



# **Drones**

## **State of the art**

# What's new



**Drones fleet management platform:** training pilots for ITA, BRA, COL planned in Nov



**BVLOS and simultaneous flight:** Procurement gave approval to the specification



**AERIAL CORE:** kick-off 10-11 December in Sevilla



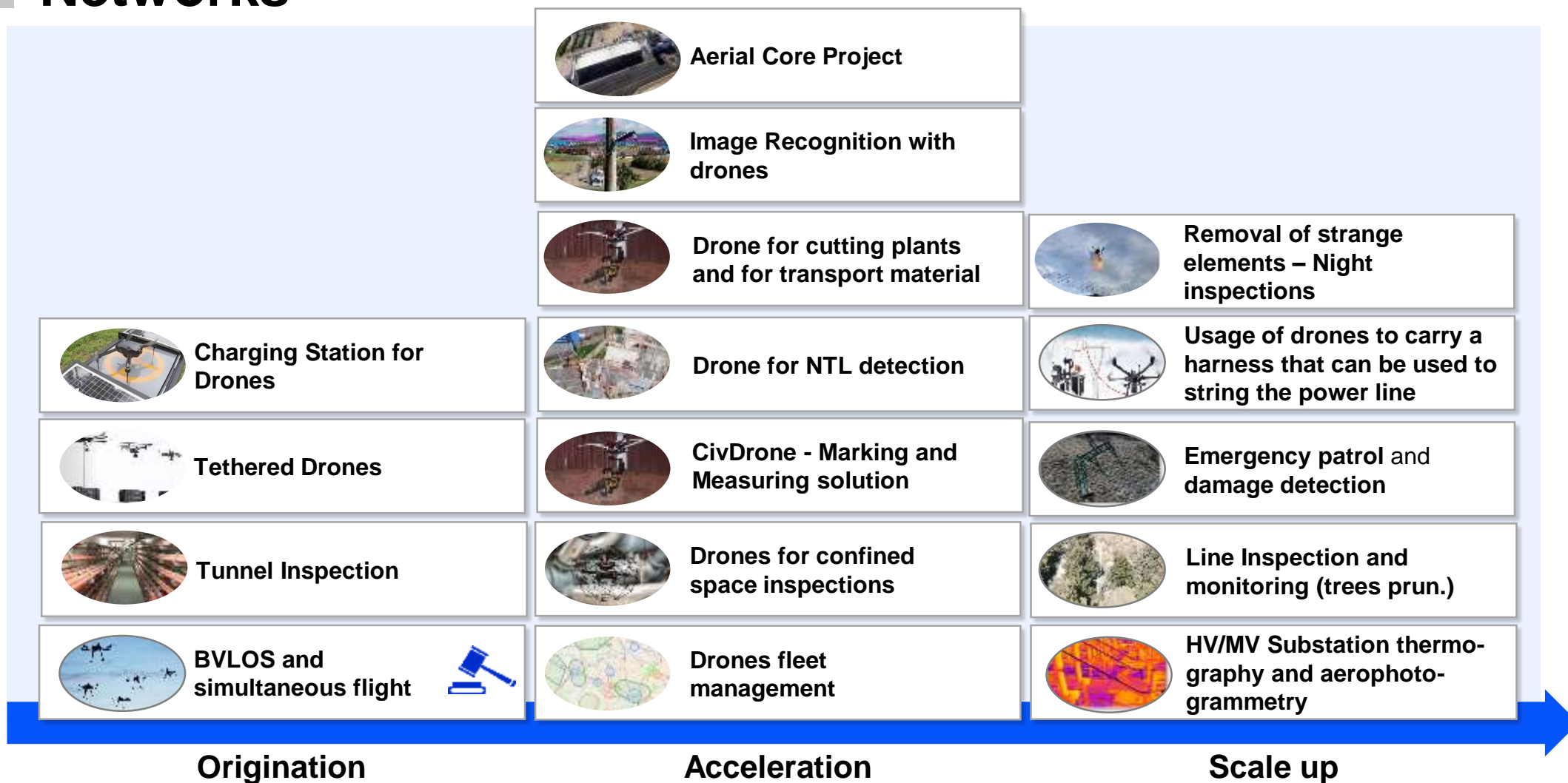
**Flyability:** qualification start-up requested



**Bootcamp:** tethered drones and charging stations in Haifa 4-5 December



# Drones use cases in Global Infrastructures & Networks



# Projects



	Aerial Core	Tunnel Inspection	BVLOS	Teth. Drone	Fleet Manag. Platform	Confin. Space	Image Recog.	Hercules	Castor	Charg. Station	NTL by drones
<b>O&amp;M</b> Line and Subst. Inspection											
<b>O&amp;M</b> Vegetation management											
<b>NCO</b> NTL detection											
<b>Cross</b> Drone managem.					 						

