

# Where are MNOs investing in Drones today

Connected Skies Webinar

26 March 5PM CET



Global UTM  
Association



AIRMAP



UNMANNED  
AIRSPACE

Air Traffic  
Management

# Panelists

## Where are MNOS investing in Drones today



Sebastian Babiarcz, **AirMap**, Head of Strategic Business Development & GUTMA Co-President - Session moderator



Mariah Scott, **Skyward a Verizon company**, President



Cyril Mugglin, **Swisscom**, Business Development Manager Drones



Nuran Demirci, **Turkcell**, Expert Radio Network Technology Engineer



Eimantas Puscus, **Vodafone**, Innovation Specialist

# Where Verizon is investing in drones



## Drones for the network

- Inspection & maintenance
- Disaster recovery
- Network resilience
- Proactive response



## Drones as the network

- Flying cell sites
- Emergency connectivity capabilities
- Drone Operations Vehicle for mobile deployments



## Drones on the network

- Advanced use cases: UTM, BVLOS, near real-time streaming
- Aviation Development Centers
- Testing connected drone use cases over 4G LTE & 5G

# Drones on the Network: 5-Year Vision





# Enabling the Digital Airspace

## From network to data to services

Cyril Mugglin

Business Development Manager Drones





# Cellular network and its value for drone operations

## Advantages of cellular network

- Unlimited range, independent of distance to drone, available today
- Allows integration with safety-relevant systems (FLARM, ADSB, ...)
- Country-wide cellular coverage

## Conclusions of research study

LTE (4G) mobile networks are well suitable to establish a UTM link between a drone and a UTM / U-space implementation with high availability in the VLL [very low level] airspace.

