12:00 – 12:45

# Tactical 5G bubbles and network slicing in public networks : Robotics and augmented reality in critical situations

Ángel Alves González – Innovation Expert, Telefónica España
Leticia López Domingo – Innovation Expert
Sergio Gamo Velasco – STAM Defensa y Seguridad, Telefónica I. Seguridad
Miguel Borja Cano – Head of Vertical Drones y Robotization, Telefónica I. Seguridad
Gustavo Medina – CEO XReallity Factory

Telefónica
desde 1924

# Tactical 5G bubbles and network slicing in public networks

Robotics and augmented reality in critical situations

# Índex & Speakers

## 01
### Network Slicing

**Context and innovation pilots**

**Ángel Alves González**

Innovation Expert

**Telefónica España**

**Leticia López Domingo**

Innovation Expert

**Telefónica España**

## 02
### Tactical 5G Bubbles

**Fast and Secure connectivity with 5G Bubbles.**

**Sergio Gamo Velasco**

STAM Defense and Security

**Telefónica España**

## 03
### Robotics and augmented reality in critical situations

**Robotization and Virtual Control Centers with AR**

**Miguel Borja Cano**

Product Marketing Manager

**Telefónica Ing. de Seguridad**

**Gustavo Medina del Rosario**

CEO

**Xreality Factory**

100 Telefónica

# Network Slicing

Context and innovation pilots

# Relevant 5G Milestones

**2021** — **2022** — **2023** — **2024** — **2025/26** →

Radio auction 700MHz

Launching Private 5G network for enterprises

Refarming 3,5GHz bandwith

Radio auction 26GHz

SA deployment in production

Network Slicing

5G Edge

Network Slicing – low latency

**5G SA**

**5G NSA**

Telefónica
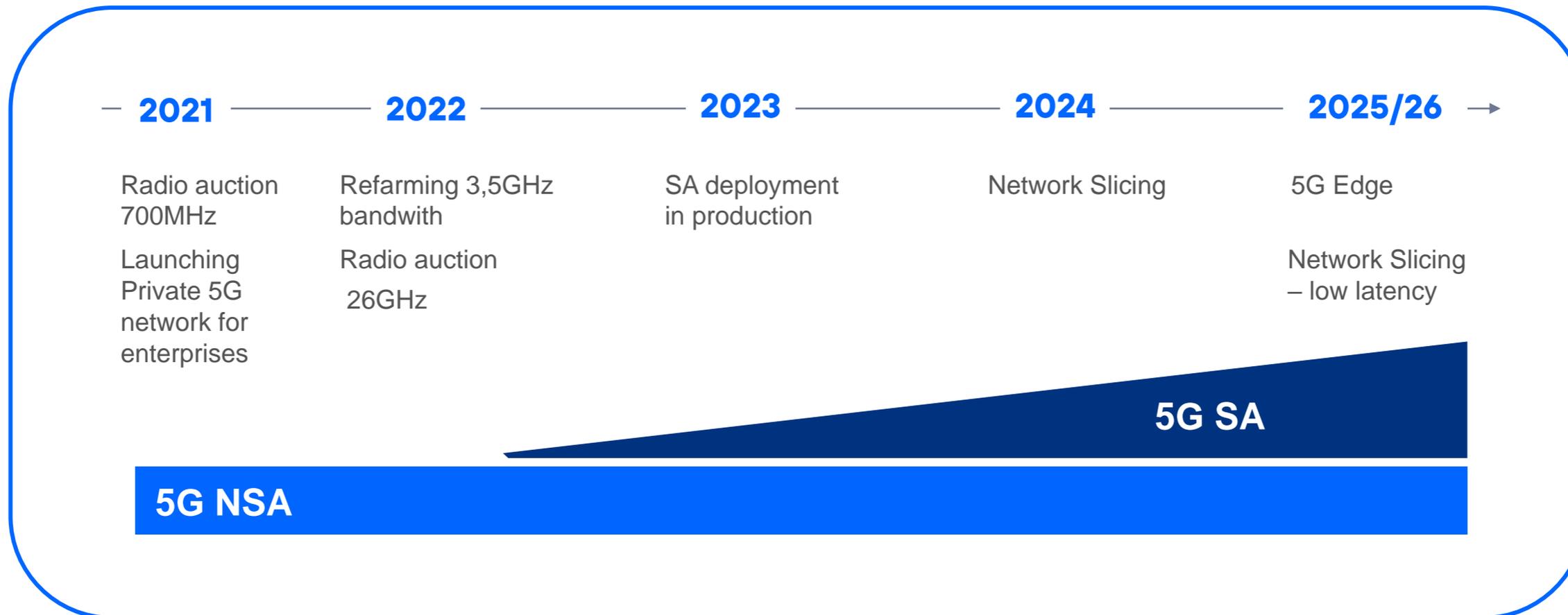
# ¿What is Network Slicing?