ORIGINATION

ACCELERATION

# Aerial Core project

ICT-10-2019-2020: Robotics Core Technology.



## Business challenge

Development of core technology modules and an integrated **aerial cognitive robotic system** that will have unprecedented capabilities on the **operation range** and safety in the interaction with people (**aerial co-workers**)



## Solution

1. Use of **UAVs with robotic arms** over power lines and infrastructures.
  - **Autonomous Inspection and maintenance** of large infrastructures.
  - **Aerial co-work activities** providing support to humans workers.
2. Increase the **range of UAVs**
  - With **morphing** capabilities (Aerial morphing)
  - **Recharging batteries**

The project validation: **ATLAS Test Center** in Villacarrillo (Jaén) a center specially designed for light and small UAS/drones operations and **with 1.000 Km2 of segregated airspace until 5.000 ft.**

**Needs** I&N Iberia  
**Owner** J. Rodriguez  
**Company**

**Location** ESP 



## Project Timeline



[click for demo video](#)

# Tunnel Inspection



## Business challenge

In **Spain** there is some **underground high voltage electricity lines**.

The inspection are made by workers, and tunnel can be long up to **2 km**.



## Solution

Introducing the **inspection of underground high voltage electricity lines** using a **remotely operated or completely autonomous system** can perform the inspection of the tunnel faster and reliable compared to manual inspection and assessment. **It reduces the risk to humans** resulting from prolonged incursions into a hazardous environment.



## Project Timeline

**Origination**  
July 2019

**Needs** O&M ESP  
**Owner**  
**Company**

**Location** ESP





# BVLOS and simultaneous flight



## Solution

To test, in a real environment, **contemporaneous drones operations** from a single or multiple operators and to **support the authority** in defining regulations to enable simultaneous flights of drones.



## Status of activities

Attivites:

- July 12th PoC approved during Innovation Committee on July 12th
- July 27th Meeting held with Enac Enav to share project details, flights missions and locations proposed on
- Sept 10th Launched working group with Global Procurement and Legal – ongoing definition of technical specification

Tender subject to “Codice Appalti”, which require longer procedures and stricter controls.  
Assignment expected by Dec 2019



**Project Owner**

All GBLS

**Location**

ITA



**Partner**

Enac, Enav,  
External partner

# Tethered Drones



## Business challenge

In San Paolo, the **legislation** on drones is rapidly changing, with the possibility to **extend** the actual use of drone technology, even allowing the use of **non-supervised unmanned drones**.

## Solution

Challenge:

Perform **HV pylons** inspections with **tethered** drone.

Use of **box tethered drone**, for remote control for **primary substations inspections**, without pilot on site.

Bootcamp has been planned in **Haifa 4-5 December**.

<b>Needs</b>	O&M BRA
<b>Owner</b>	K. Duarte
<b>Company</b>	Challenge

<b>Location</b>	BRA
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## Project Timeline

**Origination**  
Oct 2019

**BootCamp**  
Dec 2019



# Charging stations for Drones



## Business challenge

Automated charging stations for drones.



## Solution

Bootcamp has been planned in **Haifa 4-5 December**.

## Project Timeline

**Origination**  
Oct 2019

**BootCamp**  
Dec 2019

**Needs** NT&I Italy

**Owner**

**Company** Challenge

**Location**

**Budget**

**Budget owner**

# Drones fleet management platform



## Solution

**Drones fleet management platform for flight planning and operations monitoring**, providing also real-time interface with air traffic providers and authorization requests



## Status of activities

Next steps:

- **12 November** – training Zona Basilicata (ITA)
- **13 November** – training **Brazil**
- **18 November** – training **Colombia**



## Project Timeline

**Origination**  
Jun 2019

**Authorization**  
Jul 2019

**PoC end**  
Mar 2020

**Needs** All GBLs  
**Owner** GDS  
**Company** AIView

**Location**



# Drones for confined space inspections



## Business challenge

The **visual inspection** of equipment in the **underground electric network premises**, during scheduled maintenance and MV fault location detection procedure, is a **critical activity** performed manually and with a **low level of digitalization**.



