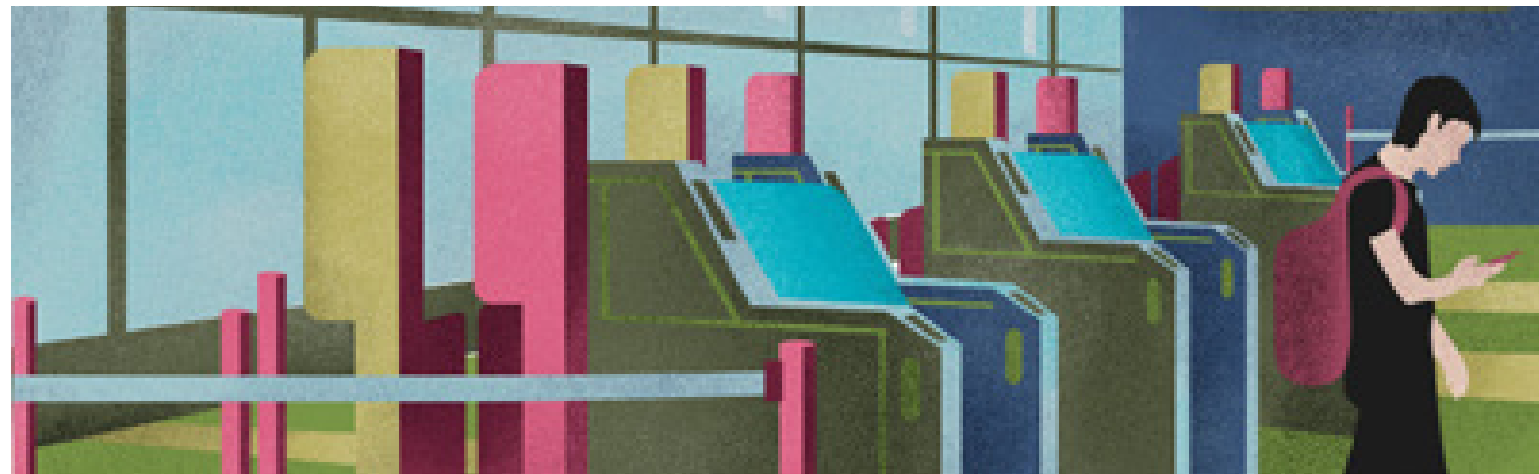
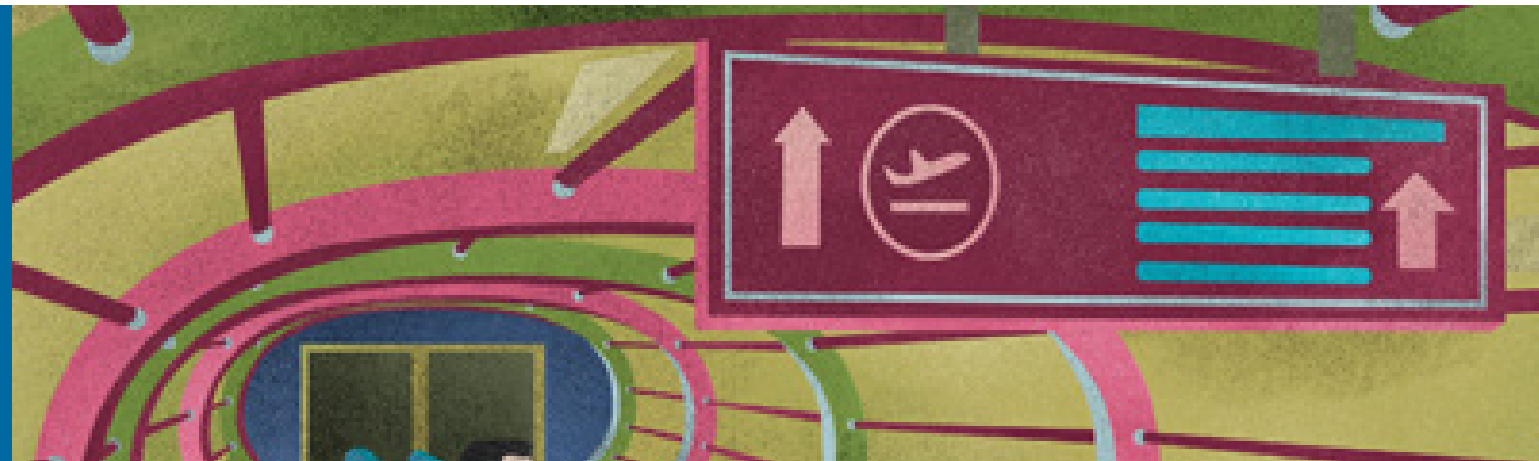