**Slice 1**: optimizada para **alto ancho banda**

**Slice 2**: optimizada para **baja latencia**

**Slice 3**: optimizada para **IoT**

**Slice 4: optimized for connected vehicle**

## When it makes sense…

Good 5G coverage, saturated environment and not dedicated infraestucture.

If multiple subnets are needed for services that require different capabilities.

# Innovation Pilots

## SLICING IN LOCALIZED AREA

Customers with presence in limited geographical areas

5G

## SLICING IN BOUNDED MOBILITY

Customers with specific service needs in limited areas

5G ... 5G

## SLICING IN MOBILITY

Customers with wide range presence

5G ... 5G ... 5G

**Good 5G coverage, saturated environment and not dedicated infraestucture**

**Multiple subnets**

Telefónica
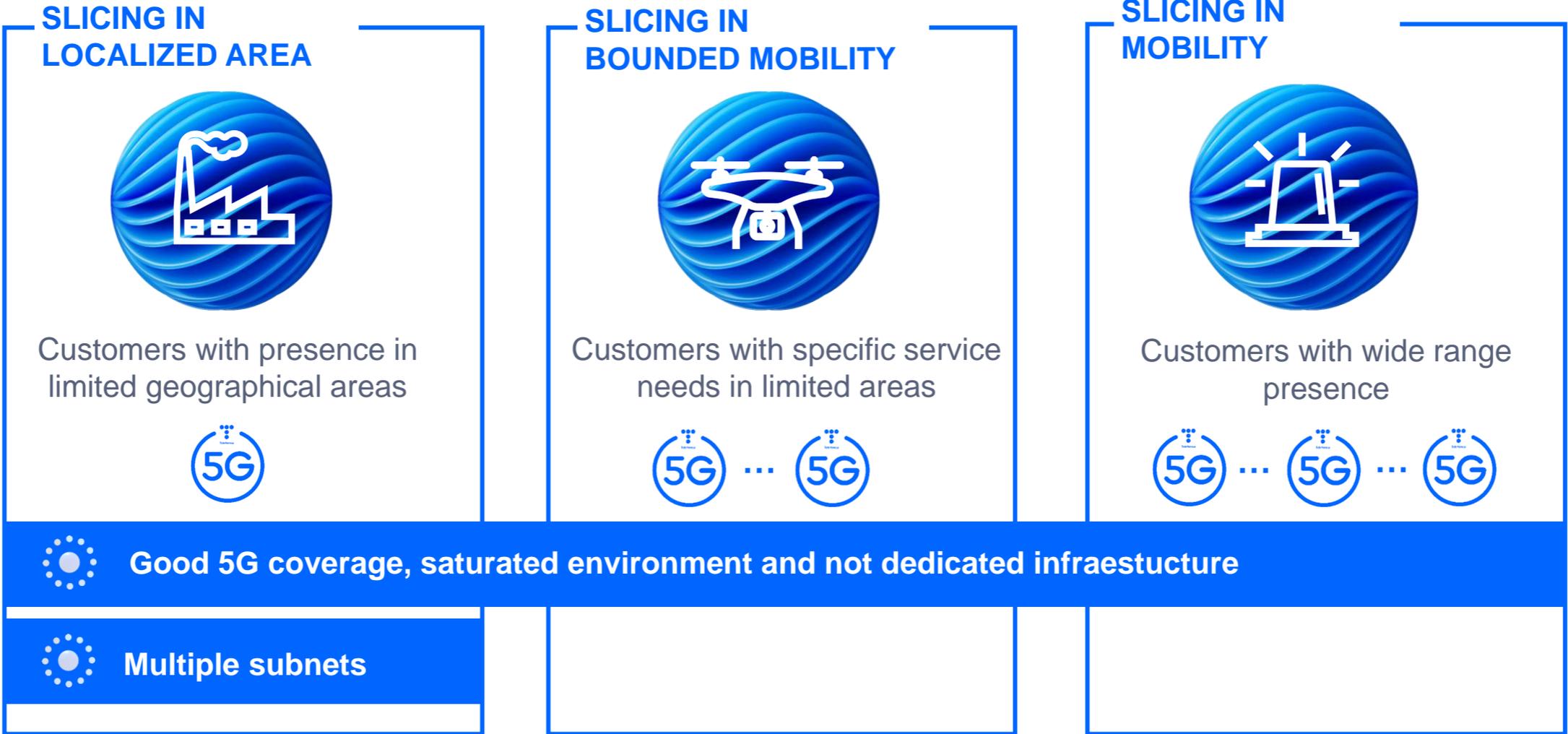
# Slicing in localized area

## Objective

Deploy a virtual **private network over 5G SA entirely based on slicing** to securely and reliably transmit port mobile crane traffic.

Goal: zero accidents at the terminal.

5G SA  ·  SLICING 700MHz (10%)  ·  VDC  ·  PRIVATE DNN  ·  C-V2X  ·  RTK
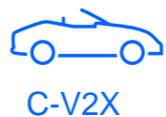
## Benefits

- 100% commercial 5G SA network reuse, earlier provisioning.
- Same SIM cards for private and commercial network services.
- Prioritized crane comms.

## Learnings

- 700MHz as a key to cover environments with high metal density.
- With 10% RRP up to 14 cranes connected simultaneously.

100 Telefónica

# Slicing in mobility

## Objective

Validate the capability of 5G SA + slicing networks **in mobility and acting as complementary TETRA network to provide video emergency communications.**