## Solution

Perform **Flyability drone** based underground electric network inspections to make them **faster**, more **efficient** and safer and to **increase their level of digitalization**.

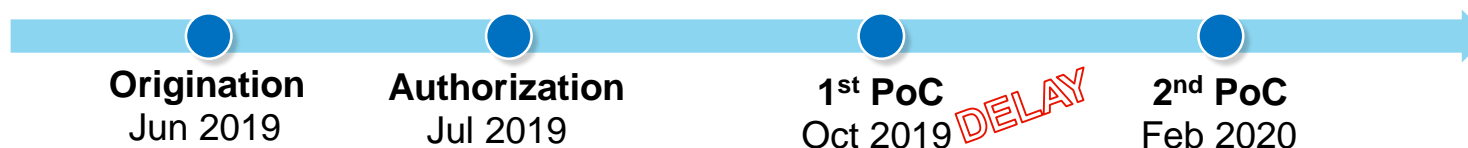
The use of Flyability drone was suggested by the Drone Community (other BSN have already used it).

PoC will be performed in two phases, each phase will unlock the next one:

- 1° with **rented** drone and pilot
- 2° **purchase** of one **Flyability drone** and **pilots training** (internal resources)



## Project Timeline



<b>Needs</b>	O&M BRA
<b>Owner</b>	N. Cammalleri
<b>Company</b>	Flyability

**Location** BRA



# Civdrone

## Marking and Measuring solution



### Business challenge

**Land surveying** activity is a relevant part of the budget of every Construction Project (0.5% - 1.5%). Nowadays this activity is performed with **Old Fashion** style, moreover the **efficiency** of this activity is **critical** in order to avoid mistakes and consequent delays.



### Solution

Development, in Infralab platform, of:

- 1. UAVs drone equipped with 3-axis robotic system** in order to distribute automatically stakes in different type of ground
  - VLOS operations
  - 1,5 – 2.0 cm Accuracy
  - 4x Faster
  - 40% Cheaper
- 2. App for integration with Autodesk + Smart Stake** equipped with NFC sensor

The solution has been **tested positively** in Shikun&Binui. Other tests are in planning with EGP Construction. GI&N ND is evaluating possible uses.

### Needs

**Owner** S. Cuni

**Company** Infralab

**Location** ISR 



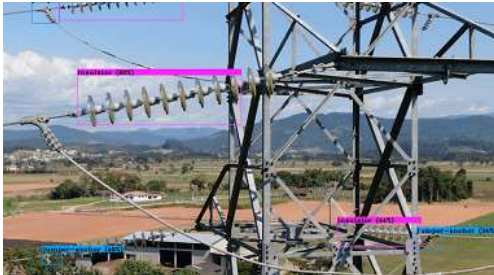
### Project Timeline



[click for demo video](#)



# Drone Image recognition



## Business challenge

Automatic **recognition** of **components** and **anomalies** in power lines, wind turbines and solar power plants, from **photos taken** by **drones** using **edge** computing.



## Solution

1<sup>st</sup> PoC in 2019: **60 km lines** inspected in Rio, Goiania and Cearà (Brazilian regulation studied)

Next steps:  
2020 – other 30 km of inspection on electrical lines

Network elements recognised: **insulator – jumper anchor – general hardware**. No automated anomalies detection.

Works with commercial drone or fixed wings Horus Drone

**Needs** O&M Brazil

**Owner** A. De Macedo

**Company** Horus

**Location** BRA



## Project Timeline

Origination

Authorization

Project start  
Nov 2018

Project end  
Nov 2021

# Dron Hercules



## Business challenge

Use of “cargo” drone, with the objective of carrying out and facilitating the transfer of materials and equipment for execution work on dispersed land, thus reducing the risk landscape in terms of ergonomics and mechanics, and increasing the operating efficiency.