INTELLIGENT AIRPORT TROLLEY  
MANAGEMENT AND CONTROL  
SYSTEM BY **UWB**





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## 1. INTRODUCTION TO THE SYSTEM

### 1.1. Purpose

The influx of passengers, security measures and tight time constraints mean that airports require very specific equipment.

This intelligent trolley management and control system from Carttec identifies trolleys via UWB signal, assisting airports in daily asset monitoring, accurate inventory, maintenance record keeping and performance monitoring of manual operations.

In this way, Carttec contributes to the management of airports, providing precision technology that facilitates day-to-day tasks.

### 1.2. Horustec (UWB Technology)

**Horustec** is an **indoor traffic management and tracking system**, developed from a platform that integrates state-of-the-art ultra-wideband technology with multiple functions that make it a very useful tool for airports.

It locates trolleys in **real time**, collecting data on passenger trajectories and determining flows, hotspots and peak times in different areas of the airport.

In addition, this system can also **monitor other assets** such as scrubbing machines, pallet trucks, other trolleys and airport vehicles in order to improve the internal distribution and management of the airport.



### 1.2.1. Analysis and potentials

#### What can we analyse?

1. Trolleys will be permanently under control. **Horustec** enables you to **be aware of how many people are in each area of the airport and where** they are at any given time.
2. **How many trolleys** are in the queue for the counter as a whole or one at a time.
3. Elapsed time of use or immobilisation with each trolley.
4. **The location** of the trolleys in the car park.
5. In the case of **other mobile elements**, such as sweepers, the **cleaning path, time of use and daily cleaning time**.

### 1.2.2. Main functions

- **Dynamic management:** Real-time trolley monitoring data
- **Identity, sending and receiving:** Data on entry and exit of airport trolleys
- **Statistics and analysis:** Trolley data stored in the cloud and statistics based on the preferences and requirements of each airport.
- **Breakdowns and maintenance:** Airport trolley maintenance data and condition records.



### 1.2.3. What services does Horustec offer?

The **creation of alerts is customisable**.

Here are some examples:

1. Possibility of making an **automatic order** when a certain number of missing trolleys is exceeded.
2. When a **trolley remains stationary** in the same location for five minutes Horustec sends a **warning to the person responsible**.
3. If the **maximum number of trolleys in a parking bay**, in a certain area, is **exceeded**, a warning is sent.

### 1.2.4. Operation

**A.** The system collects **data on the route made by passengers** with the trolley in the airport and enables you to know the time spent by each one of them in the airport.

**B.** The data is **processed by Horustec algorithms** facilitating control and management at the airport.

**C.** **Real-time** information is interpreted **to evaluate and optimise results** with the highest accuracy, showing the interactions of passengers and their journeys.



