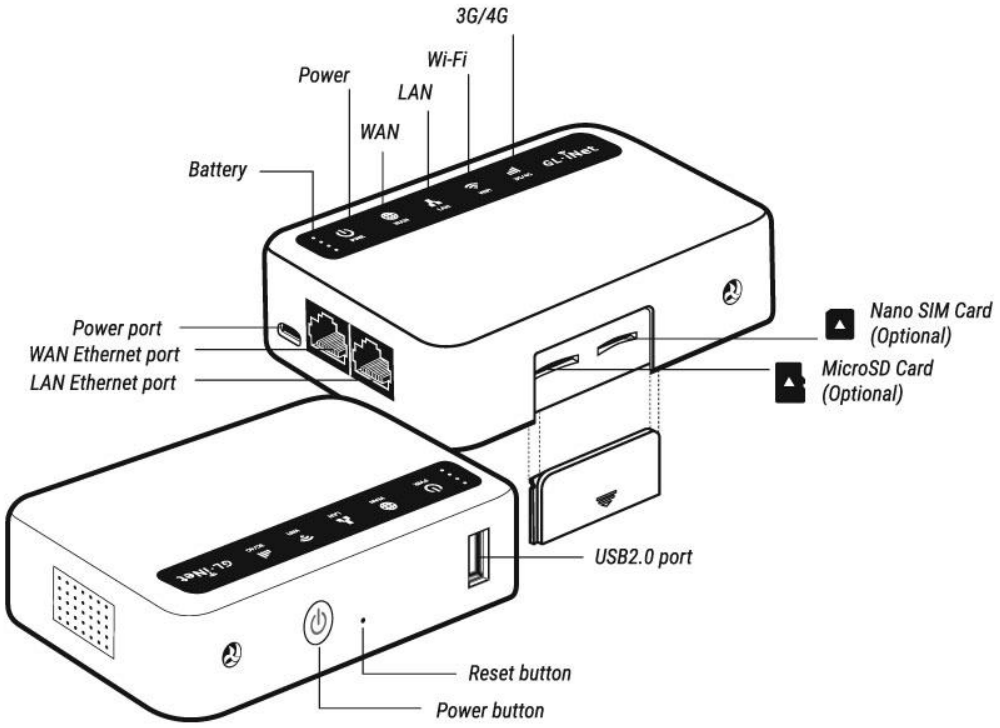
High Ceiling Version:

The detection area varies based on the sensor's installation height, as outlined in the table below. For accurate counting, the sensor can only operate within the designated detection area specified for a given height. Note that the device should be installed at a height between 3.5 meters and 6.5 meters.

Installation Height (m)	Monitored Area (m)	Detection Area(m)
3.5	4.04 x 2.90	2.08 x 1.49
3.7	4.27 x 3.07	2.31 x 1.66
3.9	4.50 x 3.23	2.54 x 1.82
4.1	4.73 x 3.40	2.77 x 1.99
4.3	4.97 x 3.56	3.00 x 2.15
4.5	5.20 x 3.73	3.23 x 2.32
4.7	5.43 x 3.89	3.46 x 2.49
4.9	5.66 x 4.06	3.70x 2.65
5.1	5.89 x 4.22	3.93 x 2.82
5.3	6.12 x 4.39	4.16 x 2.98
5.5	6.35 x 4.56	4.39 x 3.15
5.7	6.35 x 4.72	4.62 x 3.31
5.9	6.81 x 4.89	4.85 x 3.48
6.1	7.04 x 5.05	5.08 x 3.65
6.3	7.27 x 5.22	5.31 x 3.81
6.5	7.51 x 5.38	5.54 x 3.98

1.3 Ariadne SIM Card Devices

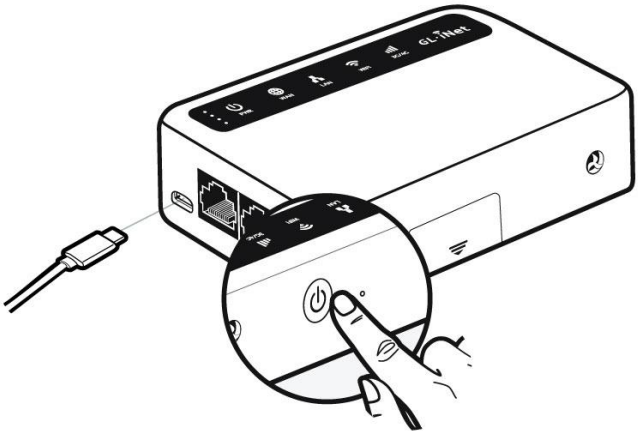
1.3.1 Device Specifications



Interface:	1 x WAN Ethernet Port 1 x LAN Ethernet Port 1 x USB 2.0 port 1 x MicroSD card slot (Up to 512GB) 1 x Nano SIM card slot 1 x Reset button 1 x Type-C power port
CPU:	QCA9531, @650MHz SoC
Memory / Storage:	DDR2 128MB / NOR Flash 16MB + NAND Flash 128MB
Wireless protocol:	IEEE 802.11b/g/n
Wi-Fi Speed:	300Mbps (2.4GHz)
Antennas:	2T2R, Internal
4G Antenna:	2 x Internal full-band antennas (700MHz ~ 2.7GHz)
Ethernet Speed:	10/100Mbps
LEDs:	4 x Power supply indicator, 1 x PWR status indicator, 1 x WAN status indicator, 1 x LAN status indicator, 1 x Wireless status indicator, 1 x 3G/4G status indicator
Power Input:	5V/2A (with battery), 5V/3A (without battery)
Power Consumption:	<4.4 W
Physical Dimensions:	120 x 74 x 28mm / 223.5g

1.3.2 Power

Press the power button to turn on and use Ariadne's GL-XE devices with built-in battery. Alternatively, you can plug the Micro USB-C power cable into the power port to power on the device and charge the built-in battery simultaneously. Ensure you are using a standard 5V/2A power adapter to avoid potential malfunctions.



1.3.3 Connect

To send the captured data to the Cloud, each device is equipped with a Nano SIM card. These SIM cards enable the devices to connect to cellular networks, ensuring reliable data transmission even in areas without Wi-Fi or Ethernet access. The pre-installed SIM cards are configured to work with the best available network, providing seamless and secure communication with Ariadne's IoT cloud.

Ensure the Nano SIM card is properly installed and activated to maintain continuous data flow and optimal device performance.

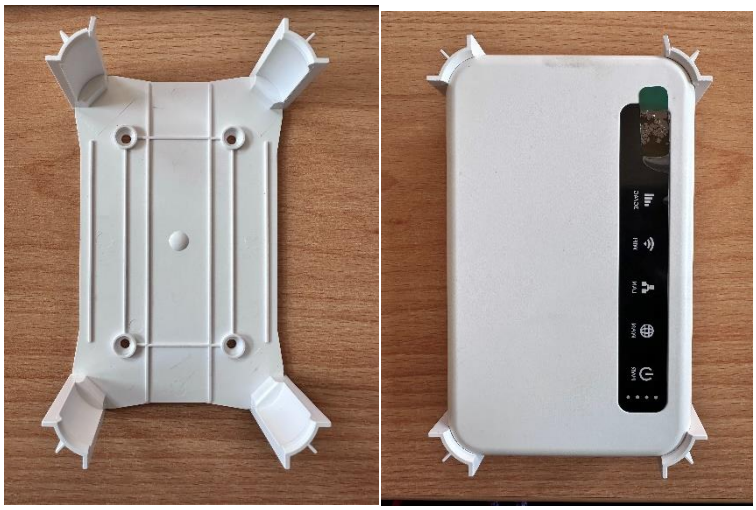
1.3.4 SIM Card Function-Specific Installation Requirements

- The device should ideally be installed at a height of 3 to 5 meters above the floor. Installation up to 6 meters is acceptable if clear placement is ensured to maintain optimal performance.

The last 4 digits of the MAC Address are required for our system configuration. Please refer to the picture below for guidance

1.3.5 Wall Mounting Process

Mounting the device is straightforward and hassle-free. We provide a bracket wall mount holder that ensures secure and stable installation. The bracket can be easily screwed into place, allowing you to set up your device quickly and efficiently. This design not only simplifies the mounting process but also ensures that your device is securely fastened and ready for optimal performance.



For detailed instructions and additional information on mounting the devices, please refer to Appendix C.

For installations in exterior locations, Ariadne offers waterproof cases to ensure the protection of our devices. These cases are designed to shield the devices from environmental elements such as rain, dust, and extreme temperatures, ensuring reliable performance in all conditions.

1.4 Easelink Solution

The EaseLink solution utilizes customers' existing access points as surveyors. There are three options for using these devices.

1.4.1 OpenWRT Devices

For devices running OpenWRT, we can:

- Build our firmware for the device
- Install required applications to stream data
- Use the device as an Ariadne surveyor

Compatible devices can be found in this link: https://openwrt.org/toh/start.

We have certain restrictions with compatible devices, at least 64MB RAM, 16MB storage and physical access for testing purposes.

1.4.2 Linux Devices (Non-OpenWRT)

For devices running Linux where building custom firmware is not possible:

- We can build and install our application only
- Requires more time for adaptation
- Use the device as an Ariadne surveyor

Our requirements for such devices are at least 5MB of free storage, 64MB RAM, kernel support for ieee80211 framework and physical access for testing purposes.

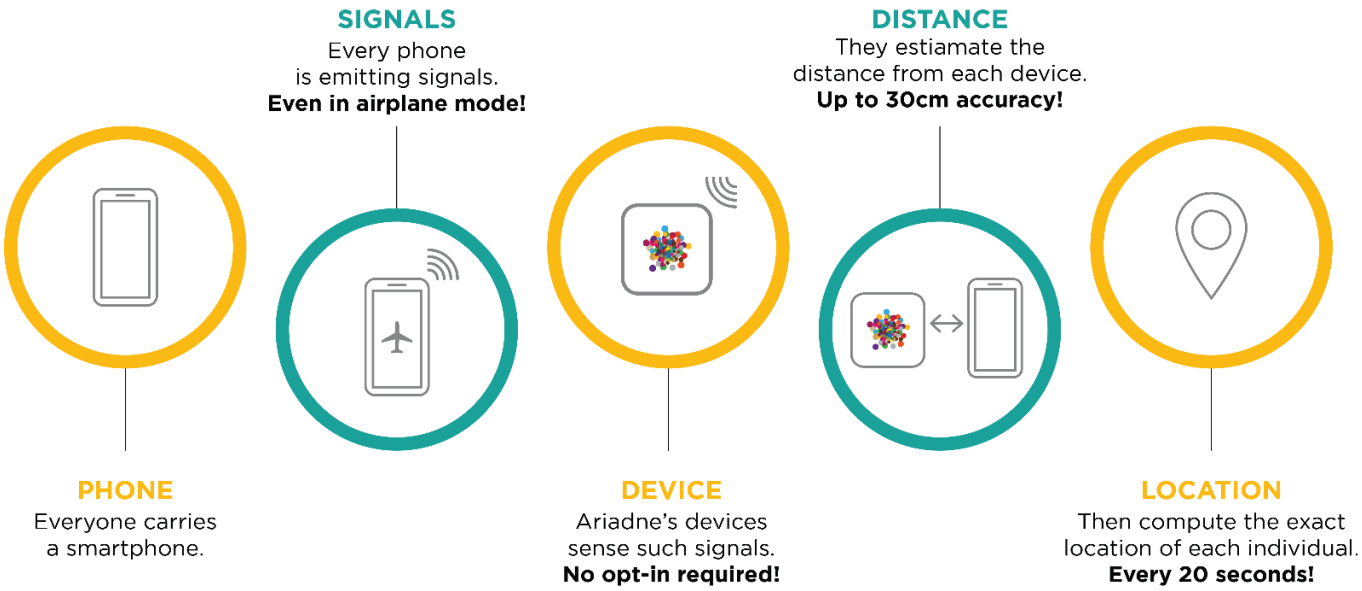
1.4.3 Complex Access Point / Controller Systems

For systems like Aruba, where changing firmware or installing applications is not possible:

- Configure access points to capture wireless packets and stream to a local computer (Ariadne Packet Analyzer)
- The local computer processes packets, generates data analysis, and streams to the cloud
- Achieves similar results to Ariadne surveyors

2 How it works

Ariadne's innovative AI-powered analytic technology can accurately count the number of visitors in your physical business. Our smart people counting device works by sending signals emitted by phones and it can uniquely determine the number of visitors in your business in real-time.



Its mission is to provide an equal advantage to physical businesses (e.g., brick-and-mortar businesses) to the one that digital business already has. More specifically, if one owns a digital business (e.g., a website), one can be aware at any time: (a) how many times the website appears in Google search, (b), how many clicks the website has, (c) what leads traffic to the website, and many more. On the other hand, if one owns a physical business (e.g., a clothes store), one cannot be aware of any information from the above. This is what Ariadne aims to provide.

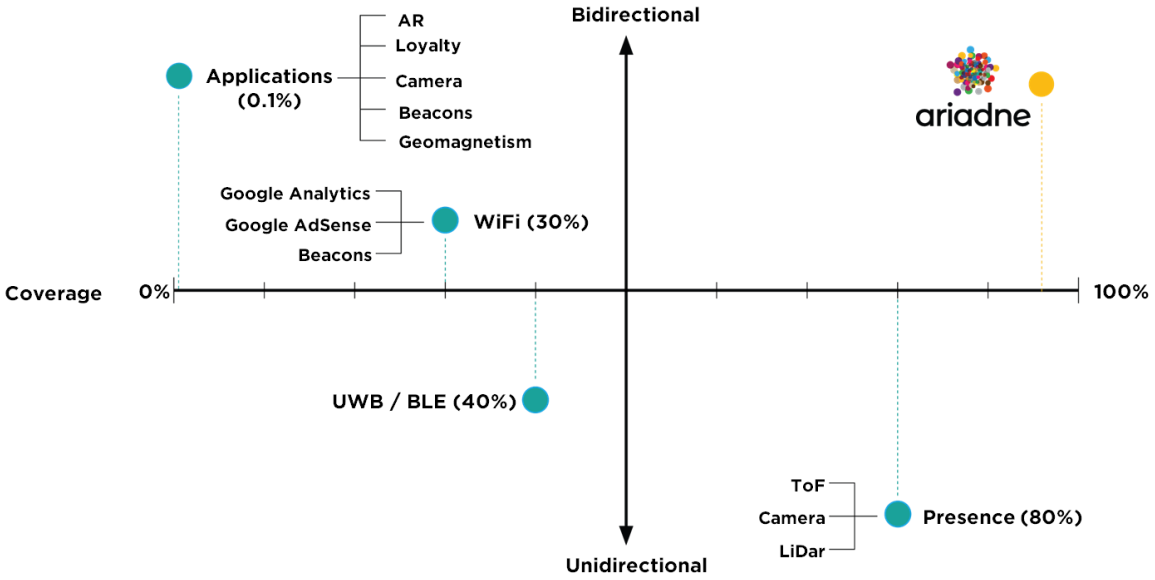
2.1 High Level Technology

Ariadne uses devices that can sense broadcast signals emitted by visitors' smartphones. All information collected from those signals is strictly anonymous and cannot be used to track the identity of the smartphone or the visitor. Specifically, Ariadne does not collect information like MAC Addresses, IMEI, or phone numbers that can uniquely identify individual phones.

Since Ariadne operates on smartphone signals it does not have common problems that legacy solutions suffer. For example, it is not sensitive to installation miss-locations, providing you the advantage of self-installation. Ariadne does not double count when your visitors or employees are moving in-and-out of your building. It does not count objects such as baby trolleys or supermarket carts. Instead, it counts smartphone devices which are always carried by people. As a result, it will never over- or under- count which enables you to better estimate the conversion rate of your business.

As per the disclosed information, Ariadne does not engage in the processing of any personally identifiable information (PII).

The information that Ariadne collects only provides an indication of the type of device used, which helps Ariadne better estimate the number of visitors (People Counting). The intensity of the signals can indicate the distance between the visitor and Ariadne's surveyors. By positioning multiple surveyors, multilateration is performed and the position of the visitor can be approximated. Ariadne improves the approximation by enhancing it with information that describes the geometry and the topology of the area.



Ariadne can precisely measure the time of stay of every visitor and it can identify phones that appear and disappear together, which enables you to quantify the group-size of your visitors. Ariadne is a GDPR-compliant technology, and it is privacy-certified by European Data Protection Authorities.

Ariadne has been benchmarked by the Indoor Positioning and Indoor Navigation Community*, and found to be more accurate than Google's ARCore, IBM's Beacon Based Tracking, and Samsung's IMU based localization, with over 95% accuracy in counting people and up to 1.4m median localization accuracy.

In addition to "People Counting," Ariadne performs various functions, including "Employee Scheduling", "Real-Time Tracking," "Push Notification," and "Navigation."

Ariadne will provide you with the optimal schedule for your employees that will enable you to maximize your sales conversion rate.

Ariadne's people counting solution can help you maximize the benefits of your business even further.

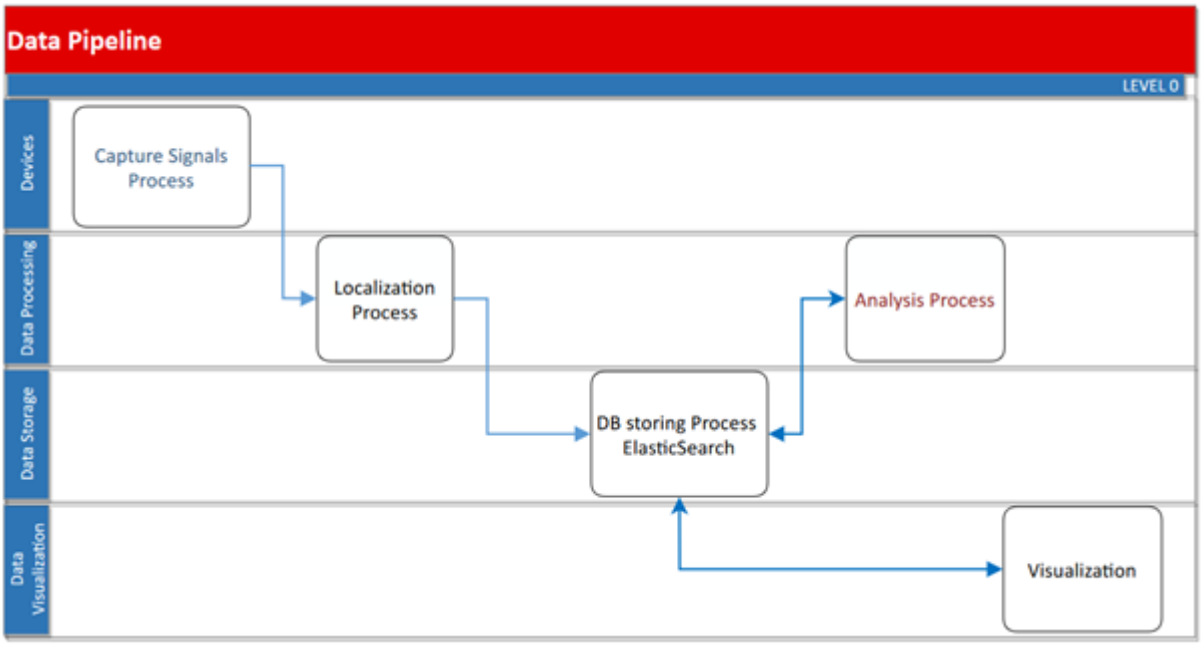
With Ariadne's push notification feature, you can market your product effectively and efficiently by targeting customers standing or passing by a specific area and sending push notifications to their smartphones.

You can even set occupancy thresholds that trigger actions such as automated voice messages or sending alerts to your employees, so you can enhance your visitors' experiences while optimizing costs.

Importantly, Ariadne executes these functions without engaging in common data processing or interaction.

2.2 The Data Lifecycle

The entire lifecycle of data performed by Ariadne consists of five main steps, the sensing and streaming of data by the **surveyors**, the **subscription** and **localization** components, and finally the **data analysis** component, where the computed aggregated data is stored **to a database** to be **visualized** in the dashboard, and hence be delivered to the customers.



2.2.1 Surveyors

In the first step of our hardware infrastructure are the Surveyor devices. The surveyors are devices able to sense signals emitted in frequency bands in 2.4 and 5 GHz. They collect the relevant anonymous information and stream it to the cloud server.

2.2.2 MQTT Subscriber

The MQTT subscriber is the first module that is executed on the cloud side. Its responsibility is to receive readings from all devices, group them to create small packets of data, called batches, into 10 seconds segments, and to create dictionaries of individually sensed signals with the corresponding signal strength (RSSI) and Surveyor ID.

The data transfer between the surveyor device and the cloud subscriber happens using the MQTT protocol and a publish/subscribe mechanism. All data is encrypted with TLS version 1.3. The authentication and authorization between the surveyors and the server is done using X.509 certificates which are installed on all devices.

2.2.3 The Distance Correction Component

Distances to Surveyor devices are estimated based on the RSSI calculated by the Surveyor but they contain some deviation from the actual (unknown) distances. To correct the error in the estimated distances, Surveyor signals and the geometry of the area of Surveyor installation are leveraged. More specifically, values for the current minimum possible distance and current maximum possible distance, derived from the size of the location covered, are calculated for each Surveyor. The estimated distances are then compared to the range specified by the minimum and maximum possible

distances and are corrected by increasing/decreasing them if they lie outside the minimum/maximum bound of the range.

2.2.4 The Localization Component

The localization component computes an estimate of the location of every individual signal captured, as well as uncertainty associated with the estimated location.

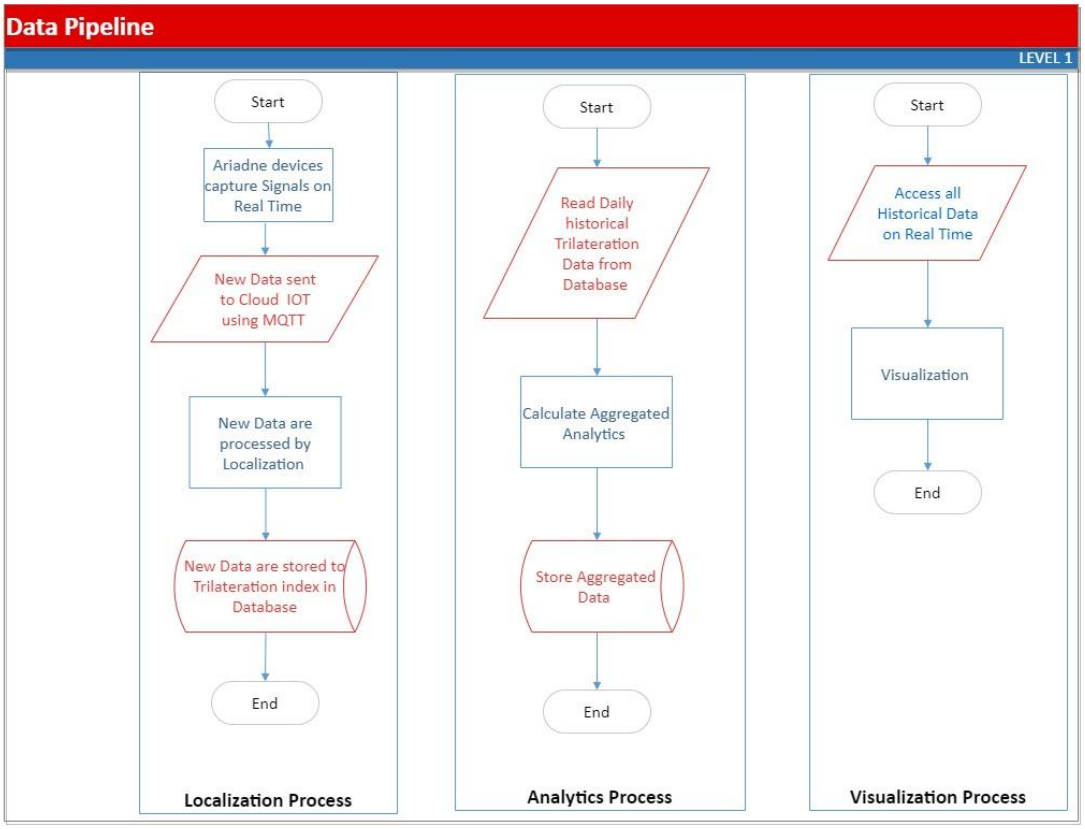
The output of the Localization Component is a location estimate and the associated uncertainty represented as a radius of a circle centered around the location estimate.

The location estimation algorithm used in the Localization Component leverages detected devices and their known installation positions, as well as distances estimated to the detected devices.

The uncertainty in the location estimate is calculated based on distances to detected devices as compared to the distance to the device with the strongest signal.

2.2.5 Data Analytics and Dashboard

The Data Analytics component is responsible for aggregating the data that will be eventually stored and shared with the customer.



2.2.6 Data Storage

Data is stored on a server located in Frankfurt, Germany and operated by Amazon Web Services Germany GmbH. AWS is equipped with all ISO certificates and regulations to secure the protection of the data. AWS has certification for compliance with ISO/IEC 27001:2013, 27017:2015, 27018:2019, and ISO/IEC 9001:2015.

Ariadne Maps GmbH has no outsourced partners, and hence no one else than Ariadne Maps GmbH can access the stored data. Ariadne Maps GmbH does not collect information that can be linked to an individual and it never stores information that corresponds to a single person. Additionally, Ariadne deletes all collected data at

regular intervals in agreement with the customer, to ensure the required quality of service. Ariadne Maps GmbH only stores aggregated data that cannot be linked to individuals and hence does not fall under GDPR.

Ariadne Maps GmbH has an alert protocol in place that immediately blocks access to non-authorized users and blocks access to all services in case of password leak. This protocol has already been tested.

2.2.6.1 Data retention and cleaning

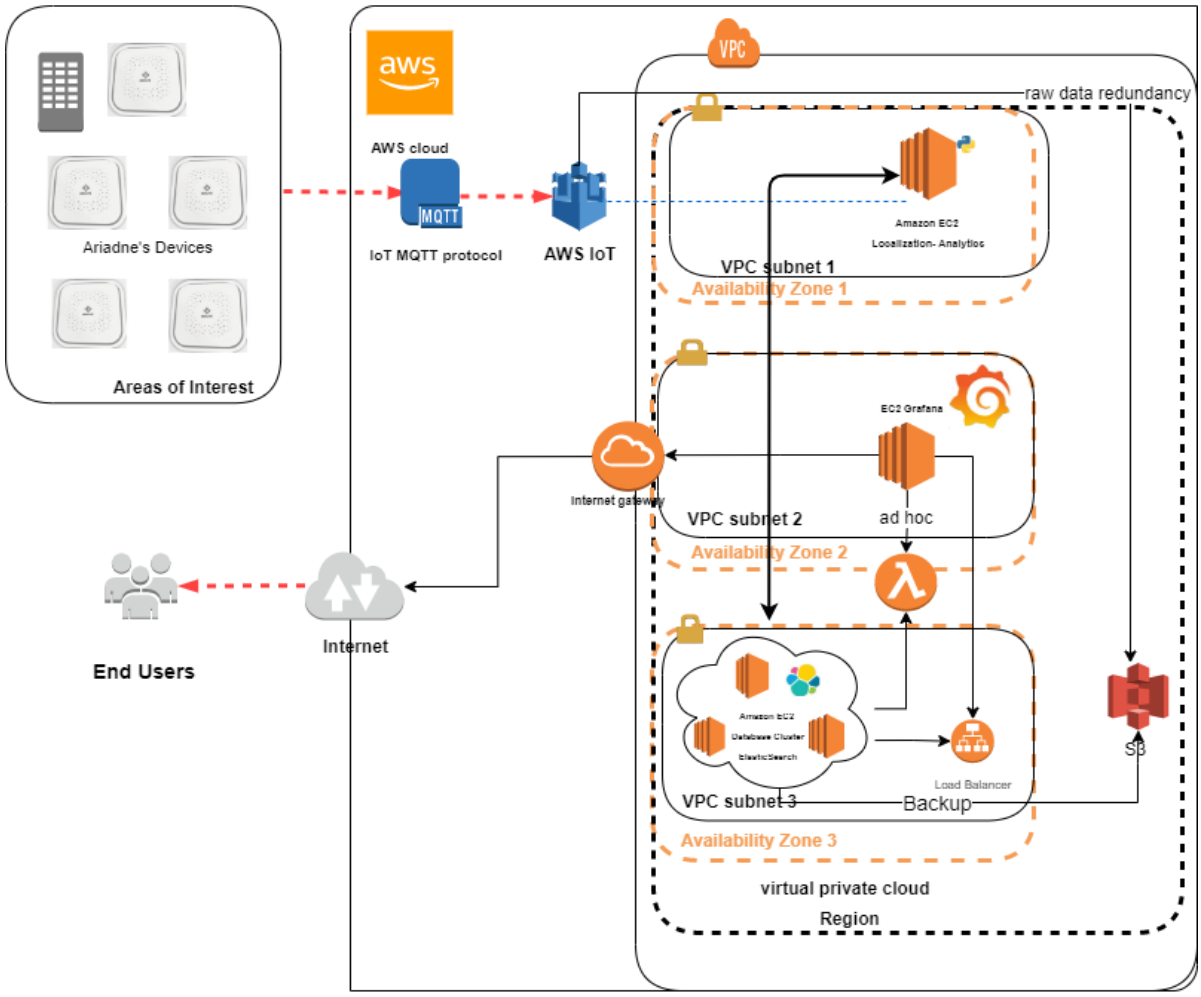
A retention policy is defined for raw data in the system. Data is backup up for 30 days and then securely archived after 60 days. Additionally, data will be deleted at agreed intervals or can be cleaned upon request.

2.2.6.2 Data encryption

All data is only stored in encrypted form. All data transfers take place over encrypted channels (e.g. HTTPS, SFTP). Secure channels are used for every data transfer. After every transmission, checks can be made to ensure data integrity. Encryption at rest is supported and enabled by default.

3 Architecture

The following diagram indicates the architecture of Ariadne's private cloud. The infrastructure is implemented in Amazon (AWS) cloud to connect Ariadne's devices and collect, store, and analyze devices' data.



3.1 AWS IoT Core

AWS IoT Core lets us connect IoT devices to the AWS cloud without the need to provision or manage servers. AWS IoT Core can support billions of devices and trillions of messages and can process and route those messages to AWS endpoints and to other devices reliably and securely. With AWS IoT Core, our application can keep track of and communicate with all your devices, all the time.

3.2 MQTT topic

MQTT topics identify AWS IoT messages. AWS IoT clients identify the messages they publish by giving the messages topic names. Clients identify the messages to which they want to subscribe (receive) by registering a topic filter with AWS IoT Core. The message broker uses topic names and topic filters to route messages from publishing clients to subscribing clients. The message broker uses topics to identify messages sent using MQTT and sent using HTTP to the HTTPS message URL.

The MQTT topics to aggregate the surveyor data are created and managed by Ariadne. AWS IoT uses the topics to identify messages received from publishing clients and select messages to send to subscribing clients.

3.3 Internet Gateway

An internet gateway is a horizontally scaled, redundant, and highly available VPC component that allows communication between your VPC and the internet. An internet gateway serves the purpose of providing a target in VPC route table for internet-routable traffic. It supports IPv4 and IPv6 traffic.

3.4 EC2 instances

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instance types comprise varying combinations of CPU, memory, storage, and networking capacity and give us the flexibility to choose the appropriate mix of resources for Ariadne's application. Each instance type allows us to scale our resources to the requirements of DFW target workload.

3.4.1 Localization Instance

This is a Linux instance which, through a Python module, reads data from MQTT, applies location of every individual signal and finally store the data in the database instance.

3.4.2 Database instance

Ariadne has a cluster of instances (Linux Instances) that act as an Elasticsearch cluster. Elasticsearch is the distributed search and analytics engine at the heart of the Elastic Stack. Ariadne uses this Elasticsearch cluster as its default database. Localization and MQTT collect and aggregate the data and temporarily store it in Elasticsearch. The dashboard enables you to interactively explore, visualize, and share insights into your data. Elasticsearch is where the indexing, search, and analysis magic happens.

3.4.3 Analytics Instance

This instance (Linux Instance) runs a service that reads the localization data from the database, filters, transforms, and aggregates it, and finally stores it again back to the database.

3.4.4 Dashboard Instance

The dashboard Linux instance hosts visualization and analytics software that allows you to query, visualize, and explore your performance metrics. It provides you with tools to turn your time-series database data into beautiful graphs and visualizations.
We could say it is the single point of contact between data and stakeholders.

3.4.4.1 API Integration

The dashboard instance is optional as Ariadne Maps platform enables on demand integration with different ERP, CRM, employee scheduling, and business intelligence tools, preventing dysconnectivity, scattered data and lack of collaboration.

With our easy-to-use API you can fuse our tracking data with inventory, sales, and performance data, to increase the overall understanding and quality of business intelligence.
Appendix A contains all the necessary information regarding the API.

3.5 Compliance

AWS supports several security standards and compliance certifications, including PCI-DSS, HIPAA/HITECH, FedRAMP, GDPR, FIPS 140-2, and NIST 800-171, helping Ariadne's customers satisfy compliance requirements for virtually every regulatory agency around the globe.

3.6 Audit / Monitor

Logs and audit trails are available in the infrastructure. AWS provides Ariadne with tools (CloudWatch – CloudTrail) as a monitoring and observability service. CloudWatch provides Ariadne with data and actionable insights to monitor our application and resource utilization.
Also, several logs are available in each part of frontend and backend of Ariadne's application. It is possible to set alerts for certain log events. Logs can be retrieved through mail. The solution provides forwarding capabilities to an external monitoring/collection system.

3.7 Backup

AWS Backup enables Ariadne to centralize and automate data protection across AWS services. AWS Backup offers a fully managed, policy-based service that further simplifies data protection at a scale.

AWS Backup helps Ariadne to support business policies for data protection, to configure, manage, and govern backup activity across Ariadne's AWS account and resources, including Amazon Elastic Compute Cloud (Amazon EC2) instances, Amazon Elastic Block Store (Amazon EBS) volumes and Amazon Simple Storage Service (Amazon S3) buckets. Data is back-up at least weekly. Recovery strategies exist and are periodically tested.

3.8 Cyber security

AWS offers Ariadne several tools for cybersecurity strategy.

Amazon Guard Duty is a threat detection service that continuously monitors for malicious activity and unauthorized behavior to protect Ariadne's AWS accounts and workloads.

AWS Security Hub is a cloud security posture management service that performs security best practice checks, aggregates alerts, and enables automated remediation.

AWS WAF (Web Application Firewall) protects Ariadne's web applications from common web exploits that could affect application availability, compromise security, or consume excessive resources.

AWS Secrets Manager helps Ariadne protect secrets needed to access services. It also integrates with AWS' logging and monitoring services for centralized auditing.

3.9 Vulnerability management

Amazon Inspector is an automated vulnerability management service that continually scans AWS workloads for software vulnerabilities and unintended network exposure.

3.10 Incident Management

Whenever there's a security incident, Ariadne strives to respond quickly and effectively to protect Ariadne's services and customer data. Ariadne employs an incident response strategy designed to investigate, contain, and remove security threats quickly and efficiently.

3.11 Software development

A secure software development lifecycle (S-SDLC) framework is used for developing Ariadne's solution. Security requirements are considered during gathering requirements as well during designing.

Python security tools are used for static application security testing. Automated deployment tools such as AWS Pipeline are used as CI/CD tools.

3.12 Deployment and hardening

Ariadne's sensors stream data to an AWS endpoint through a secure TLS channel, where they authenticate using X.509 certificates. The sensors can only be accessed through an encrypted VPN which uses Curve25519 for key exchange, ChaCha20 for symmetric encryption, Poly1305 for message authentication codes, SipHash for hash table keys, BLAKE2s for cryptographic hash function. Additionally, a 4096 bits long RSA key must be used to establish secure shell access.

Ariadne's services are deployed on secured EC2 instances where only Ariadne's IPs and Ariadne's key have access. Data transfer takes place using secure channels established using certificate authentication.

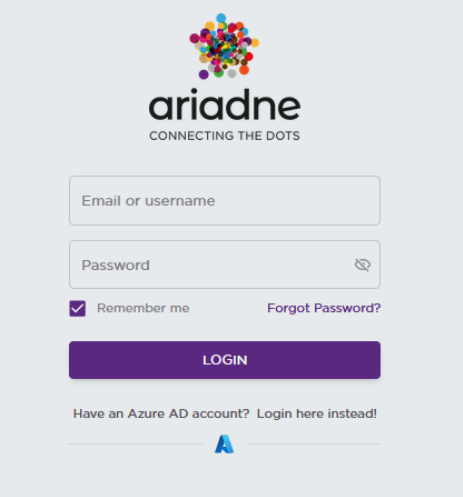
4 Dashboard

A dashboard is a set of one or more panels organized and arranged into one or more rows.

4.1 General

4.1.1 Login to the Dashboard

The dashboard can be accessed by going to [https://app.ariadne.inc]. You will be presented with the login page where you have two options to log in:



4.1.1.1 Standard Login

Enter your username and password that was provided to you by your administrator. Type your username in the username field and enter your password in the password field. Then click the "Login" button to access the dashboard.

If you have forgotten your password, click on the "Forgot Password" link. You will be asked to enter your email address that is associated with your user account. An email will be sent to you with a link to reset your password. Follow the instructions in the email to create a new password.

4.1.1.2 Azure Login

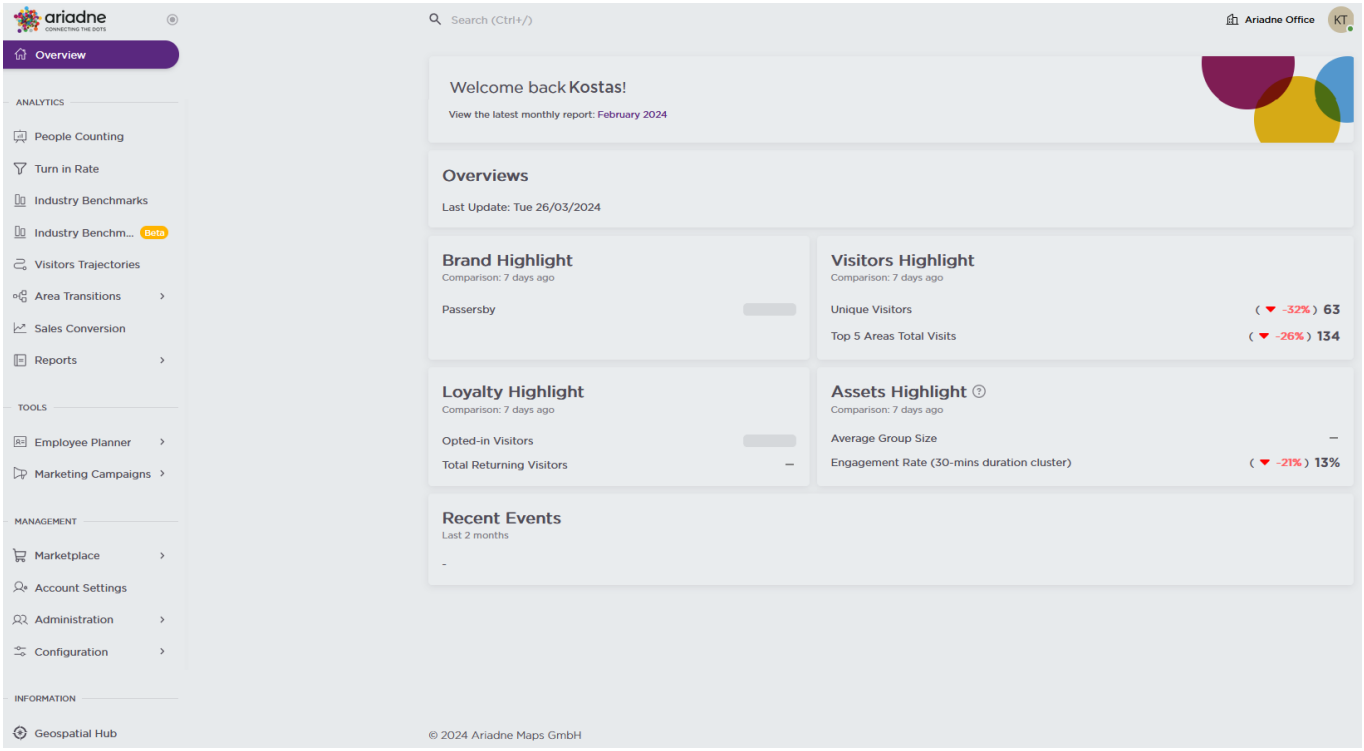
If your organization uses Azure Active Directory, you can click on the "Sign in with Azure" button. You will be redirected to the Azure login page associated with your organization. Enter your Azure username and password to login. This will automatically log you into the dashboard using your Azure account.

Once logged in via either standard login or Azure, you will be taken to the main dashboard portal where you can access reports, analytics, and other features based on your user permissions.

4.1.2 Dashboard UI

The UI dashboard presents an intuitive interface designed for seamless navigation and customization.

Positioned on the left-hand side, a concise menu offers effortless access to various features and functionalities.



At the top right corner, strategically placed icons provide convenient options for location management, allowing users to effortlessly switch between projects.

Adjacent to the location icon, another icon grants swift entry into settings, empowering users to personalize their experience and manage account preferences with ease.

With its clean layout and user-centric design, the UI dashboard ensures efficient workflow management while prioritizing user control and convenience.

At the top of the page, there is a conveniently hide able search box, accessible from any path within the dashboard, facilitating seamless navigation across pages.

4.1.2.1 Time Picker

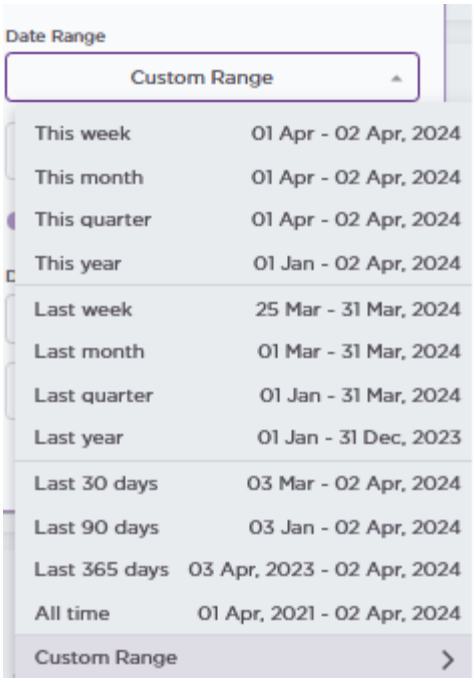
The dashboard provides several ways to manage the time ranges of the data being visualized, both at the dashboard level and the panel level. The easiest and most intuitive one is the time picker where you may select relative or absolute time ranges.

4.1.2.2 Relative time range

Select the relative time range from the **Relative time ranges** list. Some examples of time ranges are:

- This week
- This month
- This quarter
- This year
- Last week
- Last month

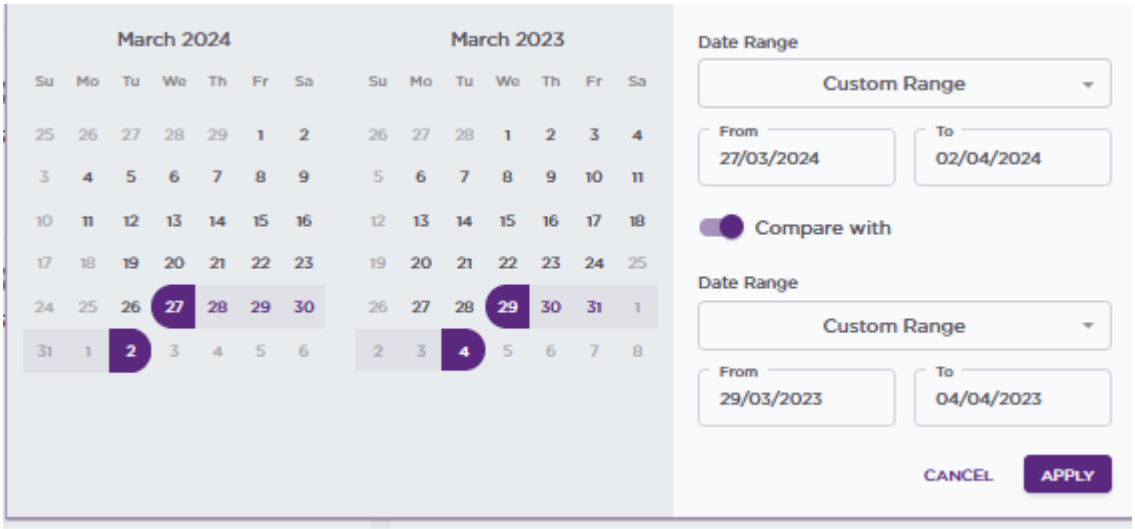
- Last quarter



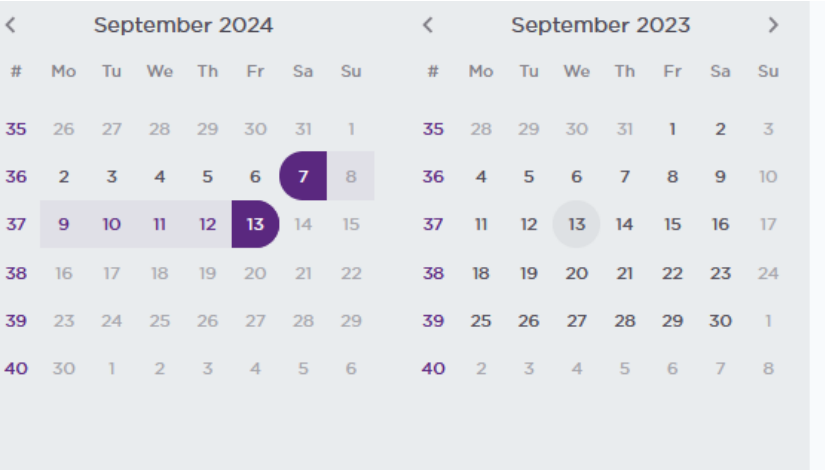
4.1.2.3 Absolute time range

Set an absolute time range one of two ways:

- Type values into the **From** and **To** fields. You can type exact time values or relative values, such as now-24h, and then click **Apply time range**.
- Click in the **From** or **To** field. Click the day or days you want to use as the current time range and then click **Apply time range**.
- Second range refers to comparison period



You can select an entire week from the calendar and compare it to the corresponding week from the previous year, ensuring the weeks align by their week number.



To enable this feature, make sure it is activated in the **Dashboard Settings**.

4.2 Access based control.

4.2.1 Roles

Ariadne's dashboard supports two roles:

- Organization manager: This role allows the user to access the data of all the areas and all the dashboard in the organization.
- Store manager: This role allows the user to access the data of selected areas and the selected dashboards.

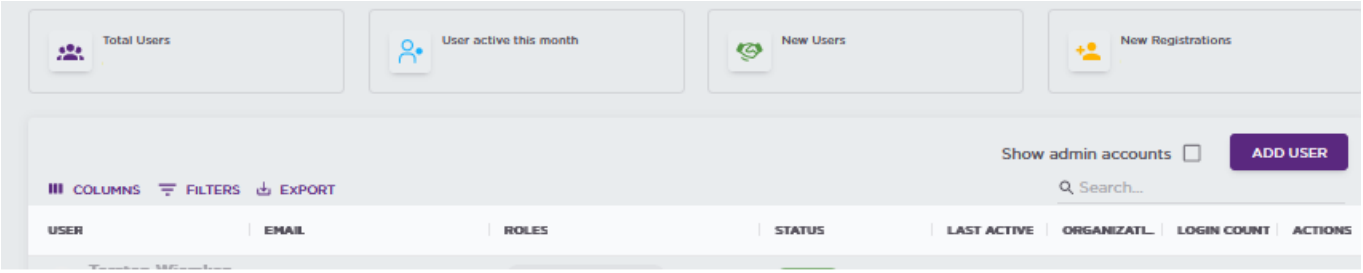
4.2.2 Users

There are two types of users including Ariadne staff and normal user

- Ariadne staff: Is usually an Ariadne employee. This user has the check `Is Ariadne staff` checked and can access all the projects, all the dashboards and the Administration sector.
- Normal user: Is usually a client. This user can only access a few projects and dashboard based on the role setting.

4.3 Manage users as an Admin.

Dashboard displays all user accounts on the server, listed in alphabetical order by username.



The following information is displayed:

- Login - The value in the Username field of the account.
- Email - The email associated with the user account.
- Roles - The value in the Role field (Store Manager, Organization Manager) of the account.
- Status - The value in the Status (Enabled or not) field of the account.
- Organization - The value in the Organization of the account
- Last Active - The date of latest activity
- Login count - The login counts of the account

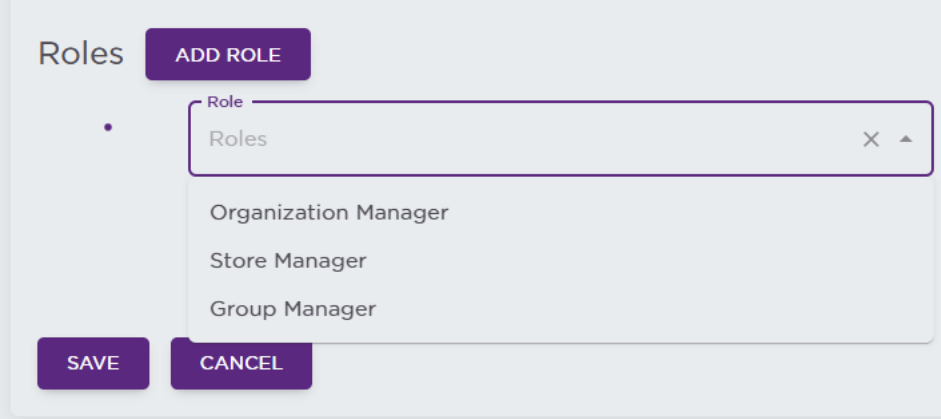
Admins can invite users to organization.

4.3.1 Invite user to organization.

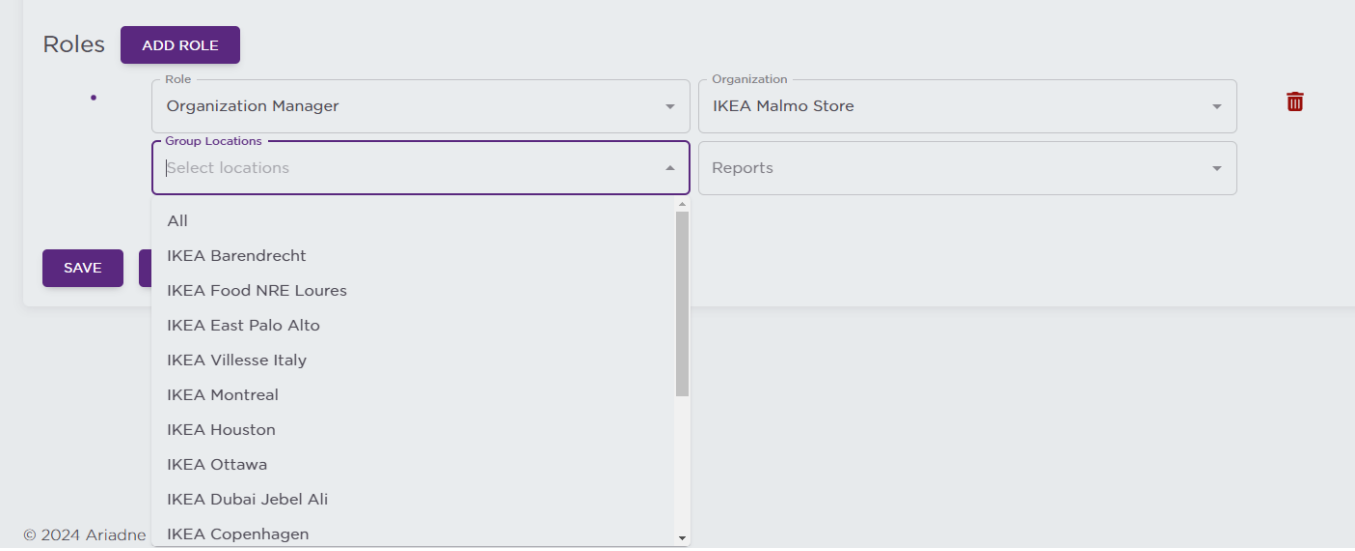
To invite a new user, we need to use an Ariadne staff account and go to Administration / Users Management / Add User form. After filling all the fields and creating the user, an invitation mail will be sent to the email of the user and the user status will be `Invitation Sent`. When the user visits the invitation link and changes the password, the user status will be `Enabled`

Create User Roles as:

1. Group Managers
2. Organization Managers
3. Store Managers

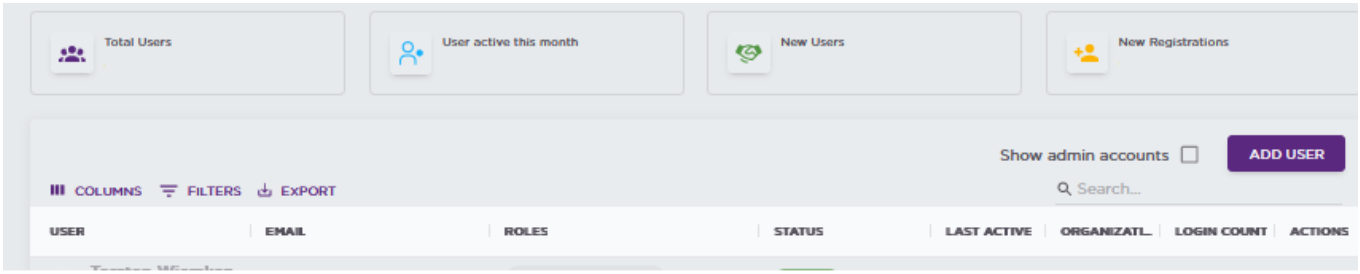


For organization & store managers select the desired locations under the same Group for which the user will have access in industry benchmarks dashboard to see their KPIs



4.4 Manage users as an Group Manager

Dashboard displays all user accounts that relate to Group Manager's organizations, listed in alphabetical order by username.



The following information is displayed:

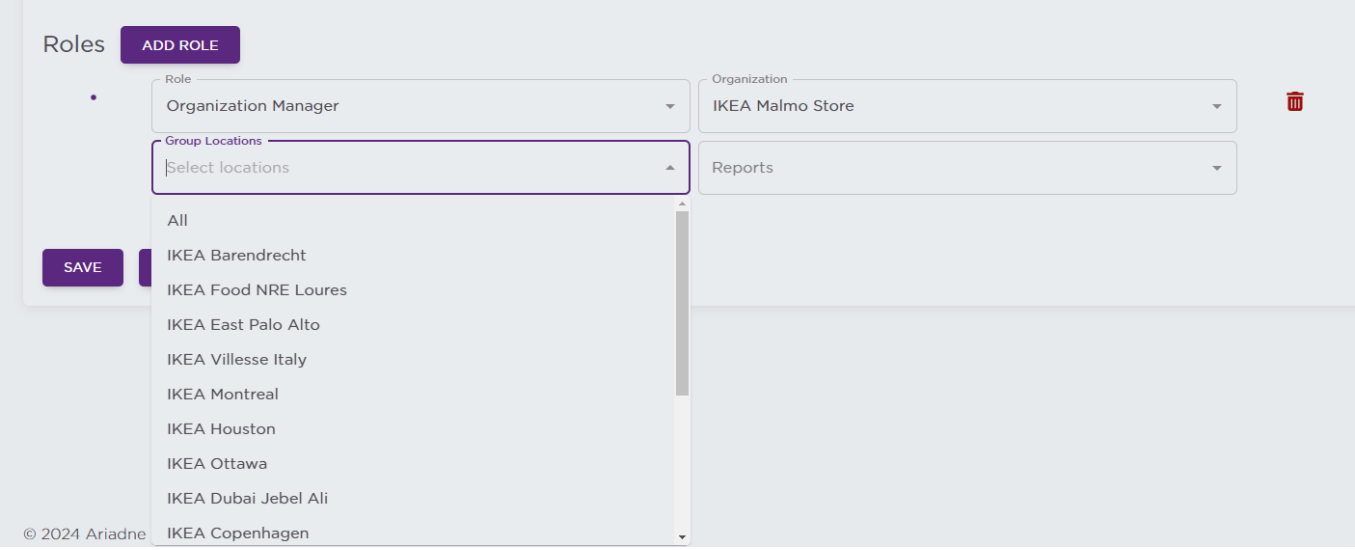
- Login - The value in the Username field of the account.
- Email - The email associated with the user account.
- Roles - The value in the Role field (Store Manager, Organization Manager) of the account.
- Status - The value in the Status (Enabled or not) field of the account.
- Organization - The value in the Organization of the account
- Last Active - The date of latest activity
- Login count - The login counts of the account

4.4.1 Invite user to organization.

To invite a new user, we need to use an Organization Manager account and go to Administration / Users Management / Add User form. After filling all the fields and creating the user, an invitation mail will be sent to the email of the user and the user status will be `Invitation Sent`. When the user visits the invitation link and changes the password, the user status will be `Enabled`

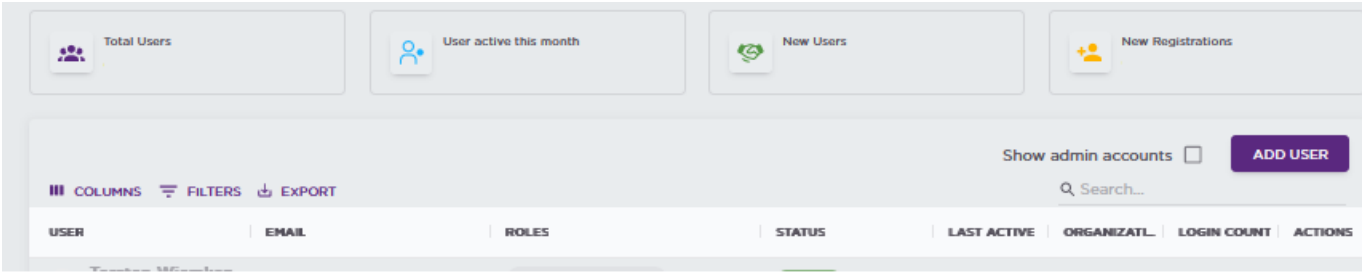
Create User Roles as:

1. Group Managers
2. Organization Managers
3. Store Managers



4.5 Manage users as an Organization Manager.

Dashboard displays all user accounts that relate to Organization Manager's organizations, listed in alphabetical order by username.