Zürcher Hochschule für Angewandte Wissenschaften

**zhaw** School of Engineering

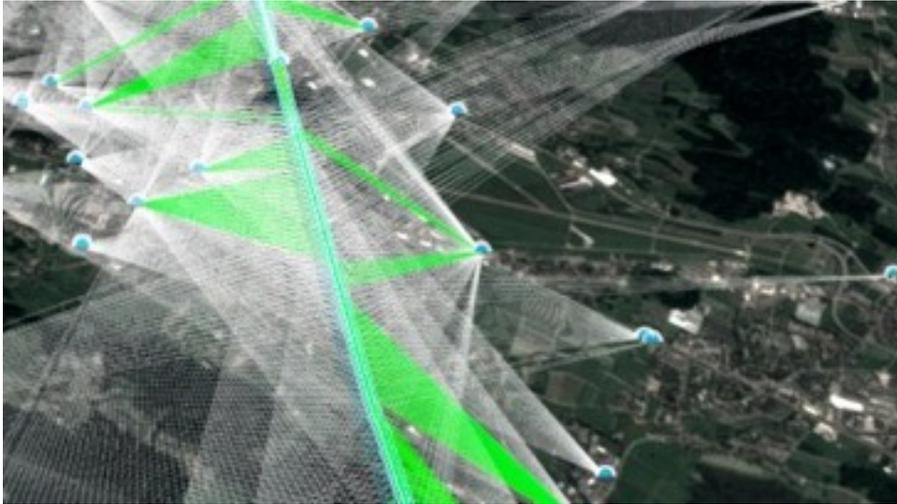
skyguide





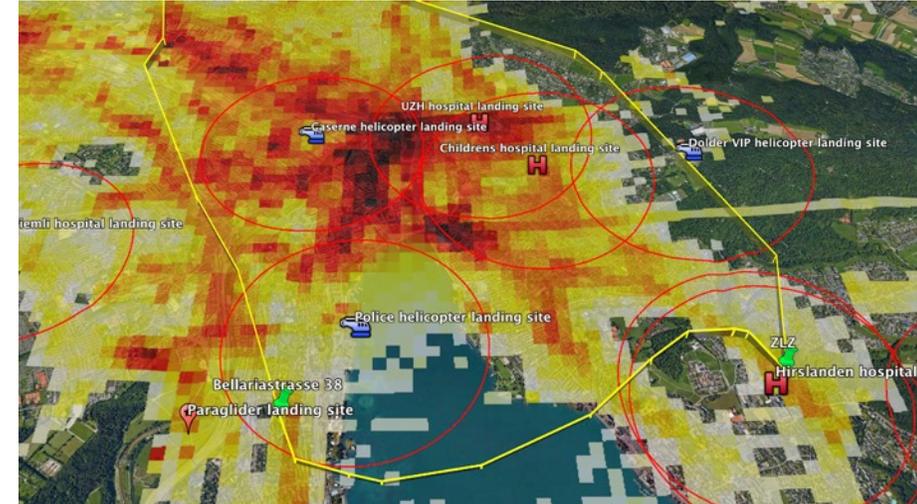
## Safety-relevant data

Relevant information that increases safety of drone operations



### Coverage and performance information

Predictions of cellular link quality and live monitoring during flight ensure reliability of operation. Showing safe zone where all parameters are met for a given application.



### Ground risk information

Anonymized and aggregated density data supports the assessment of the ground risk for drone operations.



# Ecosystem and drone-powered services

## From drones to services that solve problems



### Swiss U-Space Implementation SUSI

Swisscom joined Swiss U-Space Implementation SUSI of Swiss FOCA to collaborate with other relevant stakeholders and demonstrated cellular networked RemoteID.



### Creating and take part in the ecosystem

Swisscom works with industry partners to create use cases that deliver value for the industry.