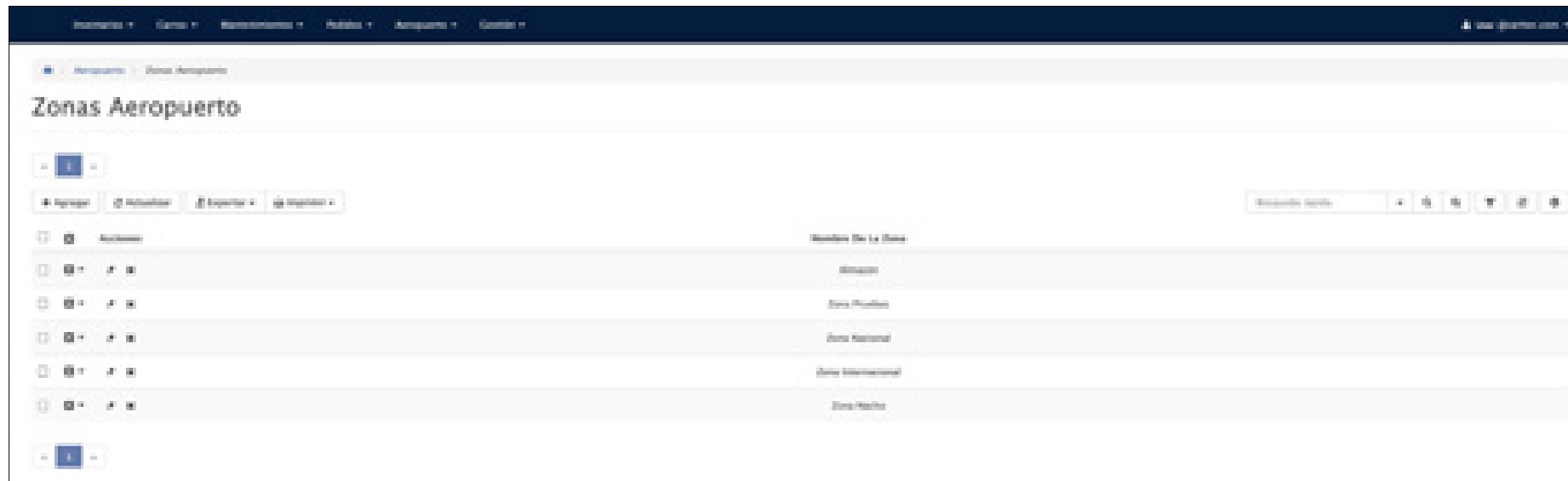
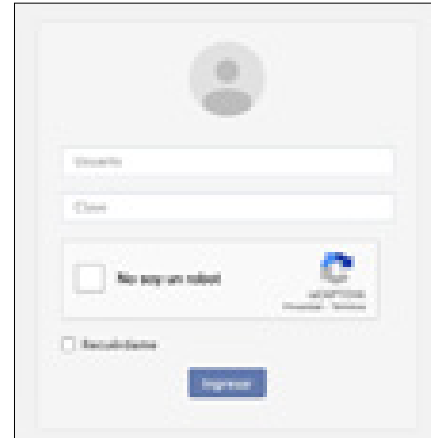
## 2. ACCESS TO THE SYSTEM

### 2.1. Homepage







A. Log into the software using the **link, account and password** provided by Carttec.

B. The home page first shows the **Areas of the Airport** and in the upper menu, the different sections of the application: **Inventories, trolleys, maintenance, orders, areas and management**.