The following information is displayed:

- Login - The value in the Username field of the account.
- Email - The email associated with the user account.
- Roles - The value in the Role field (Store Manager, Organization Manager) of the account.
- Status - The value in the Status (Enabled or not) field of the account.
- Organization - The value in the Organization of the account
- Last Active - The date of latest activity
- Login count - The login counts of the account

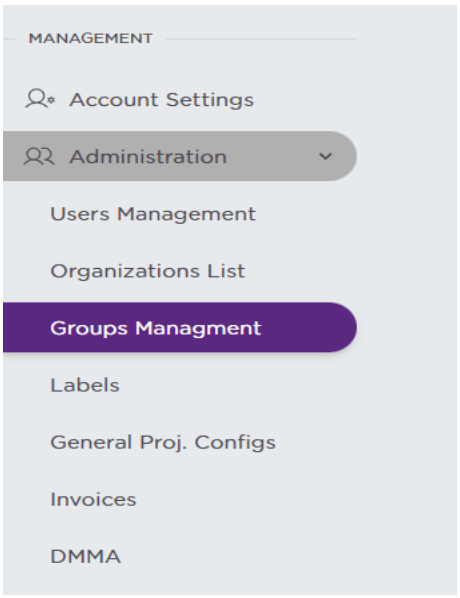
4.5.1 Invite users to organization.

To invite a new user, we need to use an Organization Manager account and go to Administration / Users Management / Add User form. After filling all the fields and creating the user, an invitation mail will be sent to the email of the user and the user status will be `Invitation Sent`. When the user visits the invitation link and changes the password, the user status will be `Enabled`

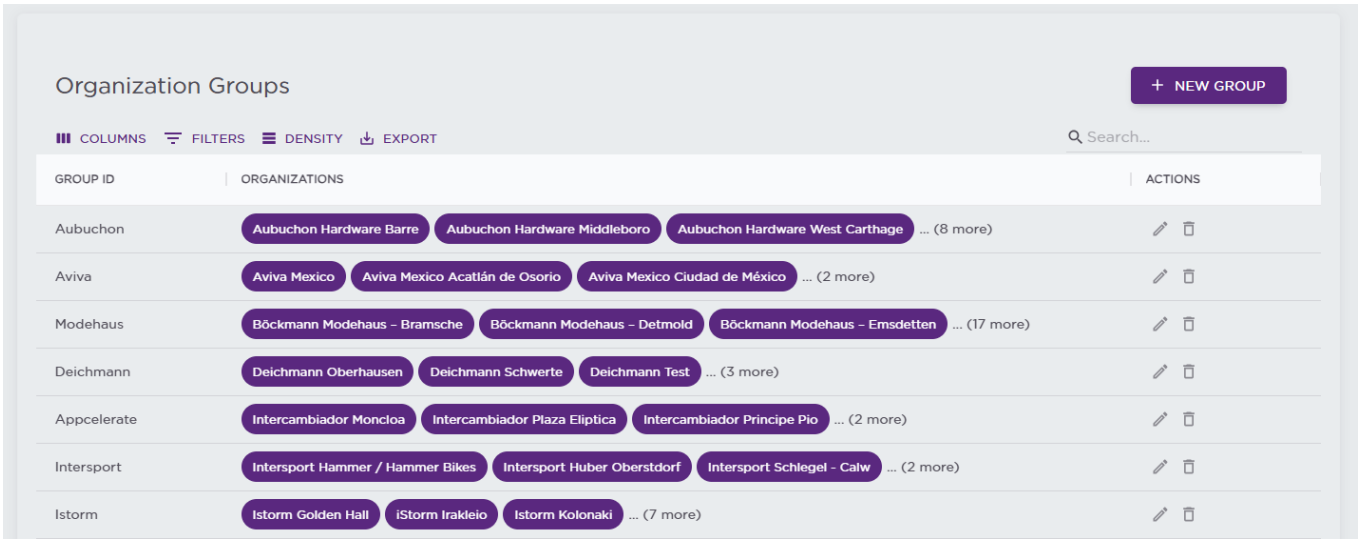
4.6 Administration of the Group Creation Process

Ariadne team has the ability to Create groups of organizations according to business/ customers' needs.

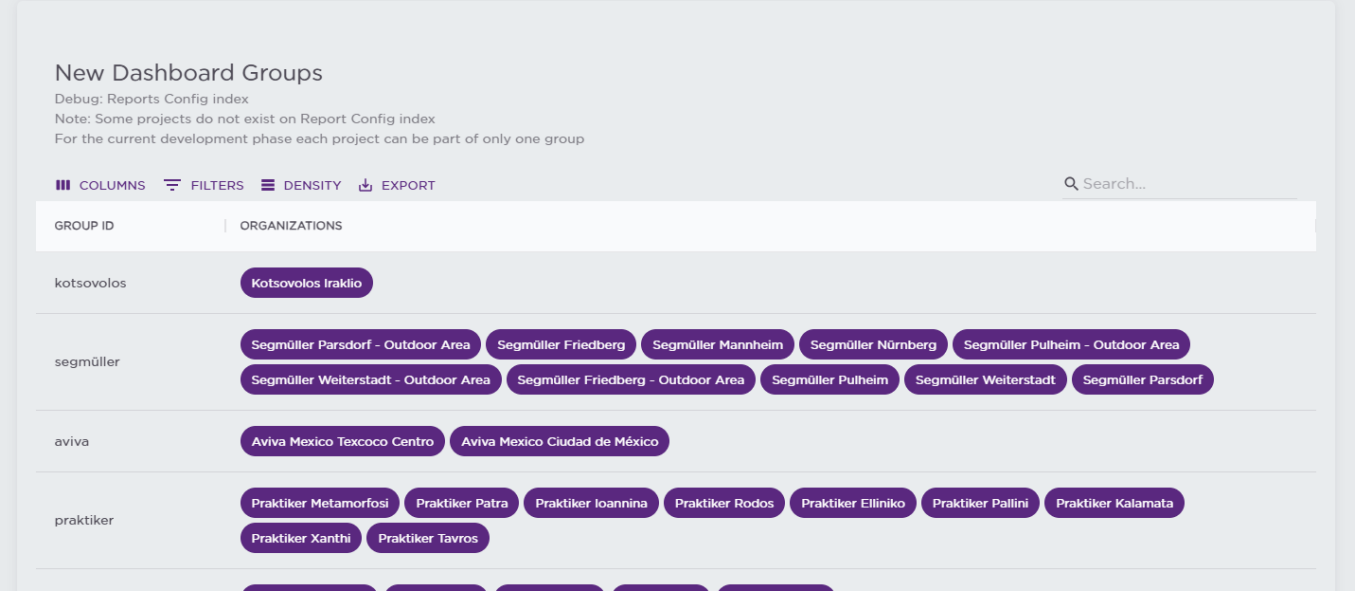
Client users that will manage those Groups will be called Group managers (see section 4.4)



Use the table below to Create/Edit/ Delete a group of organizations

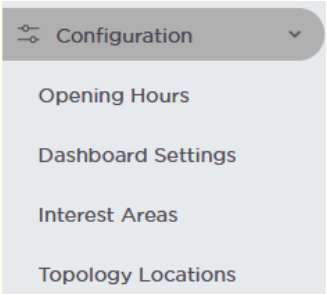


Use the debugging table to verify that New Dashboard has access to those Groups.



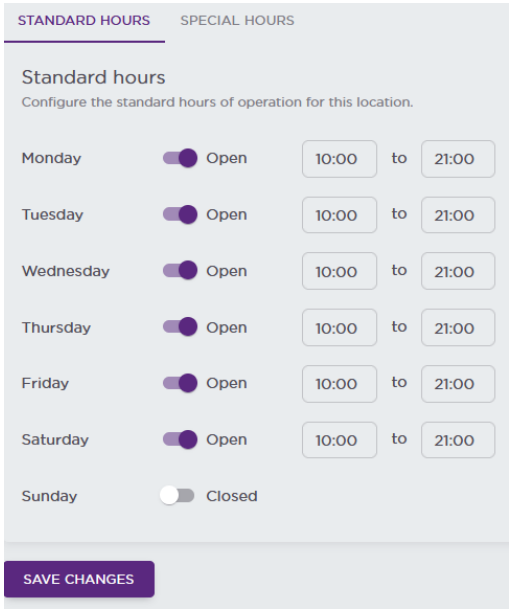
4.7 Configuration

The configuration section provides users an interaction point to set up their organization specifics. Every configuration ranging from organization location, open and closing schedule, mappings, interest areas separation can be adjusted here and saved to dashboard database.

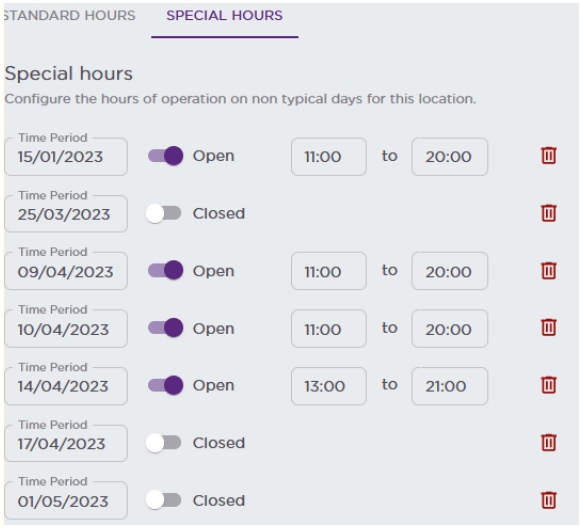


4.7.1 Opening Hours

Standard Hours: Weekly Schedule of daily opening hours of organization. Or closed if the organization is not open (e.g. Sundays)

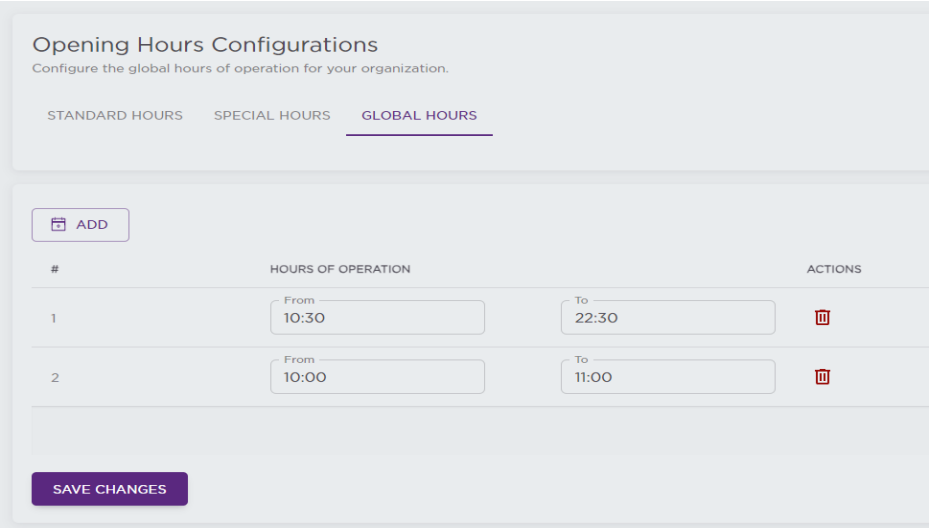


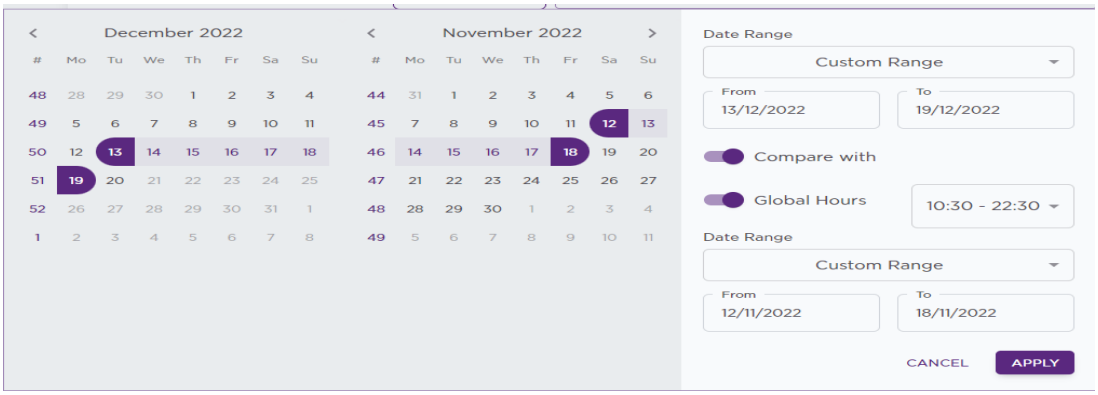
Special Hours: Some days the organization needs to adjust their weekly schedule according to Government regulations (e.g. Bank holidays), local authorities or other events. By clicking on the "ADD" button users can add as many as they need.



Global Hours: Global Hours are predefined time ranges within a day that filter the data for more in-depth comparisons with your historical data.

Some time periods within a day are considered stronger in terms of data validity due to devices defections like weather conditions, internet disconnections, construction works etc.





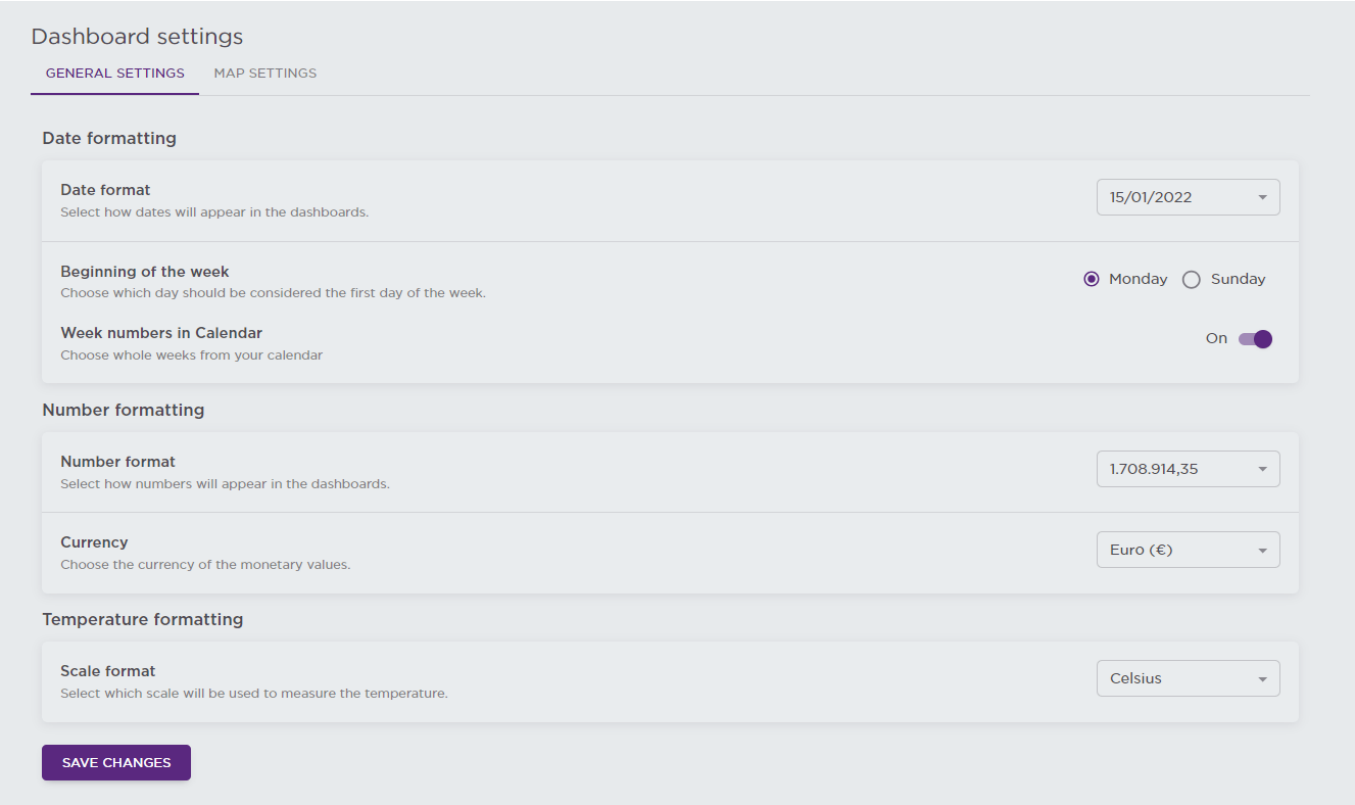
4.7.2 Dashboard Settings

a) **General Settings**

Users can set up their Dates settings by date formatting and which day they begin their working week.

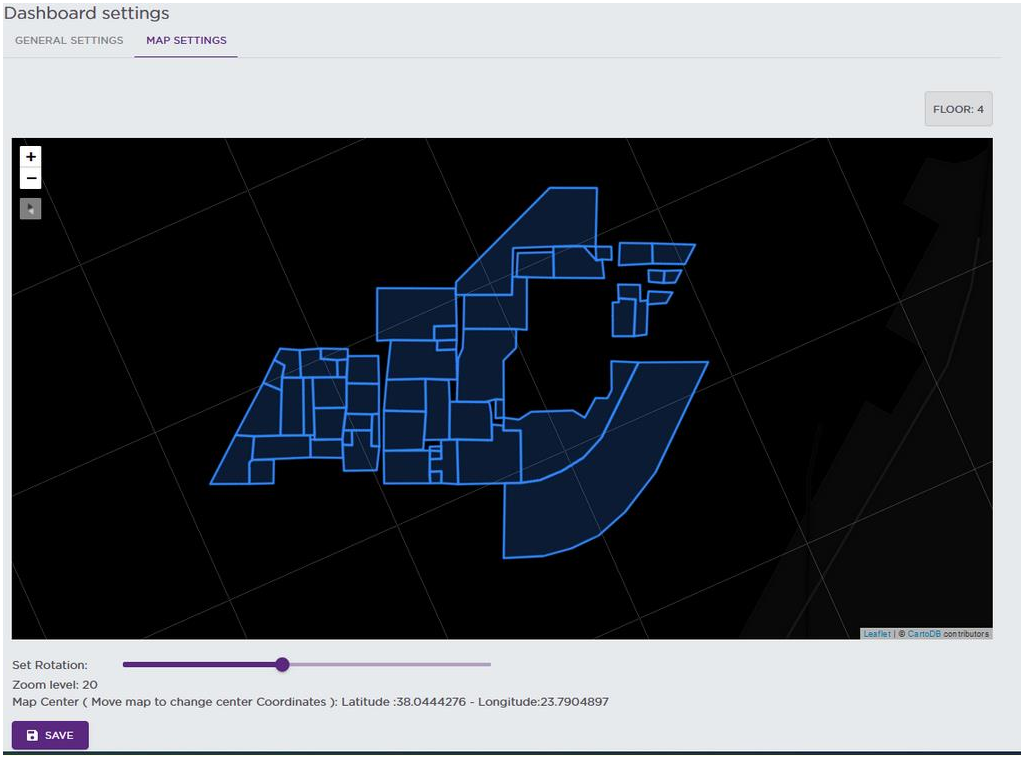
Selection if Calendars should have weekly selections.

Users can set up their Number setting by number formatting, currency they use and Temperature scale.



b) Map Settings

Users can set up the defaults when a map component is loaded: Rotation - Defaults on 0 which is North - South. Zoom level - Defaults on the level set up on the onboarding process. Map Center - Center of organization location in coordinates (Latitude - Longitude), defaults on onboarding process.



4.7.3 Interest Areas

Control of the area separation of organization per floor.

1) Light Mode / Dark Mode switch
2) Opacity of color-area covered switch
3) Show / Hide Floorplan
4) Run expected quality Tooling

5) Configure device's location placement

6) Upload floorplan

7) Floor Change

8) Dev indicator tag - Used when a feature is under development improvements

9) View Mode - Navigate freely in map without interactions

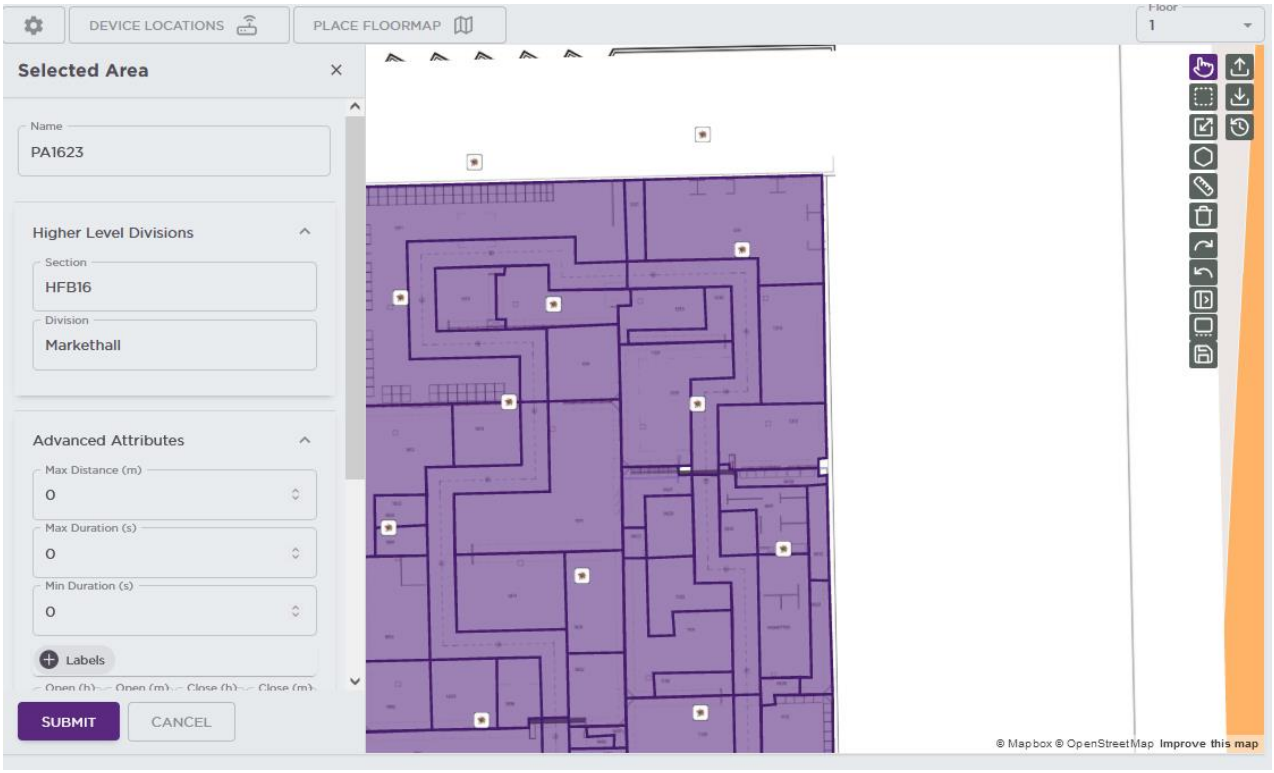
10) Draw polygon - Draw polygons in map by clicking on desired locations

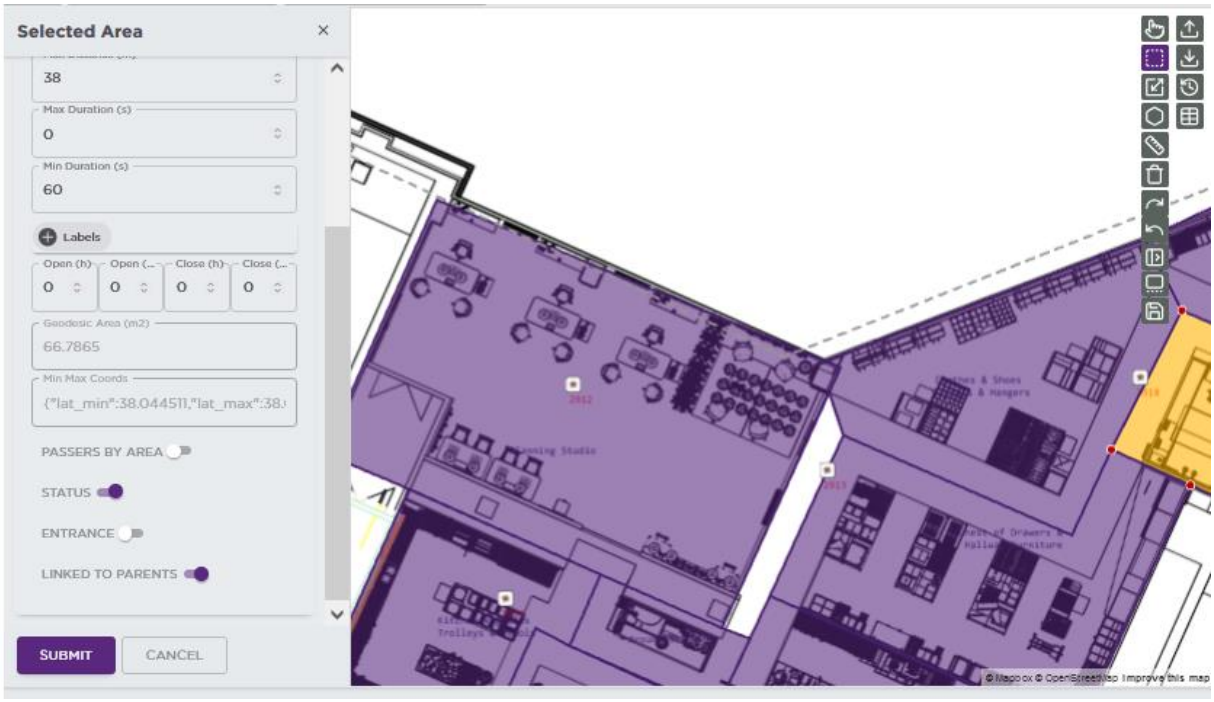
11) Ruler - Measure distances in map

12) Delete - Clear map from all polygons / Delete selected polygon

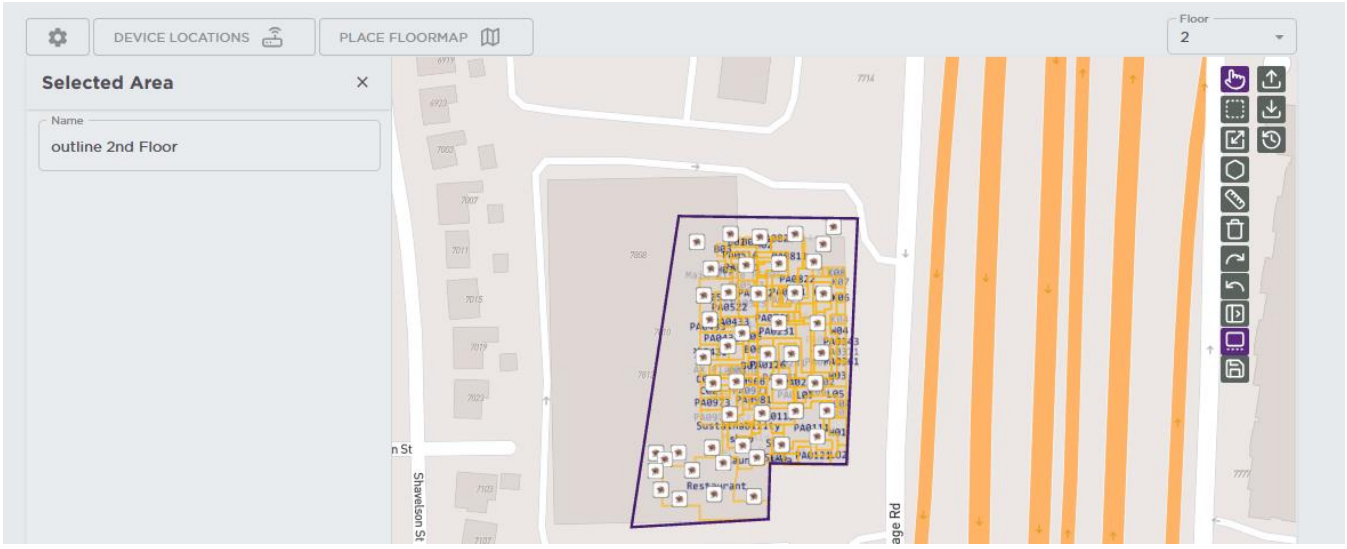
13) Redo / Undo - Redo / Undo previous action

14) Open side Bar - Open side bar to further configure each polygon (e.g. provide a name, Section, Division, Opening Hours, Max distance, Min/Max Duration)



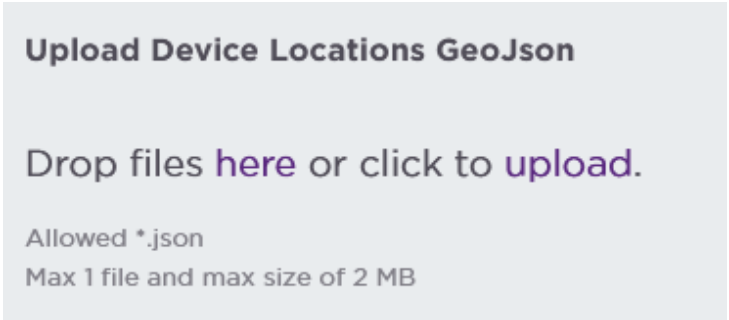


15) Outline - Draw or change the outline polygon surrounding the organization floor



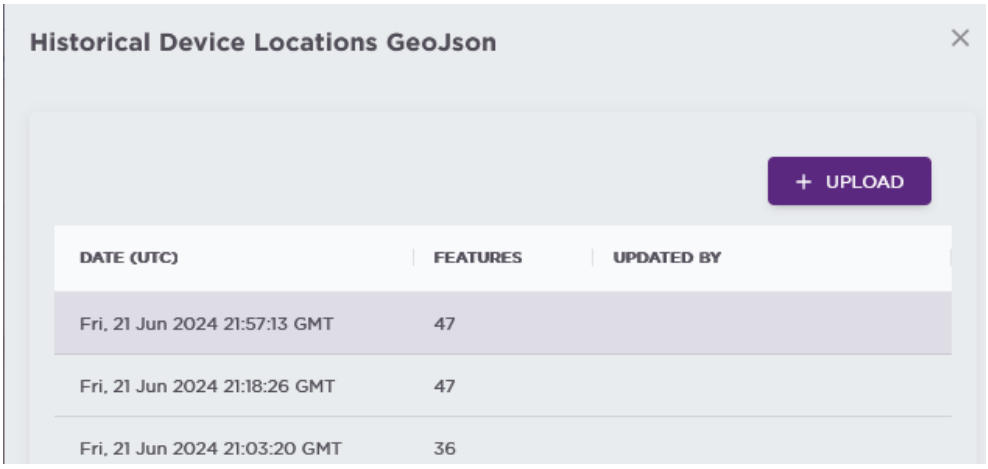
16) Save - Save current configuration

17) Upload Geojson - Upload geojson from local file



18) Download Geojson - Download current geojson schema on local system.

19) Historical Data - See older saved area configurations



20) Download Devices Data – Download a csv with the locations of your devices
See the placement of all devices according to whicharea they are located,
how much distance (in meters) from the center of the area, and the floor
(if any device is not located in one of your areas the closest area is documented)

name	areas	distance	comment	floor
e7d9	In front of H & M	3.4	inside	0
e50d	In front of Anson's	3.62	inside	0
e5c1	In front of Cecil	2.55	inside	0
e4f1	In front of Bonita	2.29	inside	0
e551	Zero	8.59	inside	0
e925	In front of Empty Store	2.35	inside	0
e4f5	Christ	6	inside	0
e731	In front of Marc O'Polo	2.65	inside	0
e51d	emptyH	3.74	inside	0
e1d1	In front of Christ	5.83	inside	0
e729	In front of Shoe City	4.04	inside	0

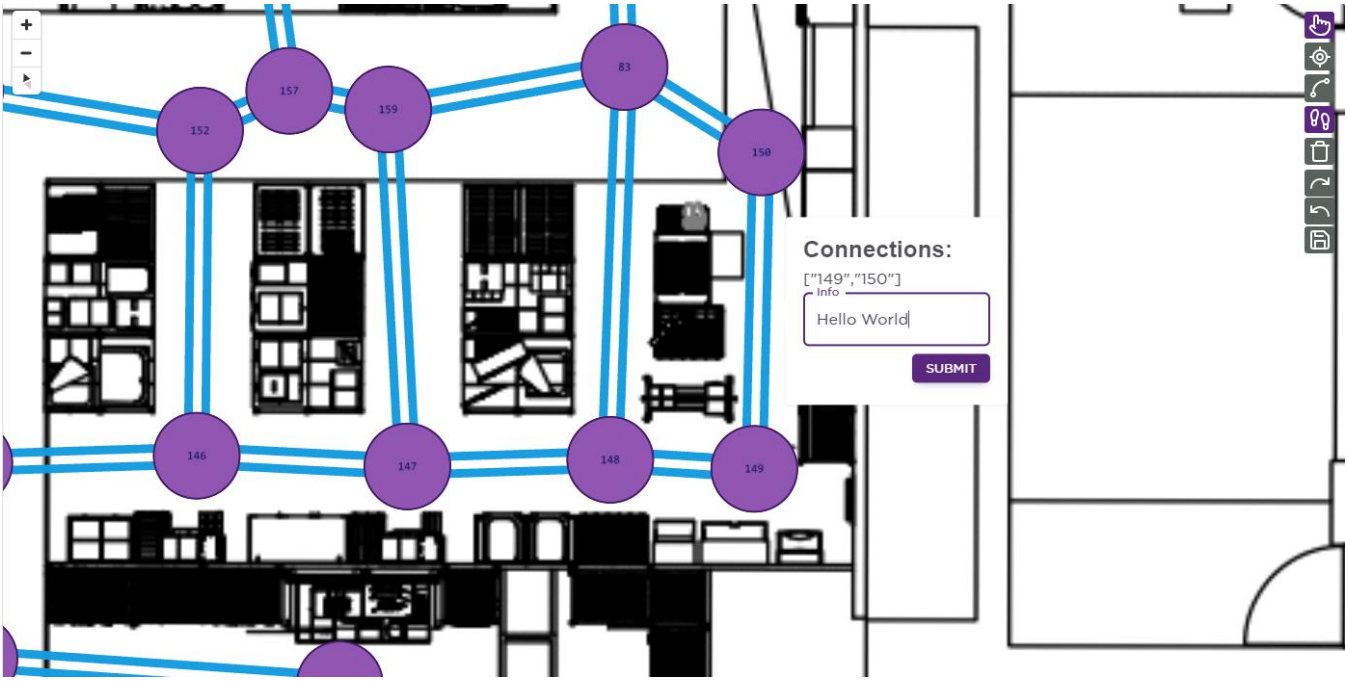
4.7.4 Topology Locations

Tools

Topologies area is a panel helping to establish the valid connections between various points in your store.

You can draw nodes covering your effective area of interest.

1) View Mode - Navigate freely in map without interactions
2) Create / Select Node
3) Delete Nodes – Delete all Nodes or Remove Selected
4) Redo / Undo - Redo / Undo previous action
5) Save - Save current configuration



User has the ability when clicking on top of a connection line to add information for the specific route.

The field provided is free text.

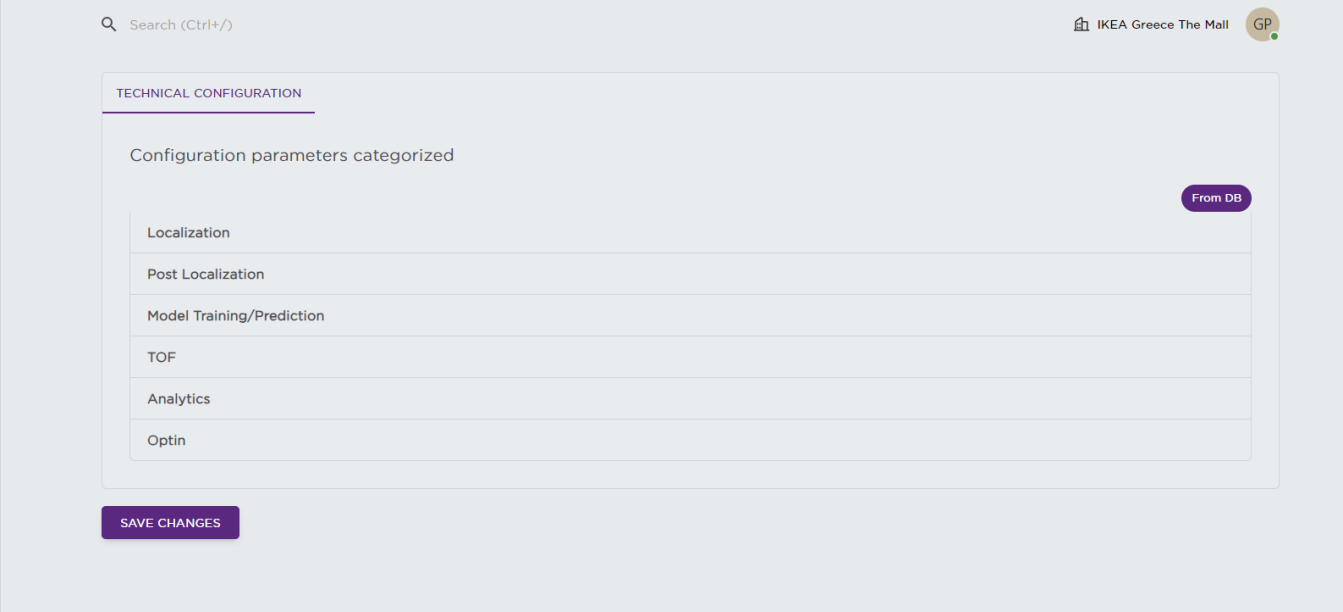
Backups

Restore previous saved topologies.

4.7.5 Technical configuration

The Technical Configuration panel provides a comprehensive view of the configuration variables associated with the selected project. These variables are meticulously categorized based on the specific components or functionalities they influence within the solution.

Each category is designed to group related variables, offering users a structured and organized approach to understanding and managing the technical settings. The categorization not only aids in ease of navigation but also ensures that changes are made with full awareness of their potential



Modification Guidelines

Users have the capability to modify these configuration variables directly within the panel. However, it is imperative to approach any changes with caution. These variables are integral to the core functionality of the server and its associated services; altering them may result in significant changes to the system's behavior.

It is strongly recommended that only users with a thorough understanding of the system architecture and the implications of these variables undertake modifications. Any changes should be documented and tested in a controlled environment before being deployed to production to avoid unintended disruptions.

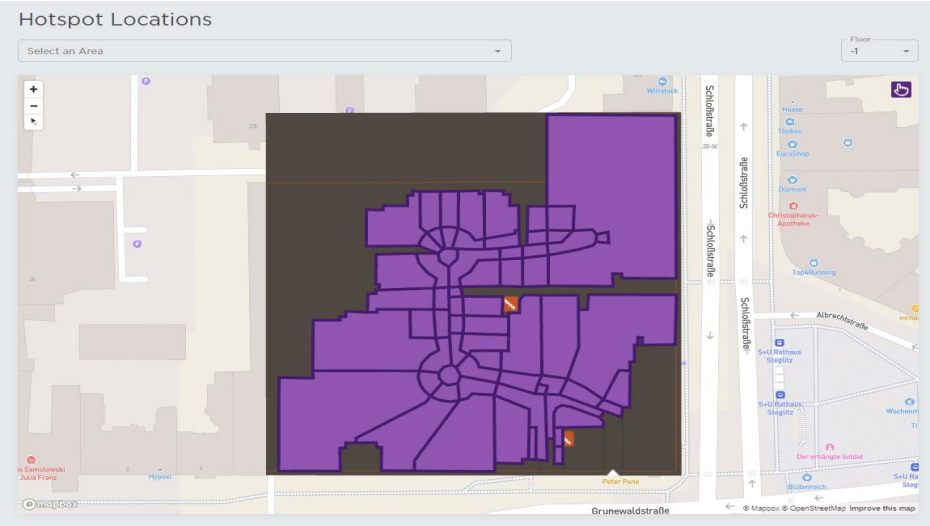
This panel is a powerful tool for managing the technical underpinnings of your project, offering flexibility and control to users who possess the requisite expertise.

4.7.6 ToF Configuration

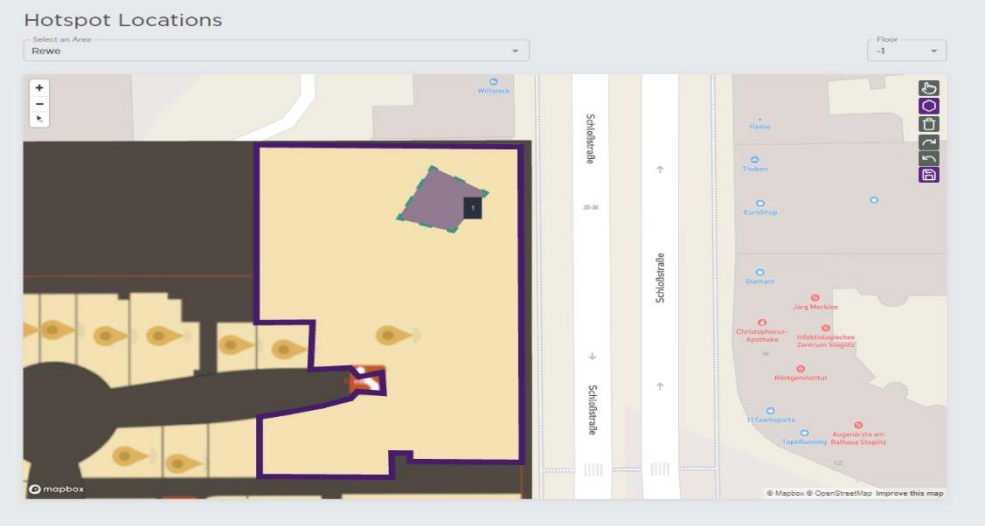
4.7.7 Hotspot Locations

This map will help the User to select an area and draw “hotspots” (meaning smaller areas of interest inside each area) and analyze the visitation and the path the visitor follows inside the area.

Firstly, the user needs to select the desired area either from the dropdown menu, or simply by clicking on the area in the map.



Secondly using the toolbox provided by the map the user can draw his first ‘hotspot’.



Users can draw a maximum of 3 hotspots inside an interest area.

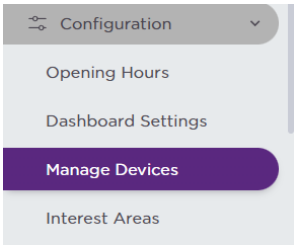
Save your work using the save button.

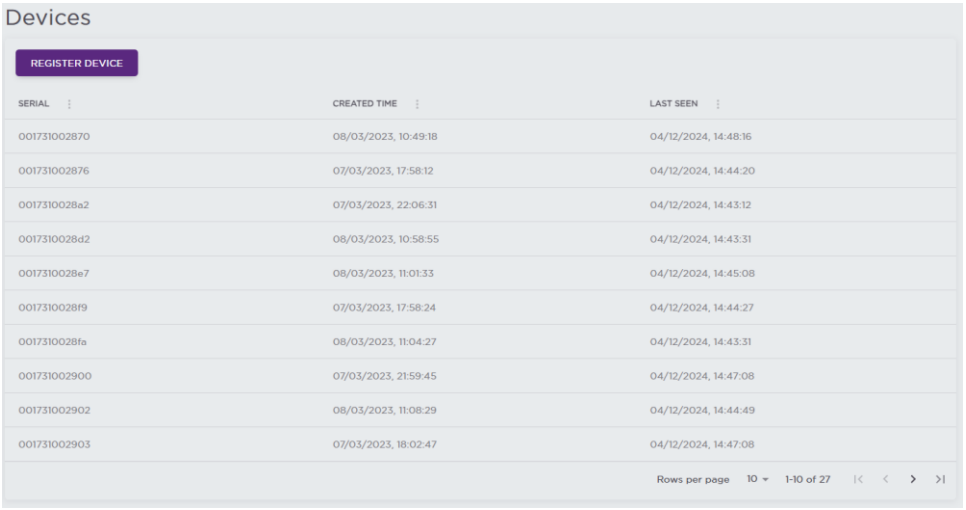
The results of that map configuration are shown in the Turn in Rate dashboard.

4.7.8 API Credentials

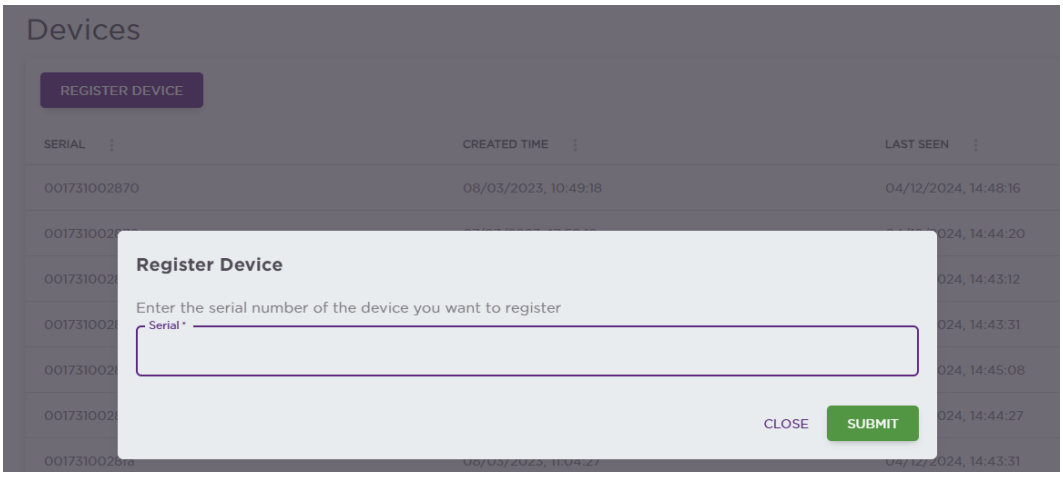
In this dashboard you will get the credentials required for API connection. (Please refer to Appendix A)

4.7.9 Manage Devices



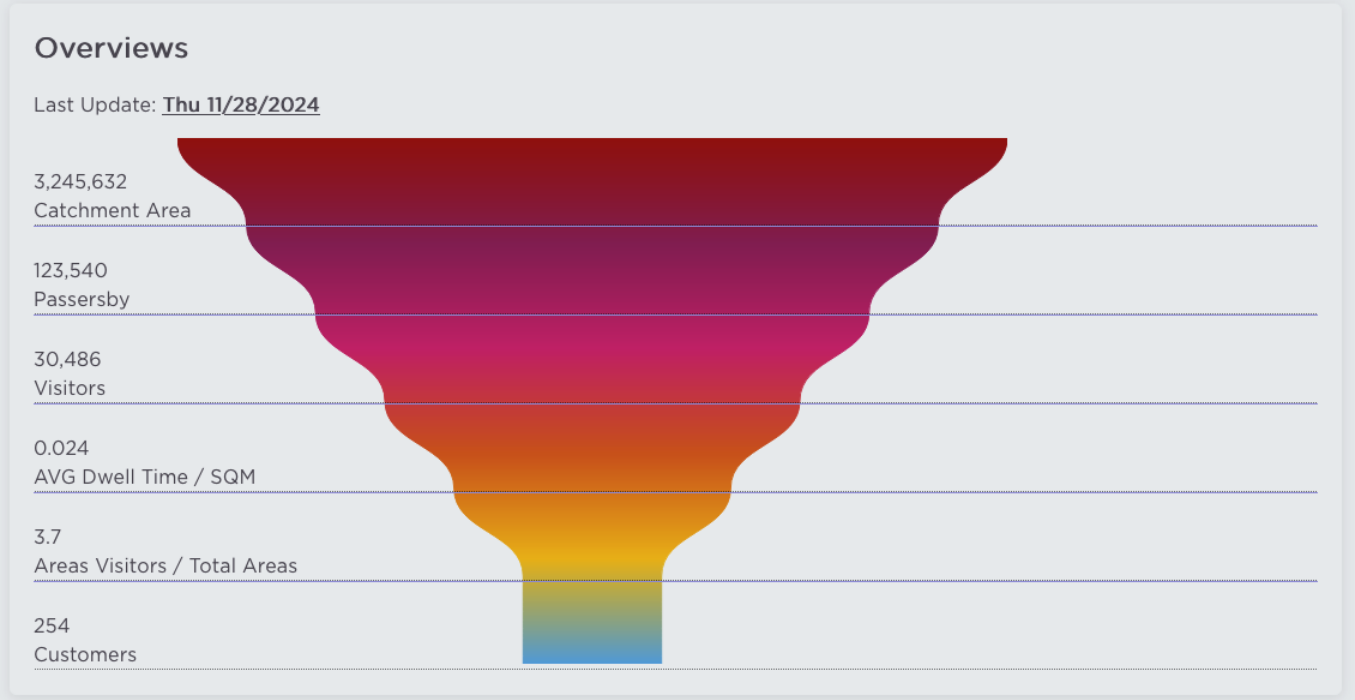


This page shows a list of all devices of the project with information such as last seen timestamp and registered timestamp as well as the device's serial number. All the information is exchanged with our DMMA Service.



The "REGISTER DEVICE" Button opens a dialog for registering new devices to our DMMA Service. A full serial number of the device is to be entered in the input and feedback will be shown after clicking the "SUBMIT" button.

4.8 Overviews



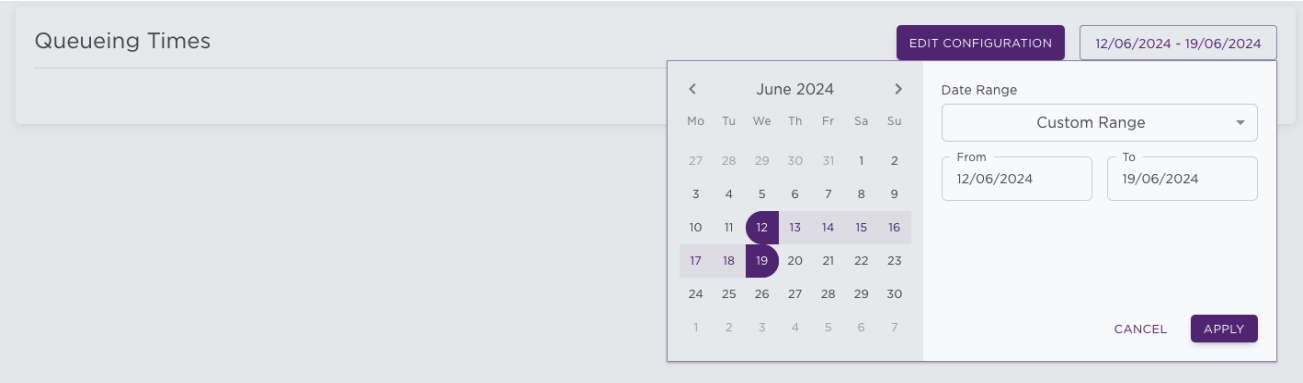
The Overview Page serves as an introductory hub, featuring a warm initial greeting and remains updated until the conclusion of the previous day, unless the current day extends past the project's closing hour. Main data displayed on each panel below is constrained within the boundaries of the start and end of the last concluded period.

There are six figures being shown in the overview panel, including:

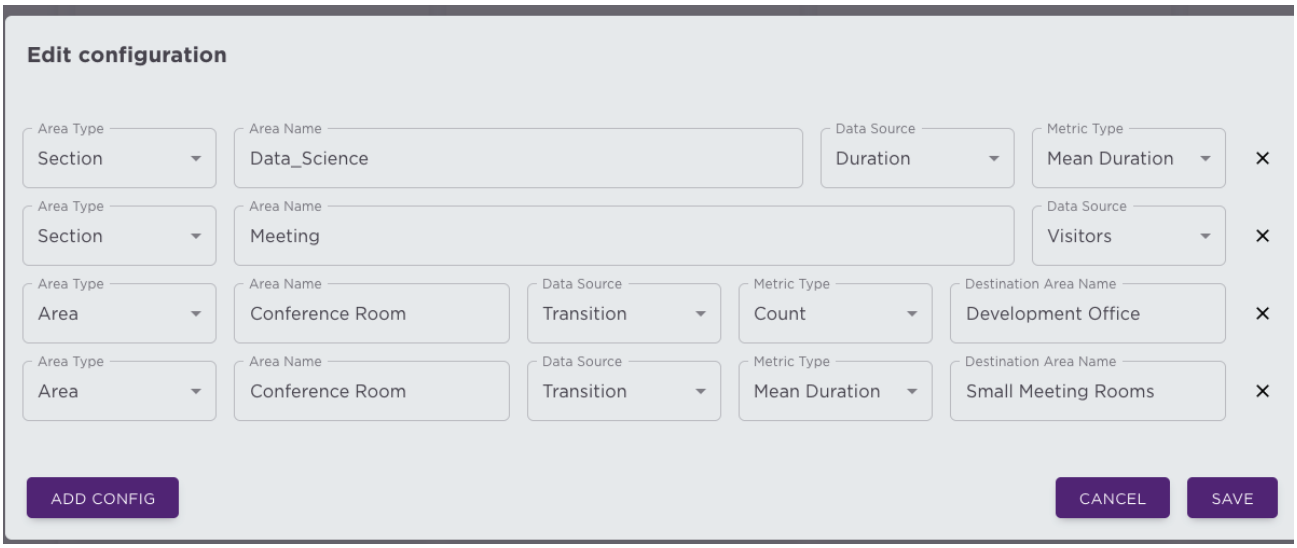
1. Catchment Area shows the total population in the catchment area
2. Passersby represents the total number of people who have passed by the store over the last 7 days
3. Visitors demonstrates the total number of people who have entered the store over the last 7 days
4. AVG Dwell Time / SQM illustates depicts the average time spent in the store per square meter over the last 7 days
5. Areas Visitors / Total Areas provide data about the average number of visitors per area over the last 7 days
6. Customers describes the total number of people who have made a purchase over the last 7 days

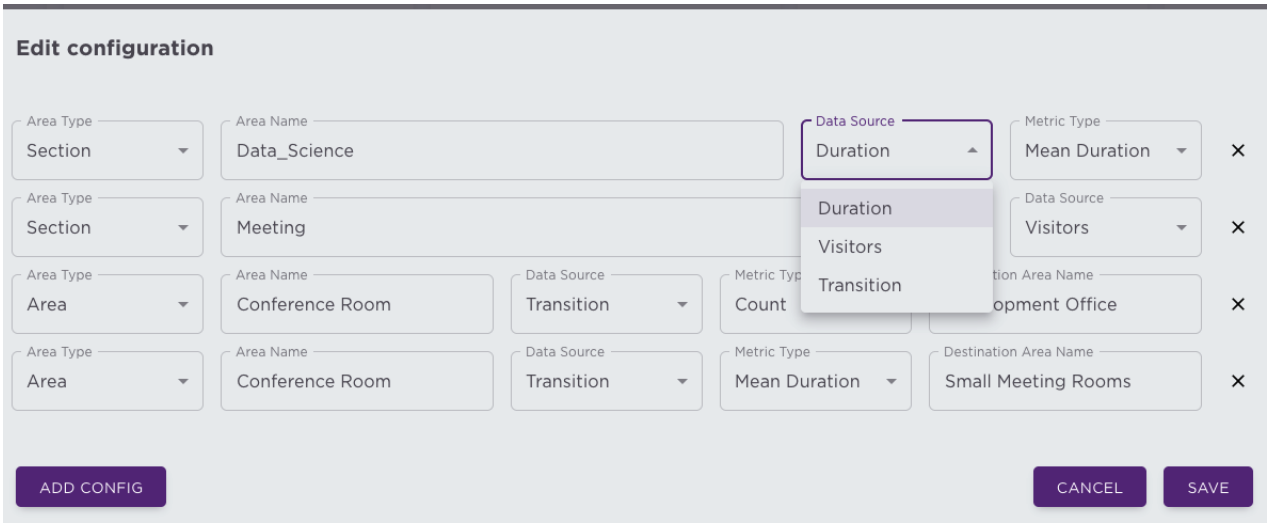
4.9 Queueing Times

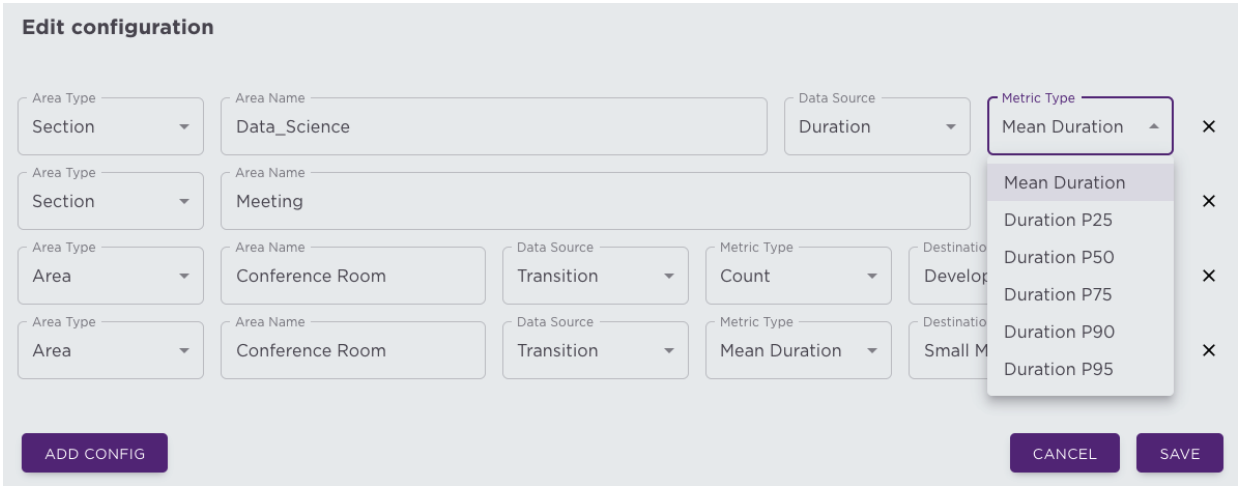
Queueing Times dashboard allows multiple average duration of several areas/sections/divisions in a time period.