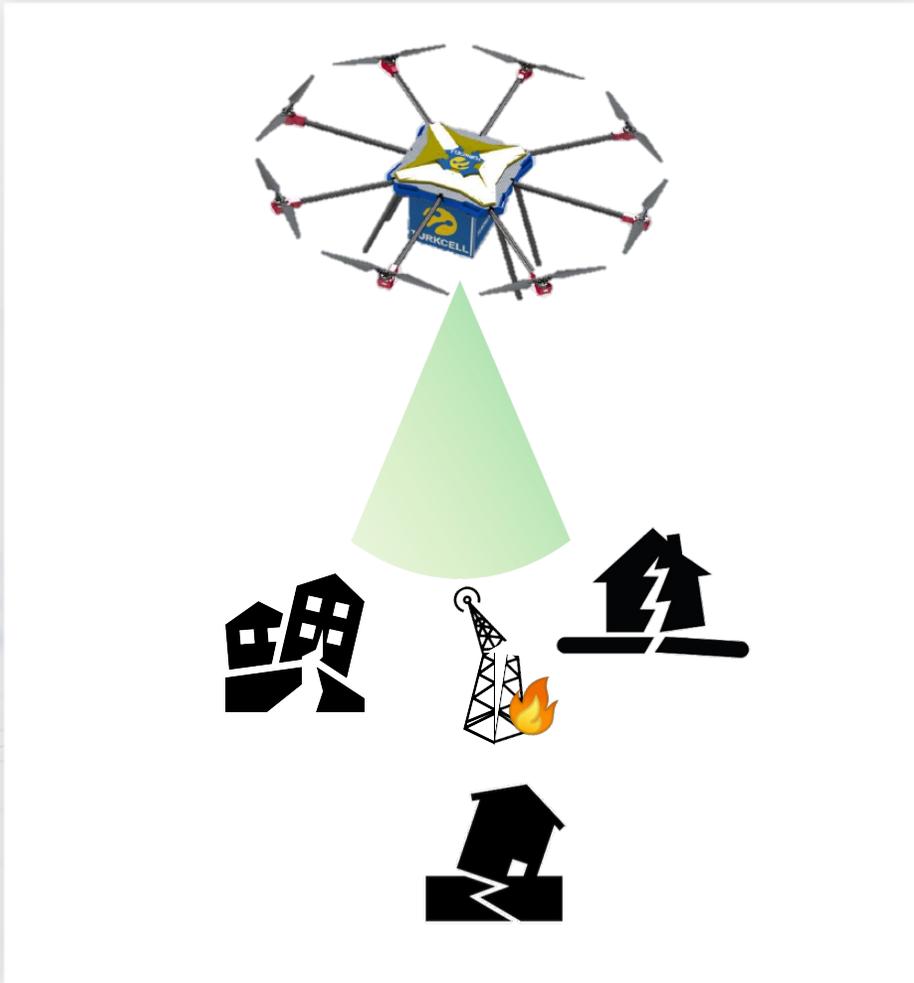
# TURKCELL & UTM



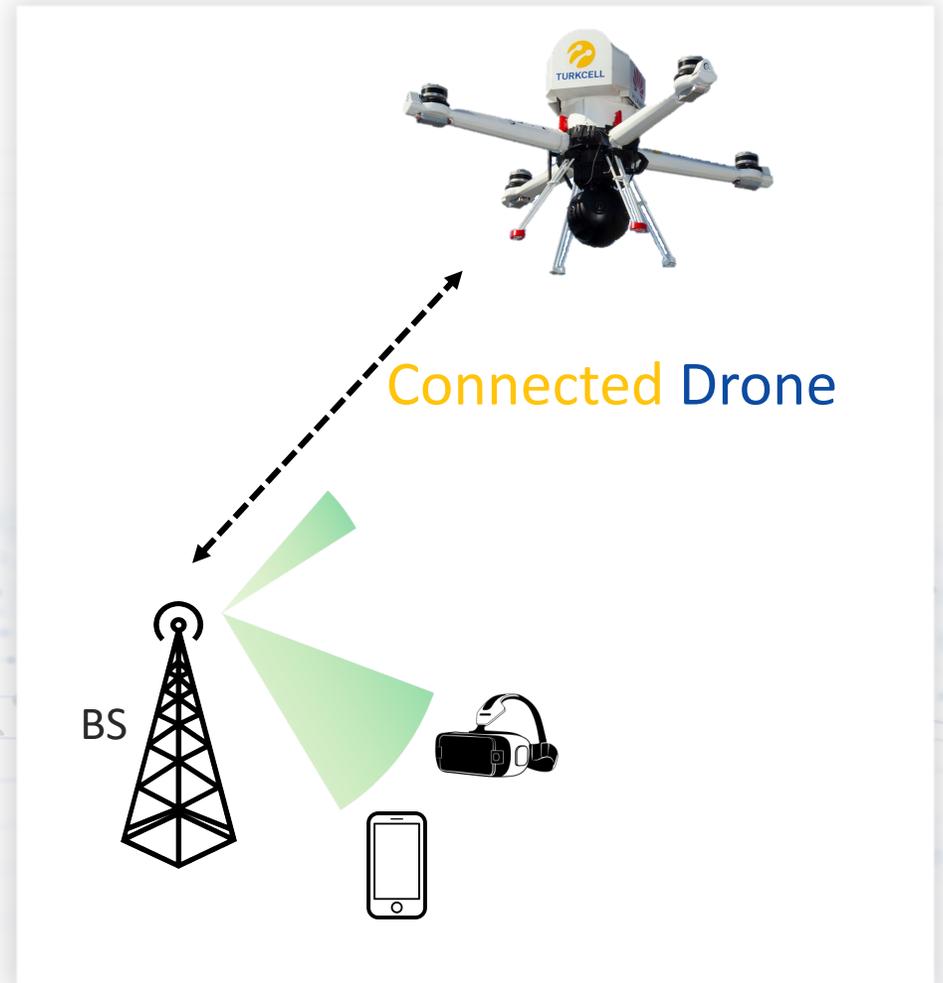


# Mobile Network & Drone Industry

## Usage of Drones for Mobile Network



## Usage of Mobile Network for Drone Industry





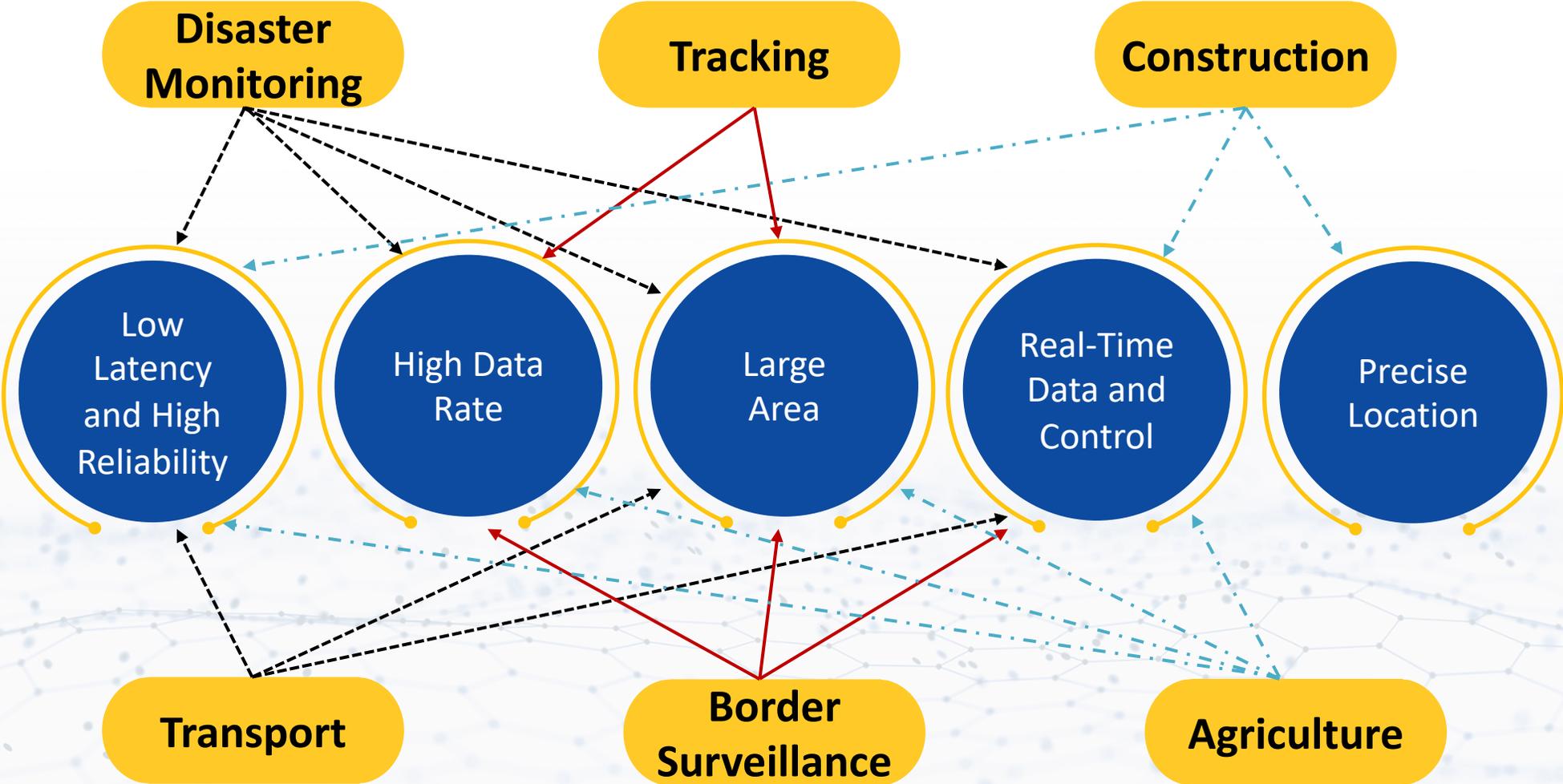
# Flying Base Station - Dronecell

- Temporary mobile cellular coverage
  - Natural Disasters → Save lives
  - Search & rescue operations
  - Hard to reach locations
  - NB-IoT Sensor Data Collection





# Use Cases for Connected Drone



Use cases



Requirements

Source: S. Hayat, E. Yanmaz and R. Muzaffar, "Survey on Unmanned Aerial Vehicle Networks for Civil Applications: A Communications Viewpoint," in *IEEE Communications Surveys & Tutorials*, vol. 18, no. 4, pp. 2624-2661, Fourthquarter 2016.