C. The hardware features the **Horustec** system and can integrate **RFID and BLE technology**.



### 3. INTRODUCTION TO THE APPLICATION

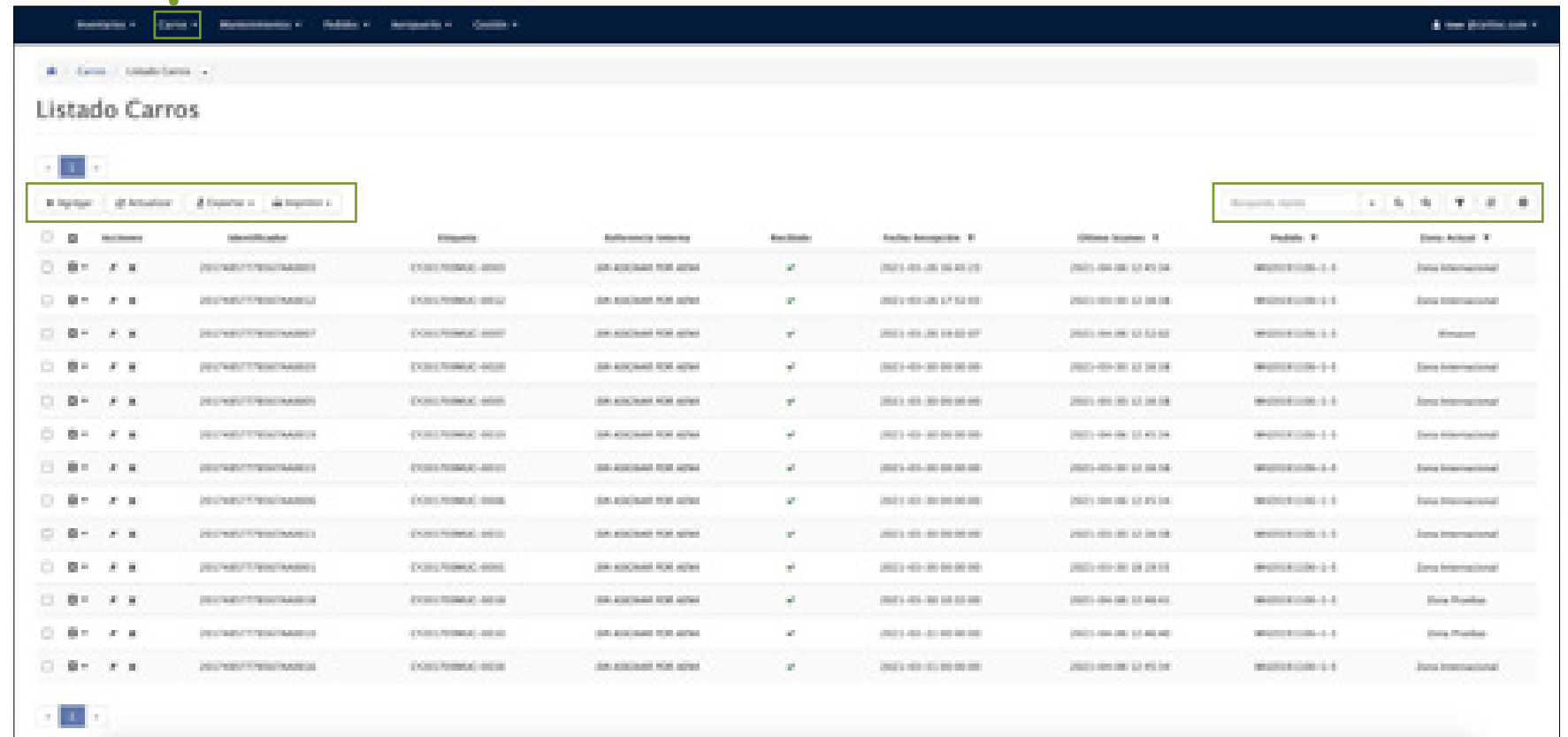
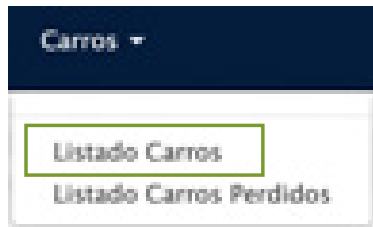
Upper menu	Function	Description
	Inventory	This section records all the <b>daily inventory information</b> , collecting data on the area, date, number of items on which an inventory has been carried out and the number of inventory assets.
	Trolley data	The <b>list of trolleys</b> provides the ID number of each asset, its label, the internal airport reference, whether it has been received or not, the date received, the last scan, the order number and the current area where it is located. The <b>list of lost trolleys</b> shows the identifier, tag, date received, last scan, contract and airport area.
	Maintenance and type of breakdown	This section records <b>data related</b> to asset <b>maintenance</b> , showing specific information for each fault: type of fault, gun, trolley, date of the fault, whether it has been resolved or not, comments, image of the incident and date of resolution.
	Orders	Registered here is <b>data related to an order</b> , showing the contract number, the date of creation, the date of shipment, the logistics company in charge, the type of product, the name of the product, those scanned and those to be scanned.
	Airport areas	Where the different <b>areas of the airport</b> are shown as well as the assigned name.
	Device and user management	Displayed in <b>device management</b> is the device identifier and the description. Appearing in <b>user management</b> are the full name, email and phone number to contact the user.

### 3.1. Reception of trolleys

#### 3.1.1. List of trolleys

1. Click on “Trolleys” and select the “List Trolleys” option from the drop-down menu.

2. On the **List Trolleys** page, all assets will be listed. The information includes the identifier, the label assigned to the trolley, its internal reference, order status (received or not received), date received, last scan, order number and current area.