User can select the time in the datepicker and add config by clicking the `Edit configuration` button. The `Edit configuration` will show up like below.







Then the user can add config and choose the area type, area name, data source, and metric type. There are three area types including area, section and division. After choosing area type, user can select the area name and metric type in the dropdown menu. After that, click save to save the configuration and load the data

The previously saved configuration will be used the next time the users in the same organization visits this dashboard.

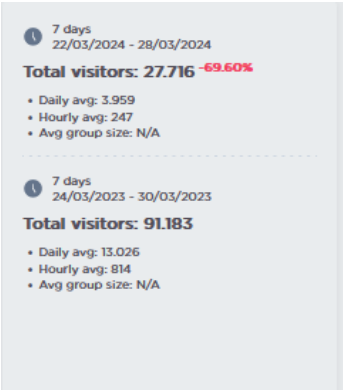
4.10 People Counting

People Counting dashboard shares analytics about the user's organization visitation. Which areas were the most visited. Historical comparisons with the most meaningful event dates for user's use case. Day by day detailed analytics. Interactive heatmaps highlighting how each area performed.

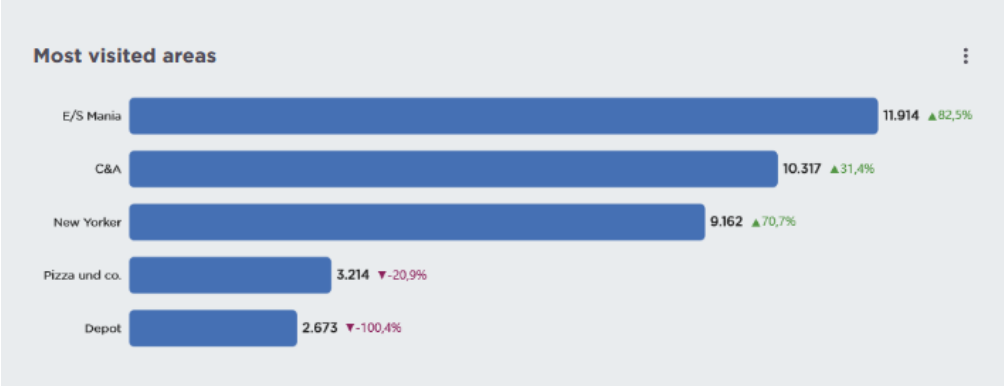
1) Datetime picker allows user to select the desired dates to analyze data. Moreover, users can select a historical date-range to compare different times and see the performance of the organization.

2) On the same theme users can save the most important dates using the Events date picker and can have immediate access to the most frequent checkmarks of the year.

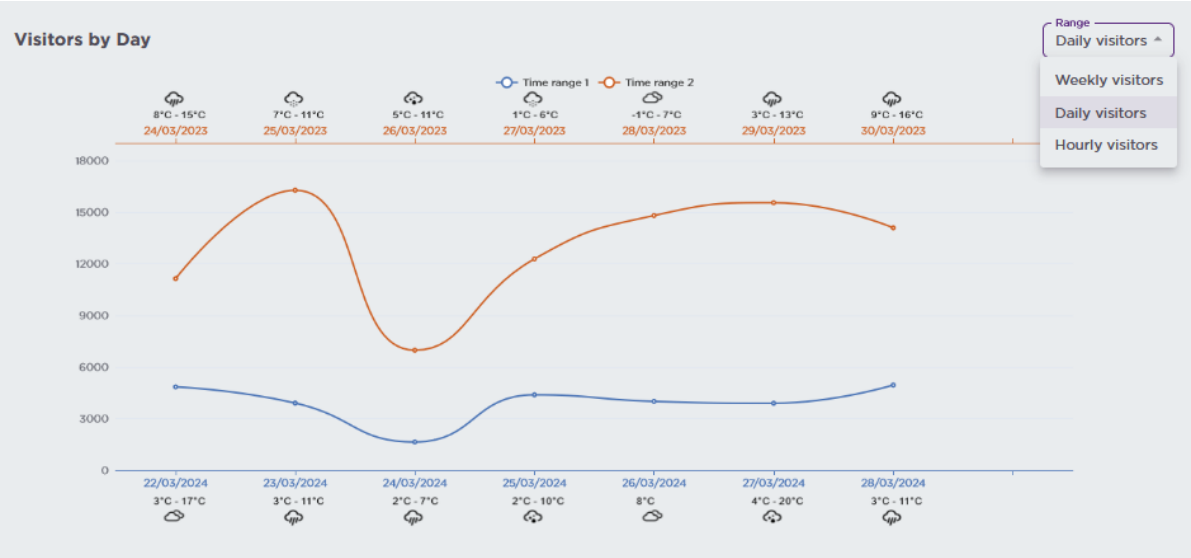
3) Total visitation of the selected date range, followed with the daily averages, hourly averages, and average group size. The same data for the historical time range selected to compare with.



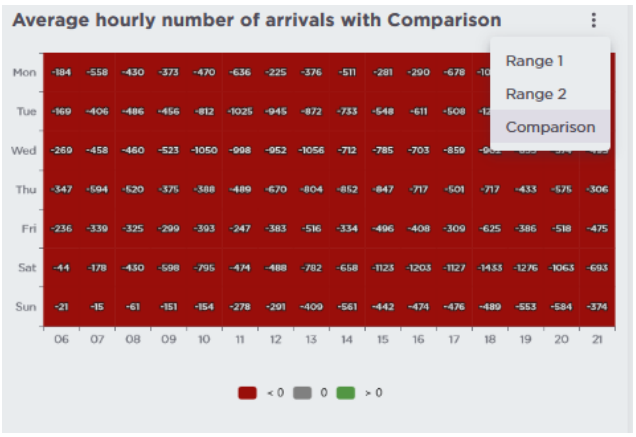
4) The top 5 most visited areas, followed by the number of visitors and a percentage comparison of the same area of the compared date time. A useful dropdown opens with the 3-dot menu allowing you to filter your areas by Polygons/Areas, Parent 1/Section, Parent 2/ Division.



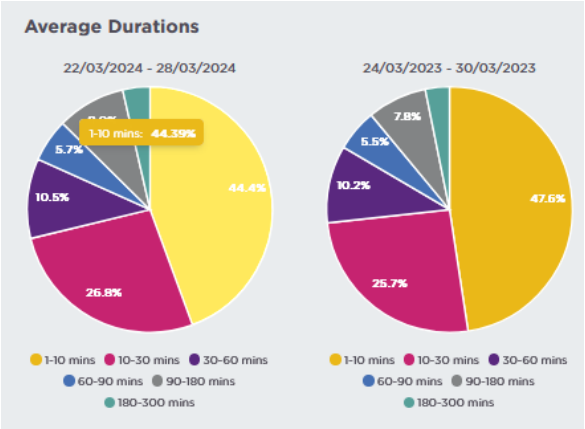
5) The visitors by day chart shows the exact distribution of the visitation by day. The range dropdown menu allows user to see the the same time range distribution Weekly and Hourly.



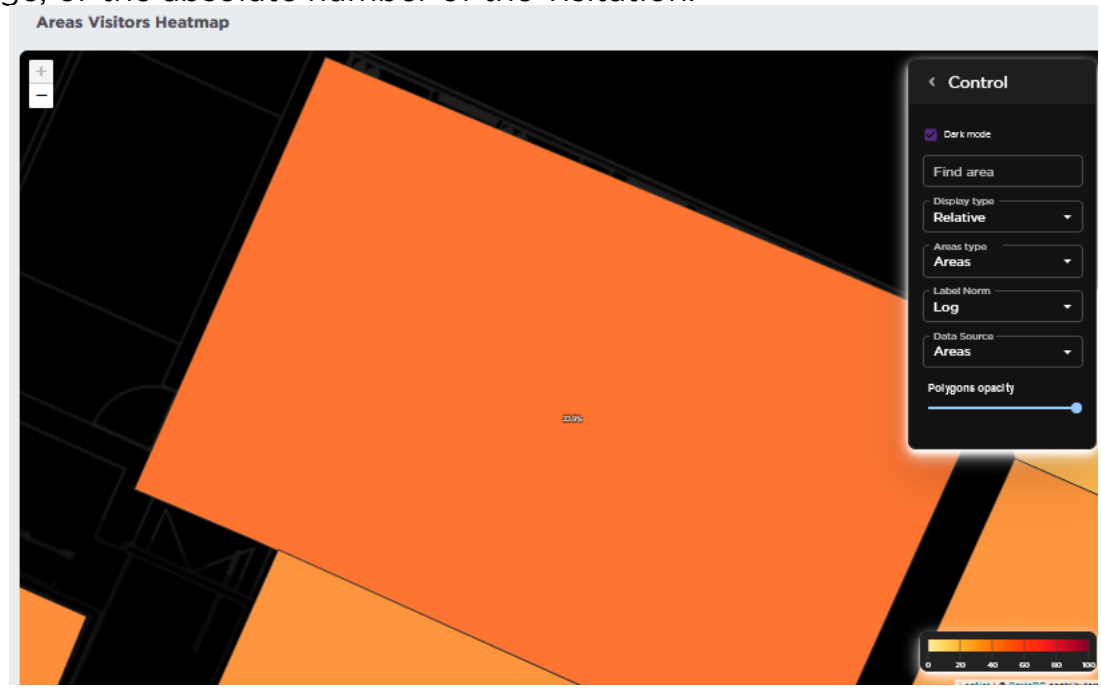
6) Average hourly number of arrivals heatmap. Compares the two-time ranges provided by the user the shows weekly the hours the organization is open to customers colored coded if on specific hour and day the visitation was higher (green color) or lower (red color)



7) Average durations pie charts show the percentage of the visitors that spent their time inside the organization area.



8) An organization heatmap is provided indicating the most visited areas of the respective floor. Controls are useful to change the targeted area, to display the percentage, or the absolute number of the visitation.

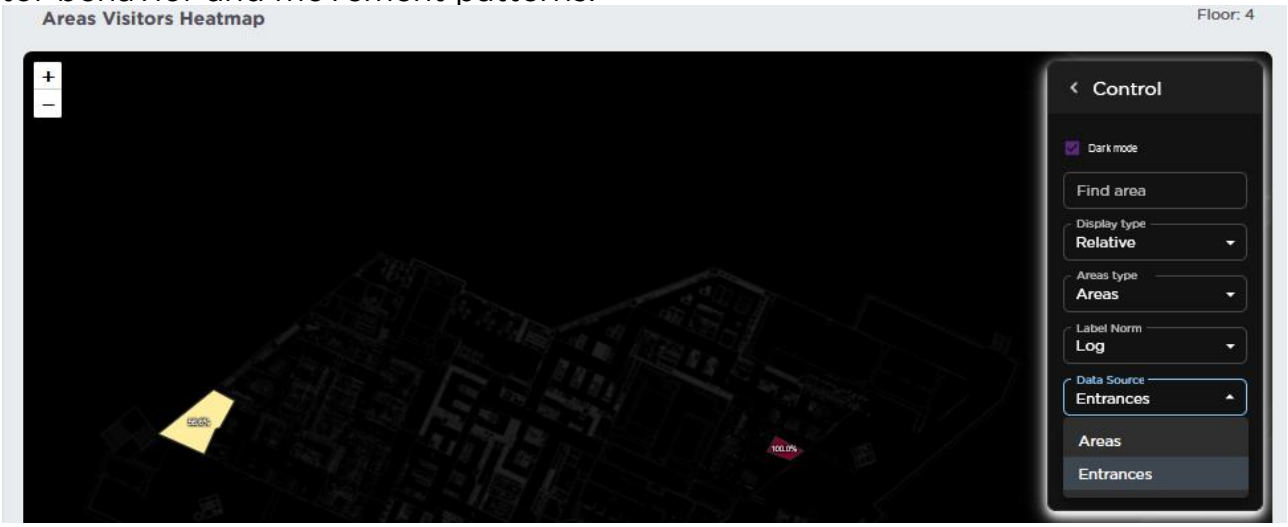


By selecting Entrances the panel provides insights into the number of unique visitors arriving at specific entrances within defined polygons. This feature helps analyze foot traffic patterns by associating visitors' initial recorded locations with the nearest designated entrances.

How It Works:

1. **Polygon Data**: The panel uses polygon data to define areas of interest (configured in the Advanced Parameters of the Areas of Interest panel).
2. **Visitor Tracking**: Each visitor's first recorded location is matched with the nearest entrance within these polygons.
3. **Data Aggregation**: Visitor arrival data is aggregated and displayed over the selected time intervals for easy analysis.

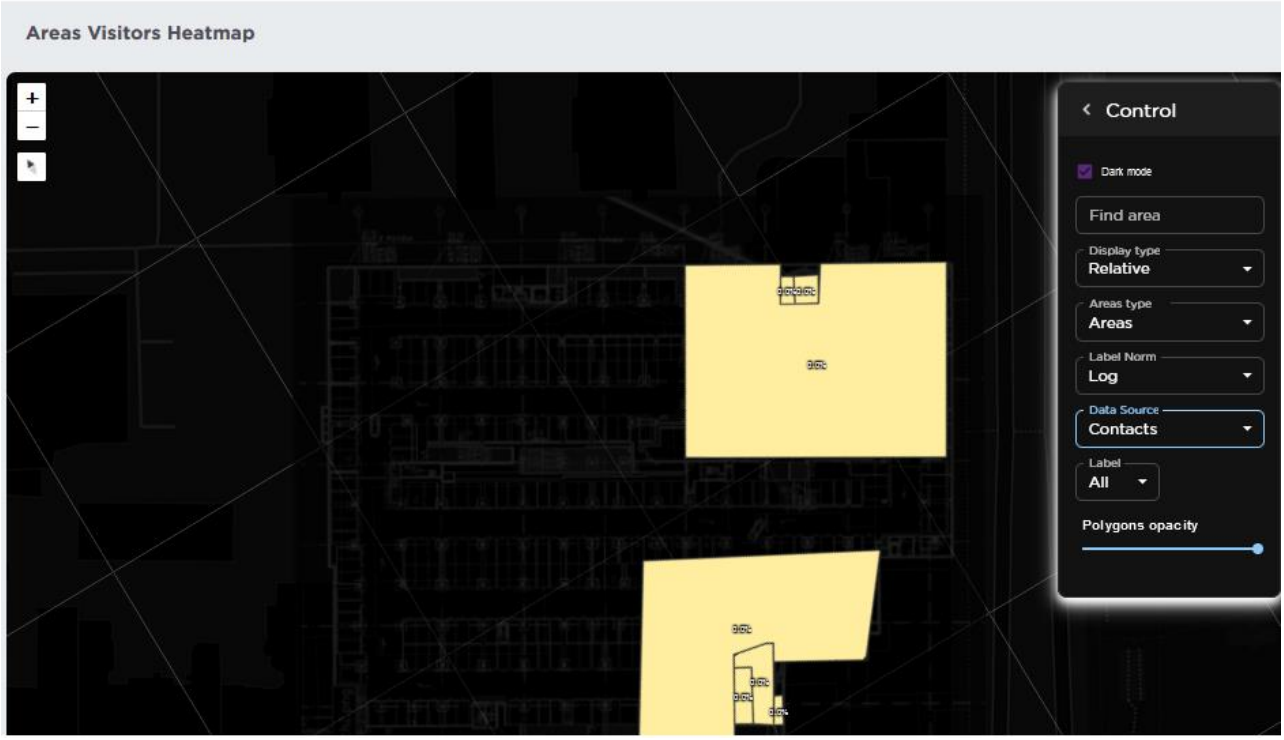
Use this panel to monitor and evaluate entrance-specific traffic to gain insights into visitor behavior and movement patterns.



By selecting Contacts, the panel provides an analysis of visitor interactions with specific polygons labeled with the "In front of" prefix. It calculates how often visitors are recorded in front of these designated polygons, helping to assess engagement levels with particular areas.

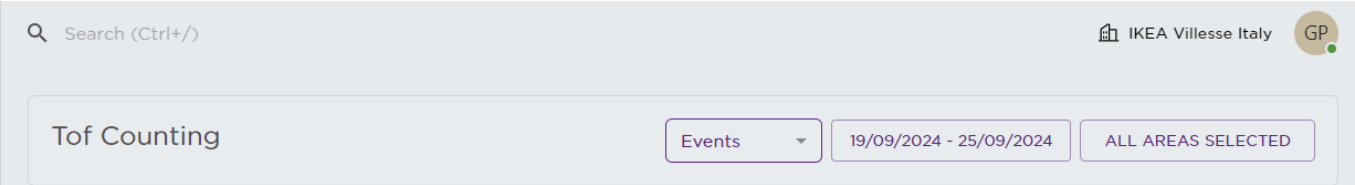
How It Works:

1. **Polygon Data**: The panel focuses on polygons labeled with the "In front of" prefix, which represent specific areas of interest.
2. **Visit Frequency**: It calculates the number of times visitors are detected near these polygons.
3. **Insight Generation**: The data is aggregated to provide an overview of how frequently visitors are present in front of these areas.



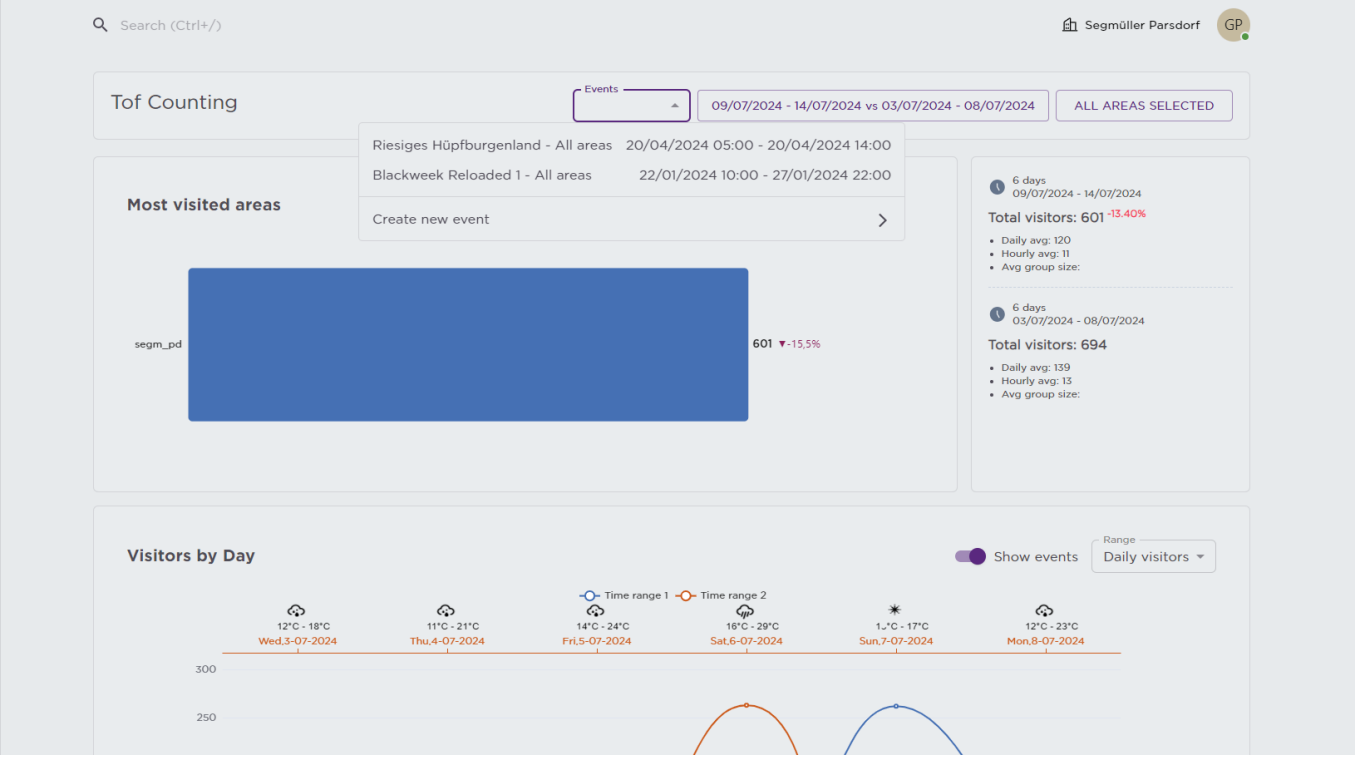
4.11 Optical Sensors

Optical Sensors Counting dashboard delivers precise analytics based on the visitation data gathered from Optical Sensors installed throughout your organization's premises. These sensors measure visitor traffic within designated polygons, offering insights into specific areas of interest. This page closely resembles the People Counting dashboard, featuring similar components and interactive elements such as heatmaps that demonstrate how different areas are frequented.



The datetime picker remains a core feature, allowing users to select specific dates for data analysis. Users can also choose historical date ranges to draw performance comparisons over time. If Optical Sensors sensors are installed at the store entrances, the dashboard provides metrics on total footfall, presenting a comprehensive view of overall visitor traffic during selected periods.

Visitation data include total counts, daily and hourly averages, within the selected timeframe, alongside comparable historical data. The dashboard allows users to mark significant dates using the Events date picker for quick reference to critical periods throughout the year.

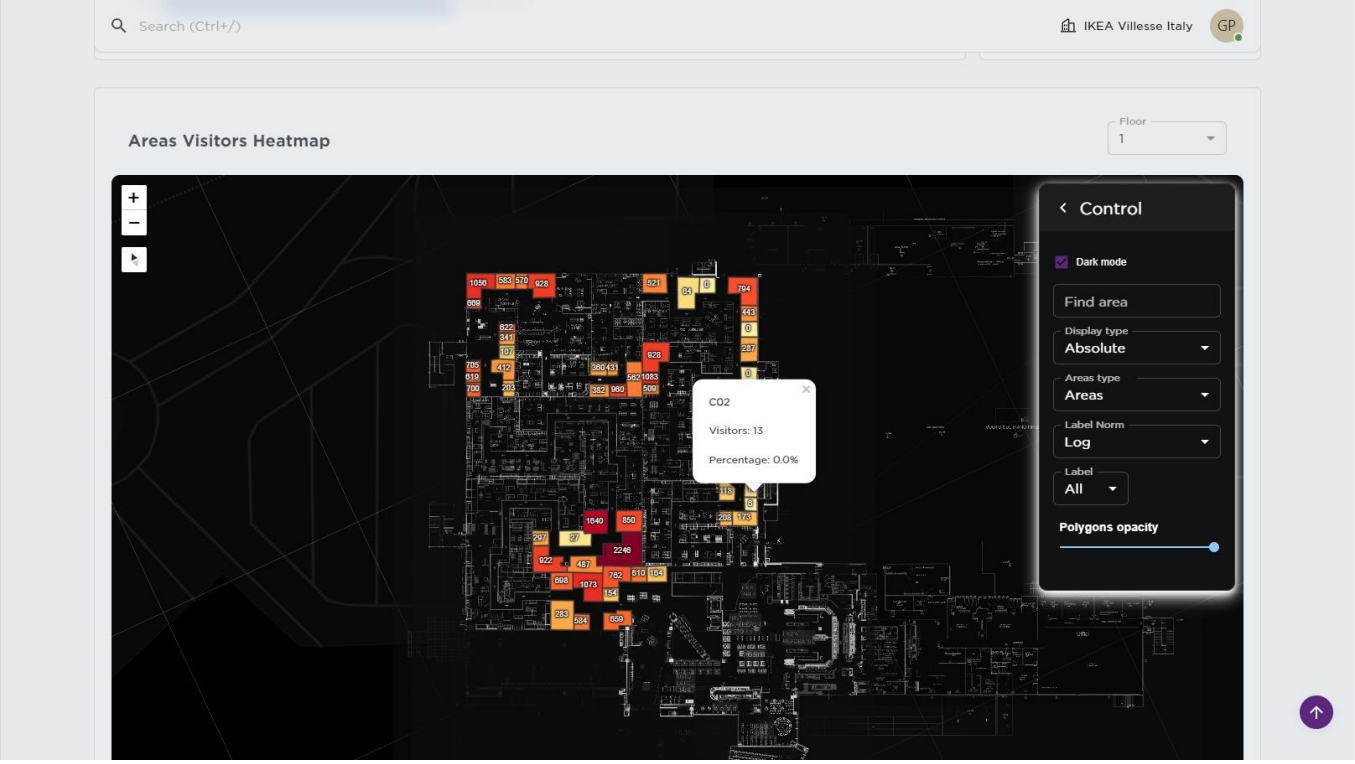


The interactive elements extend to displaying the top five most frequented areas, complete with visitor counts and percentage comparisons against previously selected dates. A convenient dropdown menu, accessible via a three-dot icon, allows users to filter these results by specific polygon labels.

Charts on the dashboard visualize the distribution of visits by day, with options to view data by week or hour, enhancing the granularity of the analysis.

The heatmap for average hourly arrivals offers a color-coded comparison of visitor counts at different times, indicating peak and off-peak periods. Similarly, pie charts depicting average visit durations provide insights into how long visitors typically spend in designated areas.

An overall heatmap enhances the dashboard's utility by showing the most visited zones on each floor, with controls to toggle between percentage and absolute counts, tailoring the display to user preferences.



4.12 Turn In Rate

The turn-in rate aims to present the percentage of visitors for each area in the table using as a reference the total footfall. The turn-in rate dashboard can depict the percentages in each parent level. In Figure below, the dashboard presents the turn-in rates for all parent 1 areas of the project for the selected period. For switching between different parent levels, the users can select the desired level from the filters highlighted in the Figure, or they can just click on the area they want to focus on.

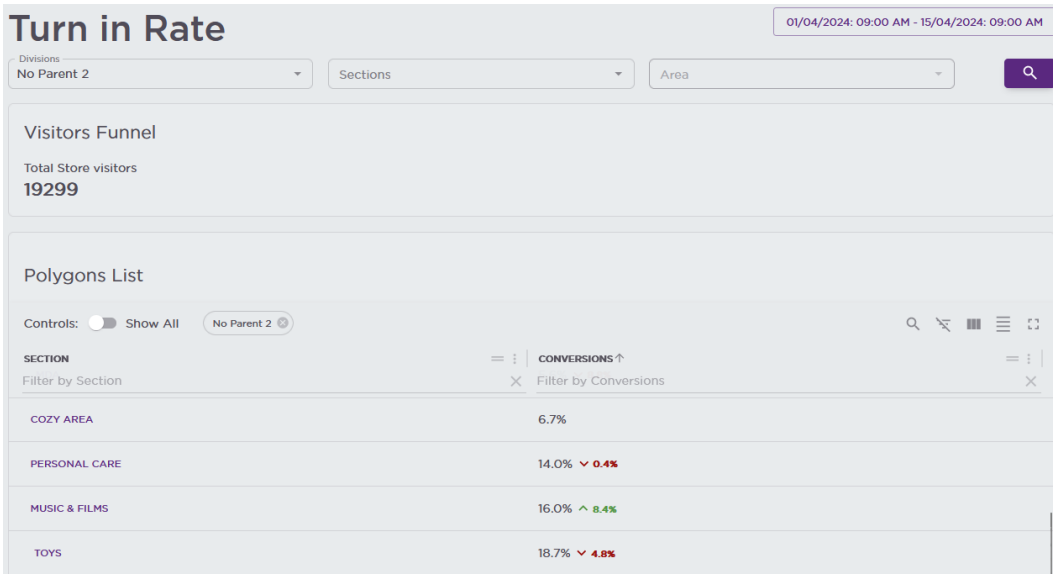


Figure: Parent 1 Level Turn-In Rates Table

The smaller in size and colored percentages next to each area conversion is only available and relevant for customers that have installed Ariadne Technology in more than one projects (many stores, many shopping malls, etc.). This is because those percentages show how this area is performing compared to the same area of all projects on average. Please keep in mind that in order to have this comparison, the projects of same owner, need to have exactly the same naming for the same areas in all parent levels.

Then by adding one more level of analysis, the users can have an overview of all areas of interest that belong to the same Parent 1 level. For example, on Figure 2 below the users can easily see all the areas of interest and their respective turn-in rates which belong to the selected Parent. The funnel presented on top analyses all the selected parent levels and thus it shows the total footfall (since there is no parent 2 level) and then also the selected parent 1 level. It highlights that the selected parent 1 attracted the 49% of the total store footfall.

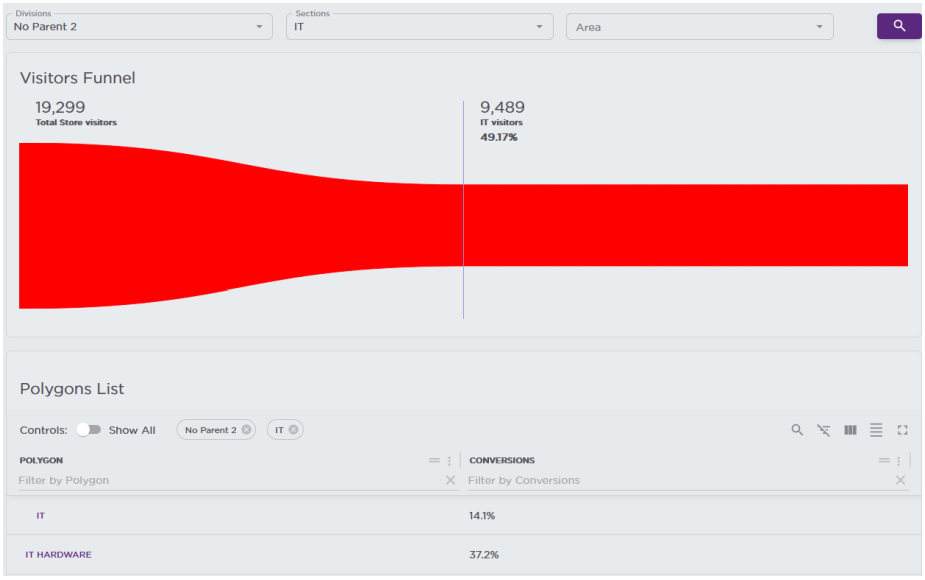


Figure : Areas of Interest Turn-In Rates Table

If the users select a specific area of interest, then the dashboard will be adjusted and presented as the following Figure 3. The turn-in rate table includes only the selected area of interest, and the funnel is adjusted and also entails the area of interest and its respective turn-in rate.

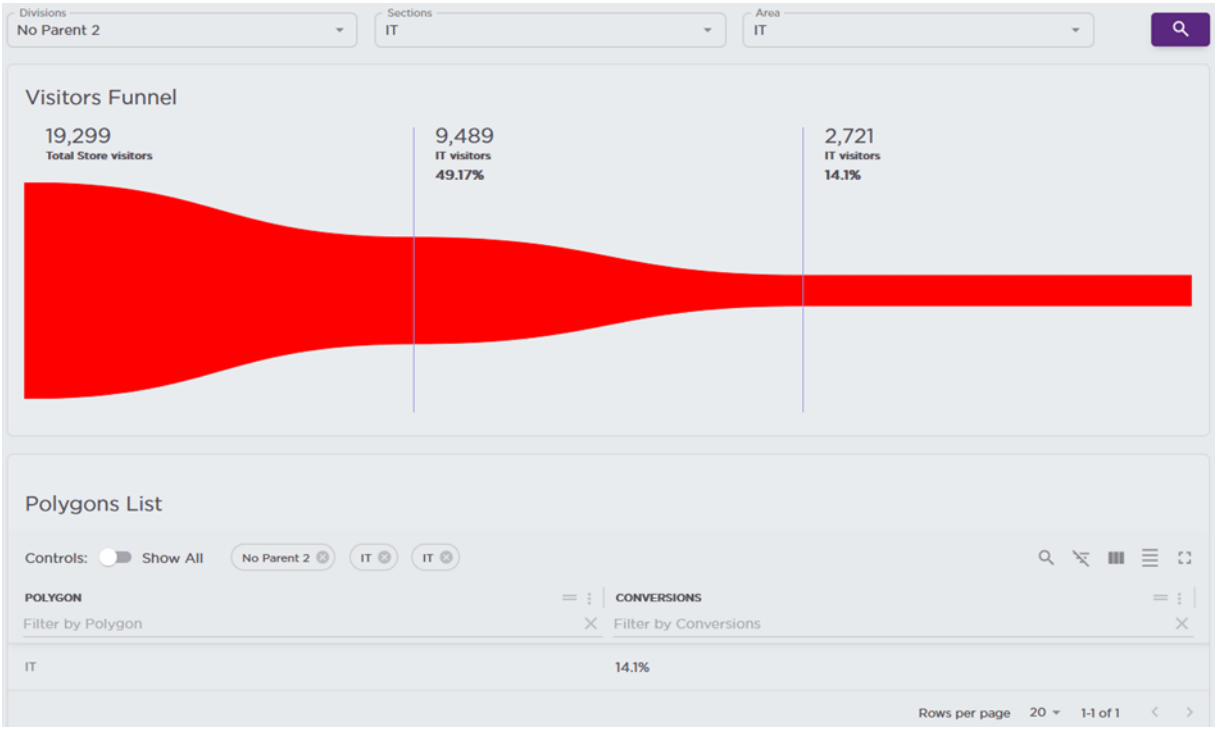


Figure: Selected Area of Interest Turn-In Rates

4.13 Industry Benchmarking

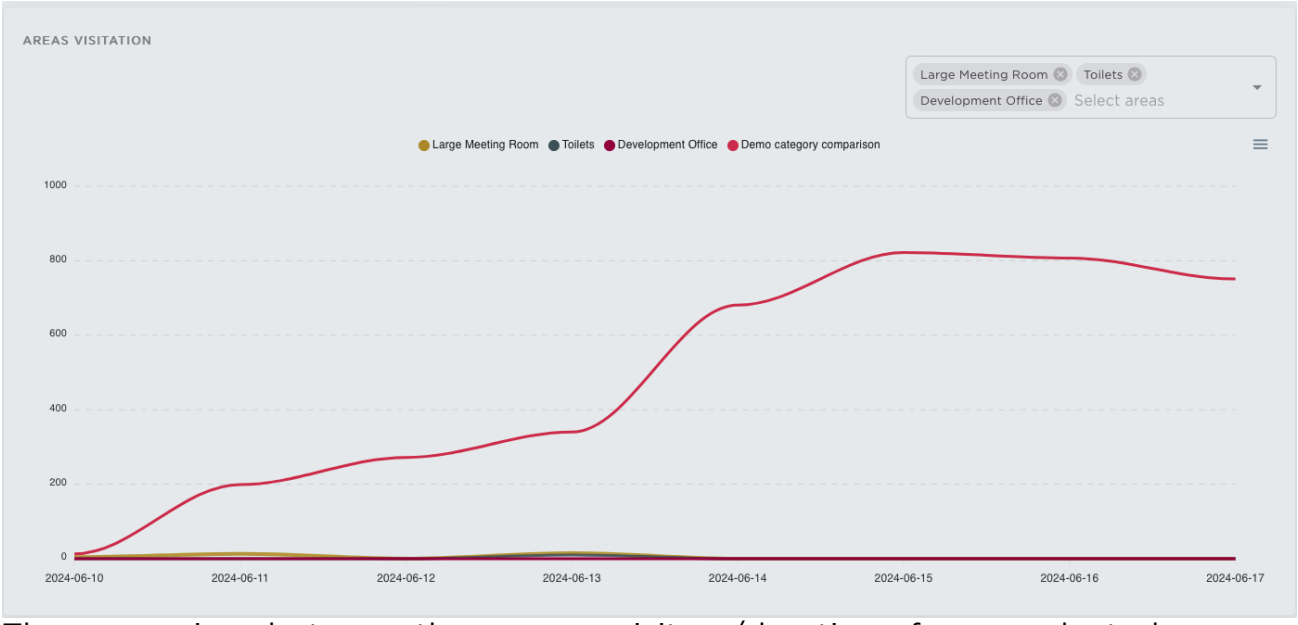
Industry Benchmarks are an innovative way to benchmark your organization's performance based on other similar typed organizations from Ariadne's database.

Blue color is used for user's data and orange color used for the average of similar typed organizations. A date range selection calendar is provided to search for the desired time range.

The panels are presented in the dashboard:

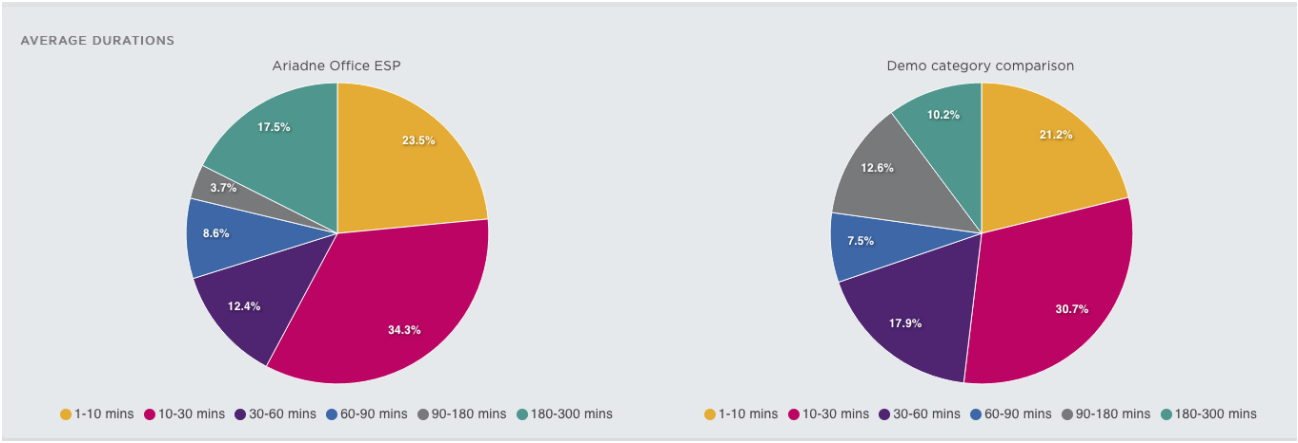
- Total Visitation vs Average Group Visitations
- Weekly Average visitation by day of week vs Weekly Average visitation by day of week from similar typed organizations
- Daily Visitation vs Average Daily visitation from similar organizations respective to the time range selection.

- Areas/Sections visitation/duration



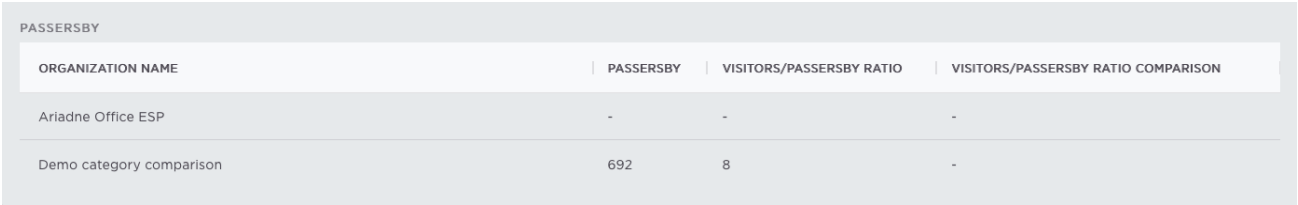
The comparison between the average visitors/duration of some selected areas/sections and the average visitors/duration of the areas/sections of the organizations in the same category/group
Users can show/hide the areas/sections by selecting them in the dropdown list

- Area duration



The comparison between the average duration of all the areas of the current organization and the average duration of the areas of all the organizations in the same category/group

- Passersby



PASSERSBY

ORGANIZATION NAME	PASSERSBY	VISITORS/PASSERSBY RATIO	VISITORS/PASSERSBY RATIO COMPARISON
Ariadne Office ESP	-	-	-
Demo category comparison	692	8	-

The comparison between the total passersby of the current organization and the average passersby of all the organizations in the same category/group.
The visitors/passersby ratio column is calculated by total visitors that have passersby data divided by total passersby. The visitors/passers ratio

comparison is calculated by visitors/passersby ratio of the current organization divided by the average visitors/passersby ratio of all the organizations in the same category/group.

- Average group size

AVERAGE GROUP SIZE

ORGANIZATION NAME	AVERAGE GROUP SIZE	AVERAGE GROUP SIZE COMPARISON
Ariadne Office ESP	0	-
Demo category comparison	1.87	-

The comparison between the average group size of the current organization and the average of average group size of all the organizations in the same category/group. The average group size comparison is calculated by average group size of the current organization divided by the average group size of all the organizations in the same category/group.

- Catchment area

CATCHMENT AREA

ORGANIZATION NAME ↑	CATCHMENT AREA SCORE	CATCHMENT AREA SCORE COMPARISON
Ariadne Office ESP	-	-
Demo category comparison	198.01	-

The comparison between the catchment area score of the current organization and the average catchment area score of all the organizations in the same category/group. The catchment area score comparison is calculated by catchment area score of the current organization divided by the catchment area score of all the organizations in the same category/group.

- Customer loyalty

CUSTOMER LOYALTY

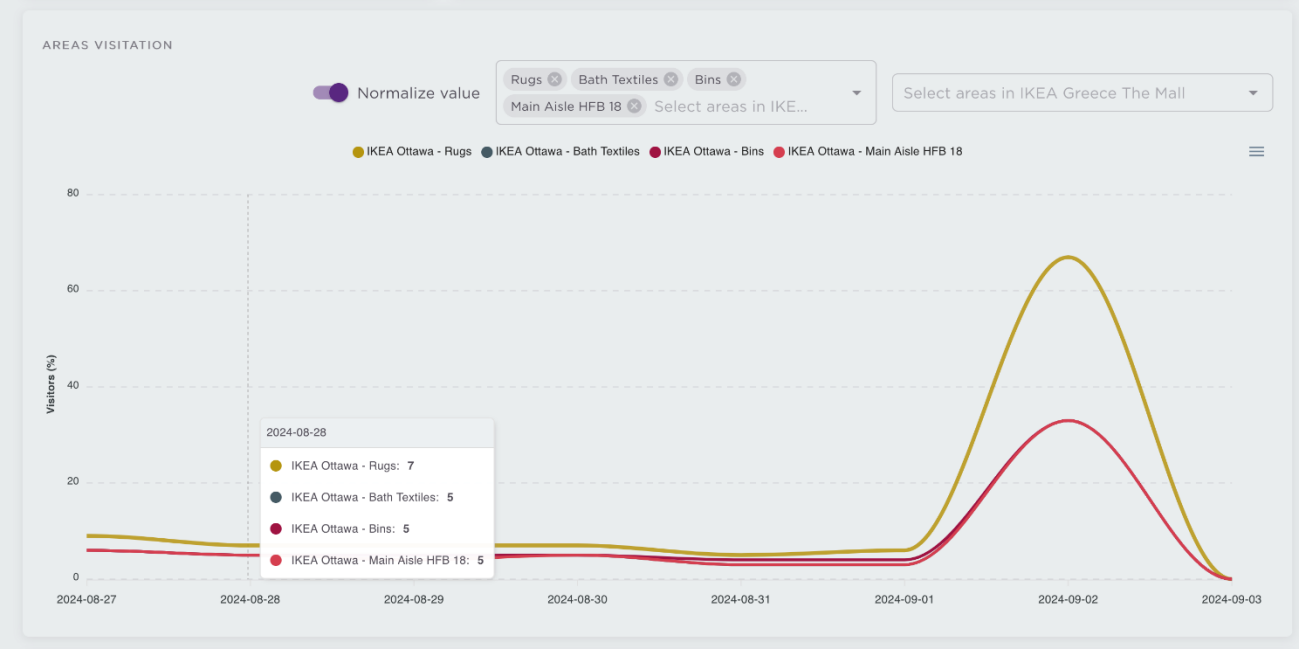
ORGANIZATION NAME	RETURNING CUSTOMERS	RETURNING CUSTOMERS COMPARISON
Ariadne Office ESP	-	-
Demo category comparison	-	-

The comparison between the customer loyalty of the current organization and the average of customer loyalty of all the organizations in the same category/group. The returning customers comparison is calculated by total returning customers of the current organization divided by the average of total returning customers of all the organizations in the same category/group.

- Sales conversion rate

The comparison between the sale conversion rate of the current organization and the average of of all the organizations in the same category/group or of the other organizations. The sales conversion rate is calculated by the total customer divided by the total visitors in an organization. The sales conversion rate of a category/group

For `Area's visitation` and ` Section visitation`, the button ` Normalize value` allows the user to select if they want to see the normalized or absolute number. The normalized value is calculated by dividing each absolute value in the area visitation or section visitation panels by the total footfall in the Daily total visitors panel in the corresponding dates and present it as an integer format



4.14 Visitors Trajectories

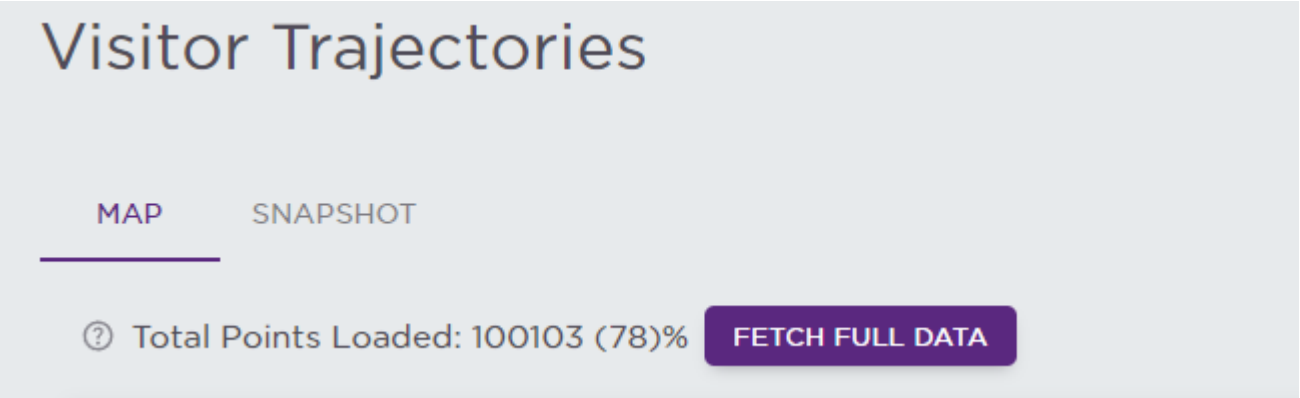
The visitor trajectories enable you to monitor the flow of visitors, or your visitor's trajectories. This can provide several benefits, including:

Improving Customer Experience: By understanding how customers move through the store, you can optimize the layout and design to improve the customer experience. For example, if a certain area of the store is often congested, the layout can be adjusted to reduce traffic and improve the flow of customers.

Increasing sales: By analyzing visitor trajectories, you can identify popular areas of the store and optimize product placement to increase sales. For example, if a certain product category is frequently visited but not frequently purchased, you can adjust product placement or pricing to encourage sales.

•**Reducing operational costs:** By identifying areas of the store that are underutilized, you can adjust staffing levels and optimize operations to reduce costs.

•**Optimizing marketing and promotions**: By analyzing visitor behavior, you can tailor marketing and promotional campaigns to specific areas of the store or specific customer segments, increasing the effectiveness of these efforts.



In some cases, only parts of the total data points are loaded to improve fetching time when and only when the total points in the selected time-range is extremely high, full data can be loaded anytime by clicking the “FETCH FULL DATA” button.

Visitors Trajectories Control Panel Tab Switch:

- Heatmap
- Trajectories

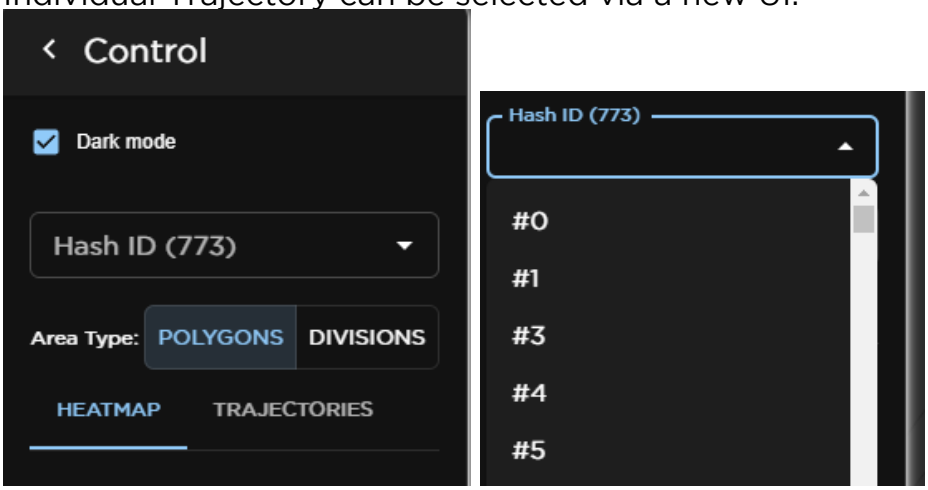
The Heatmap displays all points extracted from the trajectories, with areas exhibiting sparse points appearing yellow and transitioning to red as points become more concentrated.

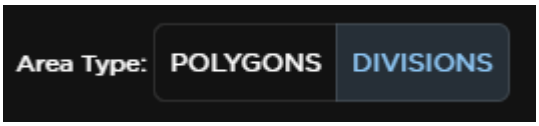
Within the Heatmap panel, there are four controls:

- Intensity Slider: Adjusts the threshold for concentration highlighting. Lower values emphasize only highly concentrated areas, with the number of nearby points required for highlighting increasing sequentially (e.g., from 2 to 4 to 6 to 8 to 10, and so forth).
- Radius Slider: Increases the size of individual points, expanding their coverage area. This feature is useful for approximating each point's coordinate.
- Threshold Slider: Functions similarly to the Intensity Slider and will be deprecated in the next release.
- Exclude Corridors Checkbox: This option is applicable only if polygons are designated as "Corridors." Checking this box hides all corridor polygons.

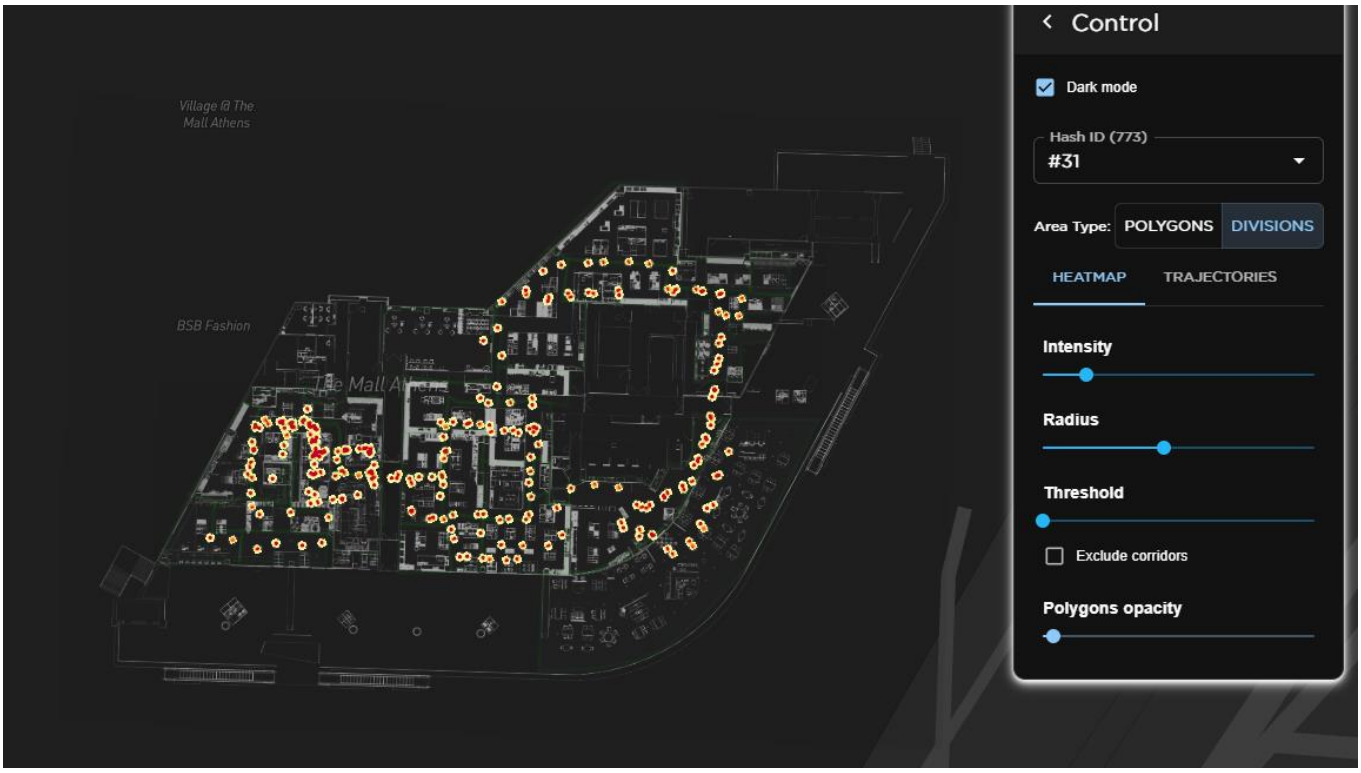
The Trajectories Map depicts the actual paths formed by connecting points belonging to a trajectory.

Individual Trajectory can be selected via a new UI.

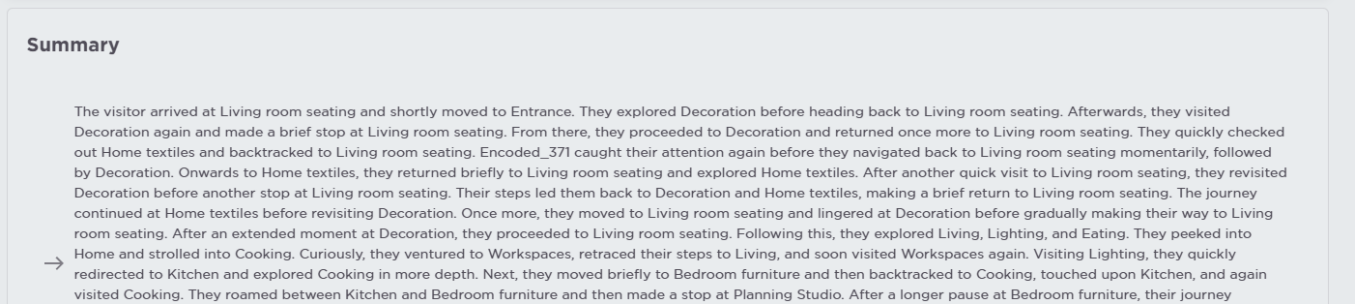




Area types can be switched with this control, this input changes the polygons grouping as well as controlling the scope of the auto-generated summary for the selected trajectory.



After a selection, only the selected trajectory will be shown, both for the heatmap and the trajectories panel.



Below the map, a summary of the selected trajectory will be generated by AI, areas names are encoded and decoded throughout the interaction with the AI, thus ensuring the privacy of the project.

The primary animation controls include:

- Start/Pause: Initiates animation from the last stopping point when stopped, and halts animation when playing, preserving the stopping point.
- Restart: Resets the stopping point to the initial position and restarts the animation.
- Increase Speed and Decrease Speed: Adjusts the animation speed multiplier (defaulting to x5, or five times faster than real-time).
- Setting Icons: Enables users to adjust the thickness of trajectory lines.

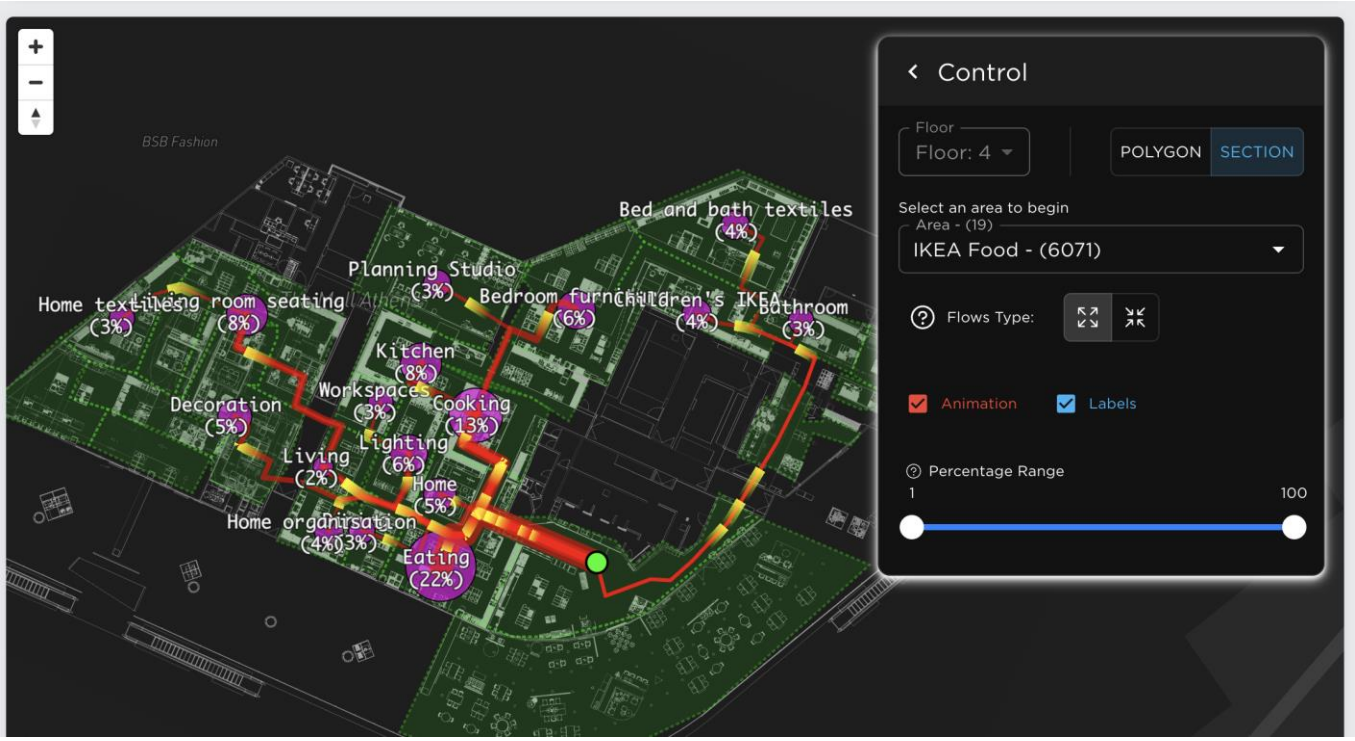
Beneath the animation controls, information such as start, end, and current timestamps (with timezone displayed above) is provided. The Trailing Checkbox and accompanying numerical input facilitate fading trajectories older than a specified duration (adjustable in seconds), with disabling the trailing option revealing all trajectories.