# UAS Challenges & MNO Capabilities

## Limited Coverage



Wide Mobile Coverage

## UAV ID



SIM Card Identification

## Real Time Geo Fencing



Real Time Action

## Unsecure Connection



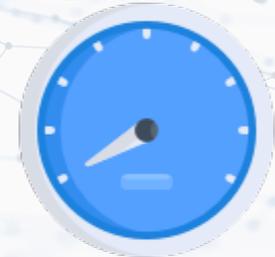
Licensed Secure Connection

## UAV Tracking - Rerouting



Real Time Tracking

## Limited Bandwidth Low Data Rate



High Data Rate with 4G & 5G



# A step for UTM - Turkcell 5G Drone Project



5G technology in line with 3GPP



Drone  
Control



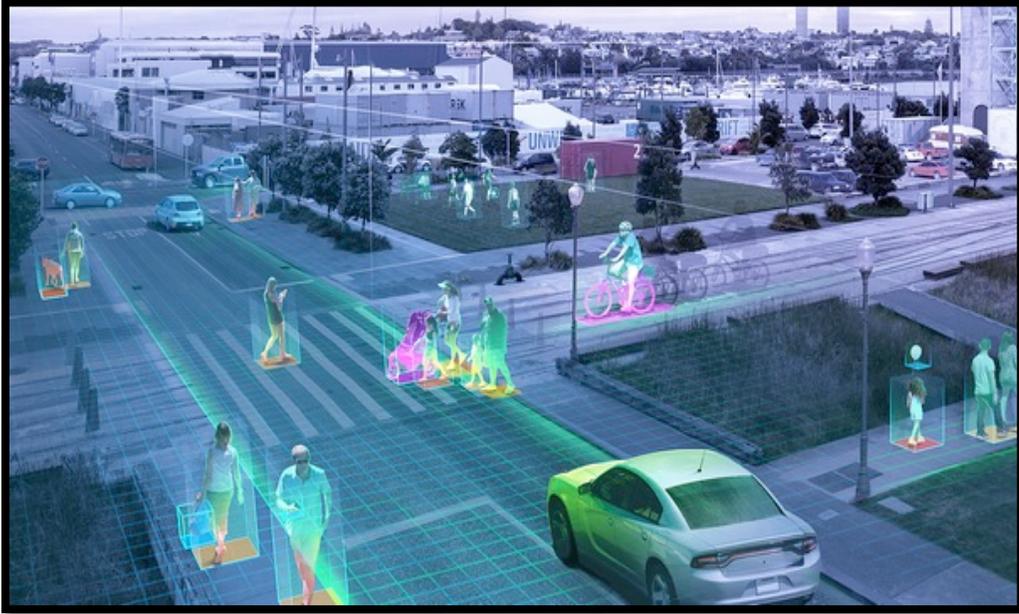
4K 360°  
Live Streaming



Virtual  
Reality



# Artificial Intelligence



## Computer Vision - Object Detection and Tracking

- Person
- Face
- Animal
- Specific Object

## Log Analytics

- Anomali Detection
- Error Prediction

An aerial night view of London, England, showing the River Thames and the Tower Bridge. The city is illuminated with lights, and a large red circle is drawn around the central area. The text "Drone Activity Overview" is overlaid on the image.

# Drone Activity Overview

# Group Networks mainly focus on network readiness

Positioning the Mobile Network infrastructure as the key enabler for BVLOS drone flights.