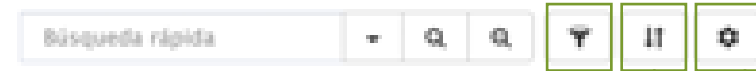
A screenshot of the "Listado Carros" web application interface. The page title is "Listado Carros". Below the title, there are navigation tabs: "Inicio", "Listado Carros", and "Listado Carros Perdidos". The "Listado Carros" tab is active. Below the tabs, there are several filters and controls: "Agregar", "Actualizar", "Eliminar", and "Imprimir". To the right, there are search and filter icons. The main content is a table with the following columns: "Seleccionar", "Icono", "Identificador", "Etiqueta", "Referencia Interna", "Estado", "Fecha Recepción", "Última Escan", "Pedido", and "Data Actual". The table contains 15 rows of data, each representing a trolley asset. A green dashed line connects the "Listado Carros" option from the dropdown menu in the previous image to the "Listado Carros" tab in this screenshot.

Seleccionar	Icono	Identificador	Etiqueta	Referencia Interna	Estado	Fecha Recepción	Última Escan	Pedido	Data Actual
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:43:00	2023-09-08 09:43:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 07:53:00	2023-09-08 07:53:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Missing
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional
<input type="checkbox"/>		20240707000000000000	EX0000000000000000	000-000000-000-0000	✓	2023-09-08 09:00:00	2023-09-08 09:00:00	000000000-0-0	Data Internacional





Ability to export to PDF, Excel, Word, XML, and CSV



### Ajustes de página

**Apariencia**

Modo de vista: Tabla

Cantidad de tarjetas por fila

Aquí puede seleccionar la cantidad de tarjetas mostradas en una fila para cada resolución de pantalla. La resolución actual está resaltada de esta manera.

Pantalla grande	1
Pantalla	1
Tableta	2
Teléfono	1

**Tamaño de página**

Cantidad total de registros: 13.

Registros por página: 20 (1 página)

Cancelar Guardar cambios

### Constructor de filtros

Seleccionar registros donde **todos** cumplan las siguientes

Identificador igual a

+ Agregar condición

Deshabilitar el filtro

Cancelar Aplicar

### Ordenar por múltiples columnas

+ Agregar nivel - Borrar nivel

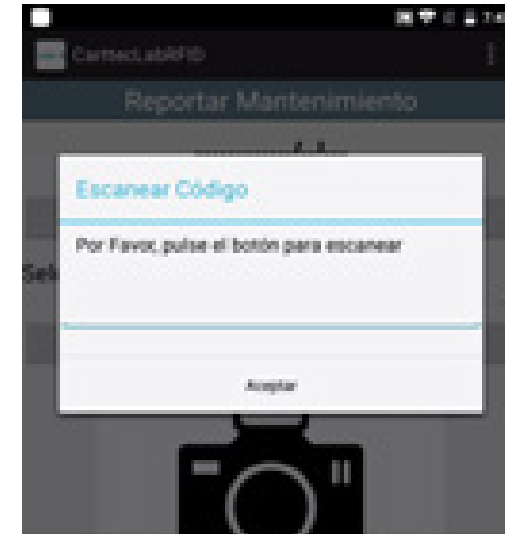
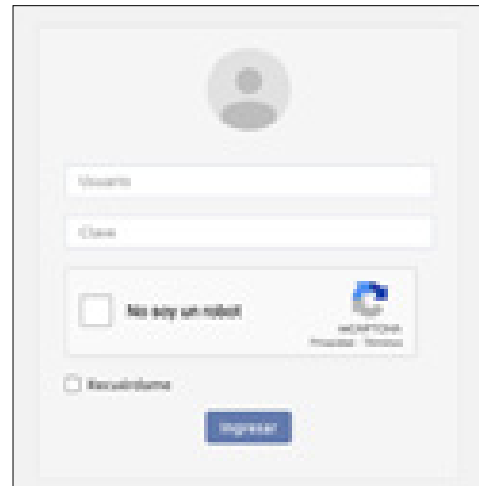
Columna	Orden

Cancelar Ordenar

### 3.1.2. Check and receive

When the goods arrive, airport staff use mobile phones to verify the goods and confirm that the quantity and identification numbers are the same as on the order.

- Log into the mobile system and scan the code.



- The first time a trolley is scanned, the system considers it to have been received and it is added to the inventory.