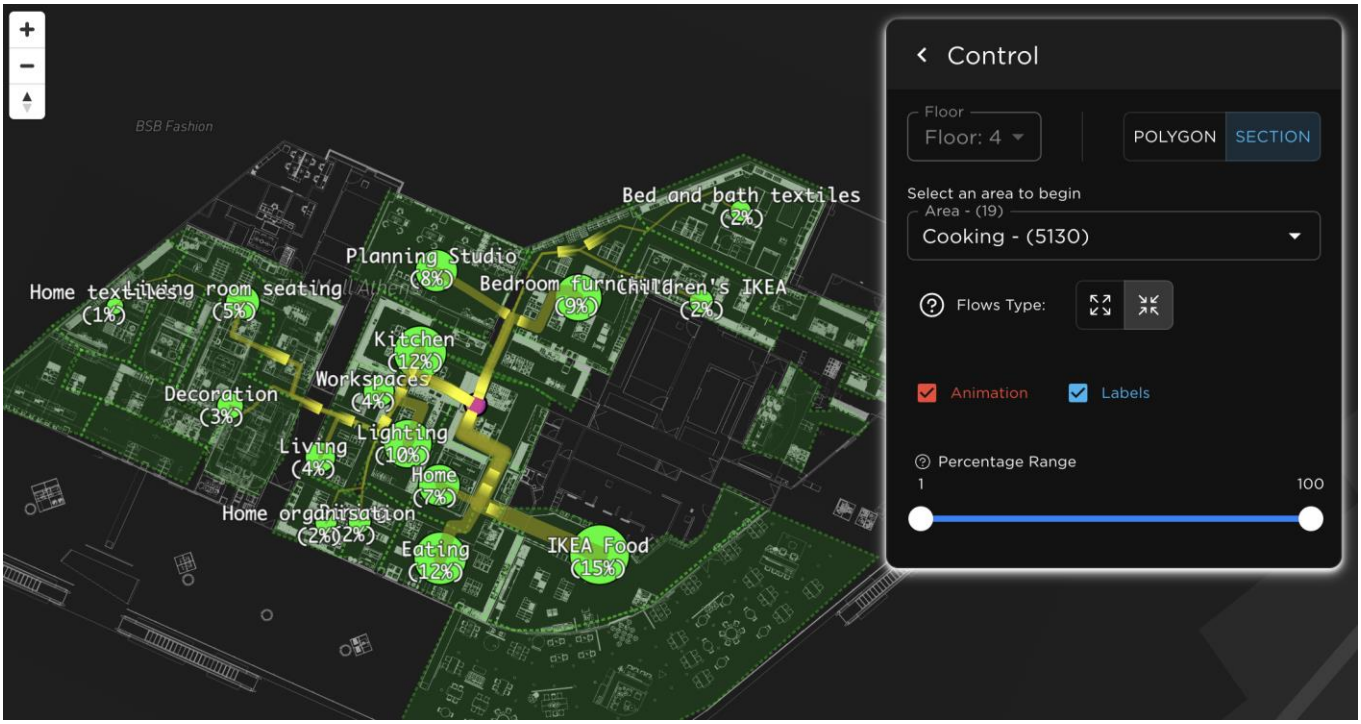
Finally, a slider allows manual adjustment of the animation's progress, applicable only when the animation is not actively playing.

4.15 Area Transitions

4.15.1 Area Transitions v3

Area Transitions v3 (Visualizing Flow Transitions between Polygons) visualizes flows among areas/sections using the actual topology of the location thus provides a view closer the reality and simple arbitrary arrows. To view the flows, an area selection is required. Without “Animation” being enabled, the directions of the flows are marked using colors. The Selected Area as an Origin is marked light green, destination points are pink, while red lines indicating outflows from the origin.





In case out in-flows, the selected area is a target destination and becomes pink while all other origins are now green, and in-flow lines are yellow.

Toggling between out-flows and in-flows are simple by using the control toggle buttons at Flows Type.

Users can customise their view by toggling between different polygon types using the toggle buttons, with options including "Section" (an alias for parent polygons) and "Polygons" (the smallest unit). Selecting a specific polygon is effortless; users can

either search for its name in the autocomplete form or simply click on the desired option.

Furthermore, the dropdown menu located at the top of the interface allows users to seamlessly switch between different floors or levels, enhancing the versatility of the visualization.

To further refine their visualisation, users can utilise the Percentage Range slider, which enables intensity filtering based on relative flow magnitudes. This slider allows users to specify a range, such as 20-30%, indicating that only flows with intensities greater than 20% of other polygons and less than 70% of other polygons will be displayed, providing precise control over the visualisation's granularity and clarity.

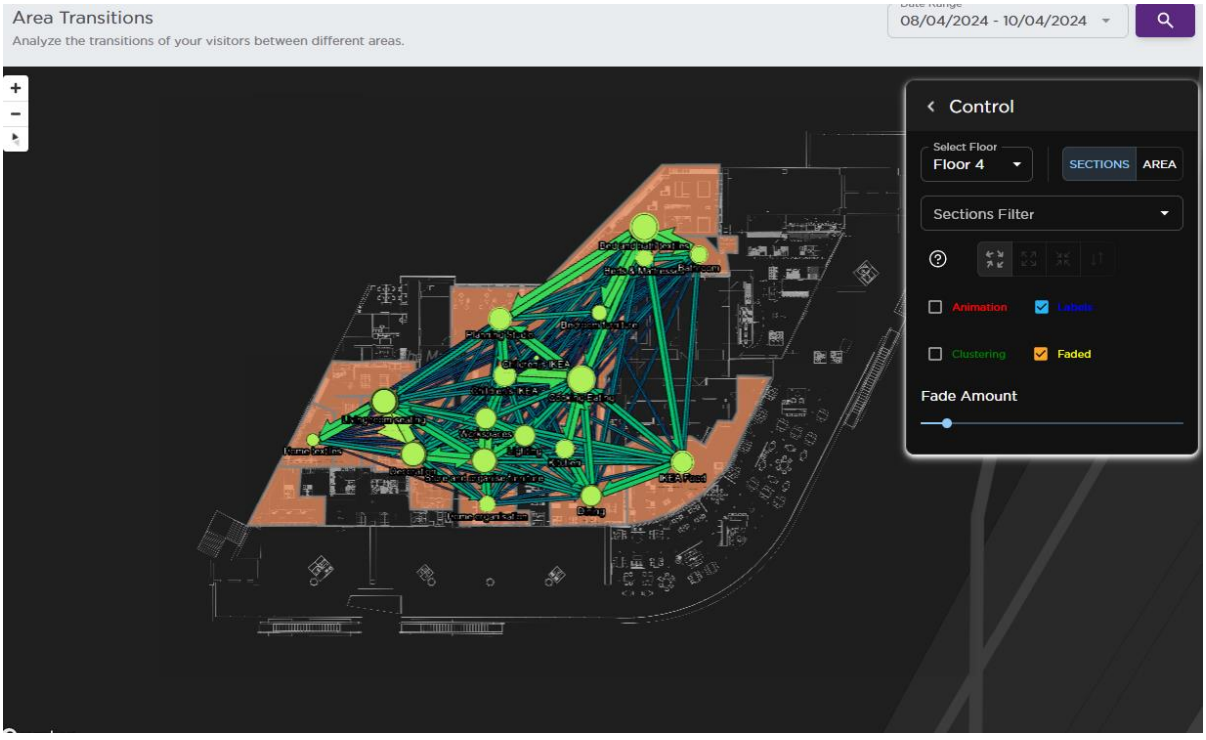
Additionally, users can enhance their visualisation experience through two toggling options:

Animation: Transform static flow arrows into animated ones, providing clearer direction visualisation.

Labels: Display the name of each area/polygon next to its node/centroid (enabled by default).

4.15.2 Area Transitions v2

Introducing our latest Transition Visualization tool, Area Transitions v2 (Enhanced Visualization Tool). This interactive map offers a dynamic portrayal of flows between polygons on the same floor or level, providing users with invaluable insights into spatial dynamics.



Each flow is represented by an arrow, with its thickness dynamically adjusted to reflect the magnitude of flow relative to other connections between polygons. The control panel empowers users to seamlessly navigate between floors or levels, facilitating comprehensive exploration.

Users have the flexibility to toggle between Sections (the default choice, serving as an alias for parent polygons) and Areas (the smallest division of polygons), tailoring the visualization to their specific needs.

By default, all nodes and polygons are included, but users can easily customize their view through a variety of filtering options. Whether entering the name of a polygon in the autocomplete field or clicking directly on nodes/polygons, users can refine their focus effortlessly. Multiple polygons can be selected, and consecutive clicks further expand the filtering set.

Additionally, users can enhance their visualization experience through four toggling options:

Animation: Transform static flow arrows into animated ones, providing clearer direction visualization.

Labels: Display the name of each area/polygon next to its node/centroid (enabled by default).

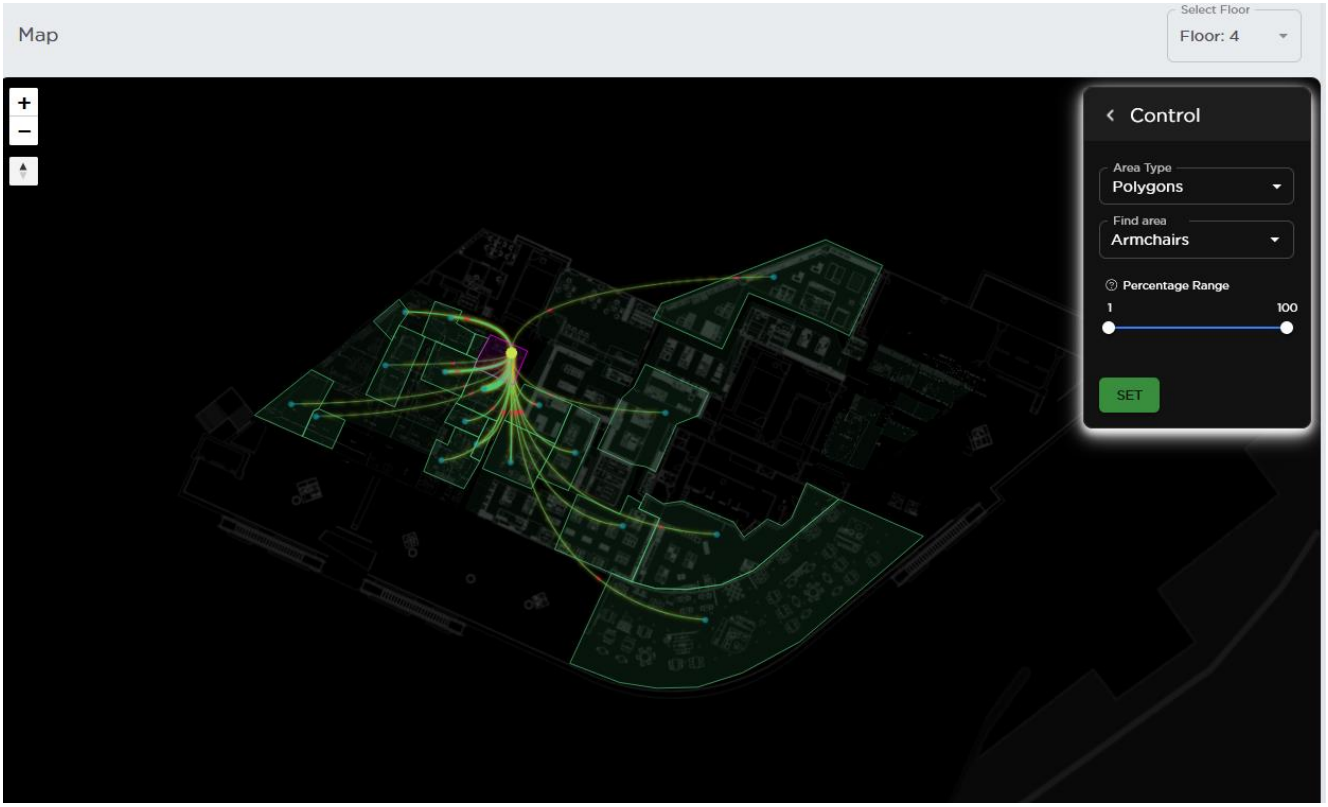
Clustering: Opt to cluster nodes together, particularly useful when dealing with a large number of nodes.

Faded: Blur out lower-flow connections, enhancing clarity (enabled by default).

A slider enables users to control the intensity of the fading effect, offering fine-grained control over visualization aesthetics. This feature is only accessible when the fading option is enabled, allowing users to adjust the blur intensity to their preference, thereby optimizing their exploration experience.

4.15.3 Area Transitions v1

Area Transitions v1 (Visualizing Flow Transitions between Polygons) offers a comprehensive visualization of transition flows between polygons, enabling users to gain insights into spatial dynamics with ease. By default, the visualization remains dormant until a polygon is selected, ensuring a focused and interactive exploration experience.



Users can customize their view by toggling between different polygon types using the dropdown menu, with options including "Divisions" (an alias for parent polygons) and "Polygons" (the smallest unit). Selecting a specific polygon is effortless; users can either search for its name in the autocomplete form or simply click on the desired option.

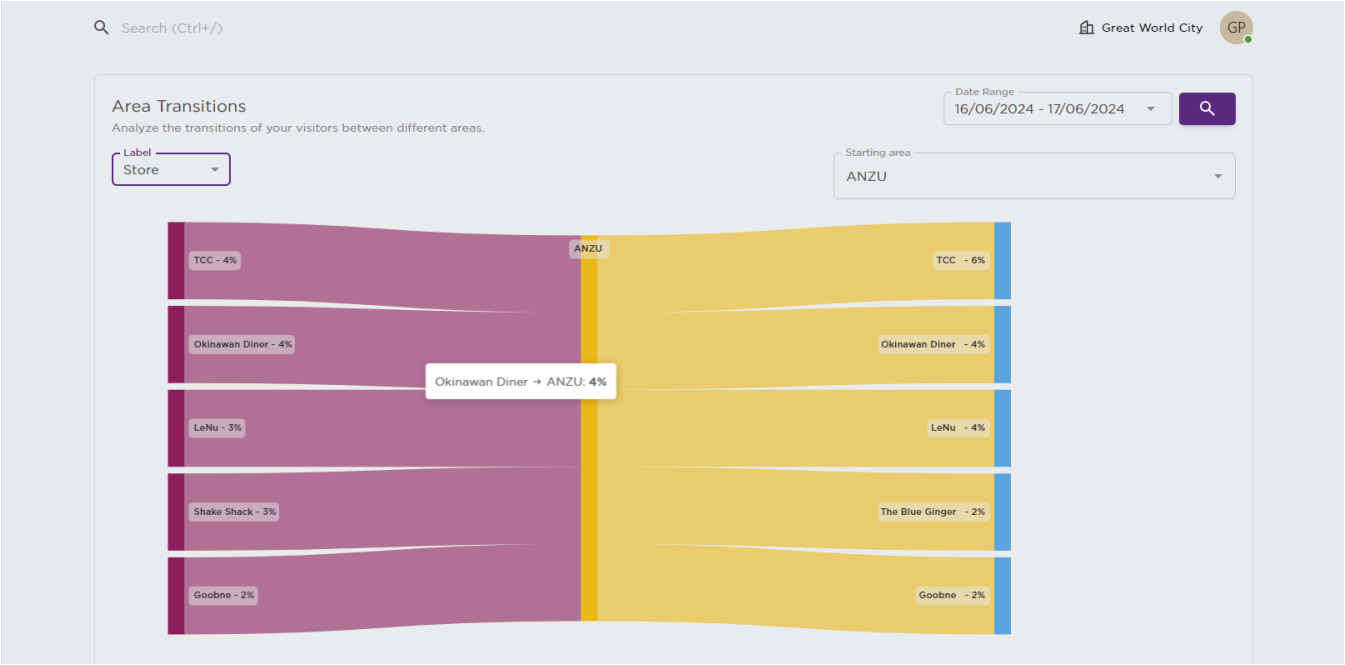
Furthermore, the dropdown menu located at the top of the interface allows users to seamlessly switch between different floors or levels, enhancing the versatility of the visualization.

To further refine their visualization, users can utilize the Percentage Range slider, which enables intensity filtering based on relative flow magnitudes. This slider allows users to specify a range, such as 20-30%, indicating that only flows with intensities greater than 20% of other polygons and less than 70% of other polygons will be displayed, providing precise control over the visualization's granularity and clarity.

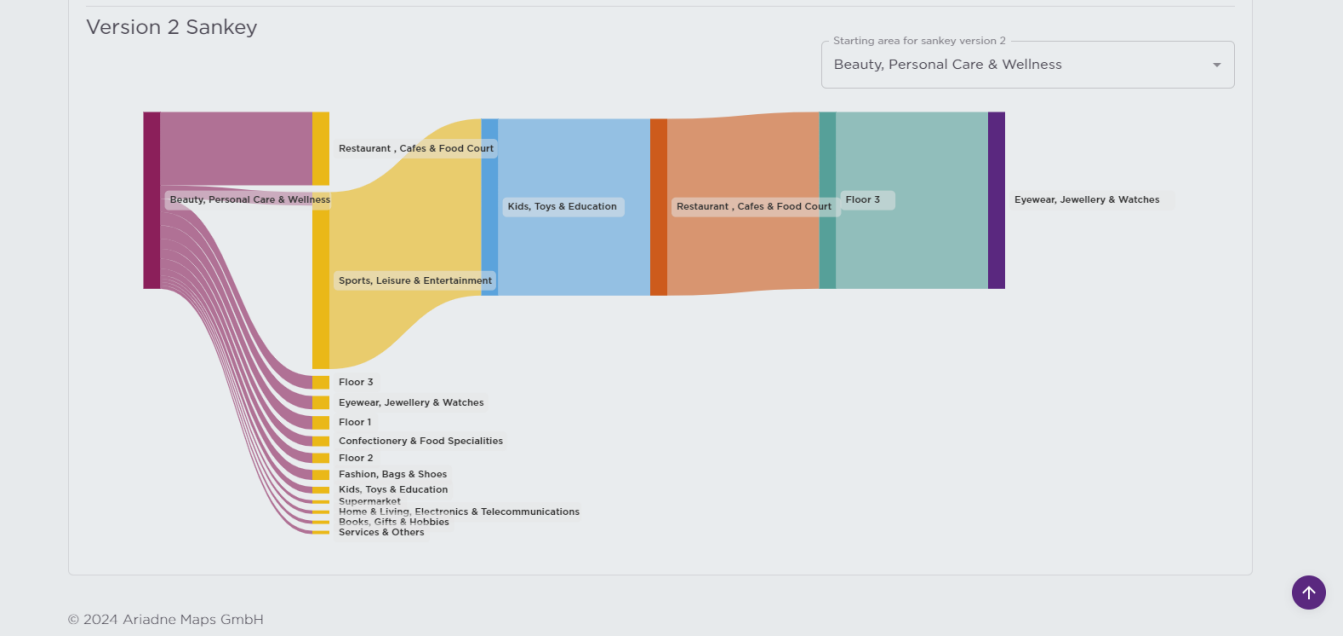
4.15.4 Sankey Diagram

The Sankey Diagram (A Comprehensive Visualization of Polygon Flows) stands as one of the two methods available to users for visualizing transition flows between polygons or areas. Within this intuitive interface, users are empowered to explore spatial dynamics through two distinct sankey charts:

With the first sankey chart the user can select any aoi from the autocomplete and see for the selected area: The top 5 source areas (where people came from) and the top 5 destination areas (where people went to)



- With the second sankey chart the user can select an area as the starting point and click to expand the full trajectory that customers followed starting from the selected area



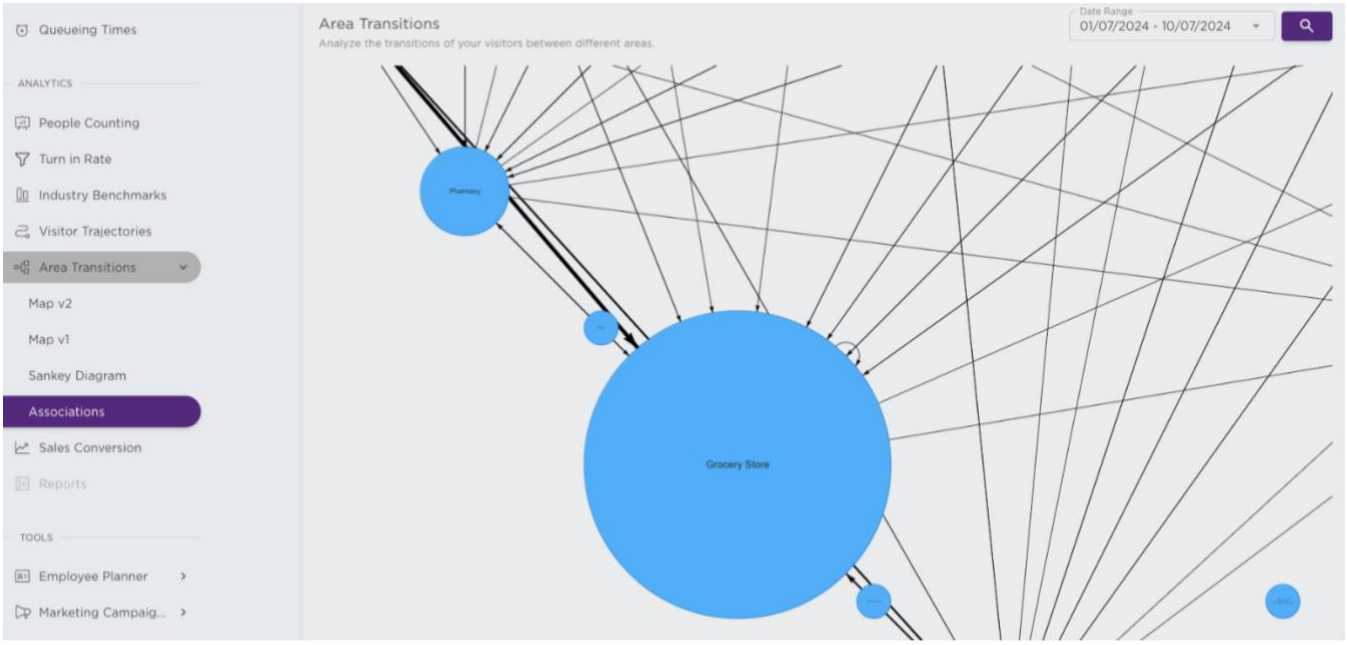
At the forefront of exploration lies the starting polygon selection, facilitated by an autocomplete field. This feature allows users to designate any polygon as their starting point, providing a tailored and focused exploration experience. With three options available for polygon types—Areas (the smallest unit polygon), Sections (parent 1), and Divisions (parent 2)—users can customize their analysis according to their specific needs.

The Sankey chart, serving as the central visualization tool, offers unparalleled depth and flexibility. Users can infinitely expand the chart by clicking on subsequent nodes, thereby revealing all transition flows from the selected polygon, starting from the root node. This dynamic operation enables users to delve into intricate spatial relationships with ease, uncovering nuanced patterns and insights along the way.

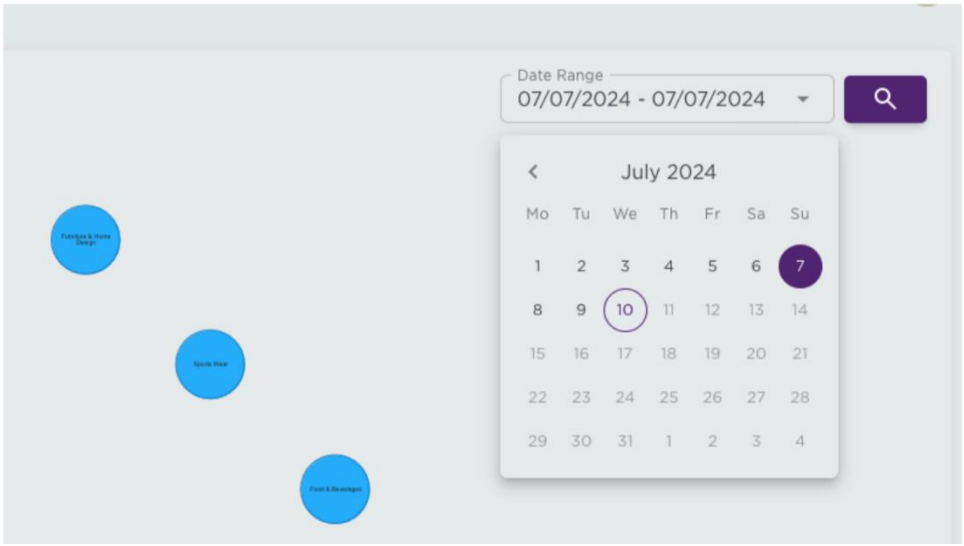
1a.1.41 Associations

The associations dashboard visualizes the transitions of the areas attached to some labels. Each node represents a label. There are 22 labels including Fashion, Shoes, Accessories, Fitness Center, Restaurant, Technology, Furniture & Home Design, Sports Wear, Food & Beverages, Jewellery, Kids store, Beauty & Wellness, Book store, Bank, Grocery Store, Pet Store, Entertainment, Specialty Foods, Gift and Novelty Shops, Services, Optical Store, Pharmacy. These labels are always shown in the graph.

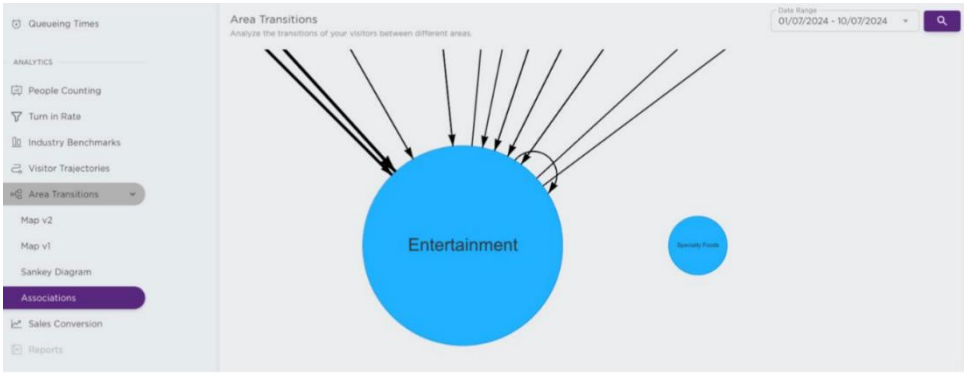
The size of the node visualizes how many visitors in the areas that are attached to the label. If the size of the node is bigger, there are more visitors in the areas with the label. Similarly, if the size of the edges is bigger, there are more transitions from the areas with a label to the areas with another label.

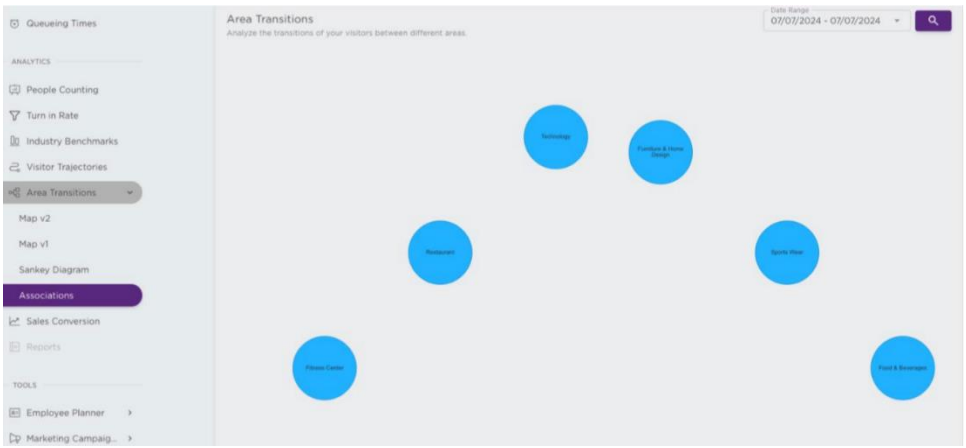


User can select the date range to visualize the transitions and click the search button to update the graph data.



If a node has no edges, there are no transitions to the areas with this node.



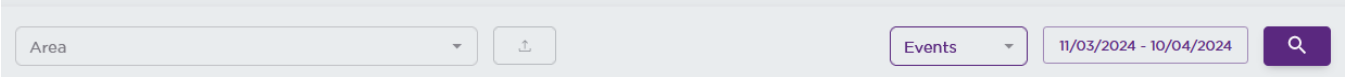


4.16 Sales Conversion

4.16.1 Overview Metrics

On the top of the page the user can find all the available filters for the Sales Conversion Dashboard as shown in Figure 1 below. On the left side of the page, the user can find the ***Area*** dropdown list where a specific area (in Parent 1 level) can be selected. The area selection is essential when the users want all the available metrics for the total sales to be estimated for a specific product category as well as all the analysis that are related with the cross-selling and cross-visitation of the selected area with all the rest areas in the store. Moreover, the user can select the specific period for which the analysis is needed, or an event that the user needs

the analysis for. The event selection can be done by the ***Events*** dropdown list which when selected all the remaining filters (Dates & Area) are adjusted accordingly.



The overview metrics can be found on top of the page, below the page's filters, and includes the conversion rate, the average value per receipt and the visitor-to-Customer funnel. The Figure depicts the conversion rate of the total sales of the store for a specific time period or the conversion rate of a specific area in case that the relevant filter is used. Next to the conversion rate the average value per receipt is depicted.

The Average value per receipt, Figure, gives a short basket overview during the selected period. The ***Items*** represents the average basket size while the ***Sales*** represents the average basket value. ***Note: the Sales metric is only available when the sales values are also provided.***

Figure : Conversion Rate

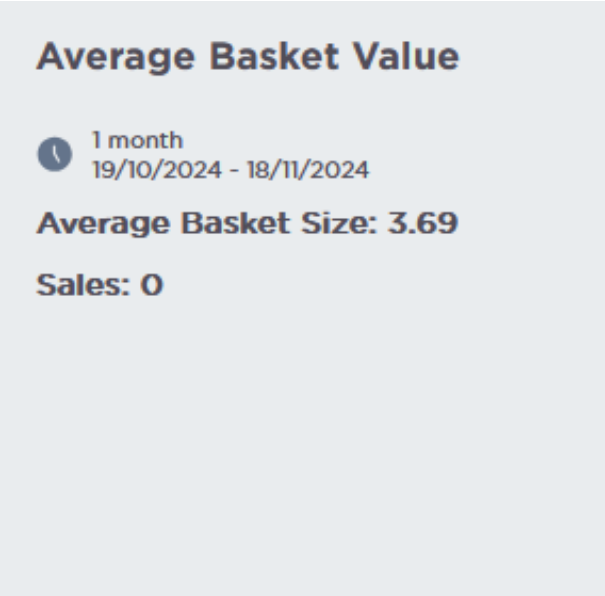


Figure : Average basket value

The Visitor-to-Customer Funnel depicts the conversion of visitors to customers. In Figure the funnel represents the conversion of visitors to customers for the total sales of the store for the selected time period. When a specific area is selected, then the funnel is adjusted to include the area visitors and the area customers, as shown in Figure .

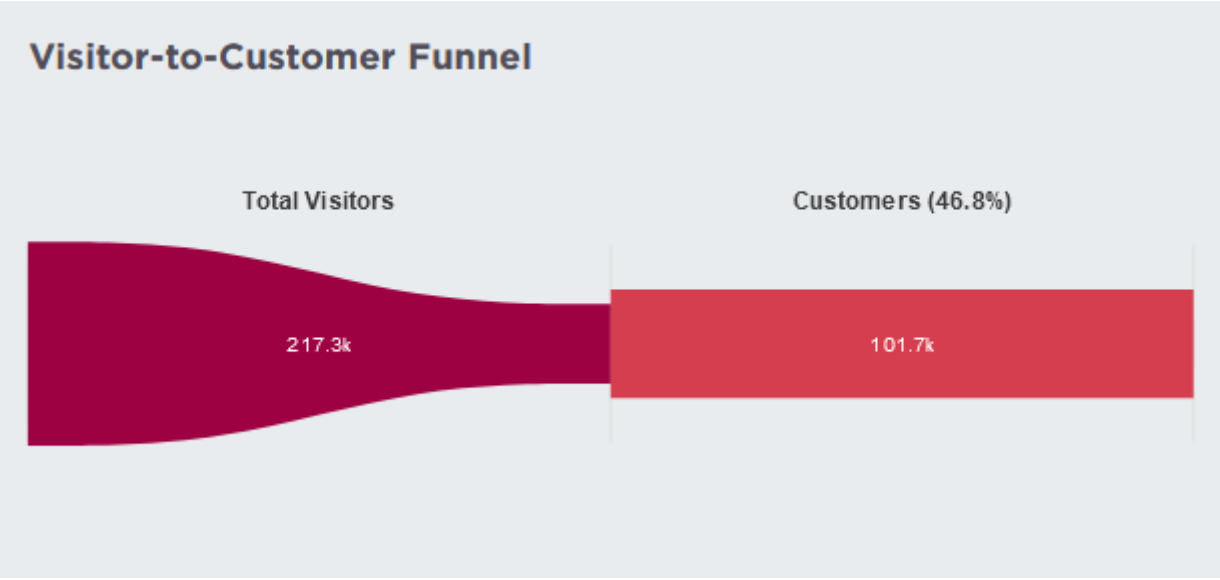


Figure : Visitor-to-Customer Funnel – Total Sales

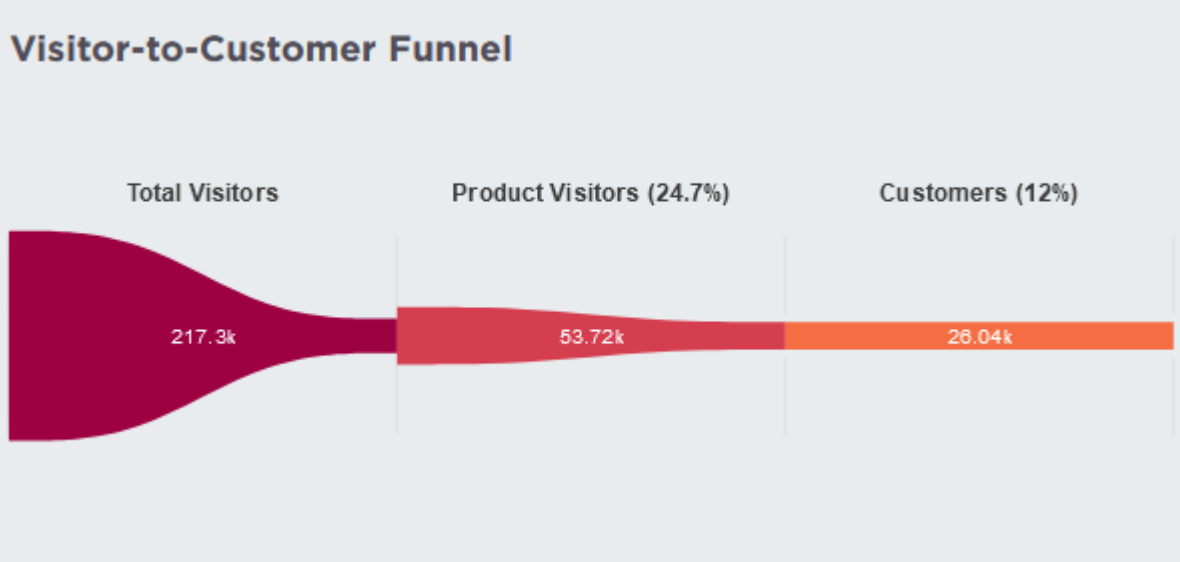


Figure : Visitor-to-Customer Funnel - Area Sales

4.16.2 Top Products Table

The top products table presents a more detailed overview of the sales performance of each product area of the store (Parent 1 level). On this table all the product areas are depicted with their respective metrics. More specifically, for each product area, the user can find ***Customers, Units, Total Revenue, Average Items per Receipt, Average Receipt Value, Area Conversion, Store Conversion***. All these metrics reflect the area performance for the selected time period. The customers are calculated based on the unique Receipt ID, the number of units sold, the total revenues of the product area based on the receipt IDs that issued during the selected time period and also the Average basket size and the Average basket value based on the receipts. Moreover, the ***Area Conversion*** is calculated based on the number of customers that purchased at least an item from this product category to the number of area visitors. Lastly, the store conversion is calculated based on the area customers and the store visitors.

Top Products
List of Products Performance

PRODUCT	CUSTOMERS	UNITS	TOTAL REVENUE	AVERAGE ITEMS P...	AVERAGE RECEIPT	AREA CONV.	STORE CONV.
Warranty Services	427	435.00	0	1.02	0	-	1.11%
TV & Home Entertainment	262	273.00	0	1.04	0	6.69%	0.68%
Toys	2399	3623.00	0	1.51	0	38.76%	6.25%
Telephony	2248	2615.00	0	1.16	0	7.91%	5.86%
Stationery	4264	12448.00	0	2.92	0	42.74%	11.11%

Figure : Top Products Table

4.16.3 Store Conversion Heatmap

The next panel that the user will see is the store conversion heatmap (Figure). The heatmap can demonstrate different metrics like ***Visitors, Customers, Sales Units, Area Conversion, and Store Conversion***.

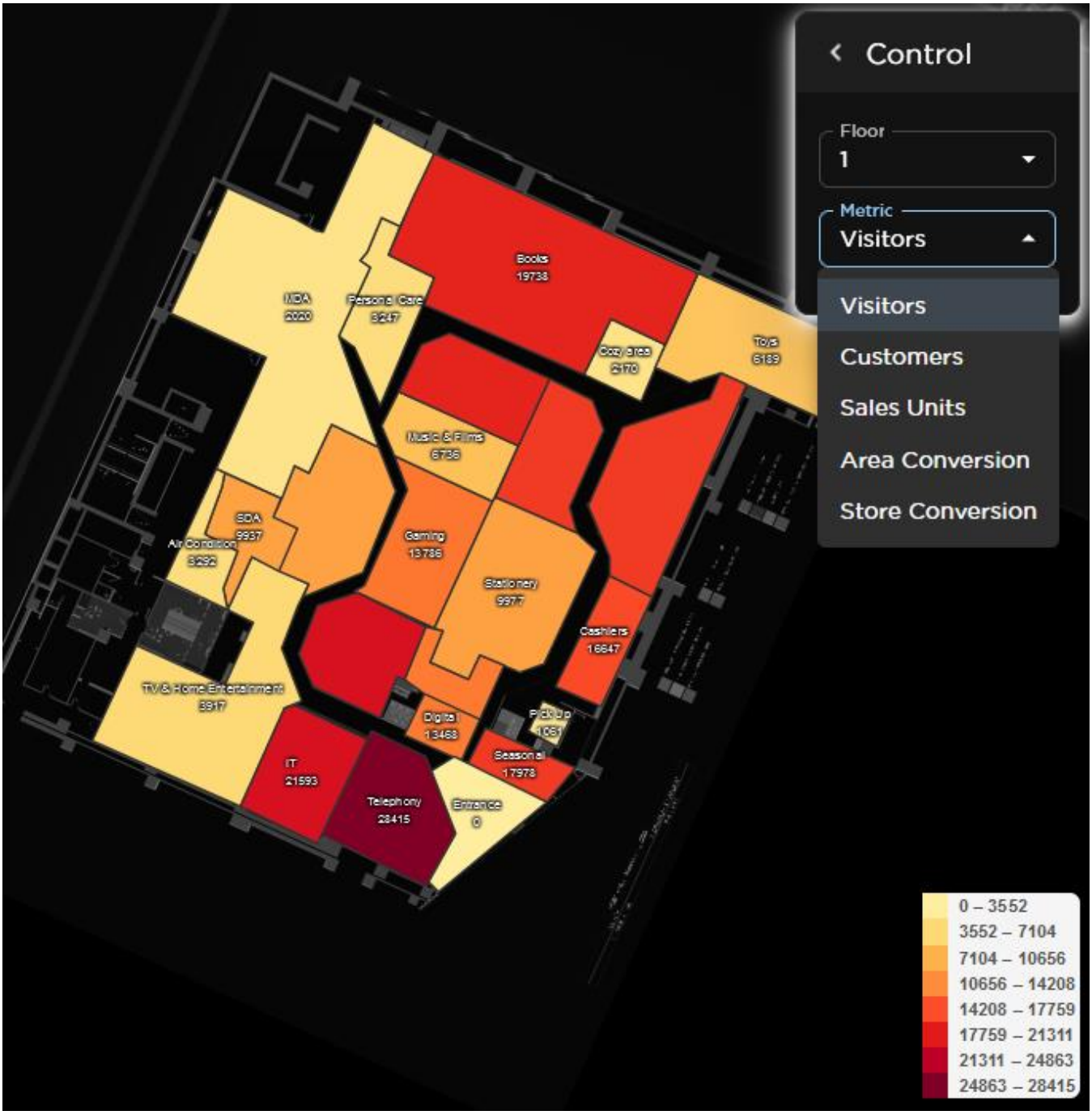


Figure : Conversion Heatmap

The heatmap colouring is adjusting according to which metric is selected. In case that the Area filter is used, the heatmap is presented like the Figure

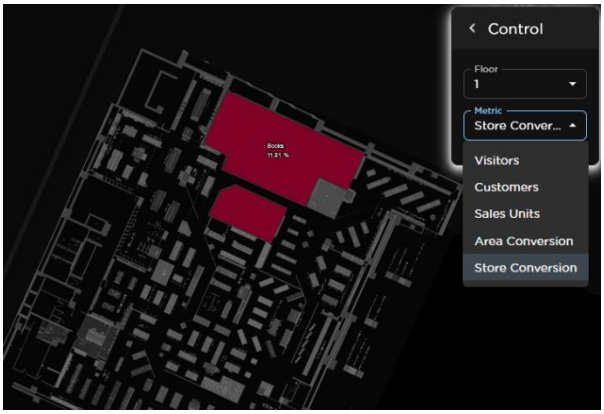


Figure : Area Conversion Heatmap

4.16.4 Store Conversion

The store conversion depicts the ***Conversion Rate, Visitors, Customers, and Unit Sales*** metrics as lines for the selected time period. On the y-axis on the left side of the graph the user can see the number of Visitors, Customers, and Unit Sales while on the right side of the graph, the y-axis depicts the percentage of conversion. The users can overview all the metrics for a specific point of time if they hover over the lines as shown on Figure 9. Under the graph title, a Highlight point is presented which refers to the point of time with the highest conversion monitored. Lastly, in case that the ***Area*** filter is used, then the line graph below is adjusted and depicts the metrics for the selected area. The users can also select the metrics that they are interested in by clicking on the labels on top so that these metrics are only depicted on the line graph.

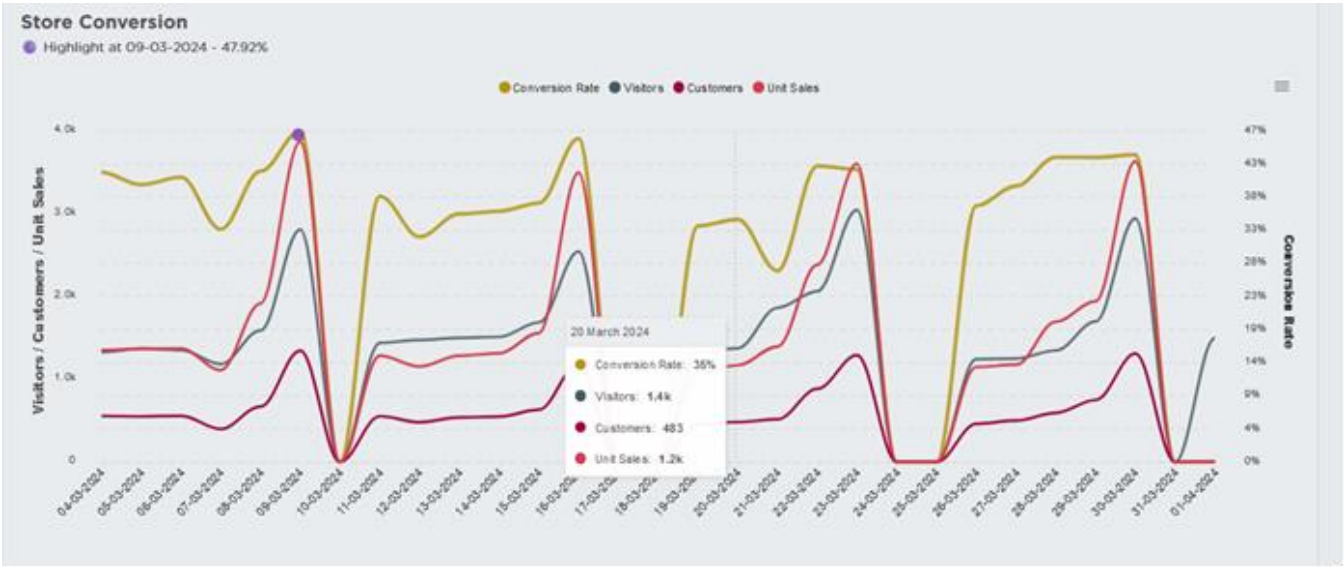


Figure : Store Conversion

4.16.5 Customers Correlation Matrixes

The customer correlation matrices are used for the identification of hidden opportunities. On the sales conversion dashboard, with no Area filtering the correlation matrices are focused on the area size and the area distance from the entrance with the number of customers.

For example, in Figure, the user can identify the correlation between the Product Area size and the number of Area Customers. The positive correlation between those two metrics indicates that the bigger the size of the area is highly positively correlated with the number of area customers. A negative correlation would mean the opposite while the product areas that seem to be outliers could be either destination products or product areas that their sales are do not seem to correlate with the area size.

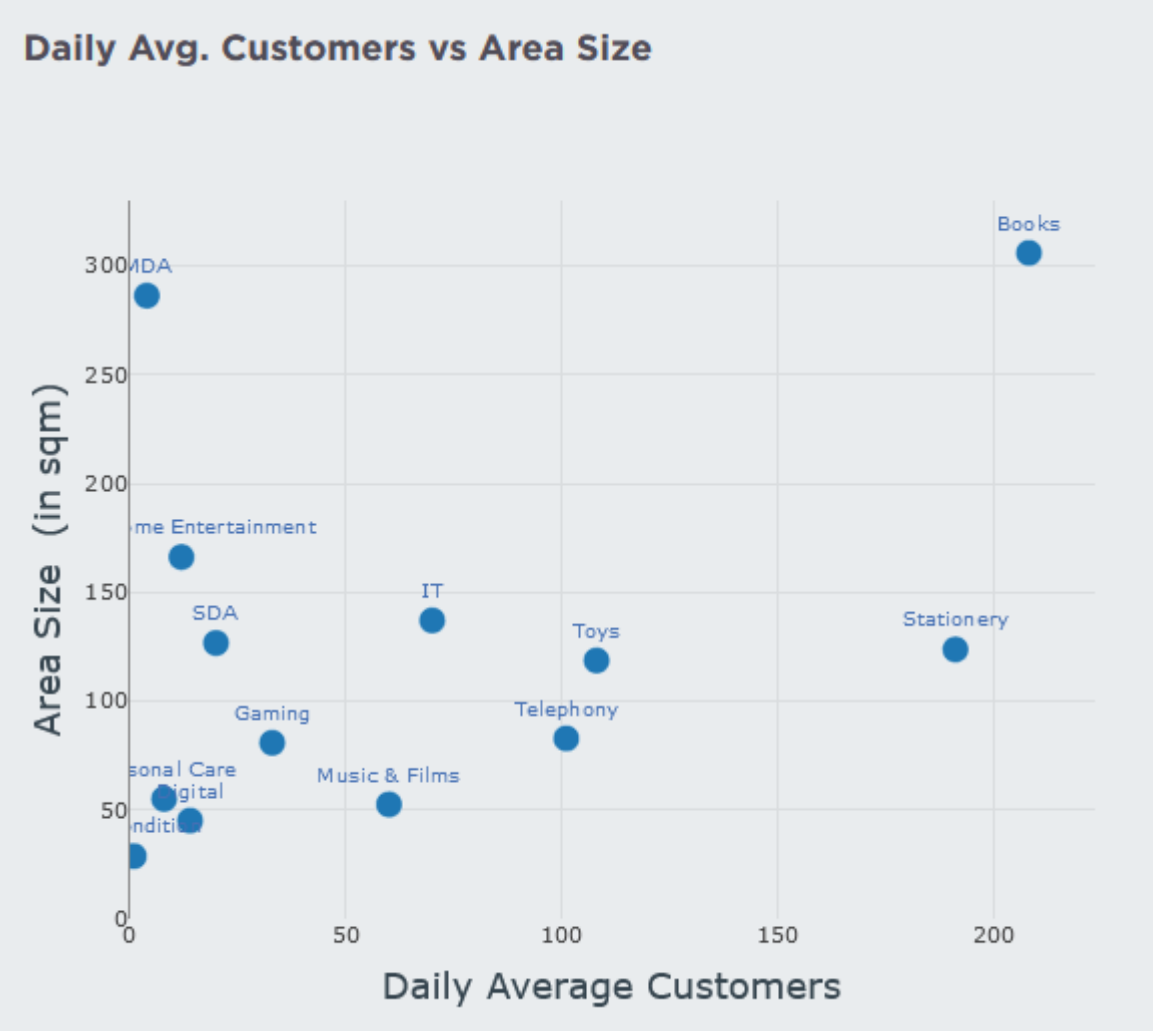


Figure : Daily Avg Customers vs Area Size

Similarly, on Figure the user can identify the correlation between the Distance from the entrance and the number of Customers. A positive correlation will indicate that there is a high positive correlation with the number of area customers and the area distance from the entrance. On Figure 11 it seems that there is a mostly negative correlation between distance from entrance and number of customers. In other words, the more the distance from the

entrance the less the area customers. Overall, the outliers are product categories that do not follow the general trend and it is mostly because these product areas could host destination product, and thus the distance from the entrance is not correlated with the number of area customers.

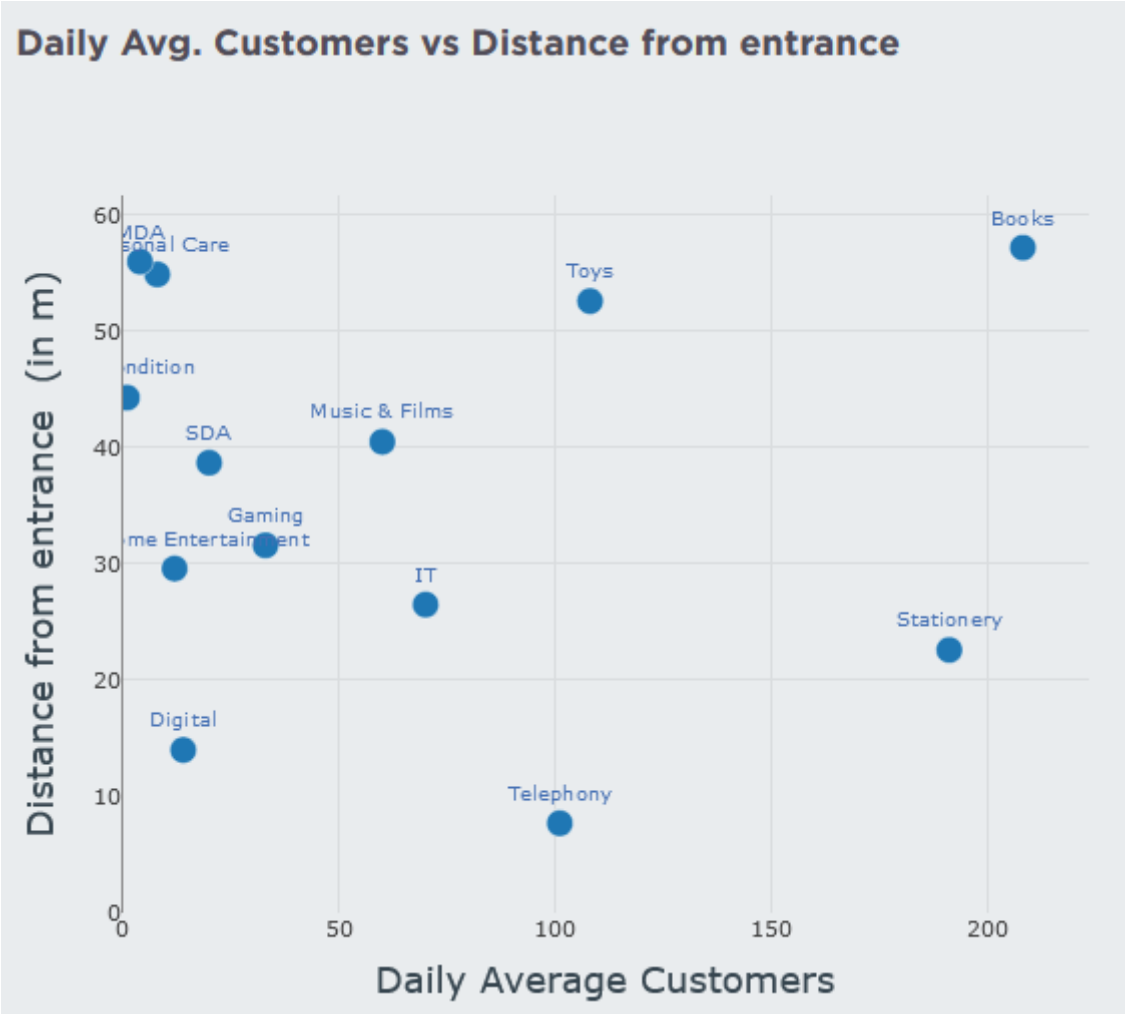


Figure : Customers vs Area Distance from Entrance Matrix

When the users select Area filtering and press the search button then one correlation matrix that appear is using the selected area as a reference. More specifically, the matrix illustrated on Figure is depicting which product areas are cross-selling and cross-visited with the selected product area. This graph reveals what is the chance of cross-selling between two areas that are visited together.

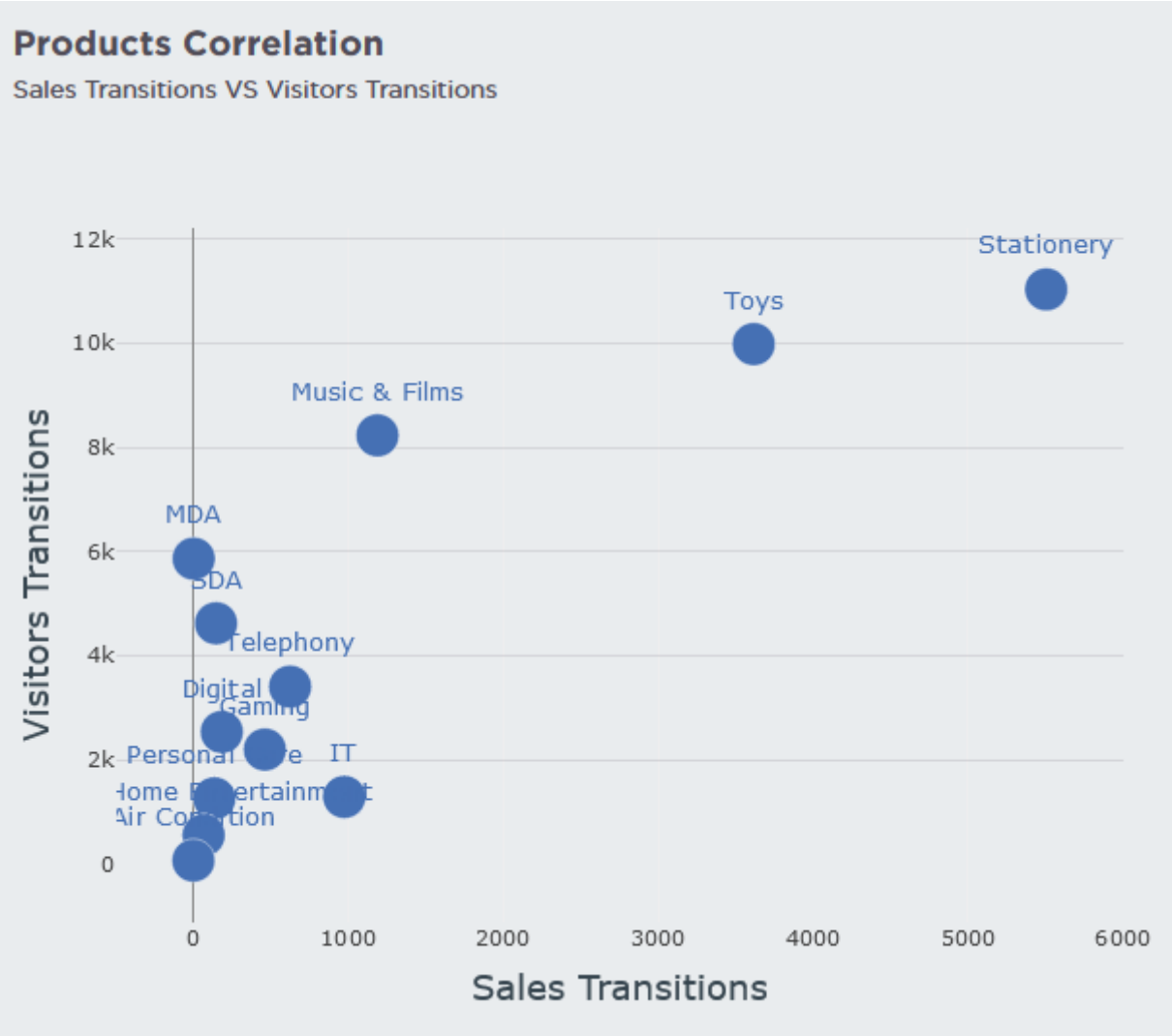


Figure: Cross Visitation vs Cross Selling

Next to the previous correlation matrix, the users can find the correlation matrix with the selected area dwell time and the number of customers. In Figure it is evident that the dwell time is positively correlated with the number of customers. However, there are also cases where the area dwell time is negatively correlated with the number of customers, or it could even be positive up to a point and then turn negative. Lastly, the users can switch from the dots on top right whether they want the data points on Hourly, Daily, Weekly, and Yearly basis.