## Regulation



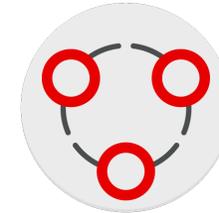
Working with regulators to develop and demonstrate mobile network capabilities

## Network Readiness



Ensuring that the mobile network infrastructure can welcome a large number of drones

## Industry Engagement



Working with industry players to apply Vodafone solutions to real use cases



# We have demonstrated a number of capabilities



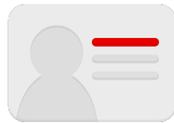
Radio Positioning System  
(RPS)



Dynamic geo-fencing and  
remedial action



Command and Control  
BVLOS



Network-based  
monitoring and  
identification



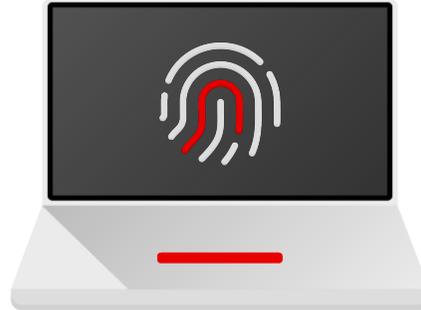
Interference  
Management Features



Flying CrowdCell



# Vodafone has developed a GPS-independent positioning technology - RPS



- Used to provide a secondary source of location information
- Geolocation tool based on fingerprinting and machine learning algorithms
  - RPS does not need any cooperation from the drone



# We have been busy exploring the latest network technologies



## 5G Urban Trial

World first urban trial with a 5G connected drone.

5G

Dedicate Drone Section

[www.vodafone.com](http://www.vodafone.com)



# There is scope for Vodafone to enter the UTM space



## UTM

- Connectivity
- Geo-fencing and alerts to UAV
- Drone tracking/positioning
- Real-time data analytics
- Weather conditions
- Post-flight data analysis and report
- Airspace access authorisations
- Cloud services