## Solution

PoC have been done using a DJI Matrice 600 PRO model, however, due to load capacity it has not been enough, they are currently evaluating other proposals that has not tested yet

## Project Timeline

**Origination**  
2019

<b>Needs</b>	<b>O&amp;M COL</b>
<b>Owner</b>	<b>F. Ceron</b>
<b>Company</b>	<b>Tomas Aereas</b>

<b>Location</b>	<b>COL</b>
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# Dron Castor



## Business challenge

Use of drone with chainsaw, to support the tasks of the forest crews and restore in a more efficient way in case of failures and / or perform preventive maintenance.

## Solution

The stage of analysis of the proposal and pilot test, currently in definition of financing and sustainability model, was completed.

## Project Timeline

**Origination**  
2019

**Needs** O&M COL  
**Owner** F. Ceron  
**Company** Tomas Aereas

**Location** COL

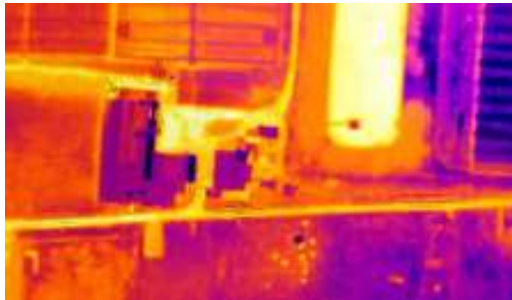


# No Technical Loss Detection



## Business challenge

Use of drone to flight over “dangerous” zone to detect and identify **unauthorized network expansions** not existing in the Enel Codensa database (RETIE). Prevents the workers from entering zones with problems of public order.




## Solution

Drone inspection requests are generated from the area with problem, the contractor performs the inspection, analyzes the information collected and sends these conclusions to the requesting area, who also performs a review and then schedule detailed inspections in the areas identified with probable situations energy theft.

Until now have been inspected 64 Ha in Bogotá/Cundinamarca: found **68 unauthorized connections** to the network and others anomalies.

**Non-automatic process.**

**Needs** NCO COL  
**Owner** M. Gomez  
C. Rincon  
**Company**

**Location** COL 

## Project Timeline

Project Start

Project end  
Dec 2019

# Dron Dragon



## Business challenge

Use of drone technology, as a design tool for waste disposal or burning in MT and BT networks, in order to eliminate foreign elements entangled in the electricity networks, mainly in the wind season, where the use of kites increases in parks and public places near the electrical infrastructure.

## Solution

In 2019 **82 foreign object**, like flying kites, shoes. etc. have been eliminated with this technology.

During the same time, the total number of these operation swere 1523.

**Rate 5%**

<b>Needs</b>	<b>O&amp;M COL</b>
<b>Owner</b>	<b>F. Ceron</b>
<b>Company</b>	<b>Tomas Aereas</b>

<b>Location</b>	<b>COL</b>	
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# Dron Luciernaga



## Business challenge

Implementation of lighting elements for personnel working at night on maintenance activities, seeking to generate adequate lighting conditions for work execution.



## Solution

During 2019, **91 night-time activities** were carried out, in Cundimarca region

In Cundinamarca at least 8 night inspections is performed daily. We talk about 1800/year.

**Rate 5%**

**Needs** O&M COL

**Owner** F. Ceron

**Company** Tomas Aereas

**Location** COL



# Dron Buho



## Business challenge

Use of drone technology for the inspection of electrical networks and the identification of failures in MV and LV circuits.

## Solution

During 2019, **1200 km of electric lines** were inspected with this technology.

In the same time the total km of electric lines inspected were 6925.

**Rate 17%**

<b>Needs</b>	<b>O&amp;M COL</b>
<b>Owner</b>	<b>F. Ceron</b>
<b>Company</b>	<b>Tomas Aereas</b>

<b>Location</b>	<b>COL</b>
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# Dron Tejedor



## Business challenge

Use of drone technology, for the laying and recovery of electrical conductors in faults.  
It is also a tool for the construction of networks and remodeling of electrical circuits.

## Solution

During 2019, approximately **70 km have been laid** in 15 maneuvers with guide wire for the construction of new networks and/or emergency in Cundinamarca.