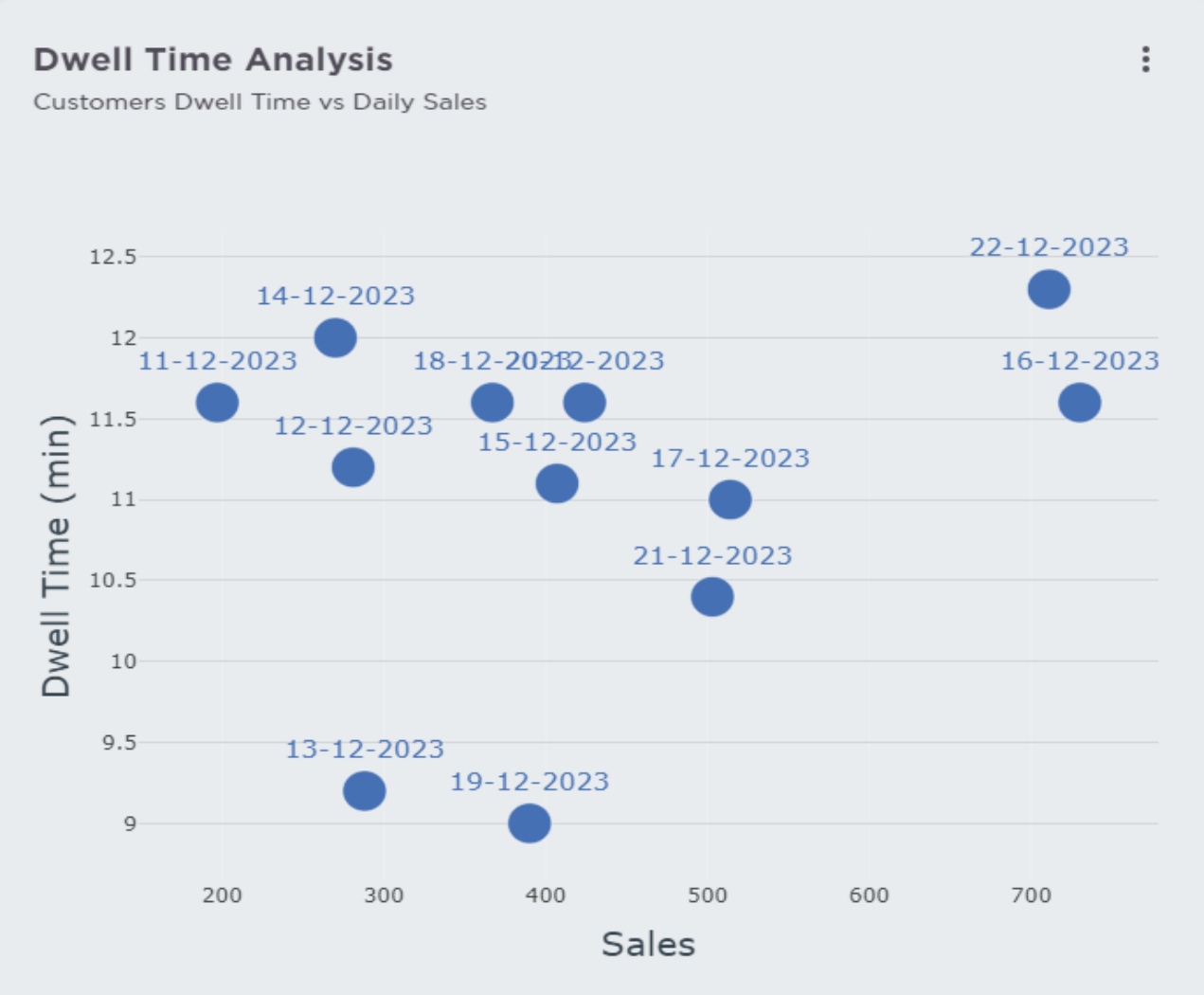


Figure: Customers Dwell Time vs Daily Sales

4.16.6 Product-Placement Analysis

The Product Placement Analysis is used by the users for identifying opportunities of product areas that highly cross-selling while they are not neighbouring areas. More specifically, on Figure 14 the users can find a nxn matrix where all the store's product categories are presented on both rows and columns of this table. The rows that have highlighted product categories are presenting the categories with identified opportunities. The cells that are highlighted with grey present the existing neighbours of the product areas in the rows. The numbers with red colour indicate the **neighbour** with which the product area in the row is selling the **least**. The cells with green coloured numbers are the product category (in column) that is cross selling the **most** with the product category in the related row. In case that a product area is cross selling the most with an existing neighbouring product category, then the positioning of both areas seems good.

multiplying with avg. Price EDIT PRICES Excluded Areas: Stationery

Notations:

Shoes: Optimisable Area/Product

200: Highest Sales Transition corresponding to each row and its column

100: The lowest Sales Transition among all neighbouring areas of the corresponding row

Neighbour area

PRODUCT	TELEPHONY	TV & HOME ENTERTAINME...	SDA	PERSONAL CA...	GAMING	MUSIC & FILMS	COZY AREA
Telephony	-	230	273	161	560	869	
TV & Home Entertainment	230	-	95	34	85	138	
SDA	273	95	-	182	120	161	
Personal Care	161	34	182	-	76	88	
Gaming	560	85	120	76	-	797	
Music & Films	869	138	161	88	797	-	
Cozy area	-	-	-	-	-	-	
Toys	1.103	114	247	152	1.303	2.113	
Cashiers	-	-	-	-	-	-	
Pick Up	-	-	-	-	-	-	

Figure: Product Placement Table

On the other hand, if a cell has a green coloured number and the related area in the column (mostly cross-sold) is not an existing neighbour to the product area in the row, then the potential opportunity is valid only if the cross visitation between the product area in the row and the mostly cross-sold area is less than the cross visitation between the area in the row and its neighbour with the least cross-selling. In other words, if the product area in the row is cross selling the most with a non-neighbouring area and the cross-visitation of these areas is higher than the cross visitation between the area ibn the row and the neighbouring area with the least cross-selling opportunities, then also this positioning seems good, even if the former group of areas are not directly neighbours.

Moreover, by enabling the multiplying with the average price on top of the table, the user can will be able to assess the product areas and their cross-selling opportunities with cross-selling values. The average price per product category can be found and edited if the user clicks on ***Edit Prices*** button. Lastly, the user can exclude from the product placement analysis all the areas that does not make sense to be included. For example, if an area is next to the cashiers and the visitors need to cross it in order to access the cashier, then this area is wise to be removed from the analysis. The user can select one or more areas to be excluded using the drop-down list found on top of the table next to the aforementioned button. It should be noted that the opportunity detections do not necessarily dictate the replacement of the area that is cross selling the most with the product area in the row. The user can use this analysis for store layout updates, for cross-merchandising purposes, for bundling offers of the identified pairs for improvement, or even for the relevant personnel education in order to facilitate the upselling opportunities.

The ROI calculation from utilising the provided insights from the product placement analysis is calculated as follows:

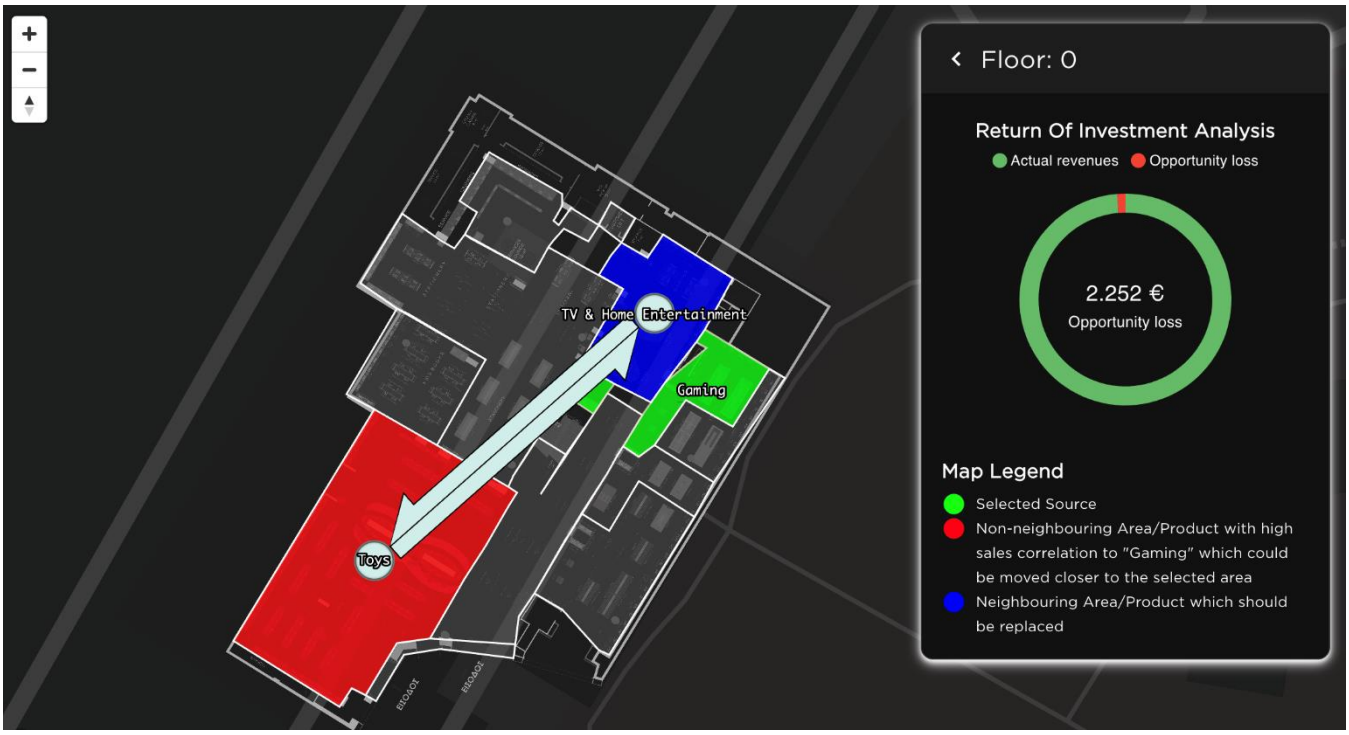
Let's assume that:

- The highlighted Product Area in the row = A
- The neighbouring Product Area with the least cross-selling = B
- The non-neighbouring Product Area with the most cross-selling = C

The ROI calculation formula:

$$ROI = (Cross\text{-}Visitation_{AB} - Cross\text{-}Visitation_{AC}) * Area\_Conversion_{c} * Average\_Price_{c}$$

The users can review the ROI by selecting the Product Area of the row in the Area filter on the top left of the page.



4.16.7 Self-upload sales data

There are two ways to upload sales data into the system:

Sales Form:
On the first tab, **SALES FORM** (Figure 15), users can upload daily data including the number of Receipts, Sales, and Sales Units. Here, both **Receipts** and **Date** are mandatory fields.

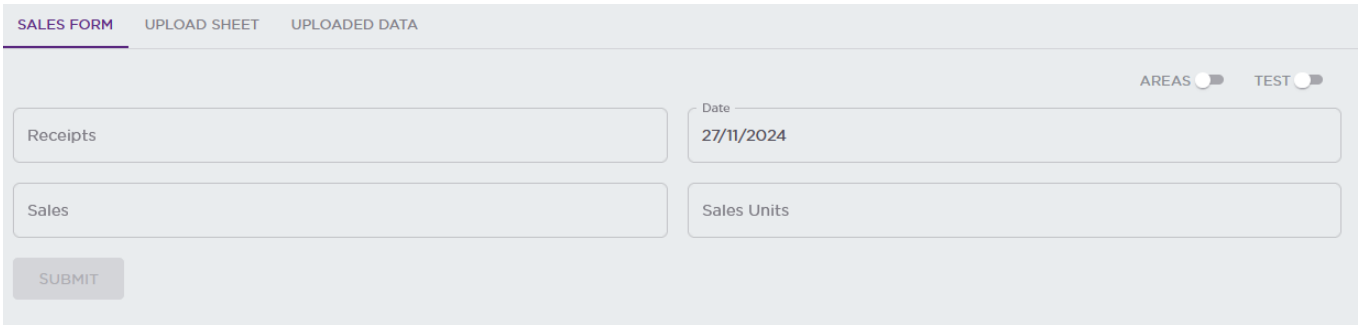
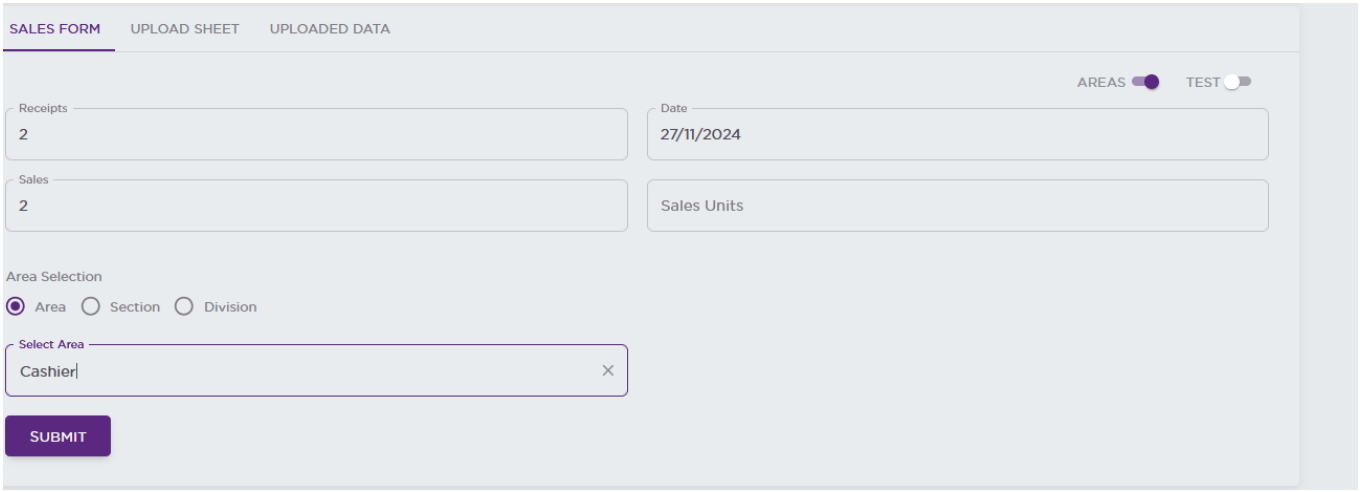


Figure: SALES FORM

Users can also enable specific areas to upload data for areas of interest.



Upload Sheet:
The second option is the **UPLOAD SHEET** tab, where users can simply drag and drop a CSV file to upload their data.

4.16.8 Upload sales file data

The system supports two types of sales data upload processes:

Receipt-Level Data (Doc ID):

This method provides detailed information at the receipt level and is especially useful for basket analysis (refer to the chapter on *Customer's Correlation Matrices*).

A **CSV** or **XLSX** file is required with the following structure:

- **PARENT_2**: Level 2 area
- **PARENT_1**: Level 1 area
- **AREA**: Areas of interest
- **DATE**: Date and time in the format DD/MM/YYYY HH:MM
- **DOC_ID**: Receipt ID
- **SALES_UNIT**: Sales items
- **SALES**: Sales value

Example

PARENT_2	PARENT_1	AREA	DOC_ID	DATE	SALES_UNIT	SALES
Parent2_Area_A	Parent_Area_A	areaA	18868	23/5/2024 9:00	1	30
Parent2_Area_A	Parent_Area_A	areaB	18868	23/5/2024 9:00	2	15
Parent2_Area_B	Parent_Area_B	areaC	18868	23/5/2024 9:00	1	20
Parent2_Area_A	Parent_Area_C	areaD	18868	23/5/2024 9:00	2	80
Parent2_Area_A	Parent_Area_A	areaA	13250	23/5/2024 9:00	2	60
Parent2_Area_A	Parent_Area_A	areaA	16460	23/5/2024 9:00	1	30
Parent2_Area_A	Parent_Area_A	areaA	17575	23/5/2024 9:00	1	30
Parent2_Area_A	Parent_Area_A	areaA	12208	23/5/2024 9:00	1	30
Parent2_Area_B	Parent_Area_B	areaC	17463	23/5/2024 9:00	1	20

Note: In case of missing info please add (-) in the corresponding cell

Higher-Level Data (Receipts):

This method provides summarized information when receipt-level details are unavailable. The data includes aggregated information at a higher level.
A **CSV** or **XLSX** file is required with the following structure:

- **PARENT_2**: Level 2 area
- **PARENT_1**: Level 1 area
- **AREA**: Areas of interest
- **DATE**: Date and time in the format DD/MM/YYYY HH:MM
- **RECEIPTS**: Number of receipts
- **SALES_UNIT**: Sales items
- **SALES**: Sales value

Example

PARENT_2	PARENT_1	AREA	RECEIPTS	DATE	SALES_UNIT	SALES
Parent2_Area_A	Parent_Area_A	areaA	10	23/5/2024 9:00	1	30
Parent2_Area_A	Parent_Area_A	areaB	11	23/5/2024 9:00	2	15

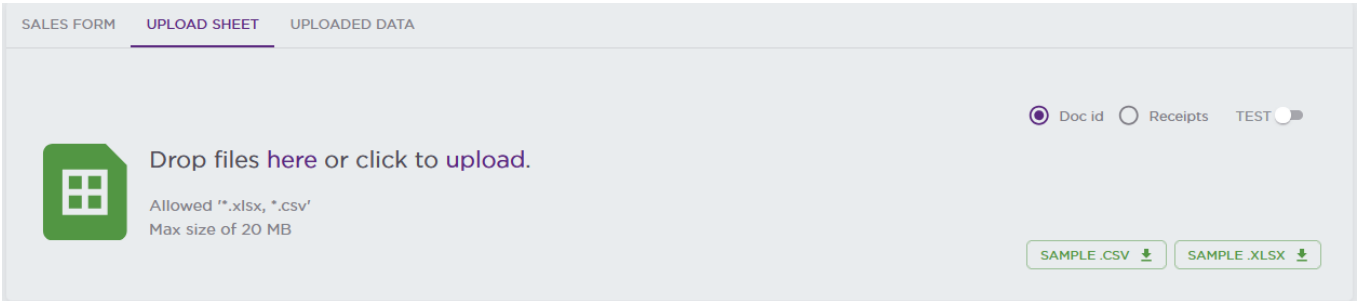
Note: In case of missing info please add (-) in the corresponding cell

Data Loading Process

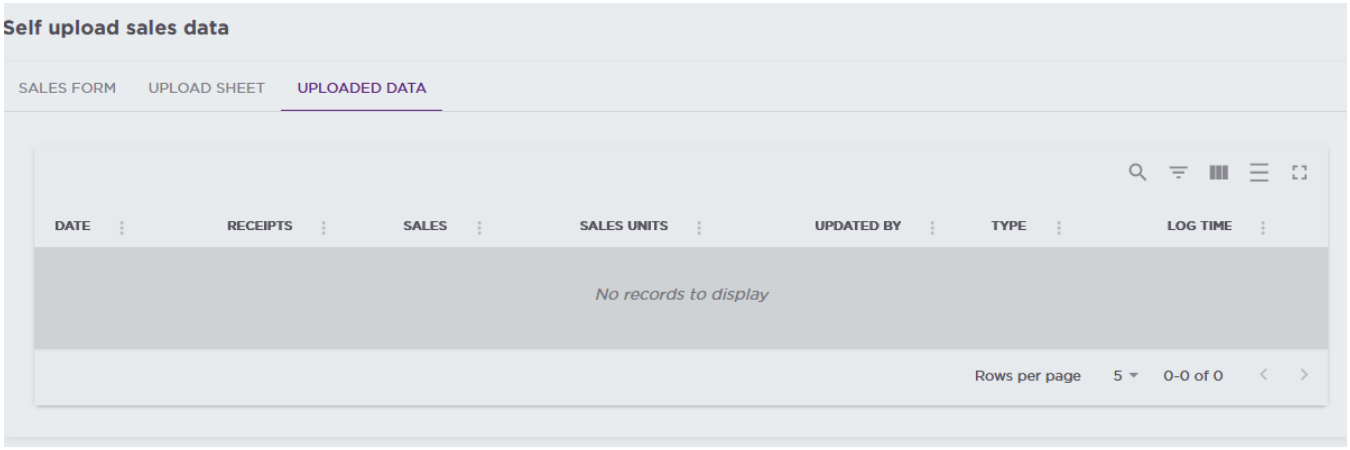
When loading the data, the system follows a process that involves the deletion of existing records falling within the date range specified in the uploaded file.

Subsequently, the system reloads with the new data to perform sales calculations. For optimal accuracy in results, it is strongly advised to provide data for complete periods, avoiding the submission of accumulated data for specific time frames. This practice is essential for precise calculations and serves to mitigate the risk of potential discrepancies in the analysis.

Option A: Load the file manually by dragging and dropping in the corresponding panel.



Results of loading process are displayed in the uploaded data.

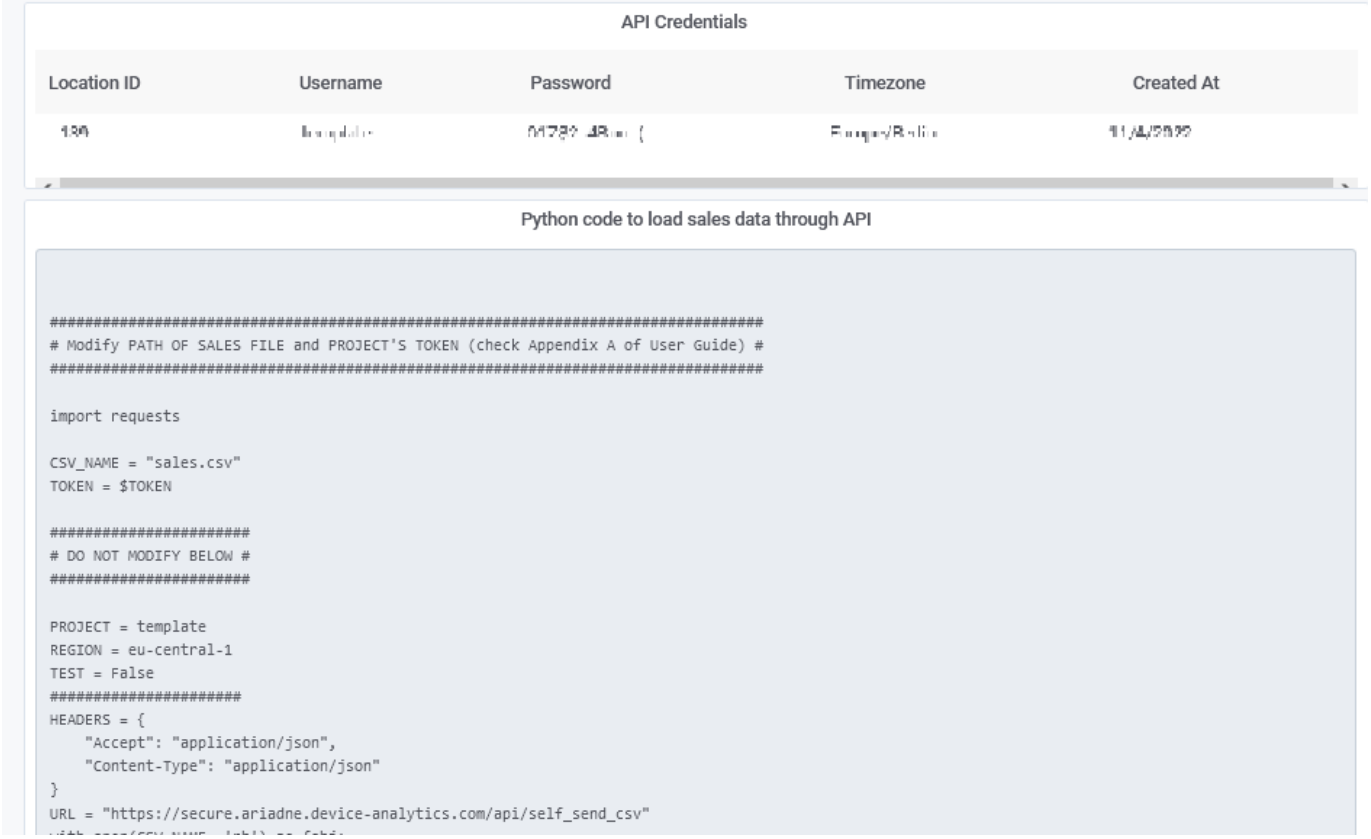


Note: That panel supports up to 20 mb files.

Option B: Use of API Configuration

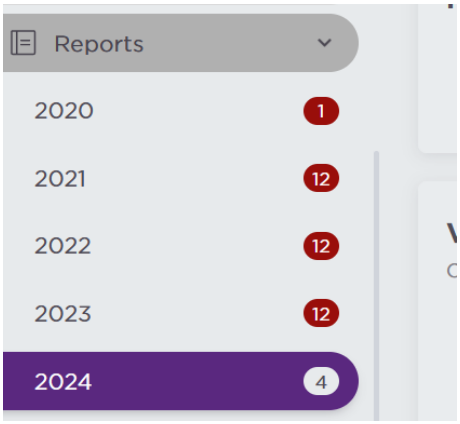
Configuration > API credentials

Template



4.17 Reports

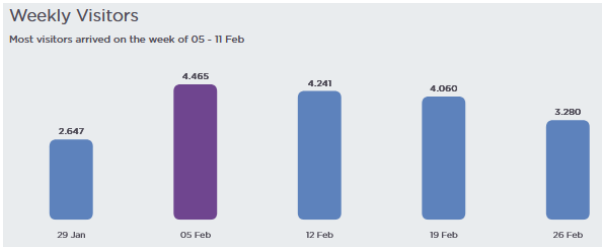
Reports play a crucial role in supporting informed decision-making and fostering continuous improvement within the organization. They serve as summaries of key information, providing valuable insights and analyses. These reports are generated monthly to ensure stakeholders stay informed about relevant developments and trends. Each report encapsulates a comprehensive overview of KPIs, offering a clear snapshot of performance metrics, emerging patterns, and noteworthy observations.



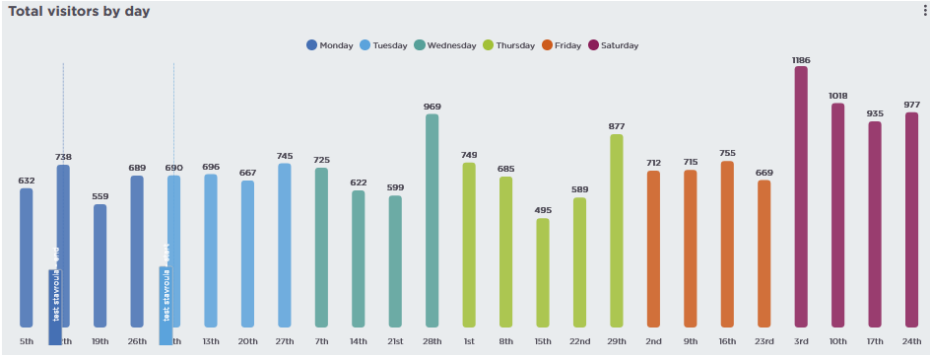
Users can leverage these reports to make informed decisions, identify areas for improvement, and track progress over time.

1. **Total visitors**: Provides the total visitation for the selected date range, along with monthly averages and the month's rank within the year.

2. **Weekly Visitors:** Displays the number of visitors for each week of the month, with the week having the highest visitors highlighted in a distinct color..

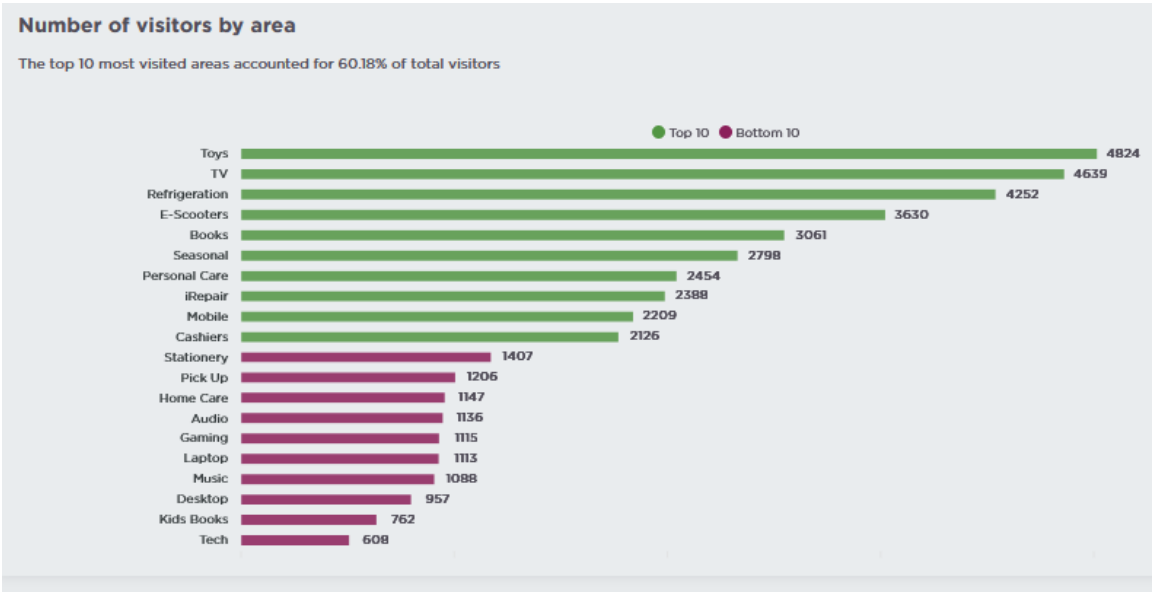


3. **Total visitors by day:** Offers a graphical representation of visitation distribution by day, with options to group data by day of the week or display days in chronological order.

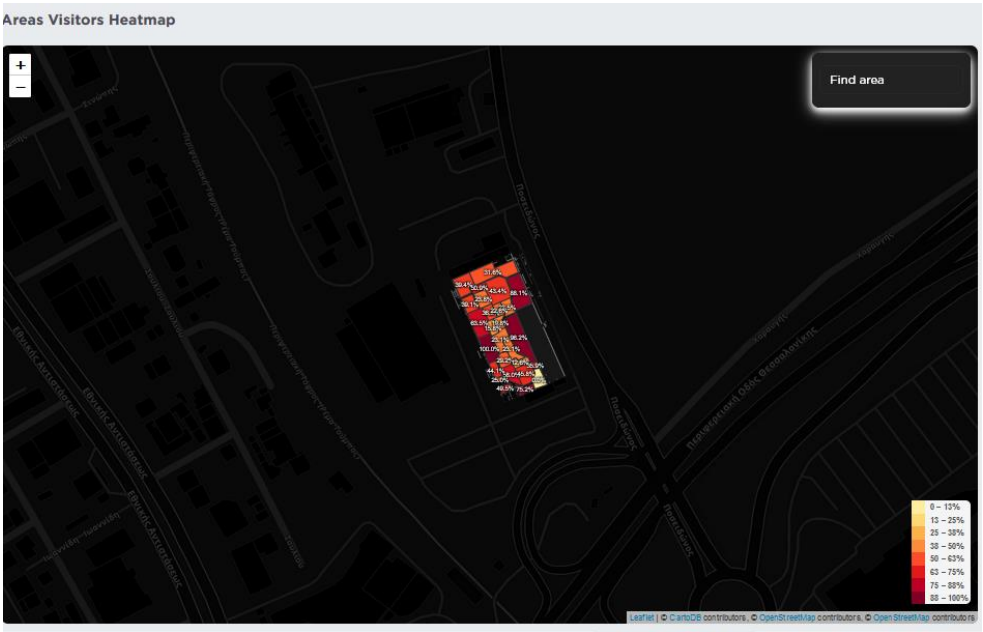


4. **Average hourly number of arrivals:** Presents a heatmap illustrating visitor traffic patterns throughout the week, showcasing average visitor numbers per hour.

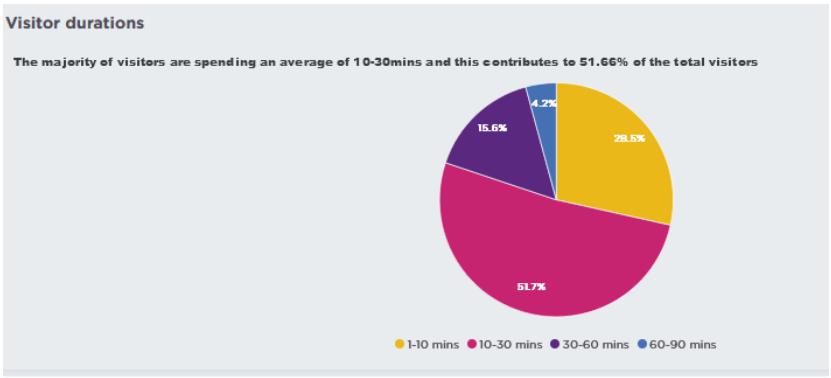
5. **Number of visitors by area**: Visualizes the top 10 areas with the most and least visitors, along with the percentage of total visitors accounted for by the top 10 most visited areas.



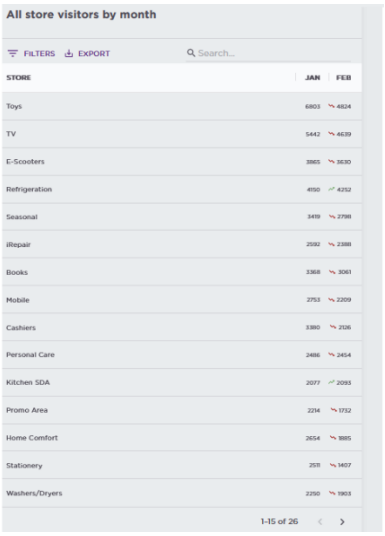
6. **Areas Visitors Heatmap:** Provides an organizational heatmap highlighting the most frequented areas within the premises, with controls to customize the display settings.



7. **Visitor durations:** Offers a pie chart depicting the percentage of visitors based on the duration spent within the organization's premises.



8. **All store visitors by month**: Presents a tabular representation of total visitors per store, categorized by month and quarter, with comparisons to the previous month.



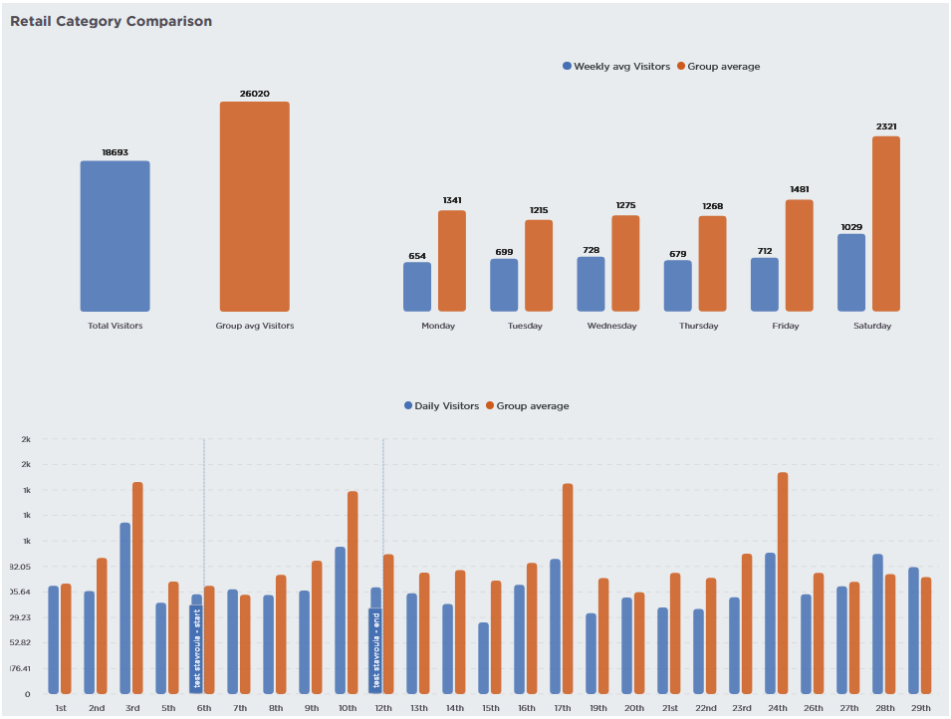
9. **Project area durations**: Displays the distribution of visitor durations spent within specific organizational areas.

area durations

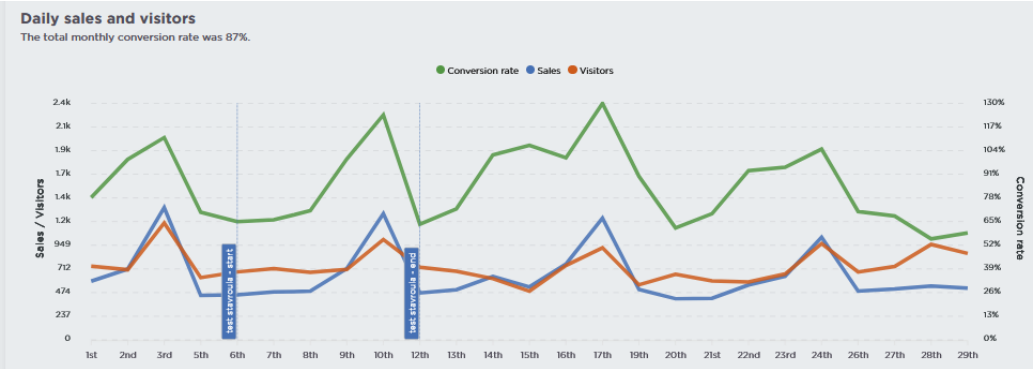
FILTERS EXPORT Search...

POLYGON	MEAN_DURATION	DURATION_P25	DURATION_P50	DURATION_P75	DURATION_P90	DURATION_P95
TV	6 mins 46 secs	2 mins 50 secs	5 mins 4 secs	9 mins 40 secs	17 mins 47 secs	26 mins 4 secs
Toys	6 mins 21 secs	2 mins 47 secs	4 mins 47 secs	9 mins 3 secs	16 mins 37 secs	24 mins 1 sec
E-Scooters	6 mins 45 secs	2 mins 46 secs	5 mins	9 mins 45 secs	16 mins 54 secs	25 mins 11 secs
Refrigeration	7 mins 9 secs	2 mins 51 secs	5 mins 4 secs	10 mins 24 secs	19 mins 16 secs	29 mins 57 secs
Books	5 mins 31 secs	2 mins 38 secs	4 mins 14 secs	7 mins 52 secs	13 mins 28 secs	20 mins 29 secs
Seasonal	6 mins 8 secs	2 mins 40 secs	4 mins 30 secs	8 mins 44 secs	16 mins 19 secs	24 mins 18 secs
iRepair	7 mins	2 mins 49 secs	4 mins 55 secs	10 mins 15 secs	19 mins 8 secs	28 mins 2 secs
Mobile	6 mins 7 secs	2 mins 40 secs	4 mins 34 secs	8 mins 53 secs	14 mins 44 secs	21 mins 32 secs
Cashiers	3 mins 36 secs	1 min 6 secs	2 mins 16 secs	5 mins 16 secs	10 mins 21 secs	15 mins 11 secs
Personal Care	6 mins 33 secs	2 mins 57 secs	5 mins 1 sec	10 mins 1 sec	16 mins 47 secs	22 mins 32 secs
Kitchen SDA	6 mins 12 secs	2 mins 44 secs	4 mins 35 secs	8 mins 49 secs	15 mins 11 secs	23 mins 1 sec
Reading Area	5 mins 4 secs	2 mins 27 secs	3 mins 53 secs	7 mins 17 secs	11 mins 46 secs	15 mins 4 secs
Washers/Dryers	7 mins 22 secs	2 mins 47 secs	5 mins 9 secs	10 mins 59 secs	19 mins 2 secs	29 mins 6 secs
Home Comfort	5 mins 49 secs	2 mins 39 secs	4 mins 39 secs	8 mins 26 secs	14 mins 26 secs	18 mins 33 secs
Promo Area	6 mins 3 secs	2 mins 42 secs	4 mins 37 secs	8 mins 24 secs	15 mins 11 secs	21 mins 9 secs
Kitchen MDA	6 mins 3 secs	2 mins 43 secs	4 mins 44 secs	8 mins 43 secs	15 mins 33 secs	22 mins 38 secs
Stationery	5 mins 17 secs	2 mins 40 secs	4 mins 5 secs	7 mins 2 secs	12 mins 21 secs	16 mins 15 secs
Laptop	5 mins 20 secs	2 mins 35 secs	4 mins 3 secs	7 mins 26 secs	12 mins 8 secs	15 mins 27 secs
Pick Up	5 mins 30 secs	2 mins 35 secs	4 mins 2 secs	7 mins 44 secs	14 mins 16 secs	18 mins 46 secs
Gaming	5 mins 7 secs	2 mins 33 secs	3 mins 56 secs	6 mins 51 secs	11 mins 47 secs	15 mins 55 secs
Home Care	4 mins 55 secs	2 mins 37 secs	4 mins	7 mins 6 secs	11 mins 14 secs	13 mins 53 secs

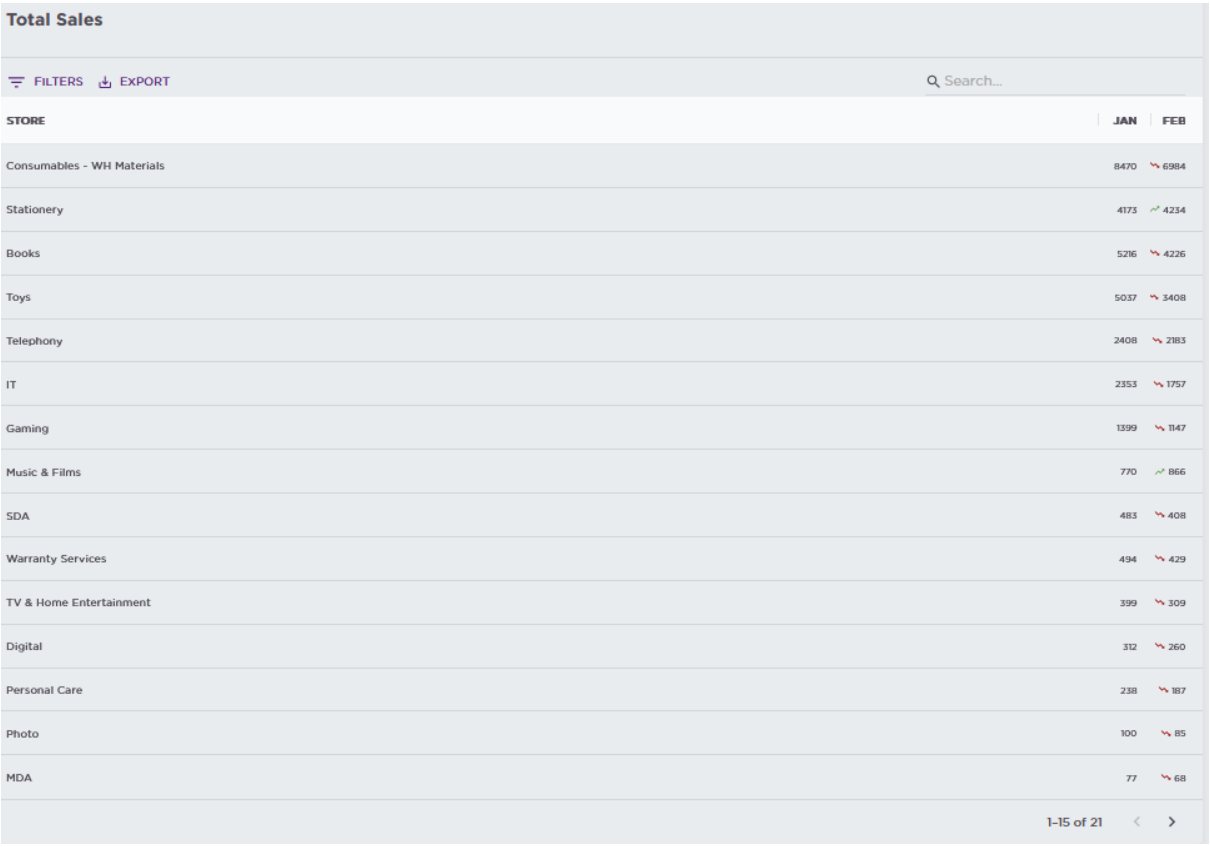
10. **Retail Category Comparison**: Compares total visitors with group average visitors on each day of the week and day of the month



11. **Daily sales and visitors**: Depicts a line chart illustrating total visitors, sales, and conversion rates on each day of the month.



12. **Total Sales:** Provides a comprehensive table showcasing total visitor counts per store, categorized by month and quarter, with comparisons to the previous month's data.

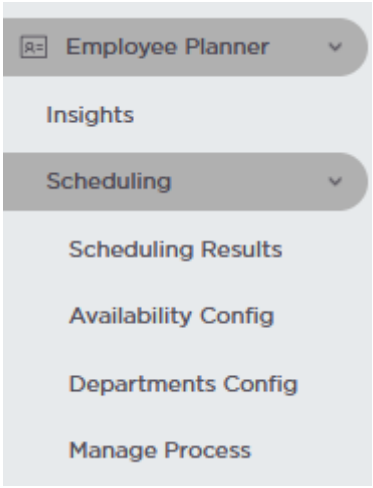


4.18 Employee Planner

Introducing our revolutionary scheduling tool, designed to optimize the organizational scheduling process. This innovative approach offers an all-encompassing solution that facilitates scheduling procedures efficiently while it also provides benefits for the user. More specifically, the user can now effortlessly create, manage, and adjust employee schedules with ease using availability and department configuration panels. This tool combines the resources availability with the predicted visitation patterns empowering managers to allocate the tasks to the employees of each department effectively, minimize the conflicts, and enhance overall customer

experience. By harnessing the power of this scheduling tool, store managers can devote more time to strategic decision-making, employee engagement, and ultimately, driving business success.

4.18.1 Scheduling

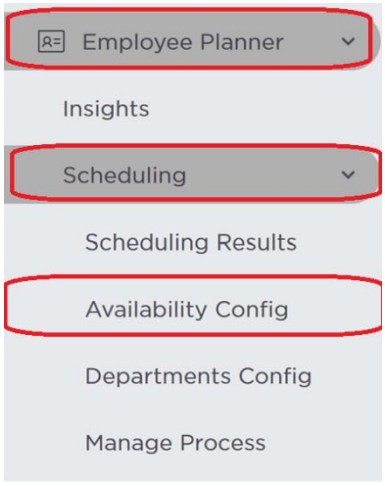


4.18.1.1 Availability Config

Before initiating the scheduling process, users are required to input the pertinent details of the available employees. For each employee, the user should make sure that the following information is provided:

1. **Full Name:** Fill in the full name of the employee.
2. **Department:** Specify the department to which the employee belongs (always on **Parent 1 level**).
3. **The Employment Type** (Full-Time, Part-Time, etc.)
4. **Working Schedule:** The working schedule should include:
    a. **Number of Working Days in a Week:** Indicate the total number of days the employee is available to work within a week.
    b. **Number of Working Hours in a Day:** Specify the total number of hours the employee is scheduled to work per day.
    c. **Split Shifts:** If applicable, denote the number of days the employee may have split shifts.

Ensure accuracy in providing these details as they form the basis for efficient scheduling and allocation of tasks. Since all this information is gathered, the employees' configuration can start. By signing in to the Dashboard, the user clicks on the ***Employee Planner*** Dashboard on the Dashboard's Menu on the left. For configuring the employees, the user should use the ***Availability Config*** placed in the ***Scheduling*** sub-menu as shown in the Figure.



In the ***Employee Availability Config*** Dashboard, the user can add the details of the employees described above by clicking on the ***ADD EMPLOYEE*** button as shown in the Figure. The table below depicts the details of the employees that are already registered. By clicking on the Actions column, each employee's registration can either be edited or deleted.

Figure: Employee Availability Config

For Registering a new employee, the user should press the Add Employee button and fill in all the fields in the form shown in the figure below. Employee's availability can either be selected with an enable/disable switch for the whole day, or for a specified time range in case availability varies per hour. The ***Days of Work*** field should only be adjusted in case the employee has a leave during the week. All other cases like public holidays or days off are automatically taken care by the scheduling algorithm. In the end the user presses the ***Submit*** button to save the details of the new employee. ***Note that the days are aligned with the department's open hours which in most cases are identical with the store's open hours.***

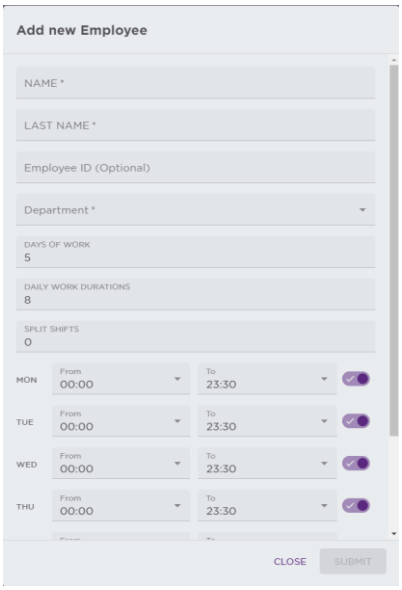


Figure: Employee Config Form

4.18.1.2 Departments Config

The configuration of the store's departments is an integral part of the scheduling process and thus the user should configure all the departments that need employees to operate smoothly. The ***Departments Config*** dashboard can be found on the Dashboard's Menu on the left, in the ***Scheduling*** sub-Menu like depicted on Figure

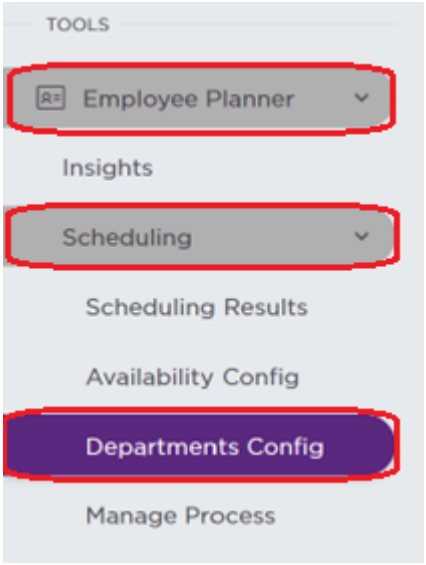


Figure : Employee Planner Menu - Departments Config

In the ***Departments Config*** Dashboard, all the registered departments are presented with all the respective details. The user can either Edit or Delete a department by clicking the dots on the ***Actions*** column. The configuration of a new department can be done by filling in the department form that can be found if the user clicks on the

Add Department button. ***Note that the departments are the Parent 1 level of the store.***

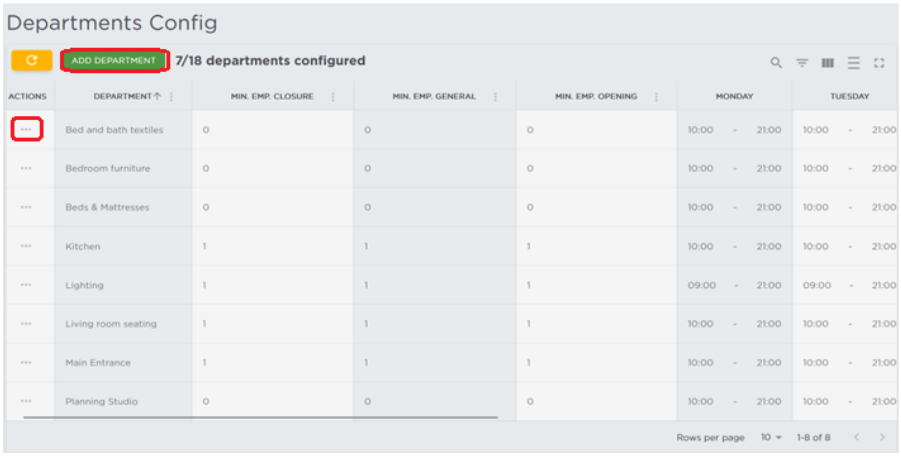


Figure : Departments Config Dashboard

To add a configuration about a department, the form depicted on the Figure 6 needs to be filled in. In the Department dropdown list one can find all the Parent 1 departments of the store. This list can be used to find the department that needs to be configured. Then, you need to apply all the necessary business rules for the department like the minimum number of employees needed in the department's opening and closing hours as well as the general minimum number of employees needed in the department. The department hours depicted in the figured below are aligned with the store's open hours. In case that the department open hours are not aligned with the store, the user needs to edit the hours per day accordingly. Lastly, when the configuration is done, then you need to save it by clicking on the submit button found on the right side of the form.

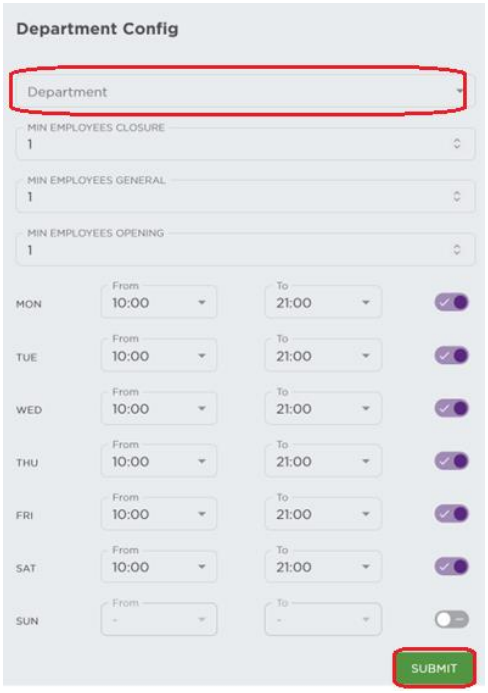


Figure: Departments Configuration

4.18.1.3 Manage Process

Every time that you want to produce a schedule for a week, you need to visit the Manage Process tab of the Scheduling sub-menu like on Figure.

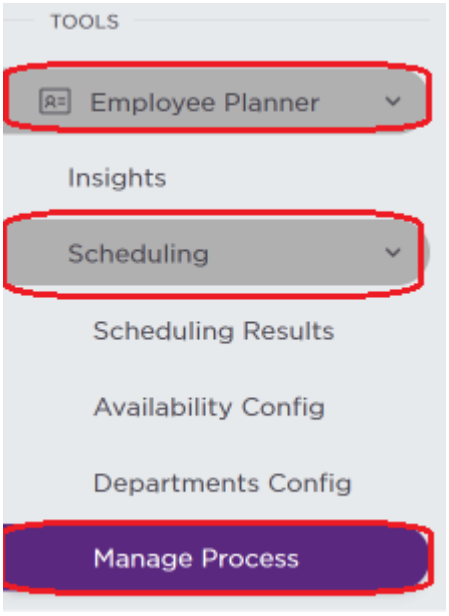


Figure: Manage Process Tab

Then, the starting date of the week for which you want to produce the schedule should be filled in the field highlighted on the Figure. The process that produces the schedule is started when you click on the ***Run Process*** button.

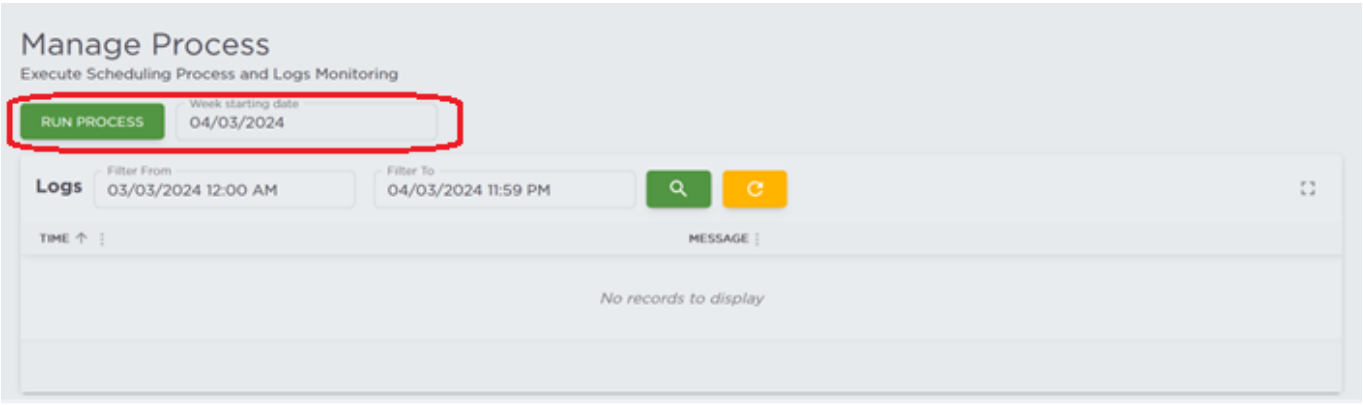


Figure: Run Scheduling Process

In the Figure 10, the user can see the logs that should be depicted on the panel when the scheduling process was executed successfully. In order to see those logs, the ***Filter from*** and ***Filter To*** fields need to be used where the user inserts the date and the time that you ran the process, and then the search button is pressed.