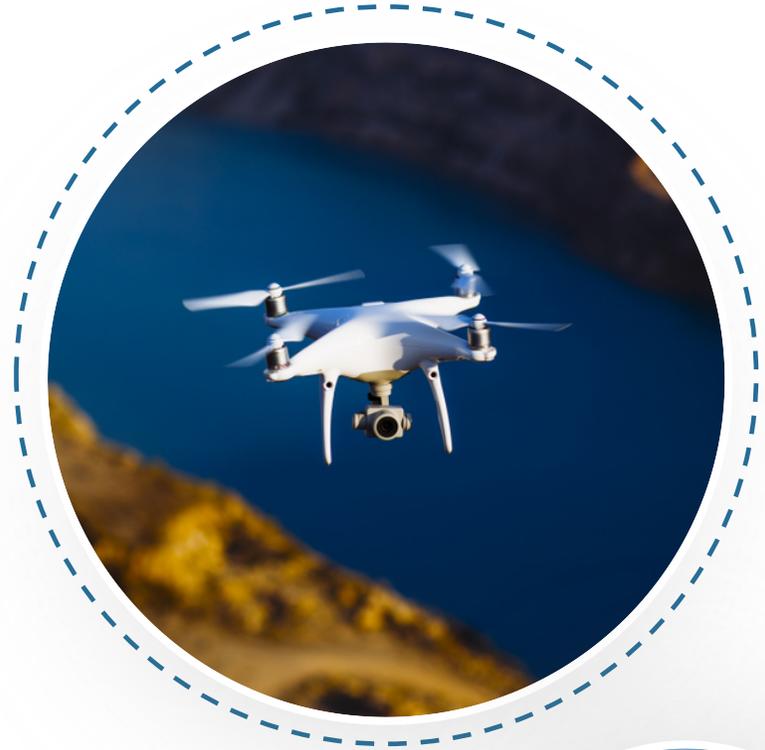




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# Q&A

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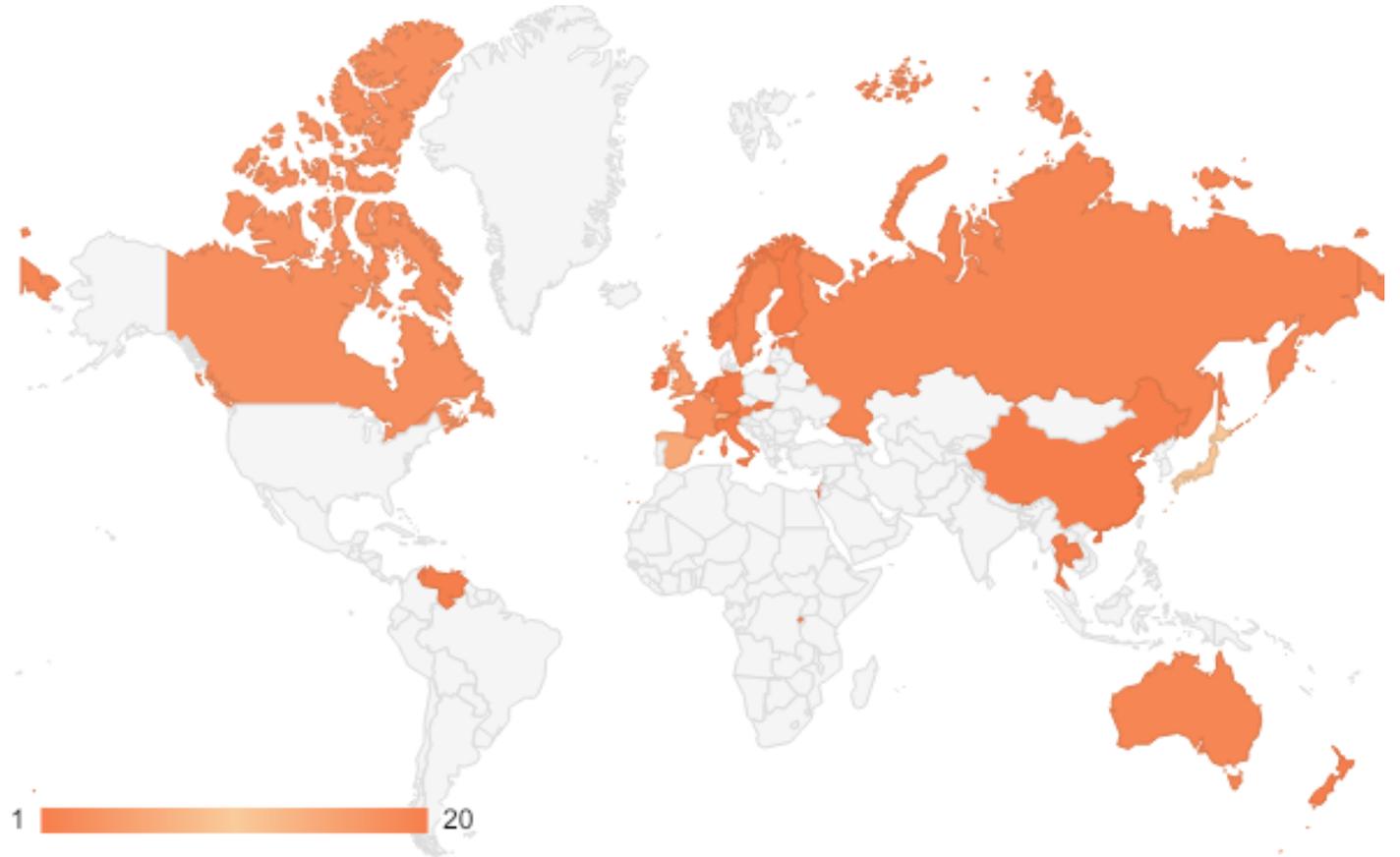


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