Acciones	Numero Control	Fecha Creado	Fecha Expira	Empresa Logistica	Tipo Producto	Nombre Producto	Escaneado	Pendientes De Escanear
[Pencil Icon]	W020191000 0 0	2021-05-08 08:18:17	2021-05-18	UWB	(*)-C0100 002	Luggage Maximum Luggage Trolley	13	0

**Acciones**

- You can also edit it manually in **Actions** by clicking the pencil icon.

- After scanning click **Save**. The result will be saved in the cloud and the status of the trolley will appear in the **Scanned** column. Unscanned trolleys will remain in the **Pending Scan** column.

### 3.2. Inventory

- The **Inventory** page displays daily inventory data.
- On this screen you can search and view the historical daily inventory data.
- Click **Quick Search** to locate a specific piece of data.
- The inventory of all trolleys will appear in the table.
- You can **filter** the **device, area and date** information as follows:

The screenshot displays the 'Inventarios' (Inventory) page. At the top, there are navigation tabs: 'Inicio', 'Inventarios', 'Historial', 'Reportes', and 'Config'. Below the tabs, there's a search bar and a table of inventory data. The table has columns for 'Dispositivo', 'Zona', 'Fecha', 'Cantidad', and 'Disponibilidad'. Three green boxes highlight the 'Dispositivo', 'Zona', and 'Fecha' columns. Below the table, three filter modal windows are shown, each corresponding to one of the highlighted columns. The 'Dispositivo' filter shows a list of device IDs (ACE-A-001, ACE-A-002, ACE-B-001, ACE-B-002) with checkboxes and 'Ver todos' and 'Aplicar' buttons. The 'Zona' filter shows radio buttons for 'Zona Internacional', 'Zona Norte', and 'Zona Sur' with 'Ver todos' and 'Aplicar' buttons. The 'Fecha' filter shows a year selection (2021) with 'Ver todos' and 'Aplicar' buttons.

### 3.2.1. Daily inventory

Trolleys should be counted every day, using the device's **Inventory** function.

Click on **Inventory**, then click on **Start Inventory** and go through the airport to scan the trolleys. After scanning, click **Save** to transmit the result to the cloud server.

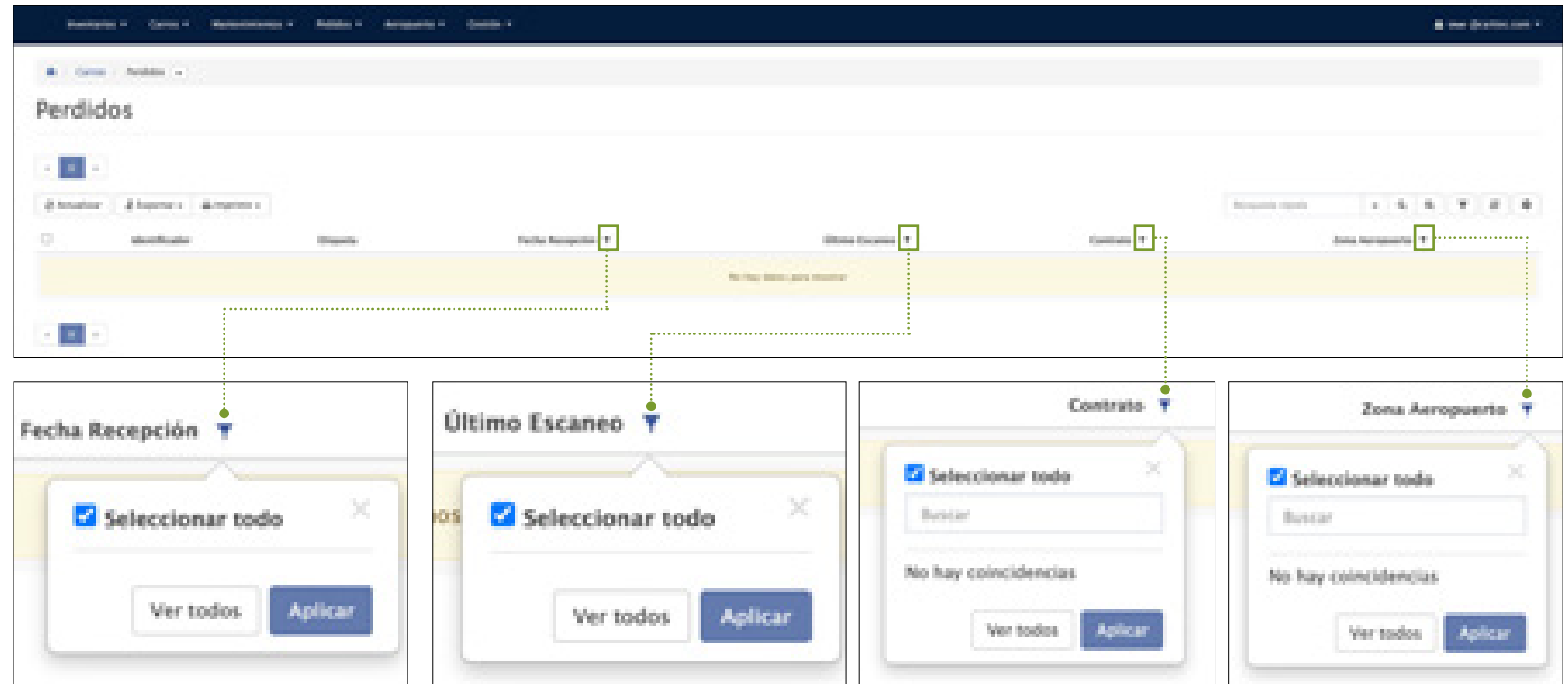
**Permanent installations in shelters** avoid the necessity of staff having to count the trolleys located inside such shelters.