In total, 258 km of air network have been installed in Cundinamarca in 2019 plus the recovery of electric cable with approximately 15 km.

**Rate 25%**

<b>Needs</b>	<b>O&amp;M COL</b>
<b>Owner</b>	<b>F. Ceron</b>
<b>Company</b>	<b>Tomas Aereas</b>

<b>Location</b>	<b>COL</b>
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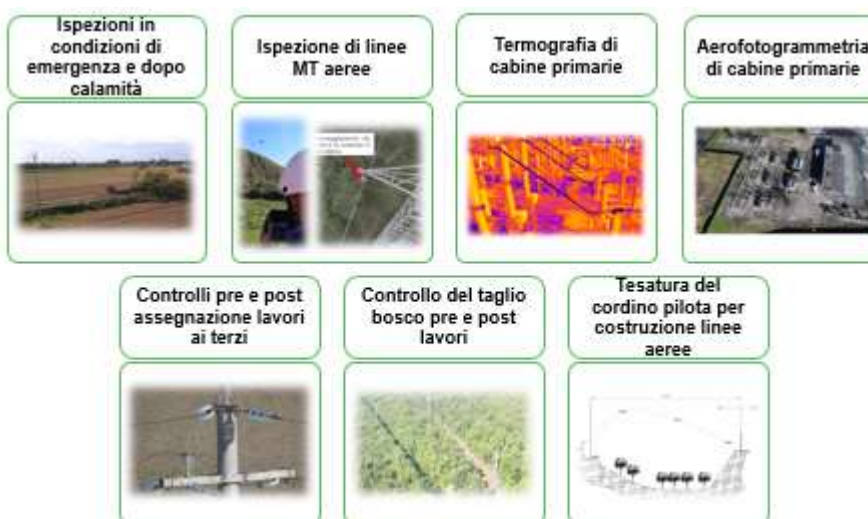
# Drones in e-distribuzione



## Business challenge

These kind of activities are declared in **scale-up** by e-distribuzione.