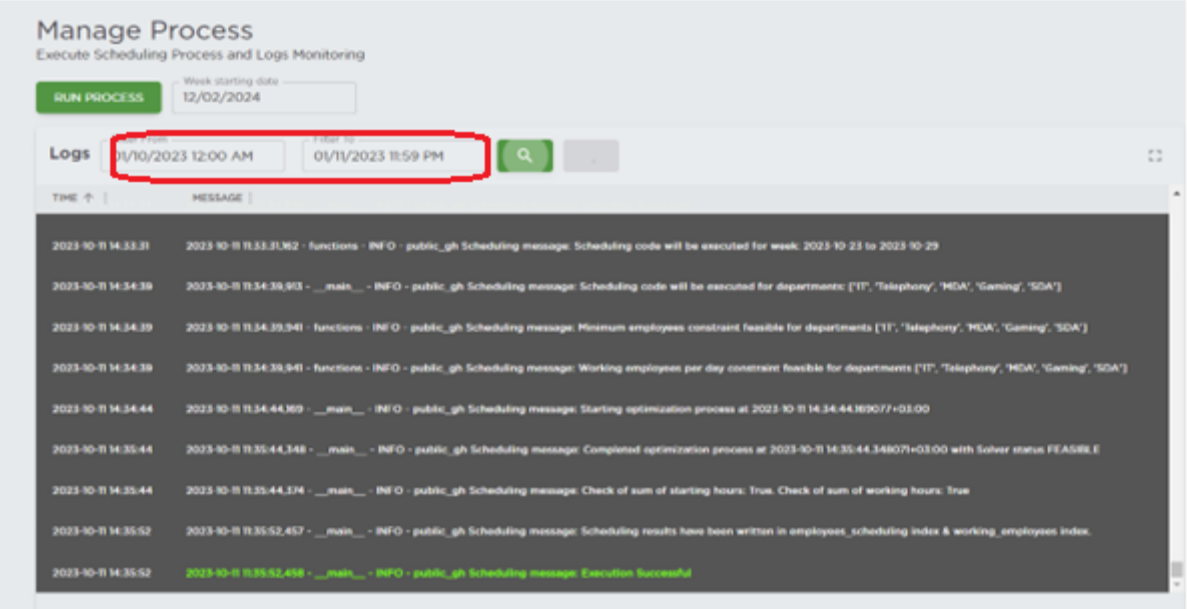


Figure: Successful Scheduling Execution

However, the user needs to be able to identify the cases when the execution was totally or partially failed. More specifically, below the Example logs of partially or totally failed executions with scheduling message can be found:

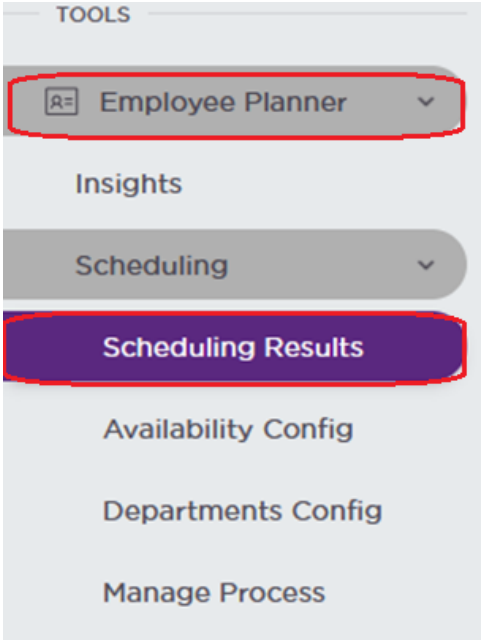
- ***Aborting scheduling execution:*** can be caused by no configuration stored for Employee availability or no prediction generated for given dates.
- ***No configuration stored for department:*** xyz (still executing for other departments).
- ***No configuration stored for any department***: Aborting scheduling execution.
- ***Minimum employees' constraint infeasible for departments:*** xyz. Aborting scheduling execution.
- ***Working employees per day constraint infeasible for department:*** Aborting scheduling execution.
- ***Completed optimization process at xyz with Solver status xyz:*** No results generated (in case of solve status infeasible and optimization failure).
- ***Exception:*** xyz & Execution Failed (for other errors).

4.18.1.4 Scheduling Results

After the finalisation of the Employee and the Department configuration and the execution of the scheduling process described in previous chapters, we need to review the scheduling results produced. The results are depicted in the Scheduling Results Tab found in the Scheduling menu as shown in Figure 11.

In this Dashboard the Employee Schedule that was produced by the system is shown as presented in the Figure 12 below. More specifically, the exact schedule for each employee is shown in the table below. In case that we desire to do some changes in the scheduled produced because of some incidents or because of special circumstances (e.g. an employee wants to shift to the afternoon shift because of a doctor appointment) we can click the Edit Icon in the Actions column and we can

make the changes needed in the schedule. Lastly, when the Employee Schedule is finalised by incorporating all the potential needed changes, then we can export it to either a CSV or an Excel file.



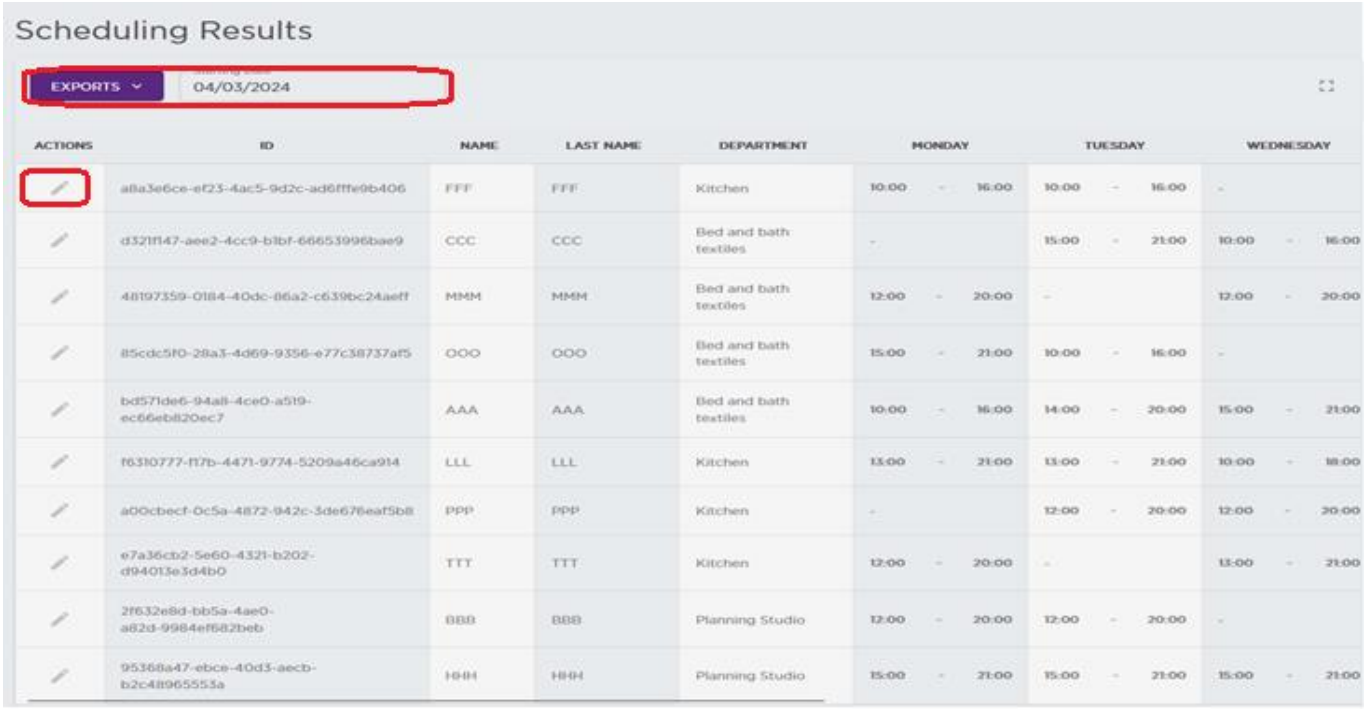


Figure: Scheduling Results

Lastly, a prediction chart for each area is produced so that we can graphically assess the results of the generated schedule. In Figure an example of a prediction chart is presented, and it depicts the prediction of the area visitation for the week that the

schedule is produced and the working employees of the area both of them normalized. Normalization means that each single value of both metrics is divided by the maximum number of each metric. The areas can be changed using the dropdown menu on top right as shown in the Figure.

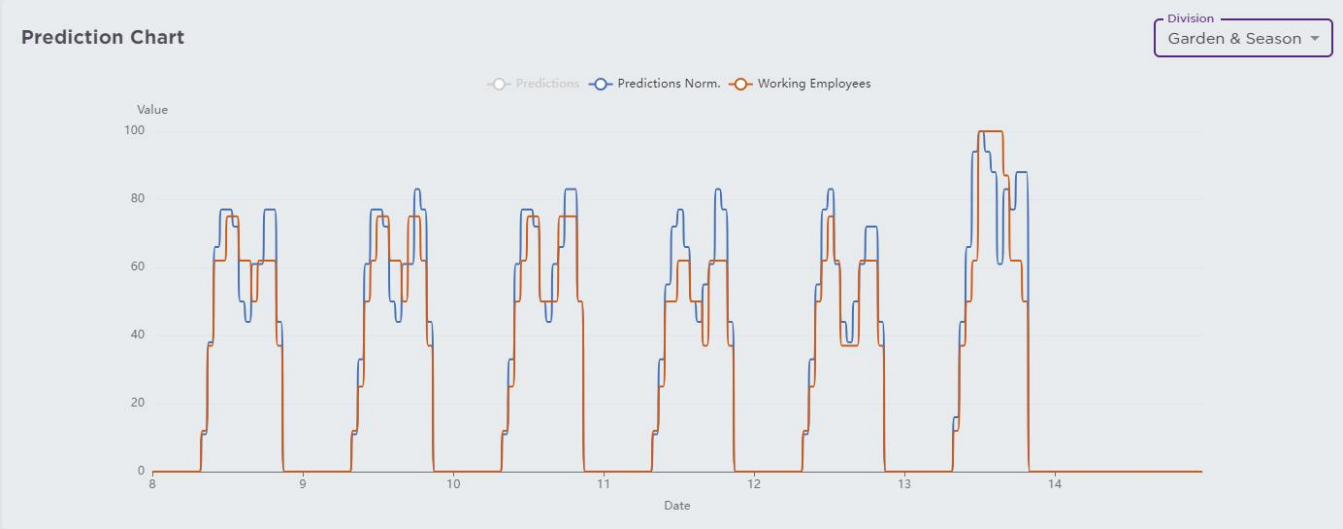


Figure: Prediction Chart per Area

4.18.2 Insights (Employee Presence)

An important aspect of the scheduling process is the assessment of the employee schedules over time. For this purpose, the user can find the respective assessment for the employee schedules in the Insights Dashboard in the Employee Planner Tool.

The user can upload an existing employee scheduling that was not produced by Ariadne, so that the previous scheduling decisions can be assessed and compared with the ones that are produced by Ariadne platform. The file should be in .xlsx format or .csv format.

The scheduling assessment results are available only on Sections (Parent 1) level, and thus the user should always choose the desired Area and the Time Period for which the results should be depicted. Then the button on the right should be pressed so that the dashboard is refreshed with the results wanted. Then the user can assess the scheduling planning using the charts described below. ***Note: The Sales data should always be provided also on same parent 1 level (ideally on hourly basis) with Scheduling so that we can have accurate assessments.***

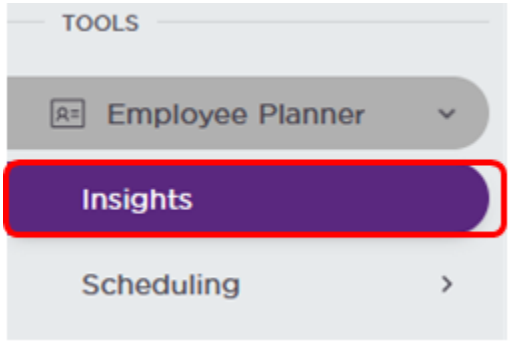


Figure: Insights Dashboard Tab

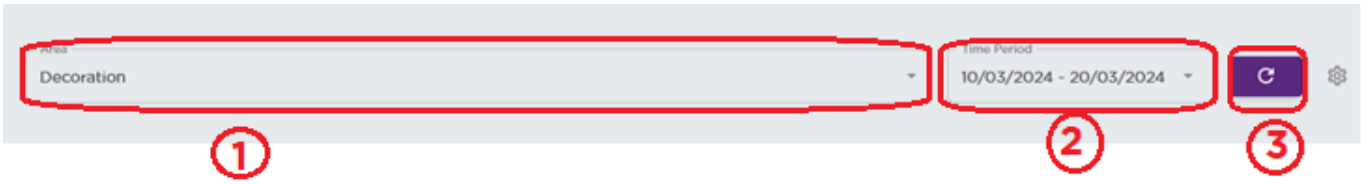


Figure: Assessment Results Filtering

4.18.2.1 Assist-Rate Analysis

Assist-Rate Analysis for Employees Scheduling is only available when minute-level precision data is available. There are two types: Aggregated Analysis and By-Section Analysis. By default, if no Section is chosen, Aggregated Analysis will be shown.

Figure: Assist-Rate Analysis

+ Assist Rates are calculated by aggregating events through out the selected time range. Per interval (default to 5 minutes), if there were visitors and employees presence, an assist-event is recorded and none otherwise.

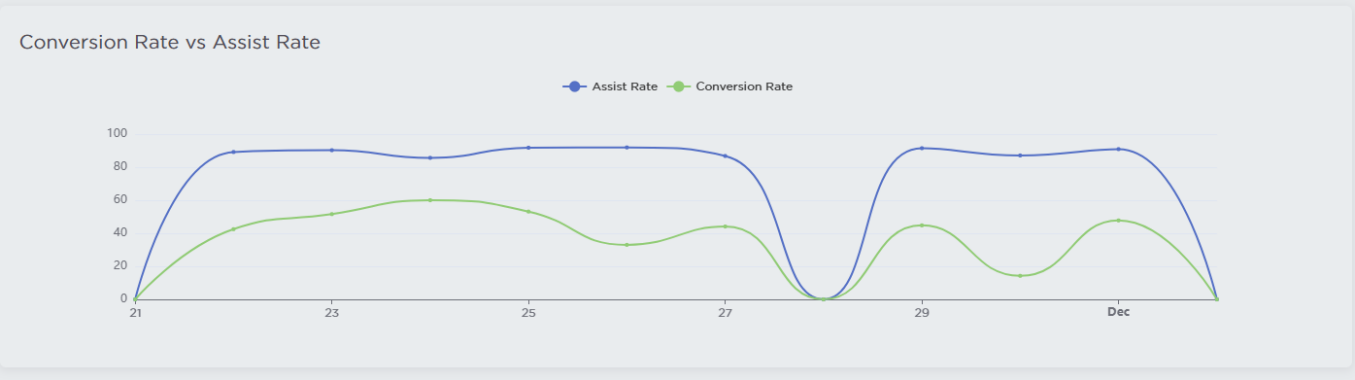


Figure: By Conversion-Rate vs Assist-Rate
The line chart tries to display a correlation between Assist-Rate and Conversion-Rate.

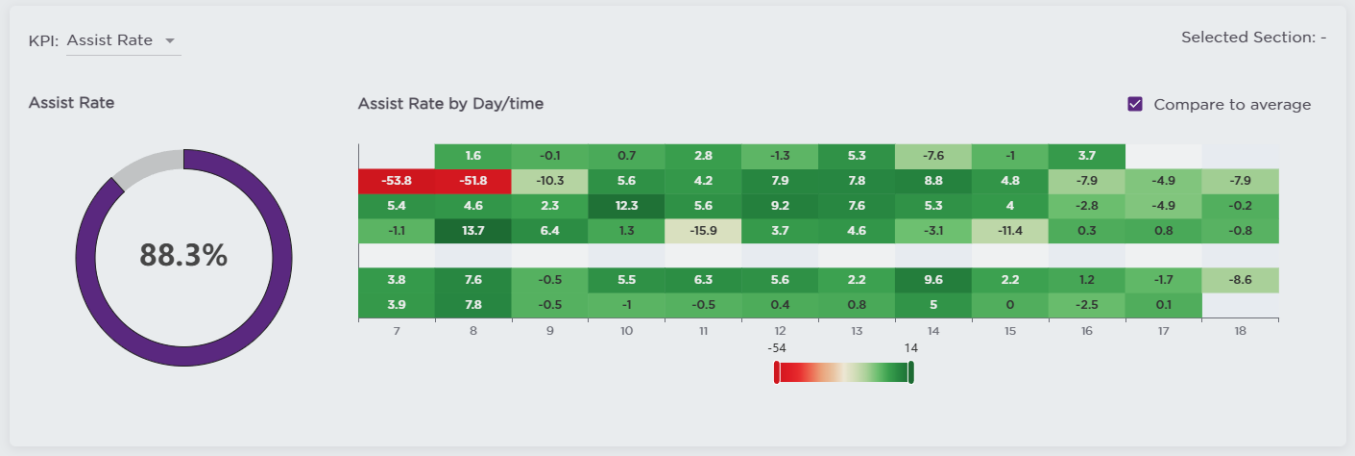
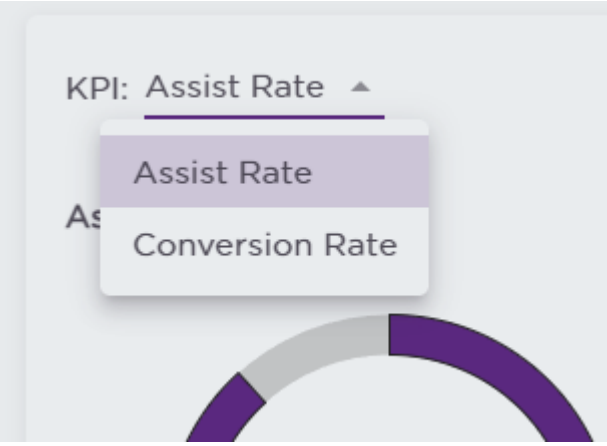
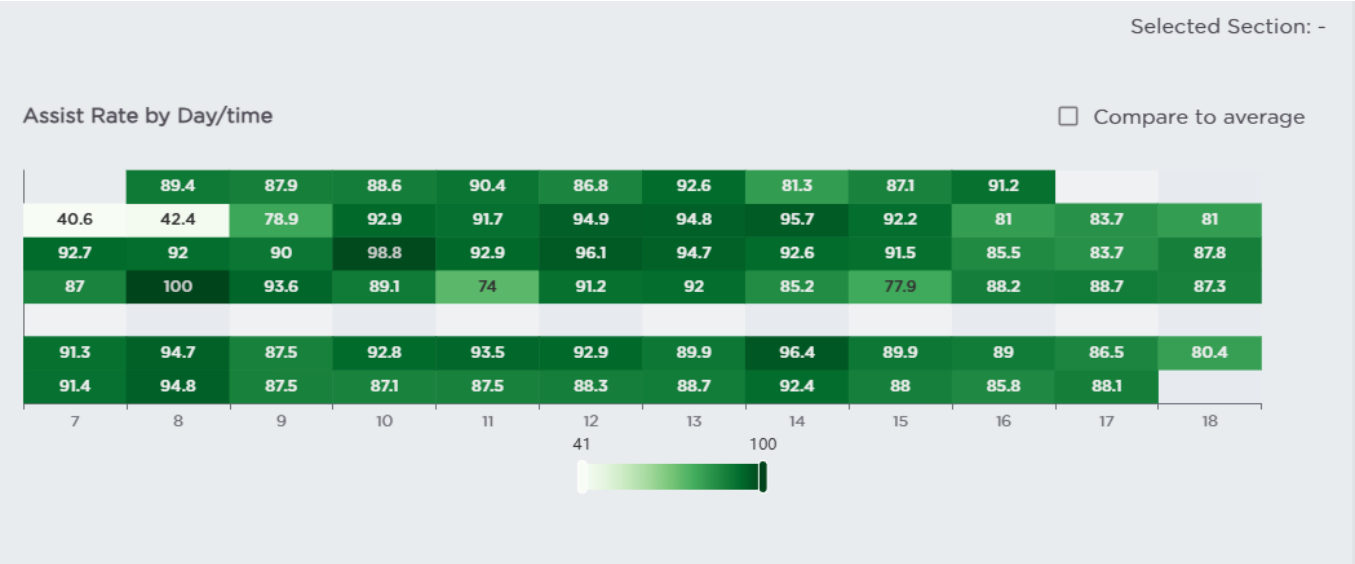


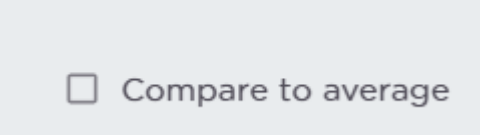
Figure: Aggregated Assist-Rate and Assist-Rate break-down by Day/Time.

The donut-chart displays the overall assist-rate/conversion rate depending on the selection. The heatmap breaks down the kpi metrics into day-of-the-week and hours.



Available KPIs are Assist Rate and Conversion Rate.





The checkbox toggle comparison (relative) of the metric with the average value of the selected metric(KPI)

The Section Data table displays detailed information for each areas with aggregations for key metrics.

Lost Opportunities calculation:
(Total area visits – Total assisted visitors) * Employees-conversion-rate [C]
F. Potential Revenue:
Lost Opportunities[E] x Average Items per Purchase x Average item price

The following Figure presents the area's opportunity loss caused by inefficient scheduling decisions. The opportunity loss is calculated by subtracting the **Actual net profit** of the area for the selected time-period from the **Optimal net profit** that the area could achieve by better scheduling decisions. On the gauge graph the purple line represents the **Actual net profit** and the yellow line represents the remaining part for the **Optimal net profit** to be achieved.

The **Actual net profit** is the real profit of the area with the existing scheduling decisions. For the calculation of **Optimal Profit**, the calculation of the **increasable percentage** is needed. This percentage expresses what would be the benefit in the Revenues of the area had the optimal number of employees for every hour of the selected time period. For the calculation the maximum and the minimum conversion rate of the area is selected for the whole selected time period. The formula for calculating this metric is the following:

Increaseable_Percentage = (max_conversion - min_conversion)/min_conversion
Equation 1: Increasable Percentage Calculation

Then the Optimal Profit calculation is estimated based on what is the existing profit and increased by the increasable amount of money that the company could earn by optimizing the employee presence in the area.

Optimal Profit = Actual net profit + price*pieces_sold*increaseable_percentage
Equation 2: Optimal Profit Calculation

(Alternative view)

Figure: Opportunity Loss Graphs

The numbers and formulas explained above are also further analysed into daily performance assessment as depicted in the Figure 17. In this Figure two different lines are presented; the blue line represents the Optimal net profit while the purple one represents the Actual net profit. The yellow part between those two is graphically

depicting the opportunity loss. On the y-axis the amount of each profit metric while on the x-axis the specific days of the time period are presented. By hovering over the lines, the user can have a more detailed overview of the exact number of each specific metric daily.

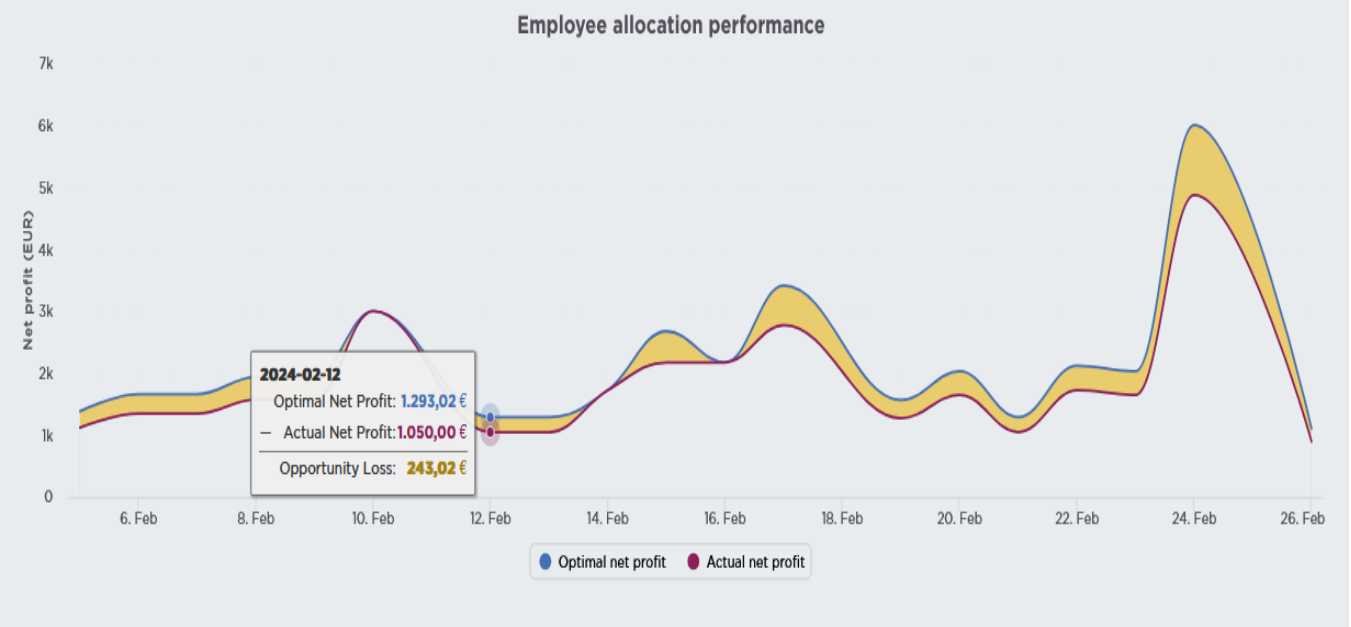
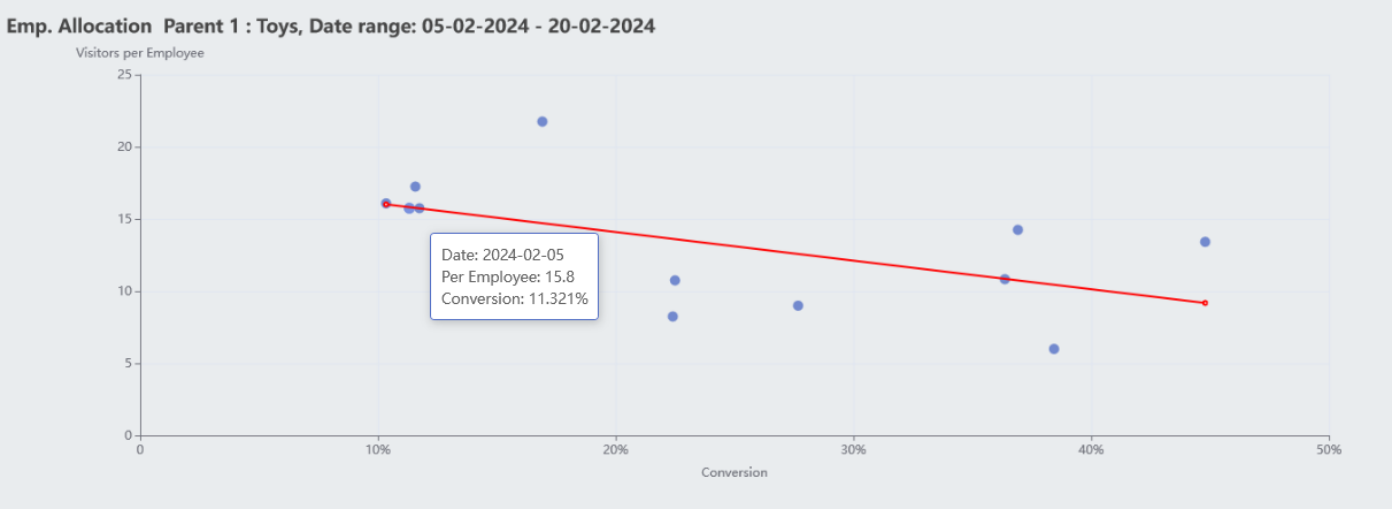


Figure 3: Employee Allocation Performance Chart

All the above visualizations are offering an overview of the opportunities that got lost in the Area (parent 1) during the selected time period because of the suboptimal staffing decisions. Then the correlation between the number of visitors served per employee in a day and the area conversion rate is highlighted in the Figure 18. More specifically, the average visitors to be served per employee daily is presented on y-axis and the daily conversion rate of the area is presented on x-axis. On the chart each dot is representing a day, and the red line is highlighting the overall trend. In the chart presented the trendline is obviously negative, which means that the smaller number of visitors are served by one employee the more are the chances that the visitor is converted to customer, and thus the conversion is increased.



Lastly, both the trends of the employee presence and the visitors of the area are analyzed so that the user can have an overview of whether the peaks of employee presence trend match the peaks of the visitors' trend.
- The bars depict the hour visitation of the area.
- The green line represents the number of scheduled employees in the area. On the x-axis the user can see the exact day for which the schedule is assessed. In this graph there are two separate y-axes so that both metrics are properly depicted. Consequently, on the y-axis on the left the Visitors per hour metric is represented while on the y-axis on the right the Employee Presence is depicted. This view is supporting the user to also understand if the scheduling decisions matched the visitation trend of the area.
- The yellow line represents Staff-to-Visitor Ratio. This metric measures how many employees are available to serve or assist a given number of customers or visitors at any given time.
It's a key indicator of service efficiency, customer experience, and workforce allocation. This ration is useful to analyze this ratio to optimize staffing levels, ensuring that there are enough employees to provide adequate service without overstaffing, which helps in managing labor costs and enhancing customer satisfaction.

Note: The employee presence is based on the schedule plan found in scheduling results dashboard and it cannot represent last minute changes in the schedule unless the user updates the schedule plan.

Figure: Visitor Trend vs Employee Trend per day.

When no areas are selected the default view of this dashboard would be an aggregated employee presence from the whole organization vs the whole store visitation.

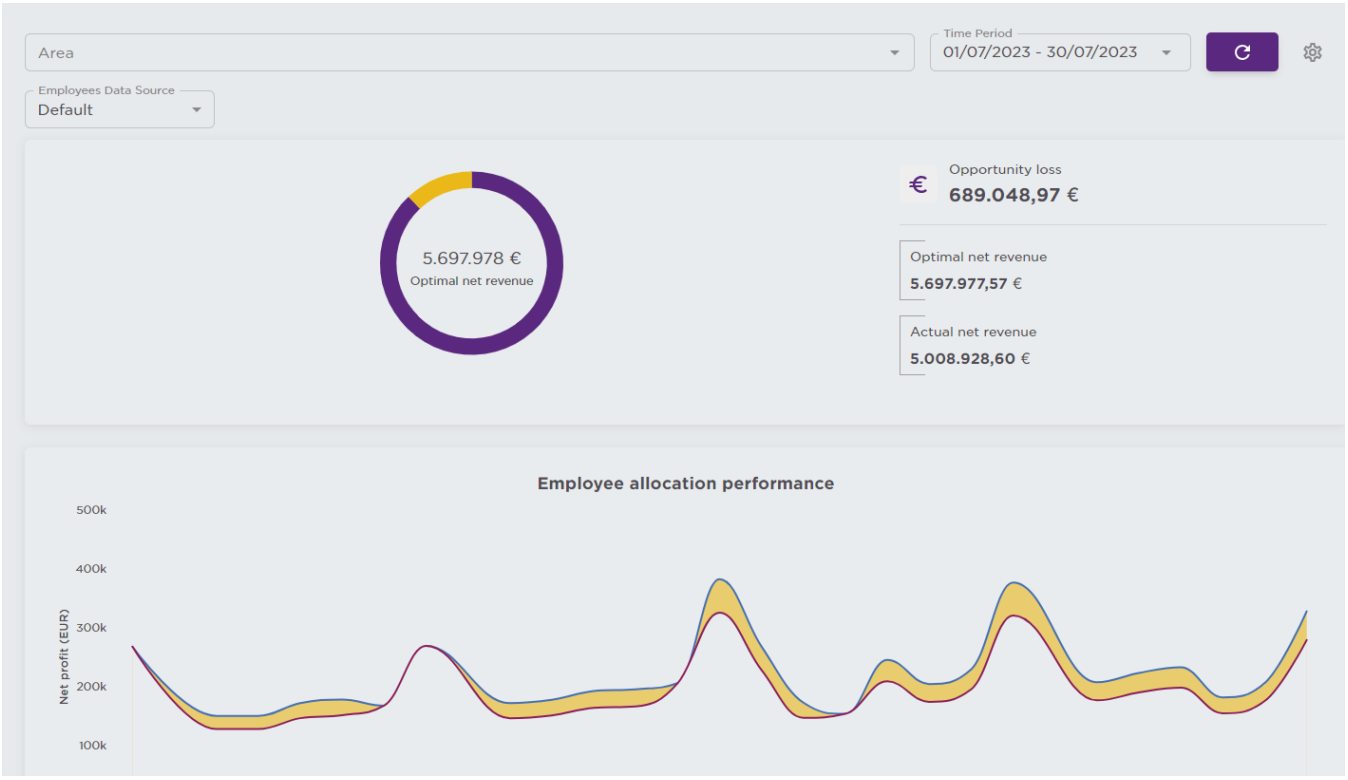


Figure: Organisation Aggregated Employee Insights

4.18.3 Upload employee schedules file data

The use can either upload csv file (.csv) or excel file (.xlsx) of employee schedules.
File requirements:

a) A CSV file is required with following columns:

EMPLOYEE: employee id

DEPARTMENT: Level 1 area

START_TIME: DD/MM/YYYY HH:MM

END_TIME: DD/MM/YYYY HH:MM

E.g.

EMPLOYEE	DEPARTMENT	START_TIME	END_TIME
123456	Cashier	06/07/2024 07:19	06/07/2024 12:28
456789	Digital	07/07/2024 07:40	07/07/2024 14:40

b) An Excel file required with following columns:

EMPLOYEE: name or id

DEPARTMENT: Level 1 area

MONDAY – SATURDAY: day of the week

DATE: DD/MM/YYYY

TIME: HH:MM – HH-MM

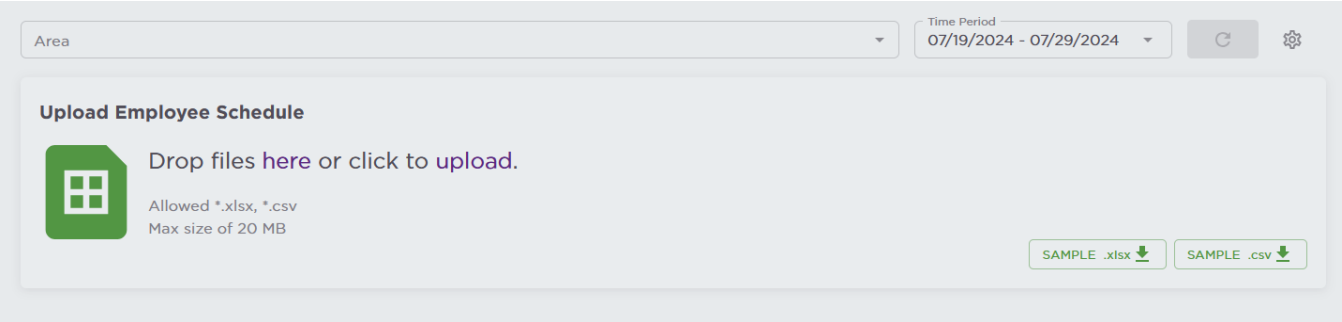
E.g.

EMPLOYEE	DEPARTMENT	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
		06/07/2024	07/07/2024	08/07/2024	09/07/2024	10/07/2024
Name A	Cashier	11:00 – 15:00	11:00 – 19:00	Day Off	11:00 – 19:00	11:00 – 19:00
Name B	Digital	09:00 – 19:00	Vacation	09:00 – 19:00	09:00 – 19:00	09:00 – 19:00

When loading the data, the system follows a process that involves the deletion of existing records falling within the date range specified in the uploaded file.

Subsequently, the system reloads with the new data to perform employees scheduling calculations. For optimal accuracy in results, it is strongly advised to provide data for complete periods, avoiding the submission of accumulated data for specific time frames. This practice is essential for precise calculations and serves to mitigate the risk of potential discrepancies in the analysis.

Option A: Load the csv file manually by dragging and dropping in the corresponding panel.



Option B: Use of API Configuration

API Credentials

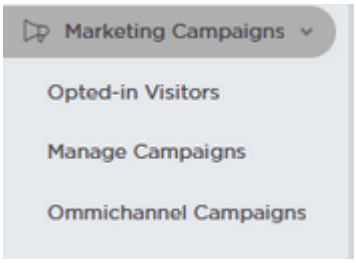
Location ID	Username	Password	Timezone	Created At

Python code to load employee data through API

```
###############################################################################
# Modify PATH OF EMPLOYEE FILE and PROJECT'S TOKEN (check Appendix A of User Guide) #
###############################################################################

import requests

FILE_NAME = "employee.csv" # OR "employee.xlsx" for excel file
TOKEN = $TOKEN

######################
# DO NOT MODIFY BELOW #
######################

PROJECT = template
REGION = eu-central-1
TEST = False
######################
HEADERS = {'x-access-token': TOKEN}
URL = "https://api.ariadne.inc/api/self_send_csv"
with open(FILE_NAME, 'rb') as file:
    files = {'file': (FILE_NAME, file, 'test/csv')}
    if FILE_NAME.endswith('xlsx'):
        files = {'file': (FILE_NAME, file, 'application/vnd.openxmlformats-officedocument.spreadsheetml.sheet')}

    r = requests.post(
        URL+f'?project={PROJECT}&region={REGION}&isTest={TEST}&category=employee',
        files=files,
        headers=HEADERS
    )
```

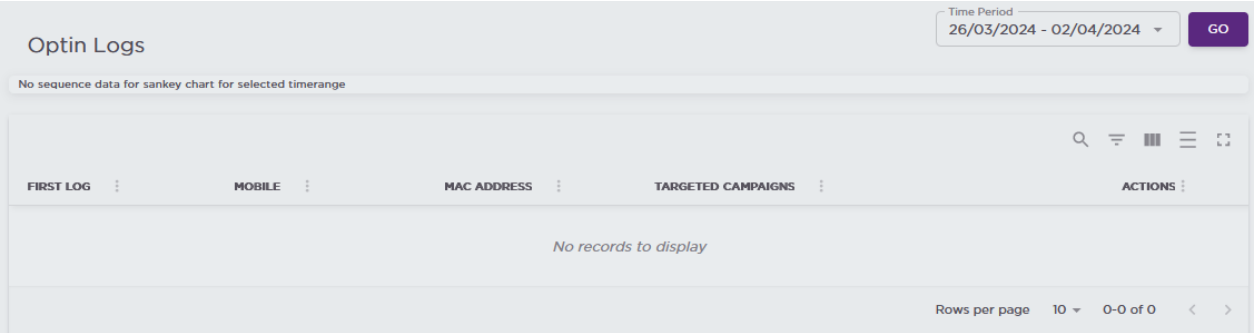
4.19 Marketing Campaigns

This is the form for the user to create / edit / view the details of a marketing campaign

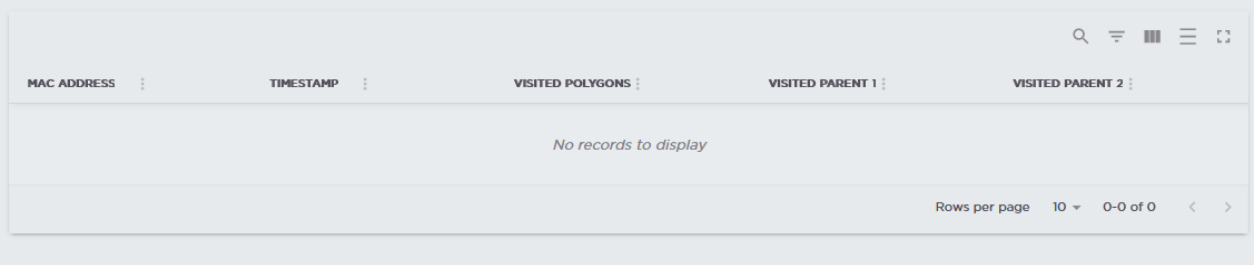


4.19.1 Opted–In Visitors

This first table **Opt-in Logs** shows the list of the opted-in visitors including the following information



- First log: The date and time when the visitor opted in
- Mobile: The mobile of the opted-in visitor
- MAC address: The MAC address of the opted-in visitor
- Targeted campaigns: A list of marketing campaigns that were sent to the opted-in visitor and their delivery status. The status `DELIVERED` means that the marketing campaign message was successfully sent to the mobile of the opted-in visitor. The status `FAILED` means that it failed to send the message due to an error.
- Action: Allow the user to delete the logs that are not useful

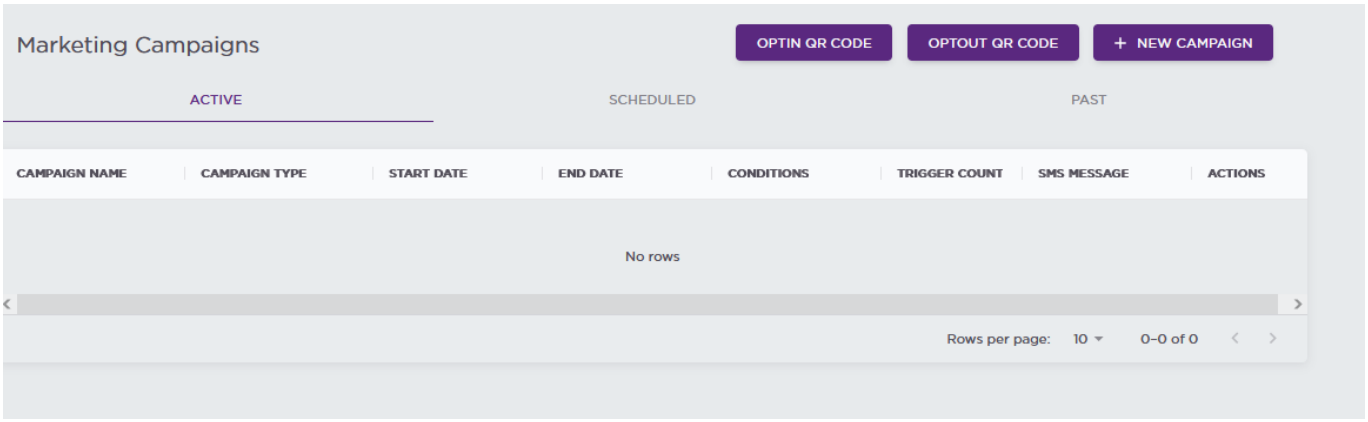


This second table called Optin Stats shows the list of time and area that the opted-in visitors visited including the following information

- MAC address: The MAC address of the opted-in visitor
- Timestamp: The date and time when the opted-in visitor visited the area
- Visited polygons / parent 1 / parent 2: The list of polygons / parent 1 / parent 2 that the opted-in visitor visited in order.

4.19.2 Manage Campaigns

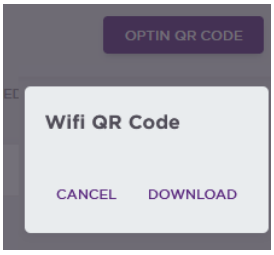
This table shows the list of marketing campaigns that are created in the project with their status `ACTIVE`, `SCHEDULED`, and `PAST` respectively on the tabs.



The columns in the table provide the following information.

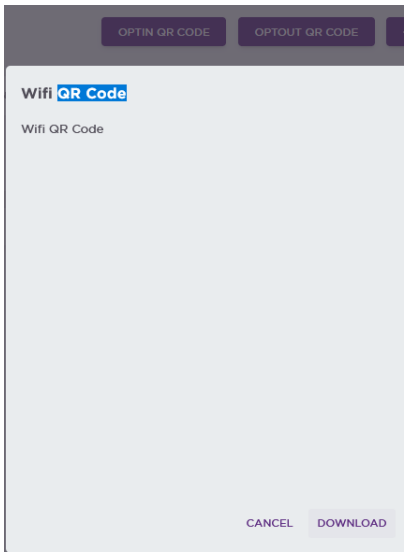
- **Campaign name:** The name of the campaign.
- **Campaign type:** The type of campaign. There are two types, consisting of Single send campaign and Automation campaign.
- **Start / End date**: For Single send campaign, this time range is used for filtering the opted-in visitors that the campaign should send messages to. For Automation campaign, this time range is when the campaign is active and sends messages to the opted-in visitors.
- **Conditions:** Includes the area (parent 1) that is used as a filter for the targeted opted-in visitors. If the opted-in visitors visited the area in the range of start and end date, they will receive the message.
- **Trigger count**: How many times the campaign sends the message to the opted-in visitors.
- **SMS message**: The content of the message that the campaign sends to the opted-in visitors.
- **Action**: Allow the user to view / edit / delete / pause / resume / re-execute the campaign

The `**Optin QR Code**` button



This button shows the QR code image for the visitors to scan and opt in

The `**Optout QR Code**` button

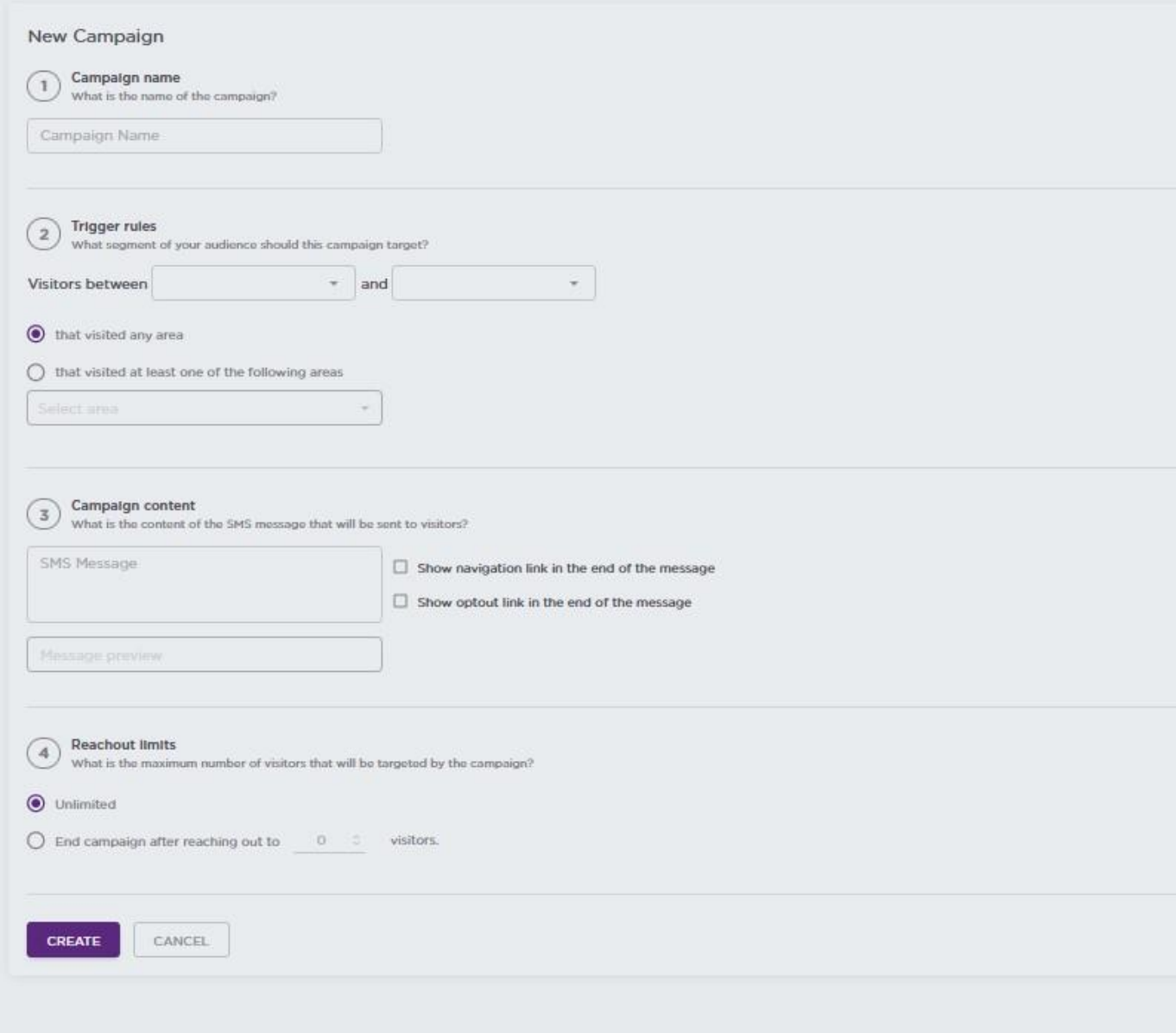


This button shows the QR code image for the visitors to scan and opt out

The `**New campaign**` button

This button allows the user to create new campaign **(single send & automation campaign)**

4.19.2.1 Single Send Campaign



This campaign will send the message to the opted-in users only once. We can send the message to the opted-in users once again by clicking the button Execute for that campaign.

Campaign name: The name of the campaign.

Activation period: Includes the start time and end time when the marketing campaign runs and all the opted-in users in the past and between the activation period will receive the SMS. The rules for ACTIVE, SCHEDULED, PAST are similar to the automation campaign

Trigger conditions: Allows to select multiple areas (parent_1) and if the opted-in user goes to one of these areas, he/she will receive the message. If no area is provided, this condition will be ignore

Campaign content: The SMS/WhatsApp content will be sent to the opted-in users

Execution schedule: Execute immediately or Schedule for execution on a specific time in the future.

Notification Type: SMS/WhatsApp. The message will be sent to the opted-in users via SMS or WhatsApp.

4.19.2.2 Automation Campaign

This campaign will send the message to the opted-in visitors when they come to a specific area and the campaign is active.

Campaign name: The name of the campaign.

Activation period: Includes the start time and end time when the marketing campaign runs and all the opted-in users will receive the SMS if they go to the areas. The ACTIVE campaign is the campaign that has the current time between the start time and end time. The SCHEDULED campaign is the campaign that the current time less than the start time. The PAST campaign is the campaign is the campaign that has the current time larger than the end time.

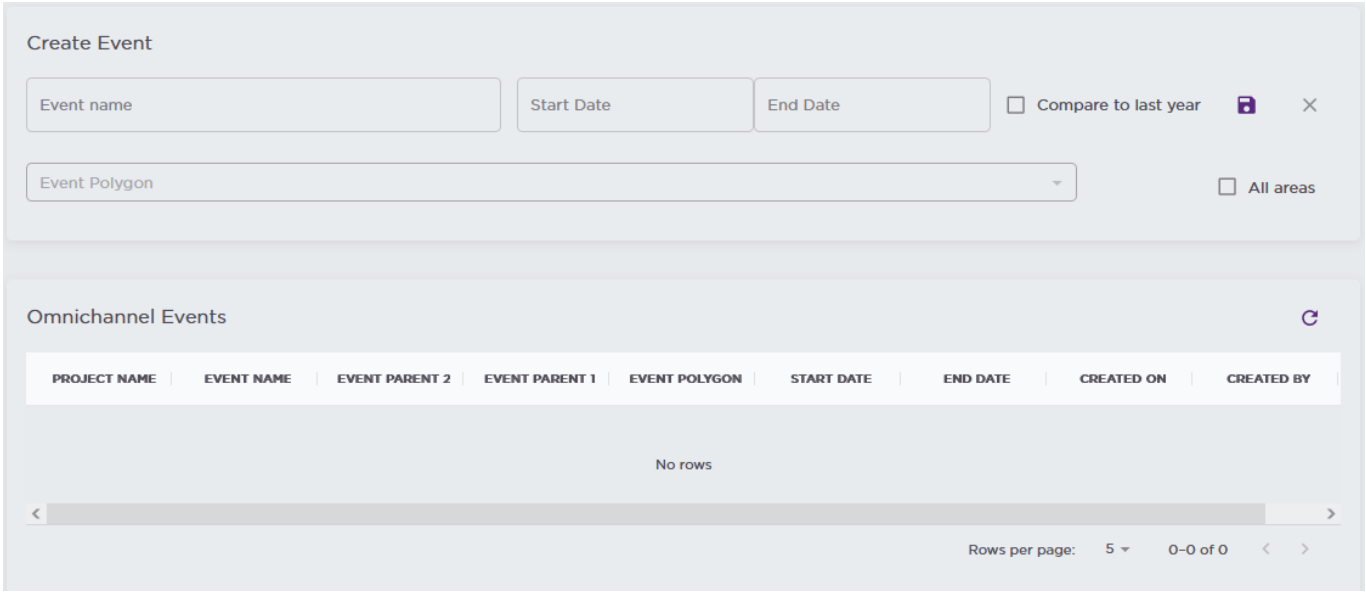
Trigger conditions: Allows to select an area (parent_1) and if the opted-in user goes to this area, he/she will receive the message. If no area is provided, this condition will be ignore.

Campaign content: The SMS/WhatsApp content will be sent to the opted-in users

Reach out limits: Unlimited or a specific number. If the trigger count of the automation campaign is larger than this value, it will stop sending the message to the opted-in users

Notification Type: SMS/WhatsApp. The message will be sent to the opted-in users via SMS or WhatsApp.

4.19.3 Omnichannel Campaigns



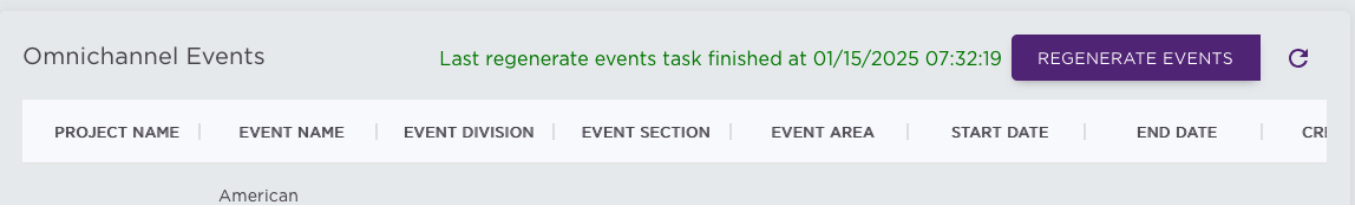
This page serves as a platform for users to efficiently create and manage their events. Presently, the events dropdown is visible on both the people counting page, adjacent to the date picker, and on the sales conversion page.

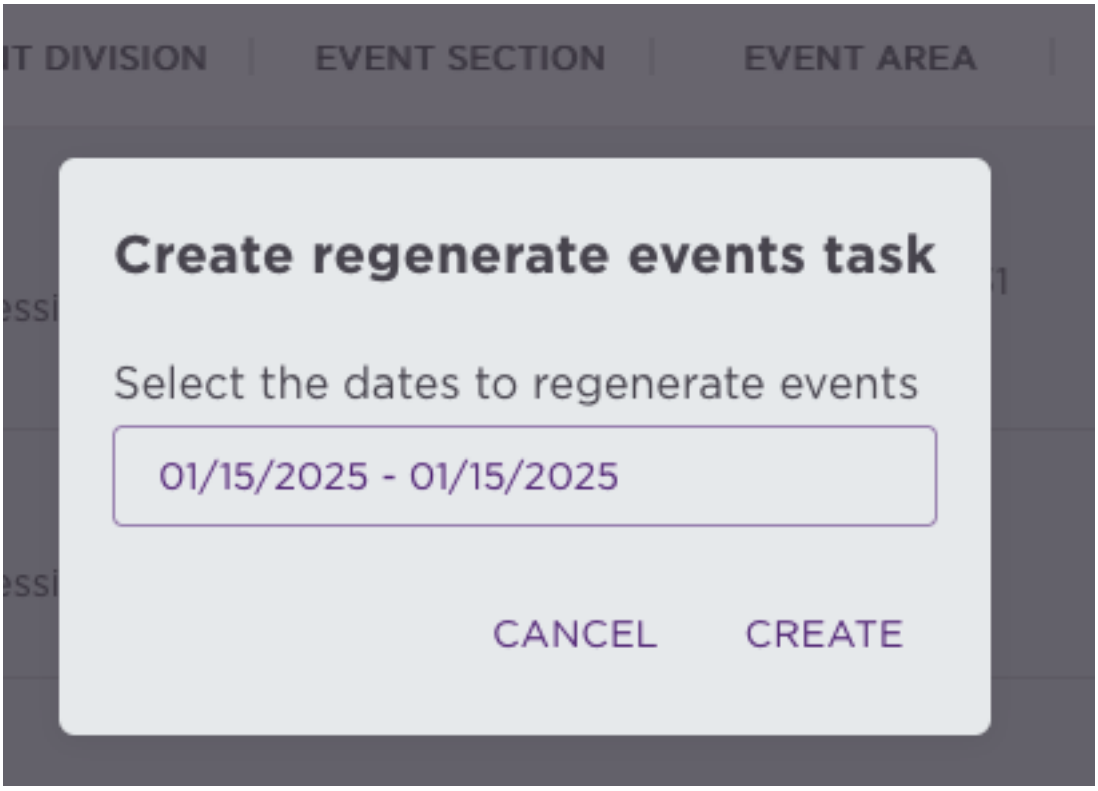
1. Within the event creation form, users encounter fields such as event name, start and end dates, along with three autocomplete options to specify the applicable area for the event. The areas can encompass a parent2 , a parent1, or a single polygon.

2. The second table provided illustrates all events created for this project. Users retain the capability to delete events directly from this table. Data within the table is sourced from the elastic index omnichannel_events, where all events across various projects are stored.

- The omnichannel events are used as time and area filter options in the People Counting or Sales Conversion dashboard.