This information is **available in real time** through the application.



### 3.3. Losses

- The **Lost and Found** page shows the trolleys that are missing from the airport.
- Click on **Trolleys**, then **Lost trolleys list**. If the daily inventory and scanning cannot find a trolley within 3 days, the system will recognise that the trolley is missing and it will appear on the **Lost and Found** list.
- In **Quick Search**, you can locate a specific piece of information
- You can **filter** the data **by date received, last scan, contract and airport area** as follows:



### 3.4. Maintenance

#### 3.4.1. List of repairs

- This page shows the maintenance data of the airport trolleys.
- Click on **Maintenance** to see all the faults on the list.
- The maintenance information allows you to know the type of fault, the gun with which the trolley was registered, the specific trolley, the date on which the fault occurred, whether it was resolved or not, comments, photographs taken by the operator at the time of reporting the incident and the date of resolution.

Acciones	Tipo Falta	Plataforma	Carril	Fecha Falta	Resuelta	Comentarios	Foto	Fecha Resolución
[Icons]	Cambio de rueda	403-A-001	01000700001-0007	2023-08-09 08:48:07	[Green checkmark]		[Redacted]	2023-08-09 07:00:00
[Icons]	Resaca de rueda	403-A-001	01000700001-0007	2023-08-09 08:54:08	[Green checkmark]		[Redacted]	En Pando
[Icons]	Falta de placa	403-A-001	01000700001-0007	2023-08-09 08:55:08	[Green checkmark]		[Redacted]	2023-08-09 08:00:00

### 3.4.2. Add maintenance data

A. From the computer application: Maintenance data can be aggregated as follows:

The image shows a web application interface for 'Mantenimientos' (Maintenance). The main view is a table with columns for 'Estado', 'Tipo de Falta', 'Fecha de Inicio', 'Fecha de Fin', 'Estado', 'Fecha de Inicio', 'Fecha de Fin', 'Estado', 'Fecha de Inicio', 'Fecha de Fin', 'Estado'. A callout box labeled '+ Agregar' points to a green plus icon in the top left of the table. Another callout box labeled 'To edit one of the already added faults:' points to a green pencil icon in the top left of the table. Below the main view, there are two inset windows: 'Agregar' (Add) and 'Editar' (Edit). The 'Agregar' window has fields for 'Tipo de Falta', 'Fecha de Inicio', 'Fecha de Fin', 'Estado', and 'Comentarios'. The 'Editar' window has fields for 'Tipo de Falta', 'Fecha de Inicio', 'Fecha de Fin', 'Estado', and 'Comentarios'. Both windows have 'Cancelar' and 'Guardar' buttons at the bottom.



**B. From the device application:** Click **Report Maintenance** and then click **Add** to record information on the fault.

### 3.4.3. Statistics

From all the data, the system generates the airport's own statistics. The statistics studied can be elaborated according to the needs and preferences of each customer.