## Solution



**Needs** O&M Italy

**Owner** G. Gai

**Company**

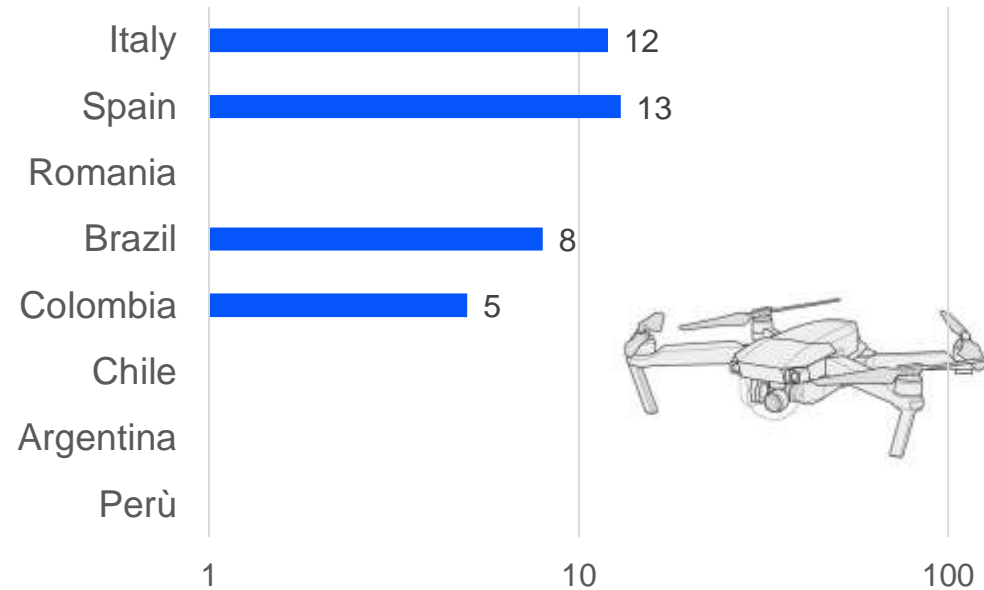
**Location** ITA



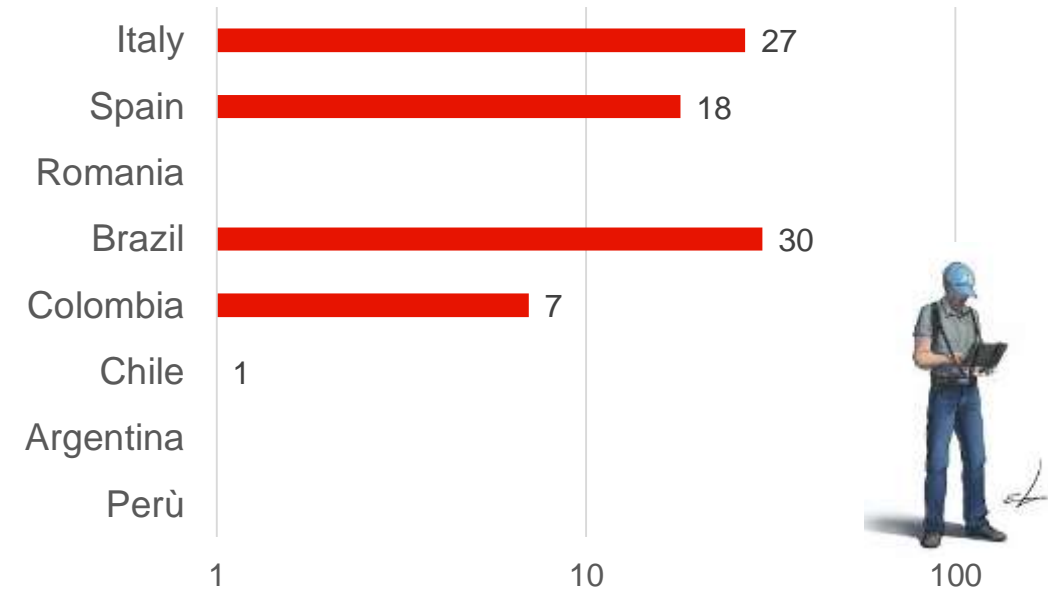
# Drones in Global Infrastructures & Networks



## I&N Drones (actual)



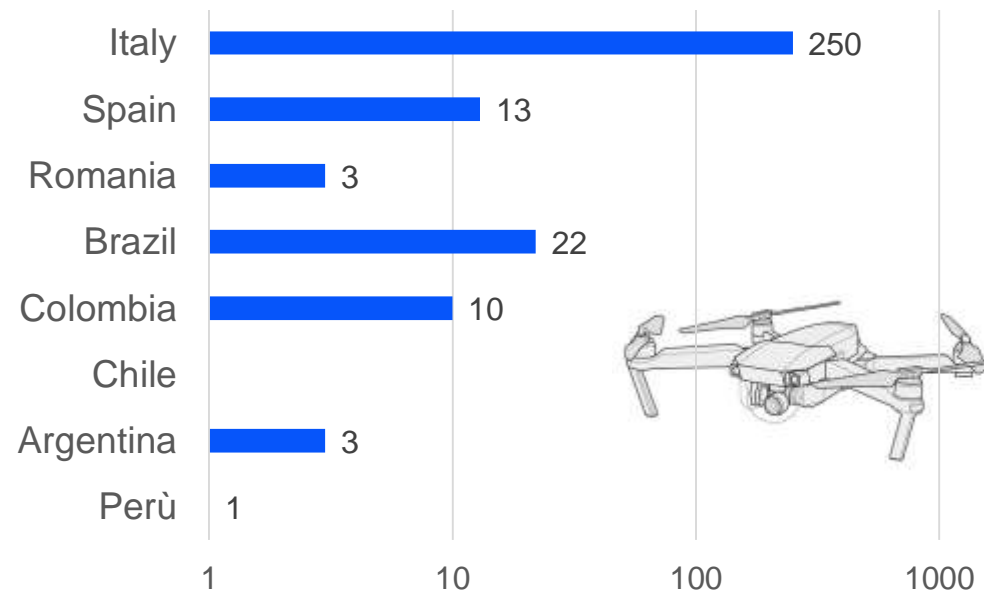
## I&N Pilots (actual)



# Drones in Global Infrastructures & Networks



## I&N Drones (forecast 2020)



## I&N Pilots (forecast 2020)