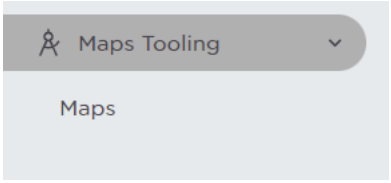
If the project is an airport, user can regenerate the events on a custom date by clicking the `Regenerate Events` button and selecting the date ranges that they want to generate the event.



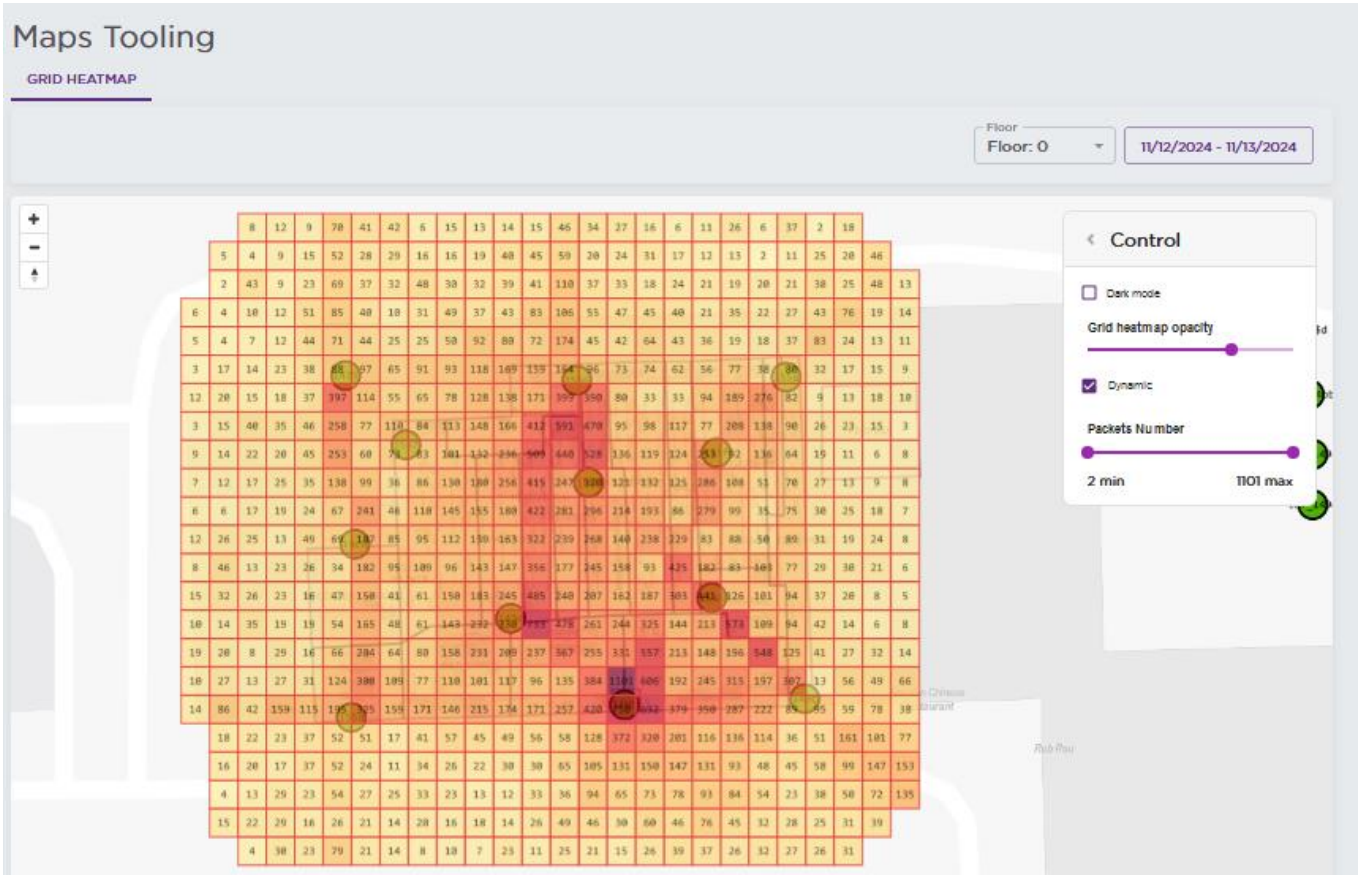


4.20 Maps Tooling

Maps tools dashboard is a placeholder for various internal tooling systems to develop and enhance our solution



User can select specific date and floor to see the generated Grid HeatMap



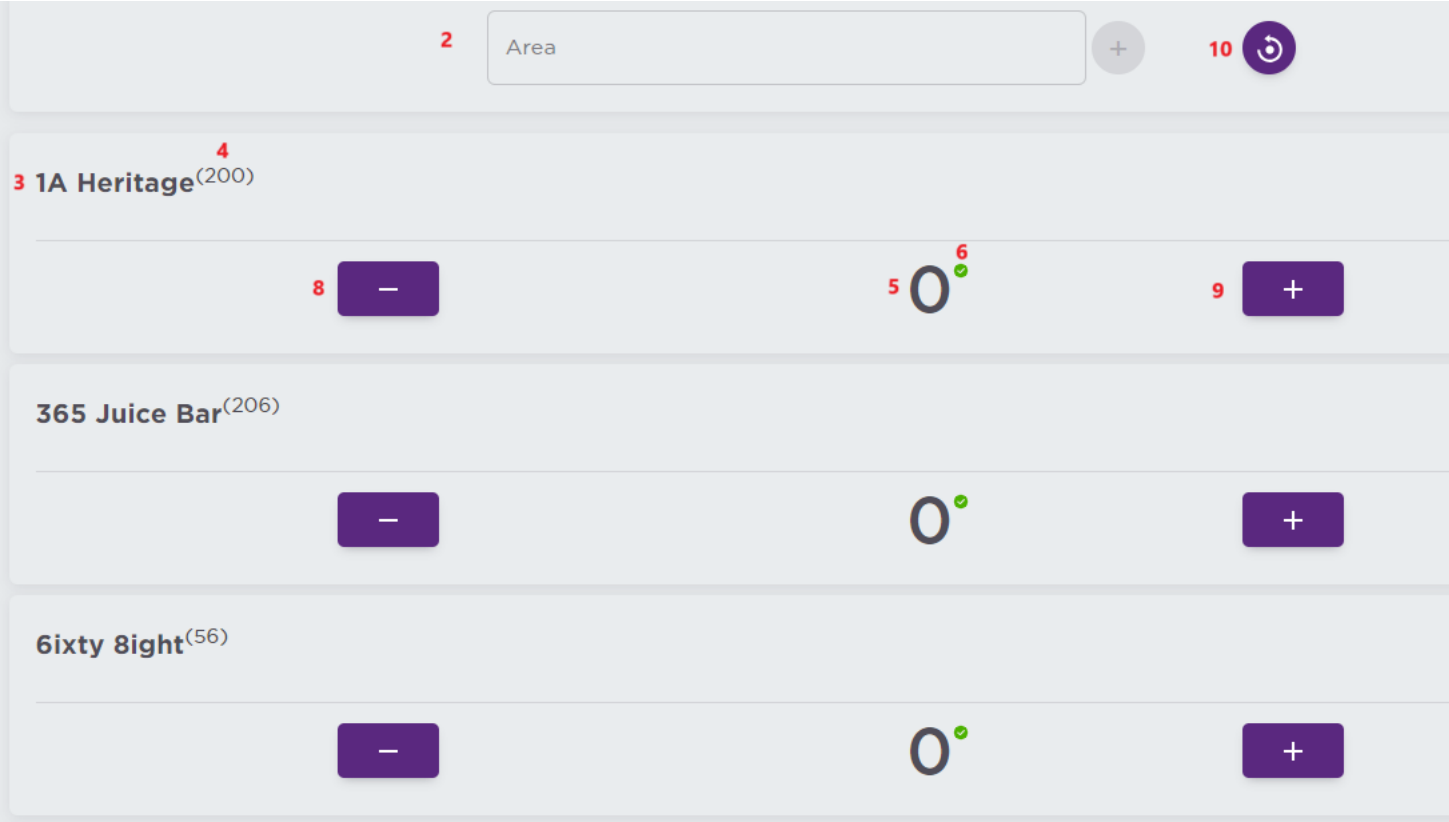
The heatmap is a visualization tool used in the localization code to display the distribution of localized packets. Each cell in the heatmap represents a specific area, with the counter inside indicating the number of packets localized within that area. This visualization is primarily intended to assist developers in assessing the effectiveness of the localization process. The map aims to determine the optimal geometric configuration (shape and area) for a polygon that maximizes a specific performance metric, ensuring the best possible accuracy and efficiency in packet localization.

4.21 Manual Counting

Manual counting dashboards are proving the ability to the user to count manually the visitation in their areas / organizations and then study and compare with the visitation that Ariadne has calculated

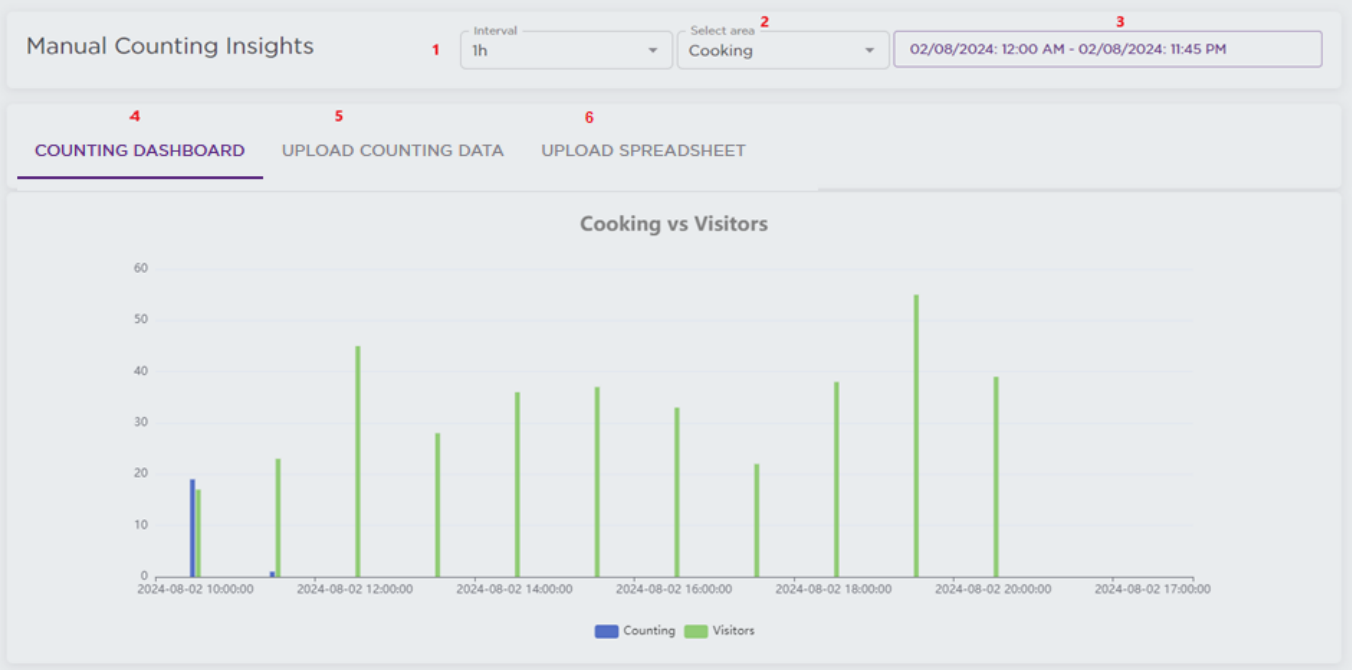
The manual counting process includes the manual counting of the total footfall but also the manual counting of each polygon.

4.21.1 Count Page

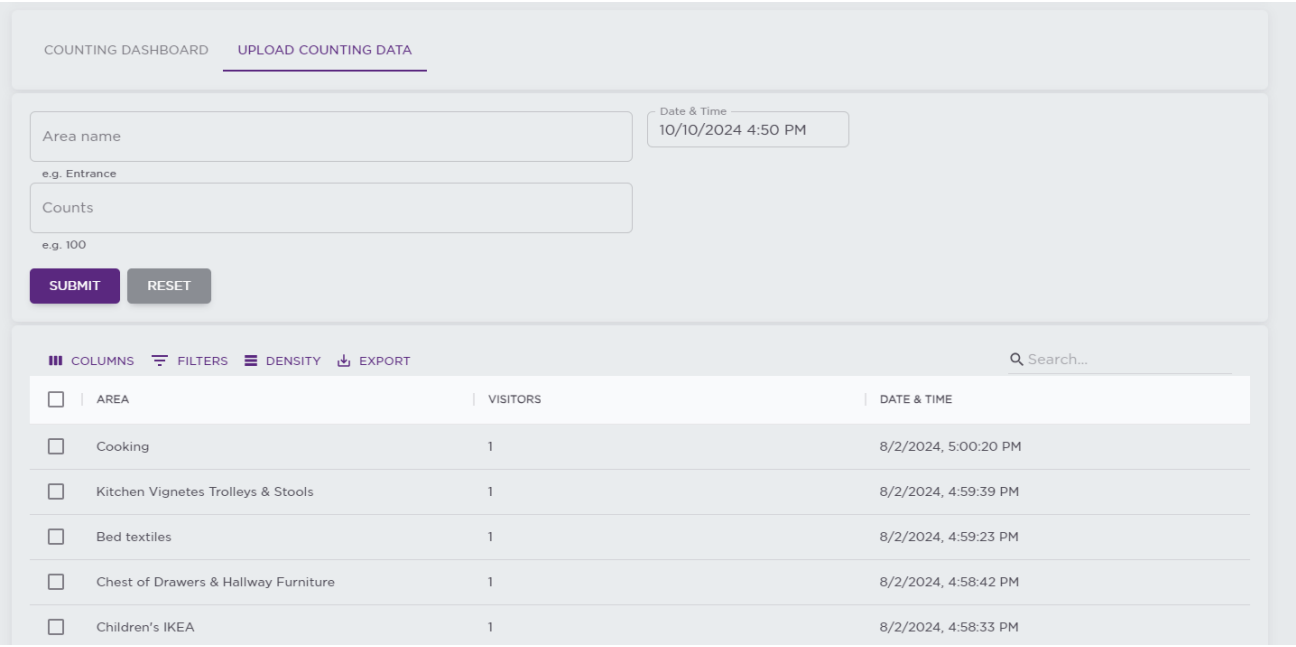


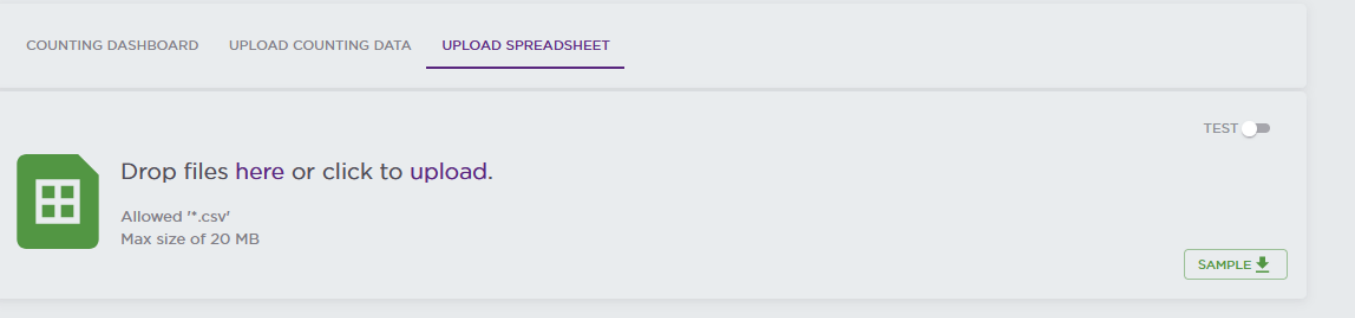
1) Date time picker
2) Areas to count - Free text - (Total for all organizations)
3) Area that is being counted
4) Aggregated count of the area in respect of the Date Time Picker (Doesn't automatically get updated)
5) User's count
6) Indicator that user's counting gets saved in the DB
7) Delete counting area
8) Add a count
9) Remove a count
10) Reset your current view of areas

4.21.2 Insights Page



1. Intervals to group the data
2. Select areas that have Counting data
3. Date Time Picker
4. Counting Dashboard Tab
5. Upload Manually Data
6. Upload Spreadsheet with Manual Data





The second option is **UPLOAD SHEET** (Figure) and you can drag n drop a csv file

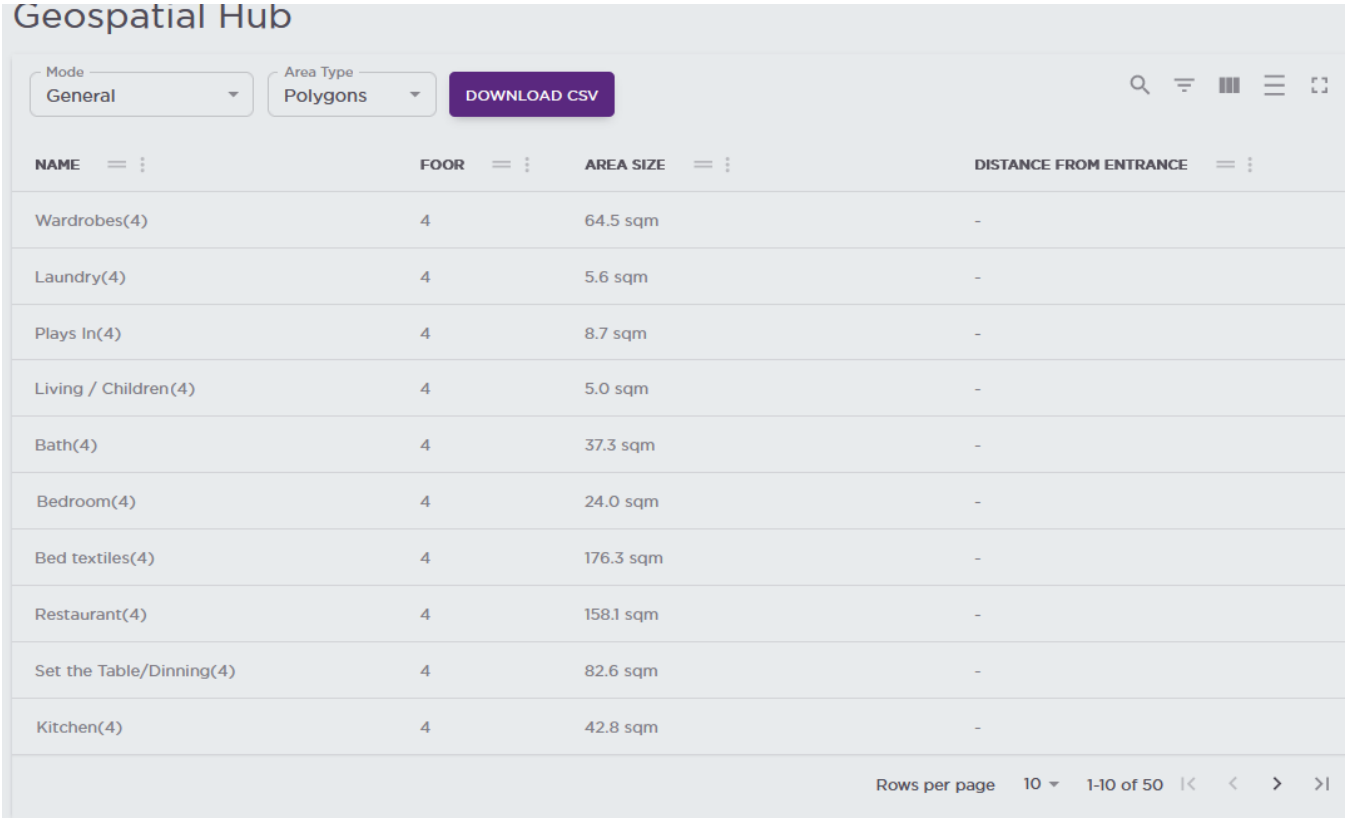
A Csv File is required with the following structure:

polygon: **Areas of interest** or **Total** (for all store)
date: **DD/MM/YYYY HH**: **MM**
count : number of counts

date	polygon	count
20/01/2024 11:00	test 2	10
20/01/2024 11:00	test 1	10

4.22 Geospatial Hub

The Geospatial Hub page offers users comprehensive insights through two distinct view types: **General** and **Distance Matrix**. Seamlessly integrated, a select box facilitates effortless toggling between polygons of the smallest unit and parent polygons, where applicable.



4.22.1 General View

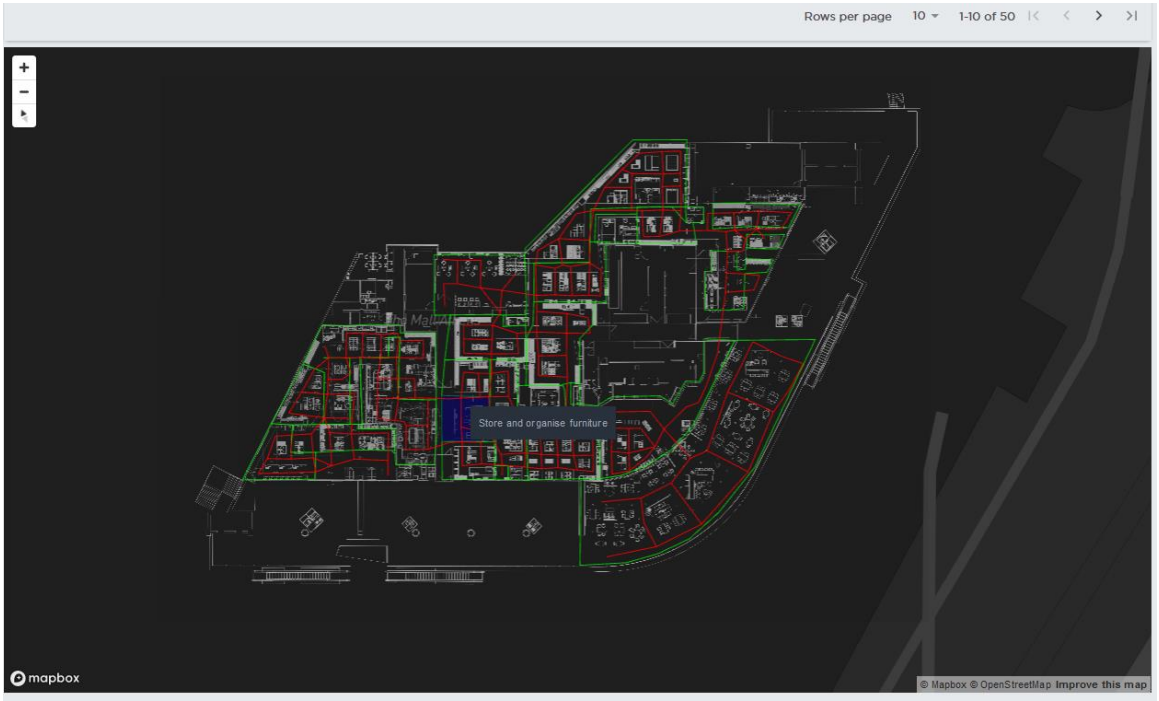
In the General view, each row provides valuable data on the area size of individual polygons, measured in square meters. Additionally, if a polygon is designated as the "entrance," the table includes information on the distance to/from this point, enhancing spatial context.

4.22.2 Distance Matrix View

The Distance Matrix view enables users to explore distances between polygons within the same level/floor or across different levels. Cross-floor distances are computed based on designated transition polygons, representing structural elements like stairs, lifts, or escalators. These calculations employ a shortest pathfinding algorithm, with accuracy contingent upon the quality of the provided topology Geojson data.

4.22.3 Geospatial Map

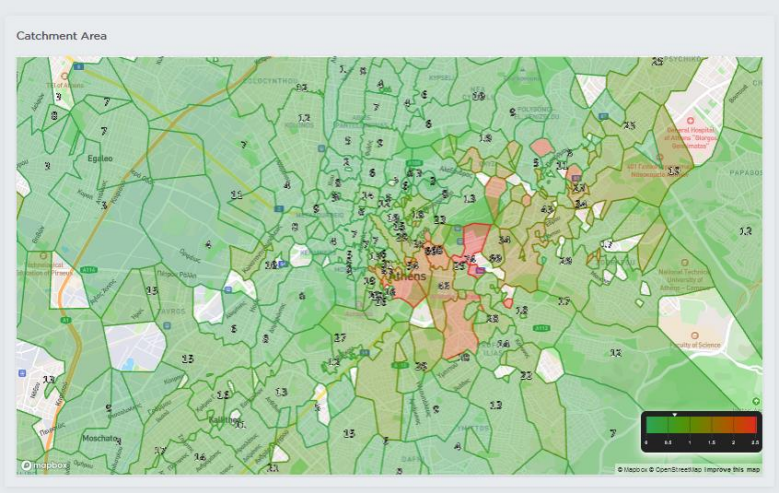
The interactive map visually represents polygons and topology, empowering users to click on specific polygons to reveal all possible paths from the selected point. Furthermore, tooltips display precise distance information between each pair of polygons, aiding in informed decision-making.



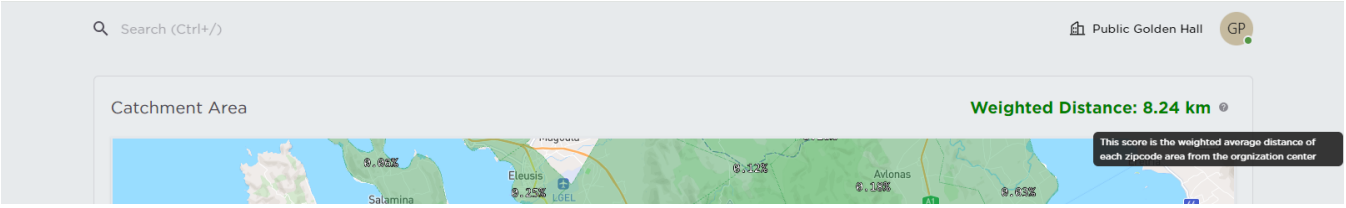
Key metrics, including distances measured in meters and area sizes in square meters, ensure clarity and precision in data interpretation, facilitating efficient spatial analysis and decision-making processes.

4.23 Catchment Area

The following panel provides an insightful overview of visitor origins based on catchment areas defined by zip codes. It visualizes the geographical distribution of visitors, showcasing the zip codes from which they originate.



Through intuitive mapping and data visualization techniques, users gain valuable insights into the geographic reach of their audience. This information enables informed decision-making regarding marketing strategies, resource allocation, and target audience engagement efforts

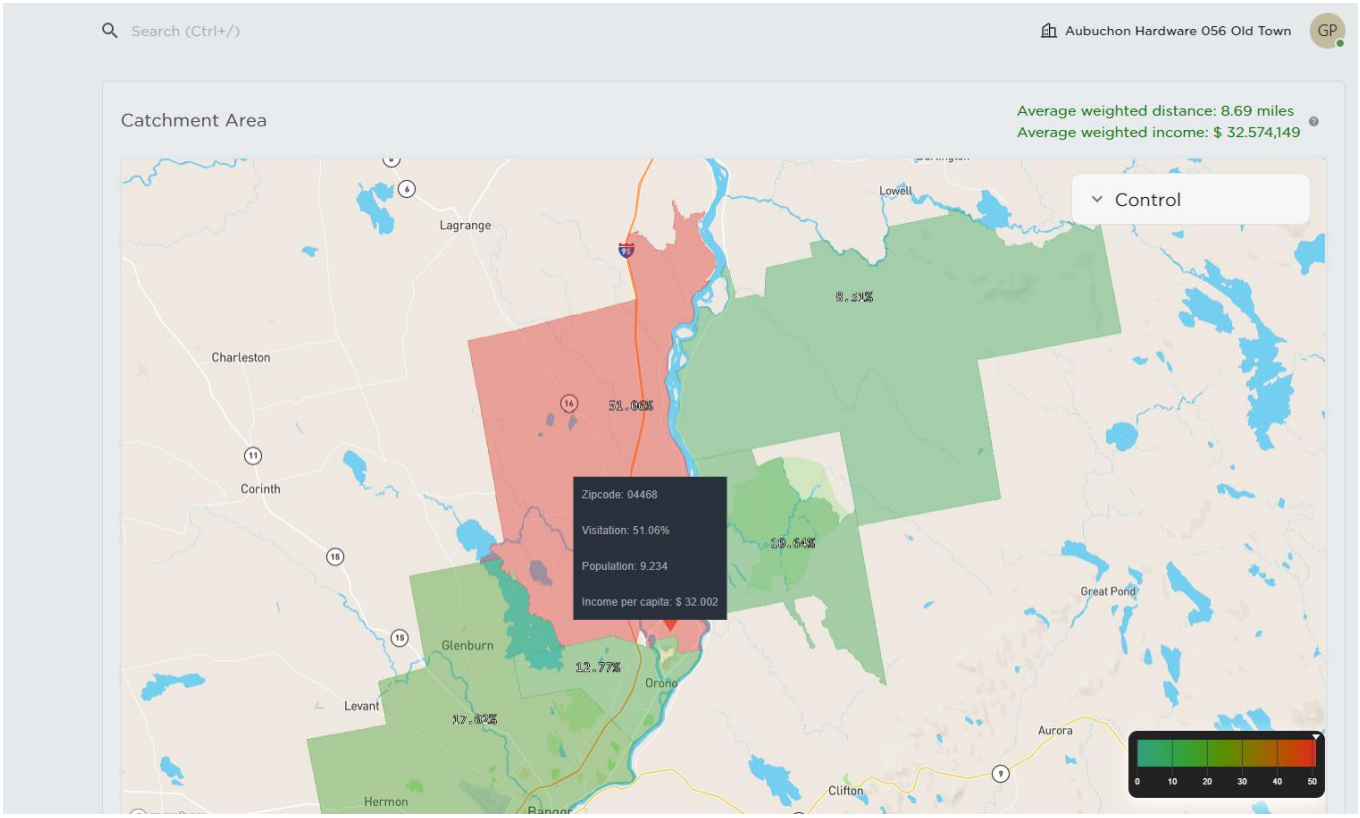


The weighted average distance for each project is calculated as such:

$$Weighted.\ Average.\ Distance = \sum_{n=0}^{N} dist_n * freq_n$$

Where:

- dist(n) is the distance of each zipcode area to the organization's center
- Freq(n) is the frequency of each zipcode area, meaning the number of visitors living in that area over the total number of visitors.
- N is the total number of zipcodes in the data.

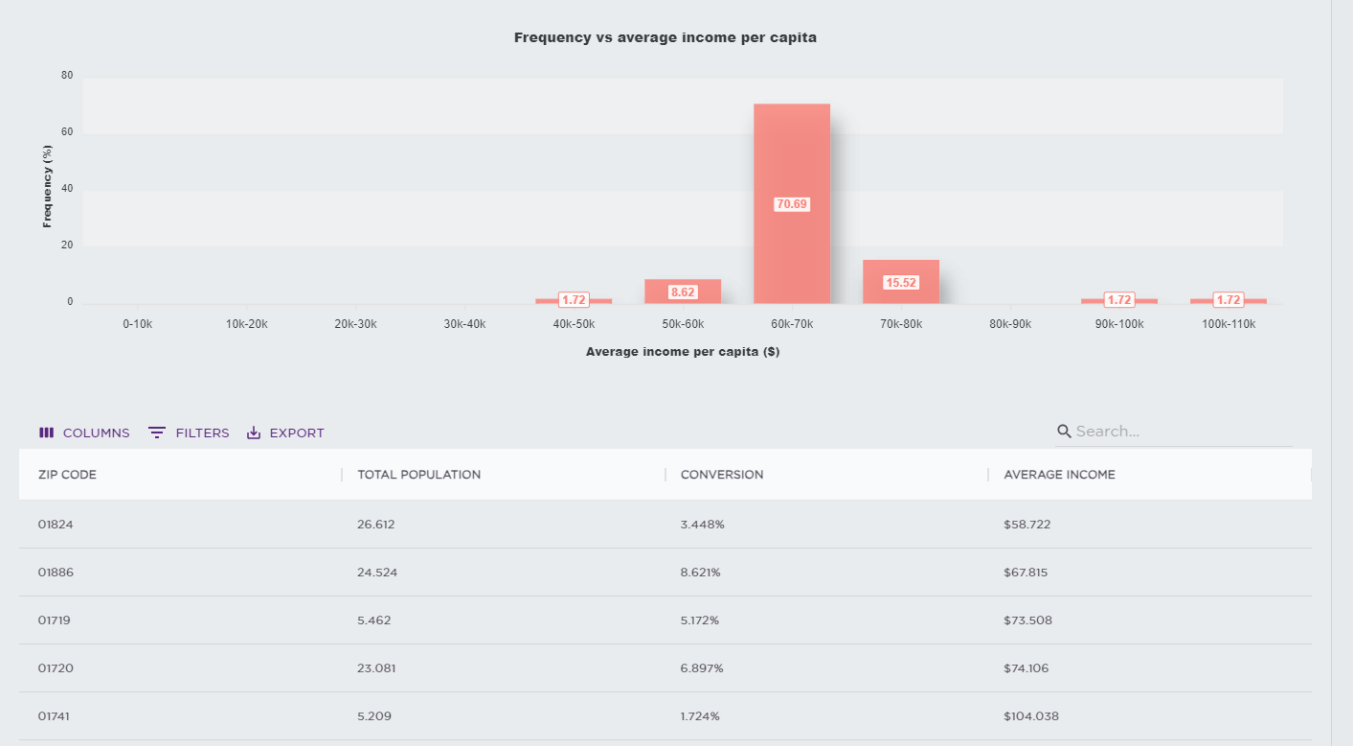


The Average Weighted Income is computed to provide an aggregated income metric that reflects the relative economic weight of different areas within the catchment. This measure is especially useful for understanding the potential market power or purchasing capability of the populations within different zip code regions. The calculation is performed as follows:

$$Weighted.\ Average.\ Income = \sum_{n=0}^{N} aip_n * freq_n$$

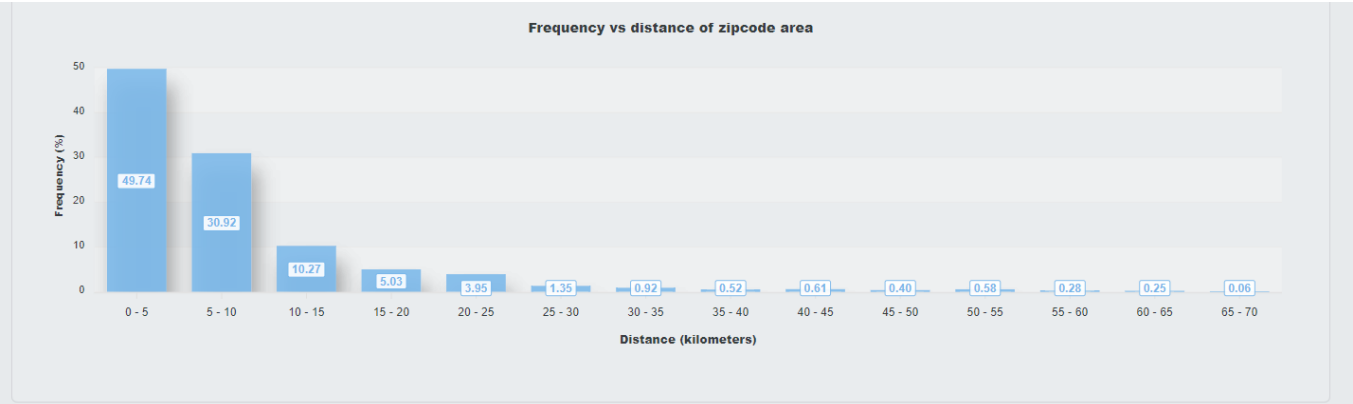
Where:

- aip(n) is the average income per capita for the nth zipcode area
- Freq(n) is the visitation pecantage of that area
- N is the total number of zipcodes in the data.



ZIP CODE	TOTAL POPULATION	CONVERSION	AVERAGE INCOME
01824	26.612	3.448%	$58.722
01886	24.524	8.621%	$67.815
01719	5.462	5.172%	$73.508
01720	23.081	6.897%	$74.106
01741	5.209	1.724%	$104.038

The visualization comprises two key components: a bar chart and a detailed table, both of which provide insights into the distribution of average income across different income brackets within the catchment area. This visual representation helps in quickly identifying which income groups are most prevalent among the visitors. Below the chart, a table is presented that lists zip codes along with corresponding total population, average income, and conversion rates. This table breaks down the data to a granular level, allowing for a detailed analysis of income distribution and visitation patterns per zip code. By connecting this data with the Average Weighted Income metric, stakeholders can gauge the economic profiles of different areas and tailor strategies that align with the financial demographics of these populations.



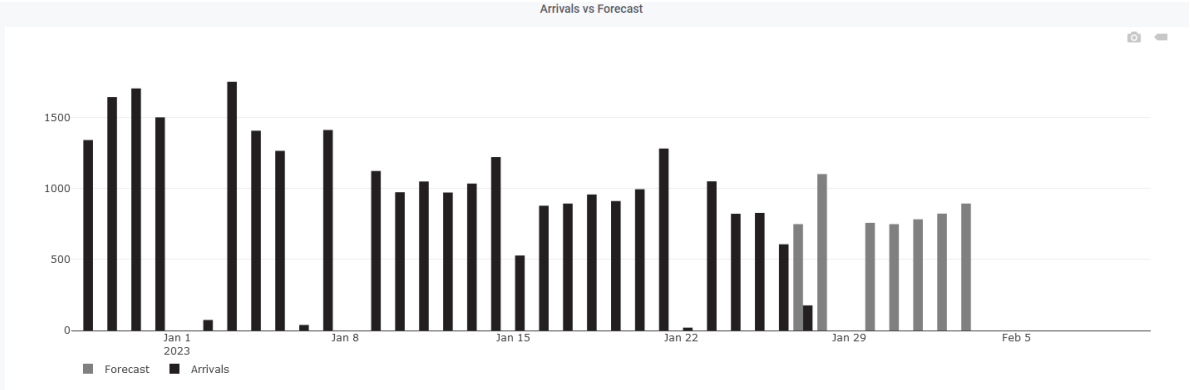
This bar chart graph visualizes this data showing each zipcode, its distance and its frequency. The insight we can get from this graph is the descending trend of the

curves which means that the further away we go from the organization's center, the less the visitation is.

4.24 Forecast Analytics Data

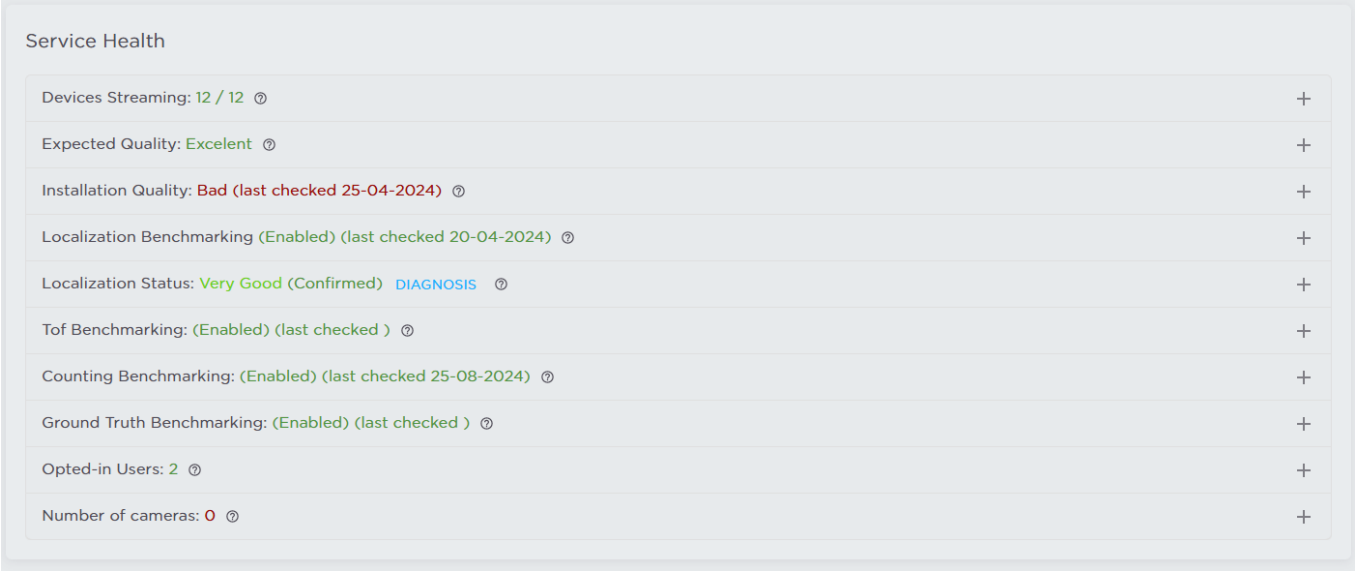
The folder contains all the dashboards which are related to Forecasting.

The panel presents the historical arrivals of visitors and the forecasting arrivals in the whole project area



4.25 Service Health

The Service Health dashboard panel serves as a critical tool for monitoring and maintaining the quality of service that customers receive. This panel provides real-time visibility into the operational status of various systems through a collection of key performance indicators (KPIs).



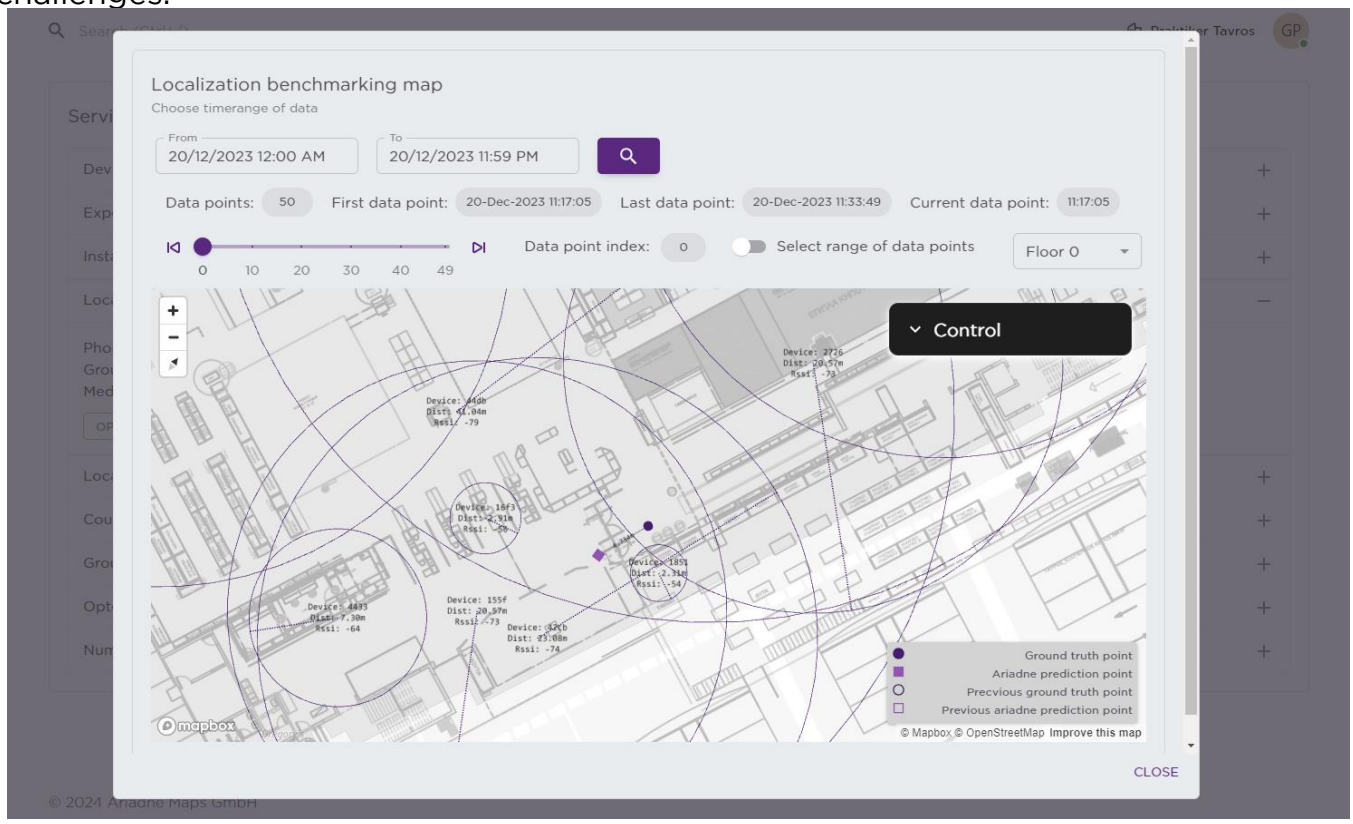
Formula for assigning the Healthiness of each system:

- < 60% - Bad
- 60% ≥ ... < 70% - Fair

- 70% ≥ … < 78% - Good
- 78% ≥ … < 85% - Very Good
- ≥ 85% - Excellent

These KPIs include metrics such as:

· **Devices Streaming**: The number of actively streaming devices over the total number of devices, where "actively streaming" refers to devices that have transmitted data within the last 24 hours.
· **Expected Quality:** The anticipated data quality customers will experience if they install the recommended number of devices at the designated locations.
· **Installation Quality:** The accuracy of device installation, measured by how closely the actual location of each device matches the designated position.
· **Localization Benchmarking:** Results of a benchmarking process that assesses the accuracy of the localization system.
In the newly integrated map feature for this KPI, users can access comprehensive localization benchmarking results. This dynamic visualization tool displays data on the store's map, enabling detailed inspection of positional accuracy at each data point. By reviewing these results, users can effectively identify zones of underperformance, which may result from factors such as low device density or specific localization challenges.



The map component provides a granular view at each data point, which includes both a 'ground truth' point (the actual, measured location) and a 'predicted' point (the location as estimated by the system). For each data point, users can see the details of the devices that captured the signals, the distances that were calculated between

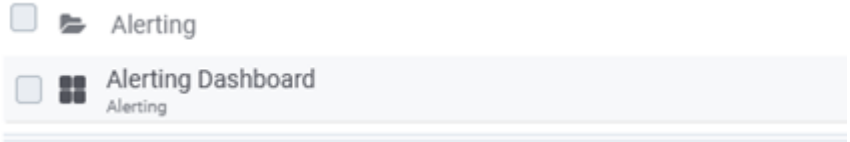
these points, and the resultant measured error in meters. This level of detail aids in a thorough analysis of the system's accuracy and operational integrity.
Additionally, users have the flexibility to select and examine a range of data points. This feature allows for an evaluation of the overall trajectory, comparing how closely the predicted path aligns with the ground truth path over a sequence of points. This holistic view is particularly useful for assessing the consistency and reliability of the localization system across different segments of the store.

· **Localization Status:** The service status for each day, represented as a percentage indicating the proportion of time people are localized relative to the store's opening hours.
· **Tof Counting Benchmarking:** Results of a benchmarking process that evaluates the quality of the people counting service by comparing it to tof counted data by tof_devices.
· **Counting Benchmarking:** Results of a benchmarking process that evaluates the quality of the people counting service by comparing it to manually counted data by agents.
· **Opted In Users:** The number of users who have chosen to receive advanced and personalized services from Ariadne.
· **Number of Cameras**: The total number of cameras installed in the store, with camera data also used to benchmark Ariadne's people counting systems.

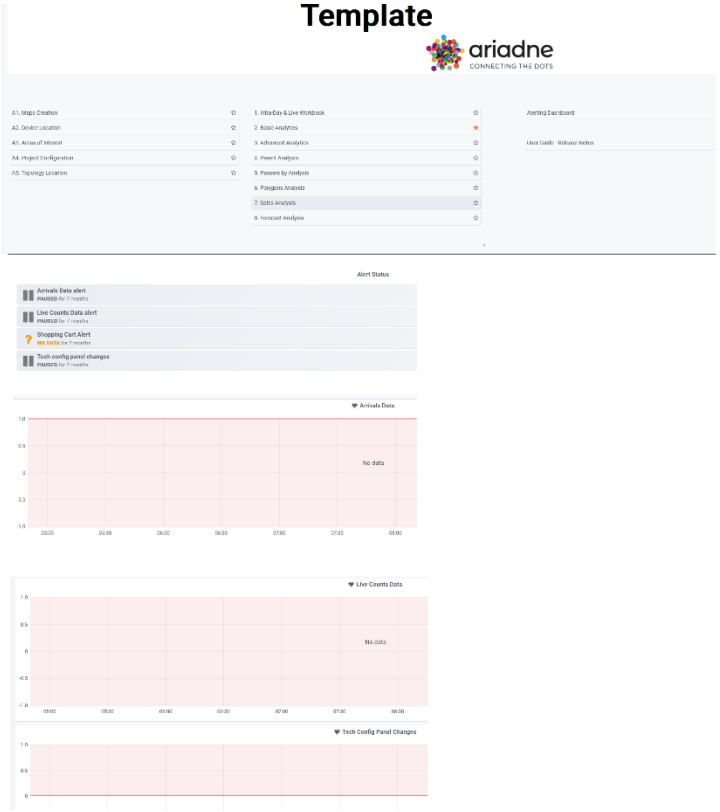
These indicators collectively offer a comprehensive view of the system's health. By continuously tracking these specific KP
issues, ensuring that systems remain operational and perform optimally. This proactive monitoring helps in minimizing downtime, improving user satisfaction, and maintaining the overall reliability and efficiency of the service.

4.26 Alerts

Ariadne's alerts allow you to learn about problems in your systems moments after they occur. Robust and actionable alerts help you identify and resolve issues quickly, minimizing disruption to your services.



By default, we provide 3 alerts (visitors, live counts, tech config changes) however admin users may add new alerts according to business requirements.



Alerting in Ariadne's dashboard allows you to attach rules to your dashboard panels. When you save the dashboard Grafana will extract the alert rules into a separate alert rule storage and schedule them for evaluation.

In the alert tab of the graph panel, you can configure how often the alert rule should be evaluated and the conditions that need to be met for the alert to change state and trigger its notifications.

When an alert changes state, it sends out notifications. Each alert rule can have multiple notifications. To add a notification to an alert rule you first need to add and configure a notification channel (can be email). This is done from the Notification Channels page.

One of the key features of dashboard is its alerting system, which allows users to set up notifications for specific events or conditions that occur within their data. These alerts can be sent to a variety of different endpoints, including Teams and email.

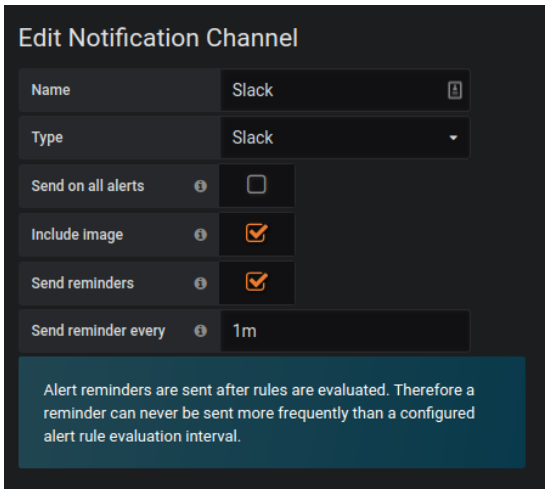
4.26.1 Alert Notifications

When an alert changes state, it sends out notifications. Each alert rule can have multiple notifications. In order to add a notification to an alert rule you first need to add and configure a notification channel (can be email, PagerDuty or other integration). This is done from the Notification Channels page.

4.26.2 Notification Channel Setup

On the Notification Channels page hit the New Channel button to go the page where you can configure and setup a new Notification Channel.

You specify a name and a type, and type specific options. You can also test the notification to make sure it's setup correctly.



- Default (send on all alerts)

When checked, this option will notify all alert rules - existing and new.

- Send reminders

When this option is checked additional notifications (reminders) will be sent for triggered alerts. You can specify how often reminders should be sent using number of seconds (s), minutes (m) or hours (h), for example 30s, 3m, 5m or 1h etc.

Important: Alert reminders are sent after the rules are evaluated. Therefore, a reminder can never be sent more frequently than a configured alert rule evaluation interval.

- Disable resolve message

When checked, this option will disable resolve message [OK] that is sent when alerting state returns to false.

4.26.3 Supported Notification Types

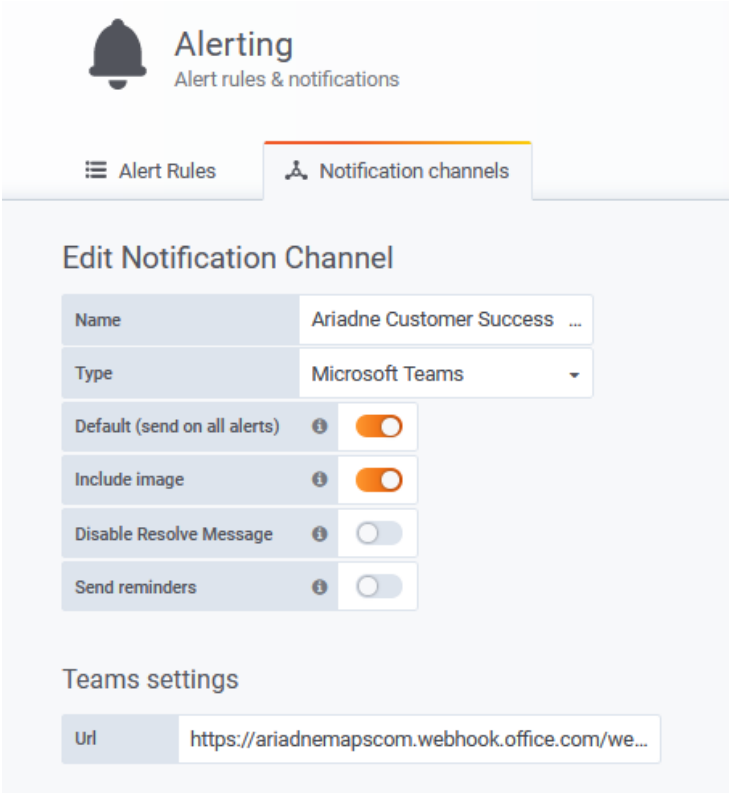
Grafana ships with several notification types. Below there are presented the major ones:

4.26.3.1 Teams

Teams is a collaboration platform developed by Microsoft that is designed to facilitate team communication and collaboration. Teams integrate with a wide range of other tools and services, including Grafana, to provide users with a streamlined experience. By connecting Grafana alerts to Teams, users can ensure that the appropriate team members are notified in real-time when critical events occur within their data.

To set up Grafana alerts in Teams, users first need to create a new notification channel within Grafana. This can be done by navigating to the "Alerting" section of the Grafana dashboard and selecting "Notification channels" from the dropdown menu. From here, users can select "Teams" as the notification type and enter their Teams webhook URL.

To add a Webhook to a team's channel please follow Microsoft's link



Once the notification channel has been set up, users can create new alerts within Grafana that are triggered when specific conditions are met. These alerts can be customized to include specific messages or details about the event, as well as the recipients who should receive the notification. Users can also set up multiple alert rules and assign different teams or individuals to receive notifications for each one.c

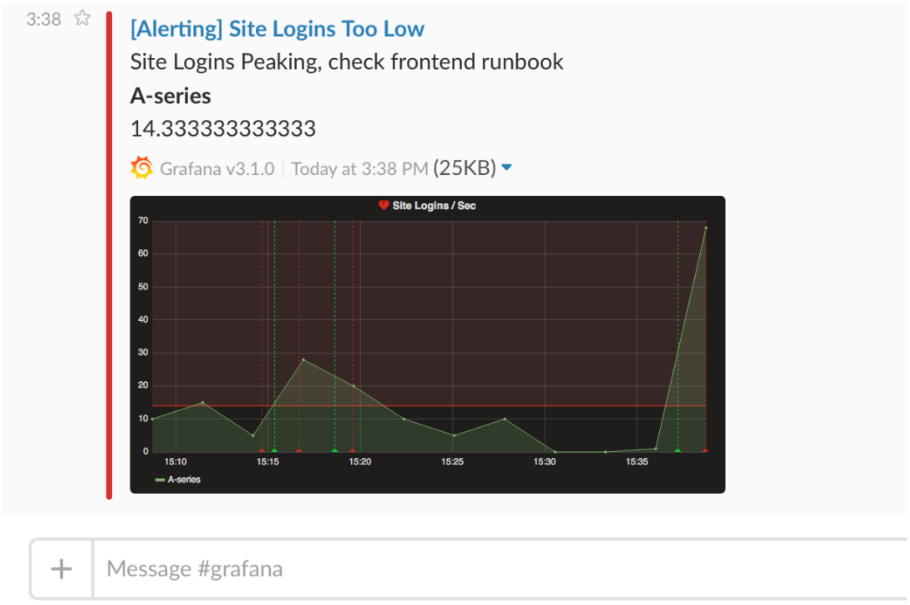
4.26.3.2 Email

In addition to Teams, Grafana alerts can also be connected to email. Email notifications can be set up in a similar manner to Teams notifications, by creating a new notification channel within Grafana and selecting "Email" as the notification type. Users can then enter their email address or the email addresses of the recipients who should receive the notification.

To enable email notifications you have to set up SMTP settings in the Grafana config. Email notifications will upload an image of the alert graph to an external image destination if available or fallback to attaching the image to the email. Be aware that if you use the local image storage email servers and clients might not be able to access the image.