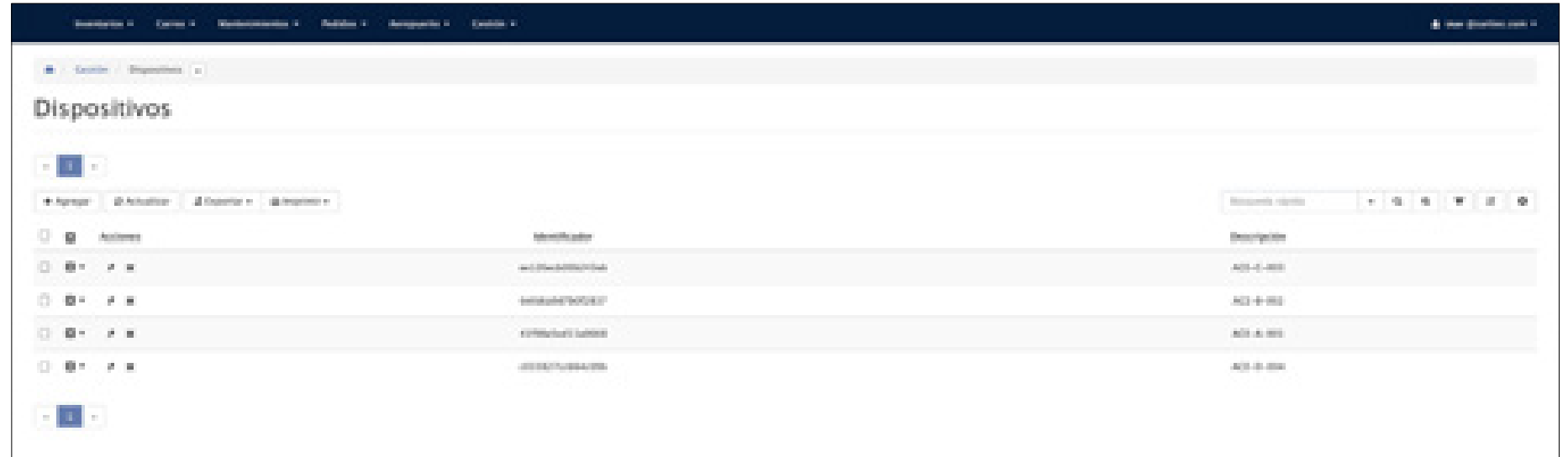
Among the statistics can be found those concerning cars repaired at the airport.



### 3.5. Management of devices

This section manages the airport devices. Click **Management and Devices** in the upper menu.

Devices that have been authorised at the airport will be displayed in the list. The information includes **Actions, Identifier and Description**.



The screenshot displays a web interface for managing devices. The main heading is 'Dispositivos'. Below the heading, there are several tabs: 'Agregar', 'Activación', 'Desactivación', and 'Eliminar'. To the right, there is a search bar and several filter icons. The main content area contains a table with three columns: 'Acciones', 'Identificador', and 'Descripción'. The table lists four devices with their respective identifiers and descriptions.

Acciones	Identificador	Descripción
[Icons]	XXXXXXXXXXXX	AGV-1-001
[Icons]	XXXXXXXXXXXX	AGV-2-002
[Icons]	XXXXXXXXXXXX	AGV-3-003
[Icons]	XXXXXXXXXXXX	AGV-4-004

### 3.6. User Management

The screenshot displays a web application interface for user management. At the top, there is a navigation menu with items like 'Inventarios', 'Campos', 'Mantenimientos', 'Perfiles', 'Asignados', and 'Exhibido'. Below the menu, the page title is 'Usuarios'. There are several action buttons: '+ Agregar' (highlighted with a green box), 'Actualizar', 'Exportar', and 'Imprimir'. To the right, there is a search bar labeled 'Búsqueda rápida' and a set of table control icons. The main content is a table with the following data:


Acciones	Nombre y Apellidos	Email	Telefono
<input type="checkbox"/> # [icon]	Gabriel	@uwb.com	4093100
<input type="checkbox"/> # [icon]	Andres	@uwb.com	8124100

This section manages the system's users.

- Click **Add** to add the new user.



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