4.26.3.3 Slack

To set up Slack, you need to configure an incoming Slack webhook URL. You can follow their guide on how to do that. If you want to include screenshots of the firing alerts in the Slack messages you must configure either the external image destination in Grafana, or a bot integration via Slack Apps. Follow Slack's guide to set up a bot integration and use the token provided (https://api.slack.com/bot-users), which starts with "xoxb



4.26.3.4 Webhook

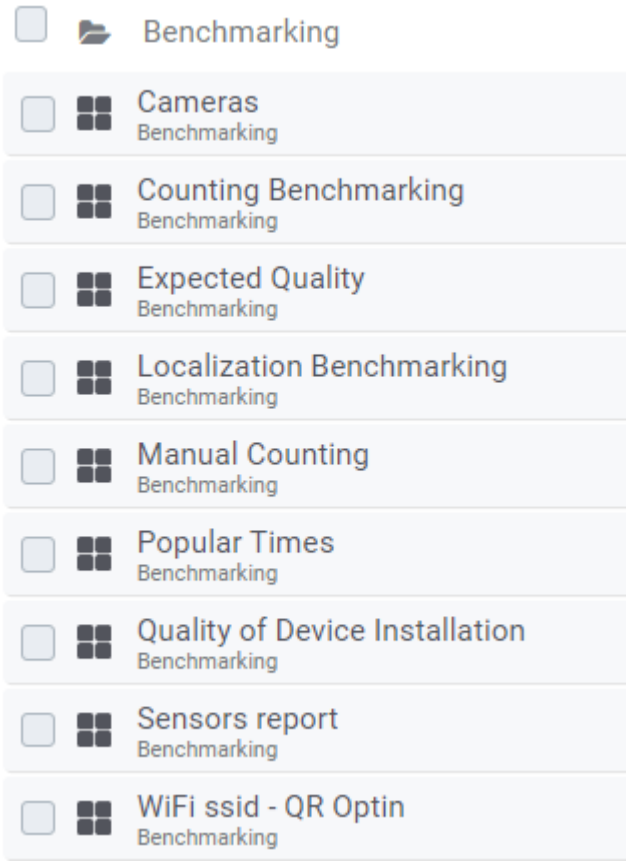
The webhook notification is a simple way to send information about a state change over HTTP to a custom endpoint. Using this notification, you could integrate Grafana into a system of your choosing.

Example json body:

```
{
  "dashboardId":1,
  "evalMatches":[
    {
      "value":1,
      "metric":"Count",
      "tags":{}
    }
  ],
  "imageUrl":"https://grafana.com/assets/img/blog/mixed_styles.png",
  "message":"Notification Message",
  "orgId":1,
  "panelId":2,
  "ruleId":1,
  "ruleName":"Panel Title alert",
  "ruleUrl":"http://localhost:3000/d/hZ7BuVbWz/test-
dashboard?fullscreen\u0026edit\u0026tab=alert\u0026panelId=2\u0026orgId=1",
  "state":"alerting",
  "tags":{
    "tag name":"tag value"
  },
  "title":"[Alerting] Panel Title alert"}
```

4.27 Benchmarking Dashboard

The folder contains all the dashboards which are related to Benchmarking accuracy



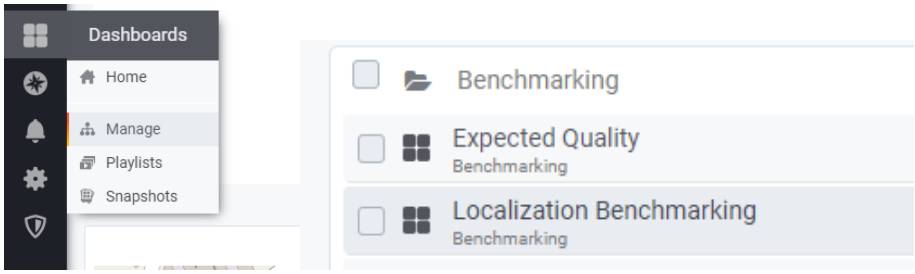
4.27.1 Localization Benchmarking Steps

1. Find a Wi-Fi enabled device that will be used as the test device for benchmarking. The test device should be connected to Wi-Fi, ideally to the same network as the Ariadne surveyors, if that's available.

2. Connect the device to a Wi-Fi network that covers all areas of the installation and get its MAC address for that network, which could be different from its real one. For Android you can find that information under Network details:

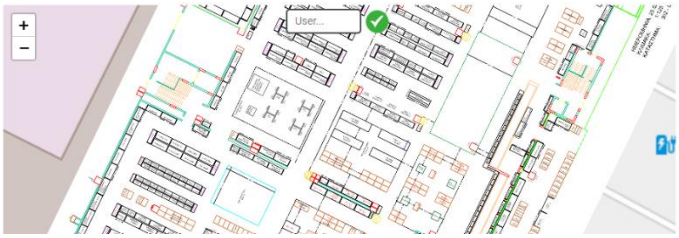
3. Send this MAC address to the Ariadne team to be allowed to be tracked individually.

4. Go to the localization benchmarking dashboard, in Benchmarking folder:

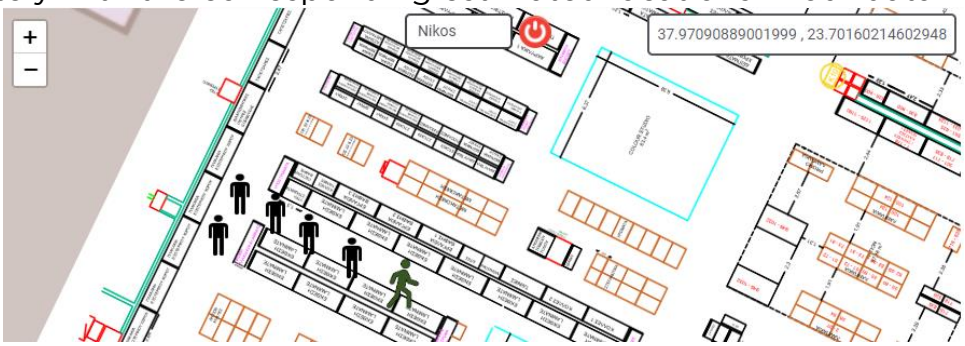


5. For each floor of the installation, you should be able to see a panel with the title: “Map of ground truth locations Floor: FLOOR”. Use the corresponding panel for each floor.

6. To start testing each floor, enter a username in the corresponding panel. By pushing the “CHECK” button you start a recording position session.



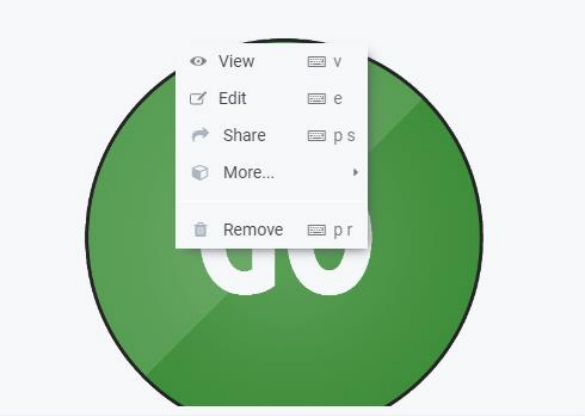
7. Walk around the area of the installation on that floor and mark your location on the map by clicking on the desired location. See on your top right corner your latitude, longitude coordinates. Every time you click on the floormap your location is immediately stored. It's important to allow a 2-minute interval between the storage of different locations in the dashboard. This practice is particularly valuable if the tracked phone is not transmitting data frequently. It ensures that the stored locations align accurately with the corresponding estimated locations in our data.



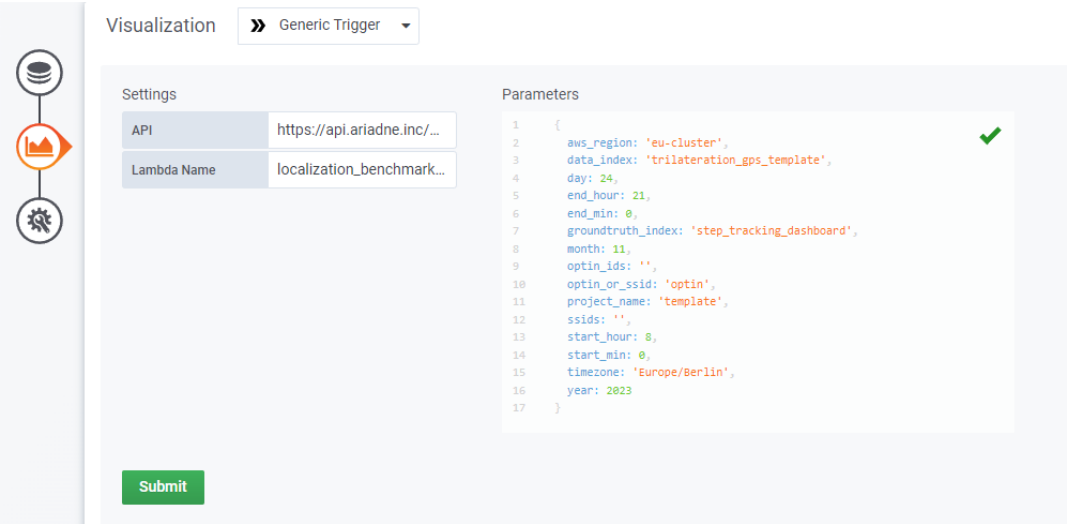
If you click the map and register an undesired location, right click on the human figure to delete this location. After you finish your session push the”STOP” button.

8. Your data is automatically uploaded to the Ariadne cloud, accompanied by a pop up message.

9. To review stored locations versus Ariadne localization, scroll down to the green “GO” button panel and select “Edit” from the drop down menu of the panel.



Then follow on to the second tab in the edit panel:



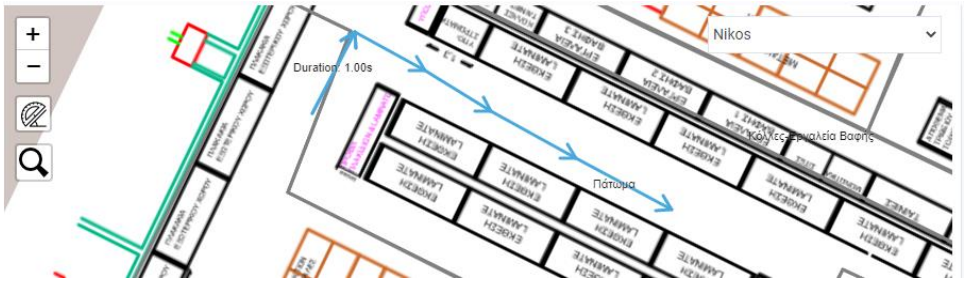
In the text box for parameters, modify relevant parameters:

a. Day, month, year: date of benchmarking
b. Start_hour, start_min, end_hour, end_min: time of localization benchmarking
c. Optin_or_ssid: mode through which user(s) device is being tracked (allowed values: optin or ssid)
d. Optin_ids: [used for optin mode] MAC address of user's phone for specific network (comma separated strings in case of multiple MACs)
e. Ssids: [used for ssid mode] ssids used (comma separated for multiple users)

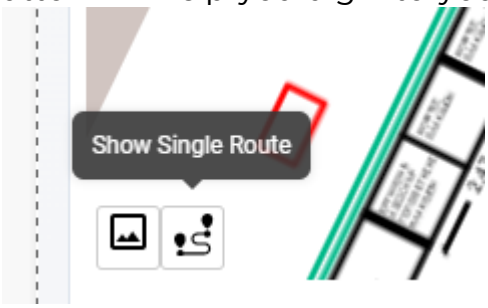
Press the submit button after the parameter values are updated. Save the dashboard and refresh the webpage.

Press the "GO" button. The following pop-up will appear:

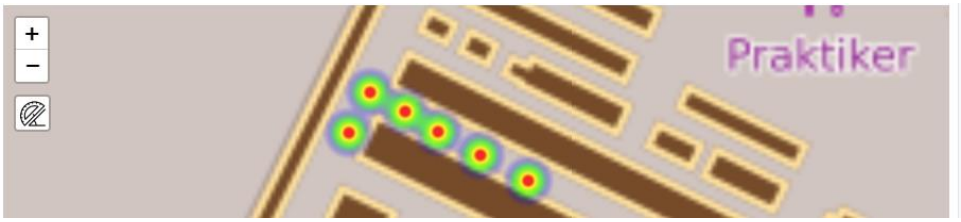
9. Using the refresh button on the top right of the page  the select box of the panel on your right named Trajectory Floor: FLOOR will show you trajectory.



The ”Show Single Route” button will help you dig into your trajectory.



10. Heatmap floor: FLOOR show a heatmap version of all the locations that have been registered.



4.27.2 Counting Benchmarking

The Counting Benchmarking Dashboard is used for the calibration of a project, after manual counting has been conducted. Initially, the date for which the manual counting was done needs to be specified in the panel (Edit option) By pression the go button the results of the calibration execution will appear in the Optimization Results panel on the right.

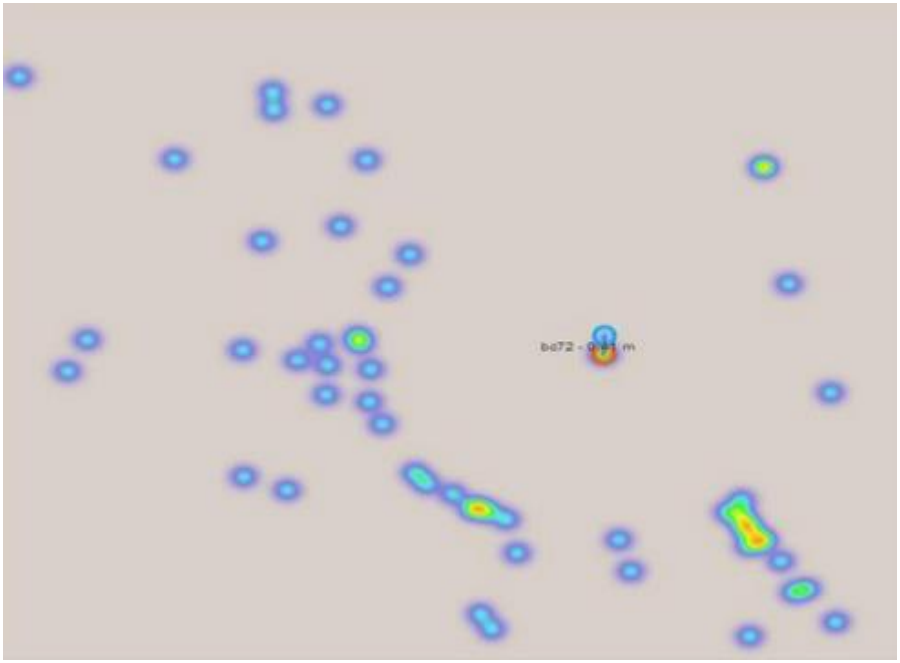
4.27.3 Quality of Device Installation

The Quality of Device Installation Dashboard helps you determine how well a specific device initially placement is compared to a position estimate according to the measurements taken on the day it is decided to perform the procedure. It is used as a tool to verify the correct installation or to correct an incorrect installation of a device.

To start using the Quality of Device Installation Dashboard, go to Dashboards à Manage à Benchmarking à Quality of Device Installation as indicated below:

You will be redirected to the Quality of Device Installation Dashboard.

Once in the Quality of Device Installation Dashboard, press the “Go” button and wait until execution finishes. Then, refresh the page to display the updated panels.

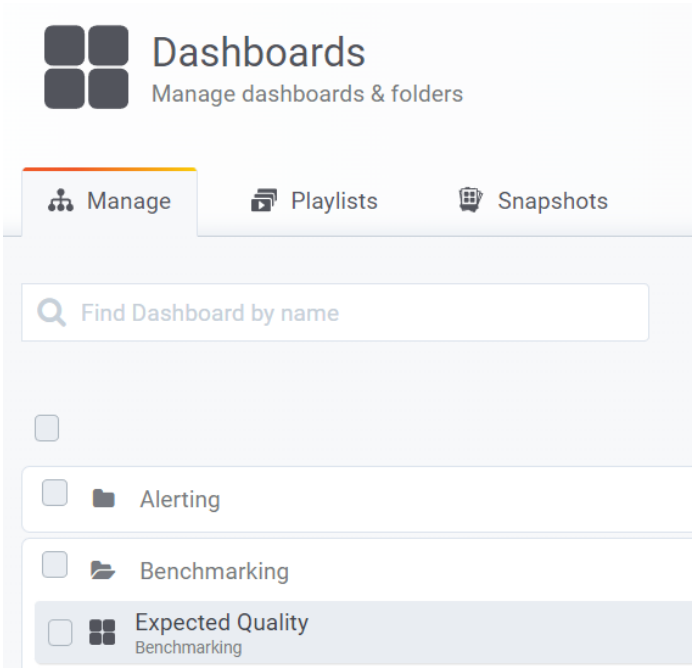


This procedure will result in a more accurate depiction of the entire installation. In the generated panels, for each device, there is a blue line between the device's current location and its new location, which is calculated as the weighted mean of RSSI values. The calculated error between the two locations is also displayed as a number near the blue line.

4.27.4 Expected Quality Dashboard

The Expected Quality Dashboard helps you determine how well a specific device placement reflects the areas of interest (polygons) of the store. Using the Expected Quality Dashboard, you can find out how well you can differentiate signals emitted from different areas of interest in the store, which in turn affects polygon-level localization accuracy. This is useful in the pre-deployment phase and is based on simulated data in order to choose one of many possible device placements based on the expected polygon-level localization quality.

To start using the Expected Quality Dashboard, go to *Dashboards / Manage / Benchmarking / Expected Quality* as indicated below:



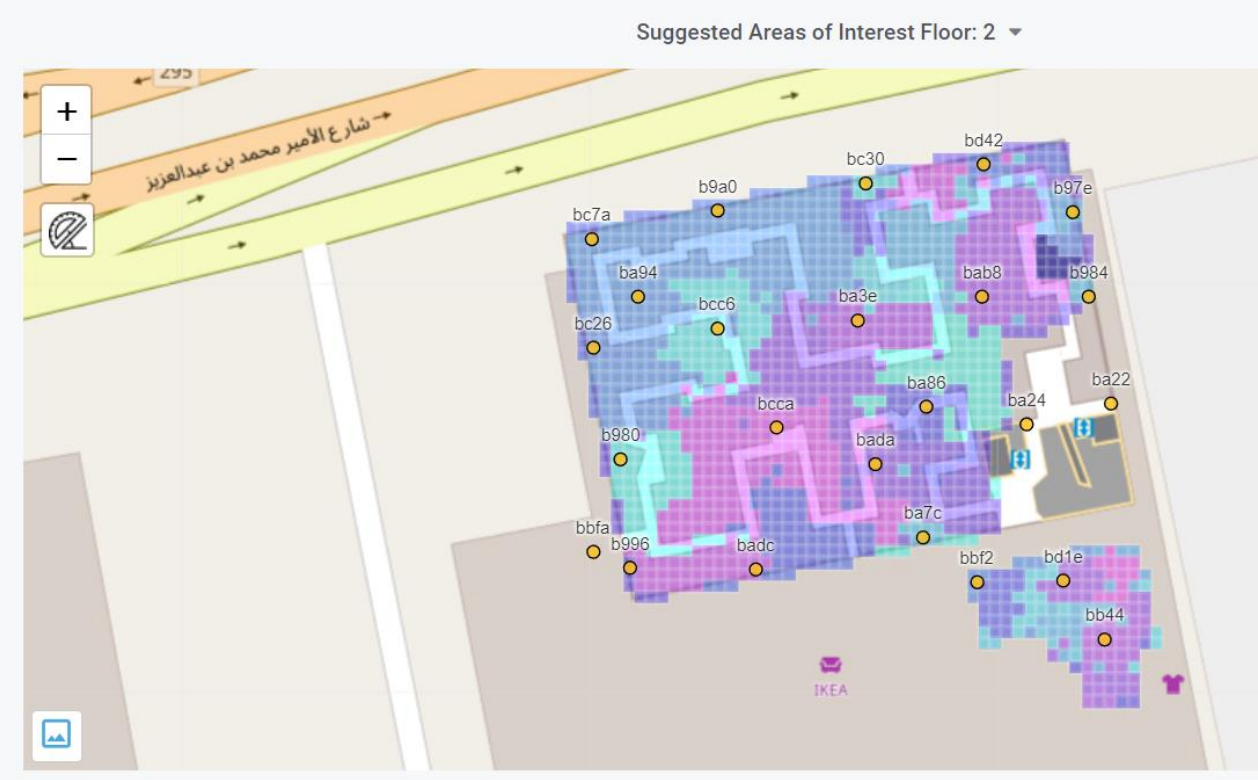
You will be redirected to the Expected Quality Dashboard. But before you start using the Expected Quality Dashboard, make sure you have configured Device Locations and Areas of Interest for your store.

Once in the Expected Quality Dashboard, press the "Go" button and wait until execution finishes. Then, refresh the page to display the updated panels. You will find different types of panels displayed:

- Suggested Areas of Interest Panel
- Average Accuracy of Area of Interest Panel
- Overall Average Accuracy Panel

Suggested Areas of Interest Panel:

The Expected Quality Dashboard shows one *Suggested Areas of Interest Panel* for each floor in the store like the image below:

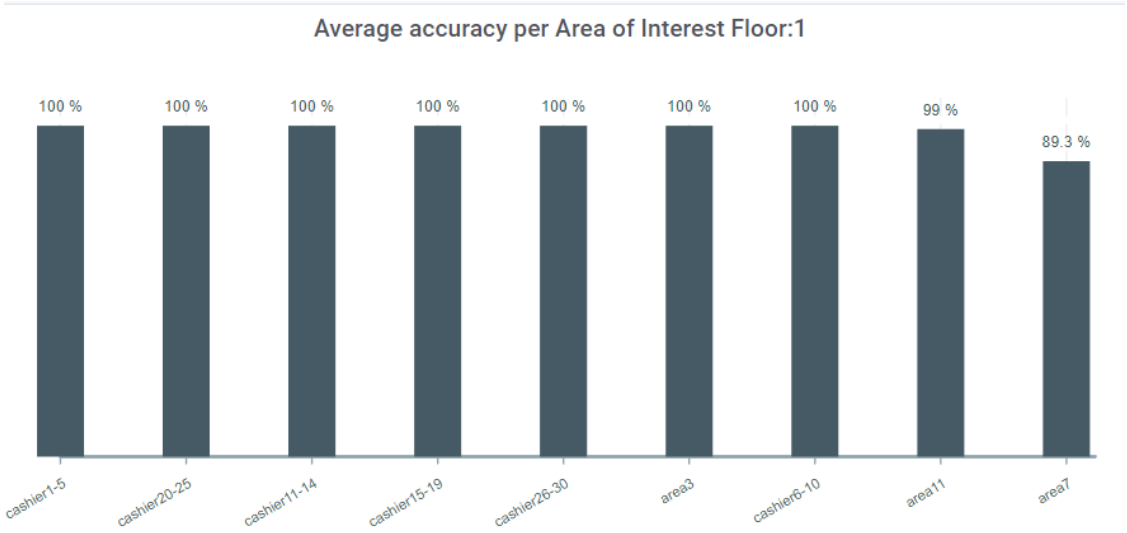


The *Suggested Areas of Interest Panel* shows a proposed division of the floor area into areas of interest that will give best accuracy according to the previously selected device placement. If this suggested division does not match your intended division of the floor area, you should consider selecting another device placement and checking how the new placement affects the suggested areas of interest.

Average Accuracy of Area of Interest Panel:

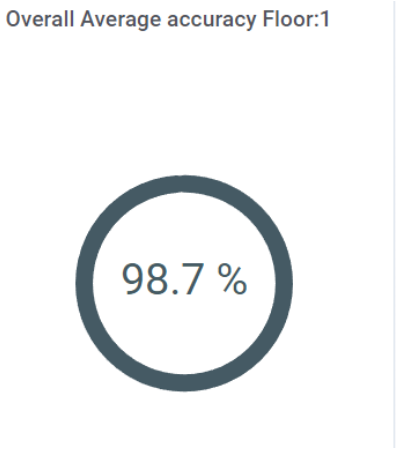
In addition to the visual representation provided by the *Suggested Areas of Interest* Panel, the *Average Accuracy of Area of Interest* Panel provides detailed information about expected accuracy. There is one *Average Accuracy of Area of Interest* Panel per floor.

The *Average Accuracy of Area of Interest* Panel contains a bar plot, where the expected localization accuracy is displayed for each configured area of interest in the store. For example, for area11 in the sample panel below an average accuracy of 99% indicates that on average the expected localization accuracy for customers in area11 is 99%. So, customers who actually are in area11 are expected be correctly classified as in area11 in 99% of the cases if the configured device installation is used.



Overall Average Accuracy Panel:

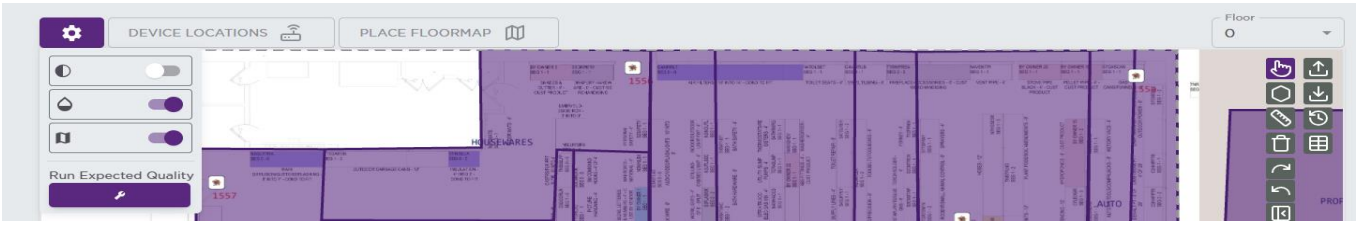
The *Overall Average Accuracy Panel* summarizes results displayed in the *Average Accuracy per Area of Interest Panel.* There is one *Overall Average Accuracy Panel* per store floor, which displays the average of all accuracies in the different areas of interest in the floor as shown below:



This number is useful when comparing the overall performance of different device placements.

Use visual information provided in the *Suggested Areas of Interest* Panel in combination with *Average Accuracy of Area of Interest* and *Overall Average Accuracy* Panels to help you compare between different device placements, and finally choose the best of them based on expected accuracy and suggested division of the store space into areas of interest.

Expected Quality can run from the new Ariadne Dashboard inside the Interest Areas Configuration under settings gear button.

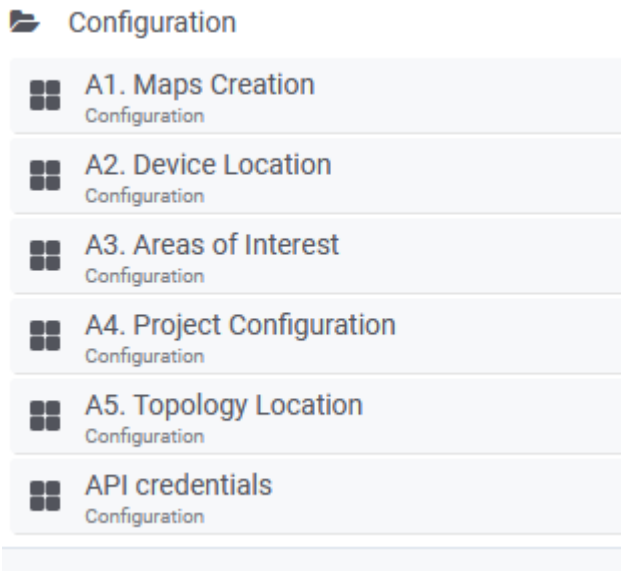

DEVICE LOCATIONS
PLACE FLOORMAP
Floor
0
Run Expected Quality

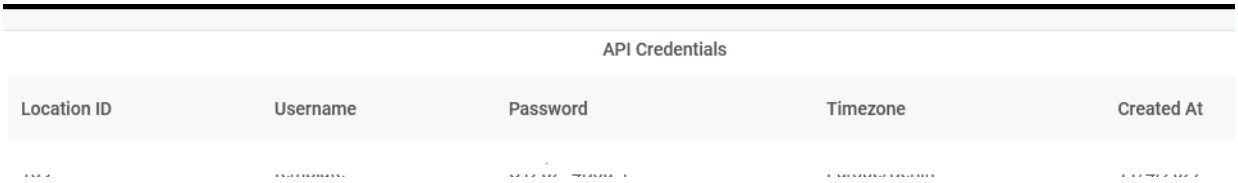
Appendix A

A.1 Authorization

- Authorized requests to the API should use an "Authorization" header, or a URL parameter token, with the value of the access token obtained through the log-in process.
- The first step is to log in with a username and password to receive an authentication token. The endpoint for logging in is /login.

The login information is in the API credentials dashboard under the Configuration sector.





- This step is done using basic authentication. The username and password can be transferred in the authorization header. Alternatively, you can log in using the browser and copy the returned authentication token.

Description	Log in and get the authorization token
HTTP Method	GET
Endpoint	/login
Parameters	username, password
Response	JSON
Example Request	https://api.ariadne.inc/api/v2/login

Example Response	{"token": "eyJ0eXAiOiJKV1QiLCJhbG..."]}

A.2 Locations

Description	Retrieve the location IDs, for which the user has access
HTTP Method	GET
Endpoint	/Locations
Parameters	Token retrieved from A.1
Response	JSON
Example Request	https://api.ariadne.inc/api/v2/locations?token=**$TOKEN**

Example Response	<pre>[
	{
	"id":1,
	"name":"LocationA"
	},
	{
	"id":2,
	"name":"LocationB"
	},
	{
	"id":3,
	"name":"LocationC"
	}
	]</pre>

A.3 Total unique visitors per day/hour

Description	Get the total number of visitors of a location per day/hour
HTTP Method	GET
Endpoint	/locations/<LOCATION_ID>/visitors
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD page: (optional) page number default is first page value 1 step: (optional) The desired resolution from the set: {5m,10m,15m,30m, hour, day}, default: day

	format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/visitors?token=**$TOKEN**&start=2022-06-05&end=2022-06-05

Example Response	{
	"ID":1,
	"data": [
	{
	"date":"2022-06-05 00:00:00",
	"visitors":2162
	}
	...
	],
	"location":"LocationA",
	“start_date”: “2022-06-05 00:00:00”,
	“end_date”: “2022-06-06 00:00:00”,
	“page_no”: 1,
	“pages”: 1,
	}

A.4 Number of visitors for all areas

Description	Get the number of visitors per day/hour for all areas included in a specific location
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/areas/visitors
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD page: (optional) page number default is first page value 1 step: (optional) The desired resolution from the set: {5m,10m,15m,30m,hour,day}, default: day format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/areas/visitors?token=**$TOKEN**&start=2022-06-05&end=2022-06-05

Example Response	{
	"ID": 1,
	"location": "LocationA",
	"areas": [
	{
	"data": [
	{
	"date":"2022-06-05 00:00:00",
	"visitors":1341
	}
	],
	"name": "AreaA",
	"total_visitors":1341
	},
	{
	"data": [
	{
	"date":"2022-06-05 00:00:00",
	"visitors":543
	}
	],
	"name": "AreaB",
	"total_visitors":543
	},
	{
	"data": [
	{
	"date":"2022-06-05 00:00:00",
	"visitors":719
	}
	],
	"name": "AreaC",
	"total_visitors":719
	},
	...
	],
	“start_date”: “2022-06-05 00:00:00”,
	“end_date”: “2022-06-06 00:00:00”,
	“page_no”:1,
	“pages”: 3,
	}

A.5 Duration of visit per day/hour

Description	Get the average duration of visit for a location per day/hour
HTTP Method	GET
Endpoint	/locations/<LOCATION_ID>/durations
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD page: (optional) page number default is first page value 1 step: (optional) The desired resolution from the set: {5m,10m,15m,30m,hour,day}, default: day format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/durations?token=**$TOKEN**&start=2022-06-05&end=2022-06-05

Example Response	{
	"ID":1,
	"data": [
	{
	"date":"2022-06-05",
	"avg_duration":37.39,
	"duration_p25": 3.55,
	"duration_p50": 17.28,
	"duration_p75": 23.4,
	"duration_p90": 24.19,
	"duration_p95": 33.94
	},
	...
	],
	"location":"LocationA",
	“start_date”: “2022-06-05 00:00:00”,
	“end_date”: “2022-06-06 00:00:00”,
	“page_no”: 1,
	“pages”: 1,
	}

A.6 Duration of Visitors for all Areas

Description	Get the average duration spent by visitors per day/hour for all areas included in a specific location
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/areas/durations
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD page: (optional) page number default is first page value 1 step: (optional) The desired resolution from the set: {5m,10m,15m,30m,hour,day}, default: day format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV (avg_time is in Minutes)
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/areas/durations?token=**$TOKEN**&start=2022-06-05&end=2022-06-05

Example Response	{
	"ID": 1,
	"location": "LocationA"
	"areas": [
	{
	"data": [
	{
	"date":"2022-06-05",
	"avg_time":6.3,
	"duration_p25": 2.49,
	"duration_p50": 7.59,
	"duration_p75": 11.9,
	"duration_p90": 19.89,
	"duration_p95": 33.58
	}
	],
	"name": "AreaA",
	"avg_time":6.3,
	"avg_p25": 2.32,
	"avg_p50": 5.39,
	"avg_p75": 11.48,
	"avg_p90": 14.12,
	"avg_p95": 18.62
	},
	{

```
      "data": [
        {
          "date":"2022-06-05",
          "avg_time":14.3,
          "duration_p25": 1.91,
          "duration_p50": 3.69,
          "duration_p75": 9.5,
          "duration_p90": 19.99,
          "duration_p95": 29.4
        }
      ],
      "name": "AreaB",
      "avg_time":14.3,
      "avg_p25": 2.4,
      "avg_p50": 4.65,
      "avg_p75": 10.46,
      "avg_p90": 15.61,
      "avg_p95": 33.98
    },
  "start_date": "2022-06-05 00:00:00",
  "end_date": "2022-06-06 00:00:00",
  "page_no":1,
  "pages": 3,
}
```


A.7 Customers by Duration Spent (minutes)

Description	Get the percentage of visitors spent duration in minutes.
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/areas/customerduration
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD type: (optional) general, polygon, parent_1, parent_2, default: general, apply for the whole store format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV (avg_time is in Minutes)
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/areas/customerduration?token=**$TOKEN**&start=2022-06-05&end=2022-06-05

Example Response	{
	"ID":1,
	"data":[
	{
	"count":45.62211990356445,
	"time_range":"01-10m"
	},
	{
	"count":23.502304077148438,
	"time_range":"10-30m"
	},
	{
	"count":0.0,
	"time_range":"180-300m"
	},
	{
	"count":7.83410120010376,
	"time_range":"30-60m"
	},
	{
	"count":7.373271942138672,
	"time_range":"60-90m"
	},
	{
	"count":15.66820240020752,
	"time_range":"90-180m"
	}
	],
	"location":"Location"
	}

A.8 Number of People By Areas Visited

Description	Get the count of visitors visited Number of areas.
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/areas/peoplecount
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD limit: (optional) returns the top numbers of area visited, default:10

	format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/areas/peoplecount?token=**$TOKEN**&start=2022-06-05&end=2022-06-05

Example Response	{
	"ID":1,
	"data":[
	{
	"areas":"2 area(s)",
	"count":66.0
	},
	{
	"areas":"3 area(s)",
	"count":36.0
	},
	{
	"areas":"1 area(s)",
	"count":29.0
	},
	{
	"areas":"4 area(s)",
	"count":26.0
	},
	{
	"areas":"5 area(s)",
	"count":20.0
	},
	{
	"areas":"6 area(s)",
	"count":11.0
	}
	],
	"location":"Location"
	}

A.9 Transition from one store to another

Description	Get the count of transition from one store to another
HTTP Method	GET

Endpoint	locations/<LOCATION_ID>/transitions
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/transitions?token=**$TOKEN**&start=2022-06-05&end=2022-06-05

Example Response	[{
	“ID”:1,
	" timestamp":1,
	" Source ": “Store A”,
	“Store A”: 0
	“Store B”: 2
	“Store C”: 2
	"location":"Location"
	},
	{
	“ID”:1,
	__" timestamp":1,
	__" Source ": “Store B”,
	“Store A”: 2
	“Store B”: 0
	“Store C”: 2
	"location":"Location"
	},
	{
	“ID”:1,
	" timestamp":1,
	" Source ": “Store C”,
	“Store A”: 4
	“Store B”: 2
	“Store C”: 0
	"location":"Location"
	}
	]

A.10 Numbers of visitors by parents

Description	Get the number of visitors pre time interval for all parents
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/parents/visitors
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD step: (optional) The desired resolution from the set: {5m, 10m,15m, 30m, hour, day}, default: day level: (optional) 1 for parent_1 and 2 for parent_2, default: 1 page: (optional) page number default is first page value 1 format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/parents/visitors?token=**$TOKEN**&start=2022-06-05&end=2022-06-05

Example Response	{
	"ID":1,
	"location":"LocationA",
	"areas": [
	{
	"data": [
	{
	"date":"2022-06-05 00:00:00",
	"visitors":1341
	}
	],
	"name": "AreaA",
	"total_visitors":1341
	},
	{
	"data": [
	{
	"date":"2022-06-05 00:00:00",
	"visitors":543
	}
	],
	"name": "AreaB",
	"total_visitors":543
	},
	{
	"data": [
	{
	"date":"2022-06-05 00:00:00",
	"visitors":719
	}
	],

	"name": "AreaC", "total_visitors":719 }], "start_date": "2022-06-05 00:00:00", "end_date": "2022-06-06 00:00:00", "page_no": 1, "pages": 2, }

A.11 Average Duration of visitors for all Parents

Description	Get average duration spent by visitors for all parents included in a specific location
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/parents/durations
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD step: (optional) The desired resolution from the set: {5m, 10m,15m, 30m, hour, day}, default: day level: (optional) 1 for parent_1 and 2 for parent_2, default: 1 page: (optional) page number default is first page value 1 format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/parents/durations?token=**$TOKEN**&start=2022-06-05&end=2022-06-05

Example Response	{
	"ID": 1,
	"location": "LocationA"
	"areas": [
	{
	"data": [
	{
	"date":"2022-06-05 00:00:00",
	"avg_time":6.3,
	"duration_p25": 4.85,
	"duration_p50": 7.33,
	"duration_p75": 11.59,
	"duration_p90": 19.96,
	"duration_p95": 28.71
	}
	],
	"name": "AreaA",
	"avg_time":6.3,
	"avg_p25": 3.55,

	"avg_p50": 7.28,
	"avg_p75": 13.4,
	"avg_p90": 24.19,
	"avg_p95": 33.94
	},
	{
	"data": [
	{
	"date":"2022-06-05 00:00:00",
	"avg_time":14.3,
	"duration_p25":1.83,
	"duration_p50": 3.61,
	"duration_p75": 12.28,
	"duration_p90": 16.43,
	"duration_p95": 27.38
	}
	],
	"name": "AreaB",
	"avg_time":14.3,
	"avg_p25": 1.97,
	"avg_p50": 2.07,
	"avg_p75": 11.93,
	"avg_p90": 16.91,
	"avg_p95": 20.61
	} ,
	"start_date": "2022-06-05 00:00:00",
	"end_date": "2022-06-06 00:00:00",
	"page_no": 1,
	"pages": 2,
	}

A.12 Get list of parents and stores

Description	Get the parents and stores belonging to the parent
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/parents
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 level: (optional) 1 for parent_1 and 2 for parent_2, default: 1
Response	JSON
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/parents?token=**$TOKEN**

Example Response	{
	"ID": 1,
	"location": "LocationA" ,
	"data":
	{
	"ParentA": [“Store1”,”Store2”],
	"ParentB": [“StoreX”,”StoreY”,”StoreZ”],
	}

A.13 Number of passersby

Description	Get number of passersby the store
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/passersby
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD step: (optional) The desired resolution from the set: {5m, 10m,15m, 30m, hour, day}, default: day level: (optional) 1 for parent_1 and 2 for parent_2, default: 1 page: (optional) page number default is first page value 1 format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/passersby?token=**$TOKEN**&start=2022-06-05&end=2022-06-05

Example Response	{
	"ID":1,
	"data": [
	{
	"date":"2022-06-05 00:00:00",
	"passersby":2538
	}
	...
	],
	"location":"LocationA",
	“start_date”: “2022-06-05 00:00:00”,
	“end_date”: “2022-06-06 00:00:00”,

	“page_no”: 1, “pages”: 1, }

A.14 Optin data

Description	Get optin data first_optin: first time the customer ever optin latest_optin: most recent time the customer optin
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/optin
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD step: (optional) The desired resolution from the set (day or hour), default:day format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/optin?token=**$TOKEN**&start=2023-06-05&end=2023-06-05

Example Response	{
	"ID":1,
	"data": [
	{
	"date": "2023-06-05"
	"user": [{
	"client_id":"abcd",
	"mobile":"+4916012345678",
	"first_optin": "2022-06-05 15:00:00",
	"latest_optin": "2022-06-05 15:00:00"},
	...
	]
	}
	...

	], "location":"LocationA", “start_date”: “2022-06-05 00:00:00”, “end_date”: “2022-06-06 00:00:00” }

A.15 Historical optin visit

Description	Get historical visit of opt-in client with the first time of the return day
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/optin-visit
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD step: (optional) The desired resolution from the set (day or hour), default:day format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/optin-visit?token=**$TOKEN**&start=2023-06-01&end=2023-06-30

Example Response	{
	"ID":1,
	"data": [
	{
	"date": "2023-06-05"
	"user": [{
	"client_id":"abcd",
	"first_optin": "2023-06-05 15:00:00",
	},
	...
	]
	}
	...
	],
	"location":"LocationA",

	“start_date”: “2023-06-01 00:00:00”, “end_date”: “2023-07-01 00:00:00” }

A.16 Optin raw data

Description	Get full raw data of opt-in clients
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/optin-raw
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD time_range (optional usage not required ‘start’, ‘end’ parameters): The latest recent time, accepted values <number>h, <number>m, <number>s, latest page (optional): The desired page number, default 1 (We return max 10.000 records per request, if the data are too large, please use page parameter to retrieve desire page, also look up for “total_pages” in the response)
Response	JSON
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/optin-raw?token=**$TOKEN**&start=2023-06-05&end=2023-06-05
Example Response	{ "ID":1, "data": [{ “hash_id”: “1234567”, “latitude”: “longitude”: “floor”: 0, “timestamp”: 1687949350, “frequency”: 5000, “optin”: 1, “rssi”: {...}, “distance”: {...}, “other_id”: “1234567”,

	“sensors”: 2, “ssid”: “abcde”, “uncertainty”: 5.25 } ...], "location":"LocationA", “start_date”: “2023-06-05 00:00:00”, “end_date”: “2023-06-06 00:00:00”, “total_pages”: 1, “page_no”: 1 }

A.17 Sensor Report

Description	Get sensor report of the day
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/sensor-report
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/sensor-report?token=**$TOKEN**&start=2023-06-05&end=2023-06-05

Example Response	{
	"ID":1,
	"data": [
	{
	"date": "2023-06-05"
	"sensors": [{
	"sensor":"abcd",
	"packets": 2502,
	},
	...
	]
	}
	...

	], "location":"LocationA", “start_date”: “2023-06-05 00:00:00”, “end_date”: “2023-06-06 00:00:00” }

A.18 Trajectory Data

Description	Get trajectory data
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/trajectory
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 date: A datetime value in the format YYYY-MM-DD page (optional): Desired page number (default 1)
Response	JSON
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/trajectory?token=**$TOKEN**&date=2024-02-06

Example Response	{
	"ID":1,
	"data": [
	{
	"coordinate": [13.41245, 45.662324],
	"floor": 0,
	"hash_id": "n_45",
	"lattitude": 45.662324,
	"longitude": 13.41245,
	"timestamp": 1707230661,
	}
	...
	],
	"date":"2024-02-06",
	"page": 1,
	"total_page": 87
	}

A.19 Get latest data for all areas

Description	Get latest data by areas
HTTP Method	GET
Endpoint	locations/<LOCATION_ID>/areas/latest_data
Response	JSON
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/areas/latest_data?token=**$TOKEN**

Example Response	{
	"ID":1,
	"data": [
	{
	"polygon": “area ABC”,
	"timestamp": 1718486100,
	"visits": 12
	}
	...
	],
	}

A.20 Number of visitors by camera

Description	Get the number of visitors by camera of a location per day/hour
HTTP Method	GET
Endpoint	/locations/<LOCATION_ID>/camera
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 start: A datetime value in the format YYYY-MM-DD end: A datetime value in the format YYYY-MM-DD page: (optional) page number default is first page value 1 step: (optional) The desired resolution from the set: {5m,10m,15m,30m, hour, day}, default: day format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/camera?token=**$TOKEN**&start=2024-09-01&end=2024-09-01

Example Response	{
	"ID":1,
	"data": [
	{
	"date":"2024-09-01 00:00:00",
	"visitors":2162
	}
	...
	],
	"location":"LocationA",
	“start_date”: “2024-09-01 00:00:00”,
	“end_date”: “2024-09-02 00:00:00”,
	“page_no”: 1,
	“pages”: 1,
	}

A.21 Device and assigned area

Description	Get the assigned or closest area for each device
HTTP Method	GET
Endpoint	/locations/<LOCATION_ID>/devicearea
Parameters	LOCATION_ID: The ID of the location of interest token: The acquired authorization token retrieved from A.1 format: (optional) The desired output format from the set {json, csv}, default: json
Response	JSON, CSV
Example Request	https://api.ariadne.inc/api/v2/locations/**$LOCATION_ID**/devicearea?token=**$TOKEN**

Example Response	{
	"ID":1,
	"data": [
	{
	"name":"device001",
	"areas":"entrance",
	"comment": "inside",
	"distance": 10.05,
	"floor": 0
	}
	...
	],
	"location":"LocationA",
	}

Appendix B

This chapter provides a comprehensive overview of the data sources, schema structure, and detailed descriptions. It aims to assist users in understanding the data and leveraging it effectively.

B.1 Arrivals

- **Name**: arrivals
- **Description**: This data source captures information related to arrivals
- **Columns**

Name	Description	Data Type	Format
first_timestamp	The timestamp of arrival.	Date	epoch_second
count	The count of arrivals.	Integer	
mean_duration	The mean duration of arrivals	Float	
duration_p25, duration_p50, duration_p75, duration_p90, duration_p95	Percentile durations of arrivals	Integer	

B.2 Duration Groups

- **Name**: duration groups
- **Description**: This data source captures information related to duration groups. Related to the panel where presents the duration of visits in percent by time intervals of the whole area of interest
- **Columns**

Name	Description	Data Type	Format
timestamp	timestamp	Date	epoch_second
count	The count of occurrences in the duration group.	Integer	
index	A keyword representing the duration group.	Keyword	

B.3 Polygons

- **Name**: polygons
- **Description**: This data source captures information related to polygons/areas of interets. Indicates arrivals per area of interest
- **Columns**

Name	Description	Data Type	Format

timestamp	The timestamp	Date	epoch_second
floor	Intigates the # floor	Byte	
polygon	A keyword representing the polygon / area of interest (level 0) defined in the configuration panel	Keyword	
parent_1	A keyword representing the parent1 (level 1) defined in the configuration panel	Keyword	
parent_2	A keyword representing the parent2 (level 2) defined in the configuration panel	Keyword	
visits	The count of arrivals insinde the polygon	Integer	

B.4 Polygon Counts

- **Name**: polygon_counts
- **Description**: This data source captures information related to the number of people by areas visited . It indicates the distribution of visiting areas.
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
count	The count of arrivals.	Integer	
index	A keyword representing the number of areas visited	Keyword	

B.5 Polygon Durations

- **Name**: polygon_durations
- **Description**: This data source captures information related to the average duration time spent of people by areas visited .
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
polygon	A keyword representing the polygon/area of interest (level 0) defined in the configuration panel	Keyword	
parent_1	A keyword representing the parent1 (level 1) defined in the configuration panel	Keyword	

parent_2	A keyword representing the parent2 (level 2) defined in the configuration panel	Keyword	
mean_duration	The mean duration of visits within the polygon.	Integer	
duration_p25, duration_p50, duration_p75, duration_p90, duration_p95	Percentile durations of visits within the polygon.	Integer	

B.6 Transitions

- **Name**: transitions
- **Description**: Indicates the relationship between 2 areas of interest .
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
source	A keyword representing the source area from which the transition occurs.	Keyword	
$destination	All areas of interest as destinations with the number of transitions	Integer	

B.7 Live counts

- **Name**: live_counts
- **Description**: Indicates total visitors in the whole area
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
count	The count of arrivals.	Integer	
write_timestamp	The timestamp last updated the index	Date	epoch_second
floor	Intigates the # floor	Interger	

B.8 Loyalty

- **Name**: loyalty

- **Description**: Loyalty indicates the percentage of customers that have revisited the store in a specific time frame window (The percentage is calculated from the "known" users or the opted-in)
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
count	The count of repeated visits.	Integer	
no_of_days	The number of repeated visited days	Keyword	
percentage	The percentage of loyalty, indicating the proportion of repeated visits	Interger	

B.9 Parent 1 Durations

- **Name**: parent 1_durations
- **Description**: This data source captures information related to the average duration time spent of people by parents 1 visited.
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
parent_1	A keyword representing the parent1 (level 1) defined in the configuration panel	Keyword	
parent_2	A keyword representing the parent2 (level 2) defined in the configuration panel	Keyword	
mean_duration	The mean duration of visits within the polygon.	Integer	
duration_p25, duration_p50, duration_p75, duration_p90, duration_p95	Percentile durations of visits within the polygon.	Integer	

B.10 Parents_1

- **Name**: parent_1
- **Description**: Indicates the relationship between 2 parent_1 areas
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second

parent_1	A keyword representing the parent1 (level 1) defined in the configuration panel	Keyword	
parent_2	A keyword representing the parent2 (level 2) defined in the configuration panel	Keyword	
visits	The count of arrivals insinde the polygon	Integer	

B.11 Parents_1_transitions

- **Name**: parent_1_transitions
- **Description**: This data source captures information related to parent1. Indicates arrivals per parent_1
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
source	A keyword representing the source parent_1 area from which the transition occurs.	Keyword	
$destination	All parent_1 areas of interest as destinations with the number of transitions	Integer	

B.12 Parent 2 Durations

- **Name**: parent 2_durations
- **Description**: This data source captures information related to the average duration time spent of people by parents 2 visited .
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
parent_2	A keyword representing the parent2 (level 2) defined in the configuration panel	Keyword	
mean_duration	The mean duration of visits within the polygon.	Integer	

duration_p25, duration_p50, duration_p75, duration_p90, duration_p95	Percentile durations of visits within the polygon.	Integer	

B.13 Parents_2

- **Name**: parent_2
- **Description**: Indicates the relationship between 2 parent_2 areas
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
parent_2	A keyword representing the parent2 (level 2) defined in the configuration panel	Keyword	
visits	The count of arrivals insinde the polygon	Integer	

B.14 Parents_2_transitions

- **Name**: parent_2_transitions
- **Description**: This data source captures information related to parent1. Indicates arrivals per parent_2
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
source	A keyword representing the source parent_2 area from which the transition occurs.	Keyword	
$destination	All parent_2 areas of interest as destinations with the number of transitions	Integer	

B.15 Arrivals Employees

- **Name**: arrivals_employees
- **Description**: This data source captures information related to arrivals of employees only
- **Columns**

Name	Description	Data Type	Format
first_timestamp	The timestamp of arrival.	Date	epoch_second
count	The count of arrivals.	Integer	
mean_duration	The mean duration of arrivals	Float	
duration_p25, duration_p50, duration_p75, duration_p90, duration_p95	Percentile durations of arrivals	Integer	

B.16 Parent_1 Duration Groups

- **Name**: parent_1_duration_groups
- **Description**: This data source captures information related to duration groups. Related to the panel where presents the duration of visits in percent by time intervals of parent_1 areas of interest
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
parent_1	A keyword representing the parent1 (level 1) defined in the configuration panel	Keyword	
count	The count of occurrences in the duration group.	Integer	
duration	A keyword representing the duration group.	Keyword	
percent	The percentage	Float	

B.17 Parent_2 Duration Groups

- **Name**: parent_2_duration_groups
- **Description**: This data source captures information related to duration groups. Related to the panel where presents the duration of visits in percent by time intervals of the parent 2 areas of interest
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
parent_2	A keyword representing the parent2 (level 2) defined in the configuration panel	Keyword	
count	The count of occurrences in the duration group.	Integer	

duration	A keyword representing the duration group.	Keyword	
percent	The timestamp	float	

B.18 Passersby arrivals

- **Name**: passers_by_arrivals
- **Description**: This data source captures information related to duration groups. Related to the panel where presents the duration of visits in percent by time intervals of the parent 2 areas of interest
- **Columns**

Name	Description	Data Type	Format
first_timestamp	The timestamp of arrival.	Date	epoch_second
count	The count of arrivals.	Integer	
mean_duration	The mean duration of arrivals	Float	
first_timestamp	The timestamp of arrival.	Date	epoch_second

B.19 Passersby arrivals

- **Name**: passers_by_arrivals
- **Description**: This data source captures information related to duration groups. Related to the panel where presents the duration of visits in percent by time intervals of the parent 2 areas of interest
- **Columns**

Name	Description	Data Type	Format
first_timestamp	The timestamp of arrival.	Date	epoch_second
count	The count of arrivals.	Integer	
mean_duration	The mean duration of arrivals	Float	
first_timestamp	The timestamp of arrival.	Date	epoch_second

B.20 Polygon Duration Groups

- **Name**: polygon_duration_groups
- **Description**: This data source captures information related to duration groups. Related to the panel where presents the duration of visits in percent by time intervals of polygons/areas of interest
- **Columns**

Name	Description	Data Type	Format

timestamp	The timestamp	Date	epoch_second
polygon	A keyword representing the polygon defined in the configuration panel	Keyword	
count	The count of occurrences in the duration group.	Integer	
duration	A keyword representing the duration group.	Keyword	
percent	The percentage	Float	

B.21 Group visits

- **Name**: group_visits
- **Description**: This data source indicates distribution of group visits in the project area of interest
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
groups	A keyword representing the groups (1 person , 2 person...)	Keyword	
count	The count of occurrences in the group.	Integer	
percent	The percentage	float	
average_group_size	The average group size per timestamp	float	

B.22 Predictions

- **Name**: predictions
- **Description**: This data source indicates forecast of group visits in the project area of interest
- **Columns**

Name	Description	Data Type	Format
timestamp	The timestamp	Date	epoch_second
footfall	The count of predictions	Integer	
mean_duration	The mean duration of arrivals	Float	

polygon	A keyword representing the polygon defined in the configuration panel	Keyword	
parent_1	A keyword representing the parent1 (level 1) defined in the configuration panel	Keyword	
parent_2	A keyword representing the parent2 (level 2) defined in the configuration panel	Keyword	

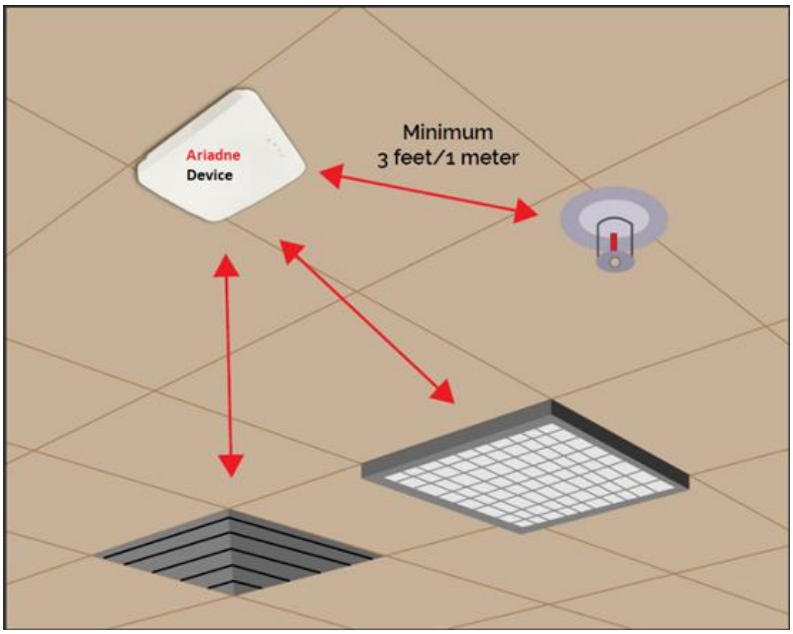
Appendix C

C.1 Best Practices for Installing Ariadne Sensors

When installing Ariadne's sensors, it is crucial to consider the following factors related to their mounting locations to ensure accurate and reliable data collection. Here are the key points to keep in mind:

1. **Exact Mounting Location**: Please install the sensor at the exact mounting location provided by the Customer Success team, as indicated on the floor plan. This will ensure a clear line of sight for our sensors to the area of interest.
2. **Clear Placement**: Place sensors in clear locations on the ceiling or wall, avoiding obstructions such as plasterboards, cables, cameras, or any other infrastructure that could block or interfere with the sensor's view and coverage.
3. **Sensor Height and Orientation**: Position the sensors at the height and orientation specified by the Customer Success team to capture the desired field of view, achieve the required level of detail, and effectively cover the area. For detailed height intervals of each sensor type, please see the next page.
4. **Weather Protection**: When installing a sensor in an outdoor area, it is recommended to add protective enclosures. This will shield the sensors from rain, snow, wind, and extreme temperatures, prolonging their lifespan and ensuring optimal performance. Such installations should be communicated to the Customer Success team to confirm that data collection is being conducted seamlessly.
5. **Device Location Sheet**: After completing the installation of the devices, please update and return the completed device location sheet, noting the sensors' MAC IDs on the front side with the exact location number, to the Customer Success team.

Important: If you cannot install the sensor at the exact provided location and must place it nearby, please inform our Customer Success team by marking the new location on the included map. Photos of the area are welcome to ensure optimal installation. Please send updates to customersuccess@ariadne.inc



Sensor	Sensor Type	Installation Height
	XE300	Ideally 3 to 5 meters, or up to 6 meters* *if clear placement is ensured*
	B1300	Ideally 3 to 5 meters, or up to 6 meters* *if clear placement is ensured*
	Ar201m-ToF / ESP32-ToF	Ideally 2 to 2.6 meters* *if clear placement is ensured*
	VS133 (Short Range)	Ideally 2.5 to 3.5 meters* *If clear placement is ensured*
	VS135 (Long Range)	Ideally 3.5 to 6.5 meters* *If clear placement is ensured*