**5G SA**    SLICING 700MHz (10%)    SLICING 3500MHz (10%)    PRIVATE DNN

## Benefits

- No need to deploy a dedicated network.

- Same SIM cards for private and commercial network services.

- Sending multimedia files, or video calls, beyond voice and text (TETRA complementary).

## Learnings

- On 700 MHz with 10% RRP 31 HD videocalls.

- 3500 MHz band suitable for supporting multiple HD video sessions.

**100 Telefónica**

# Slicing in bounded mobility

# Network slicing for video transmission in congested environments

**DRONES FOR SECURITY**
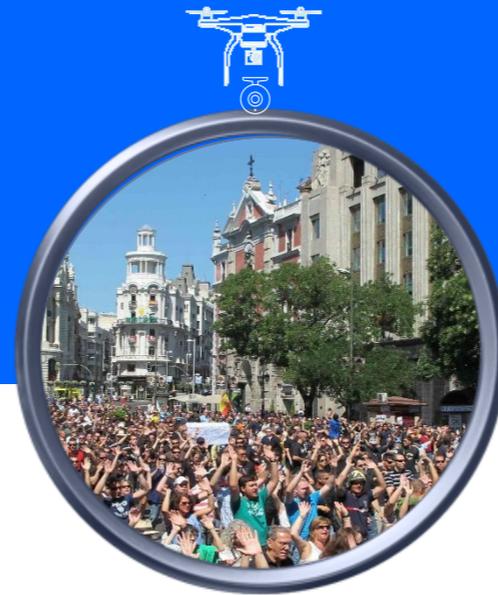


**The images are only seen by the drone pilot through the controller**

**With 5G and Network Slicing the video can be viewed from the control center**

100 Telefónica

Radiofrecuency

5G

Radiofrecuency

5G

5G

**3500 MHz**
**Priorized Slice**

**5G**
**SA**

Core 5G SA

5G

POLICE

VPN

**Video server**
**(Tecnoalcalá)**

**Video Management System**
**(VMS)**
**Control center**

# Slicing in bounded mobility

## Objective

Deploy dedicated network resources, based on slicing, for the **delivery of high quality video captured by a drone** to monitor security at mass events (control center).

**5G SA**  **SLICING 3500MHz (30%)**  **VDC**  **PRIVATE DNN**  **5G**

## Benefits

- No need to deploy a dedicated network.

- A single SIM from a single operator offers the same capacity as 8 SIMs from different operators.

## Learnings

- For video transmission, an RRP of 30% is required in the 3500MHz band.

- Proven effectiveness of slicing, offering reserved resources for video delivery in situations of network congestion.

Telefónica

# "Network Slicing, a commercial reality in 2024"
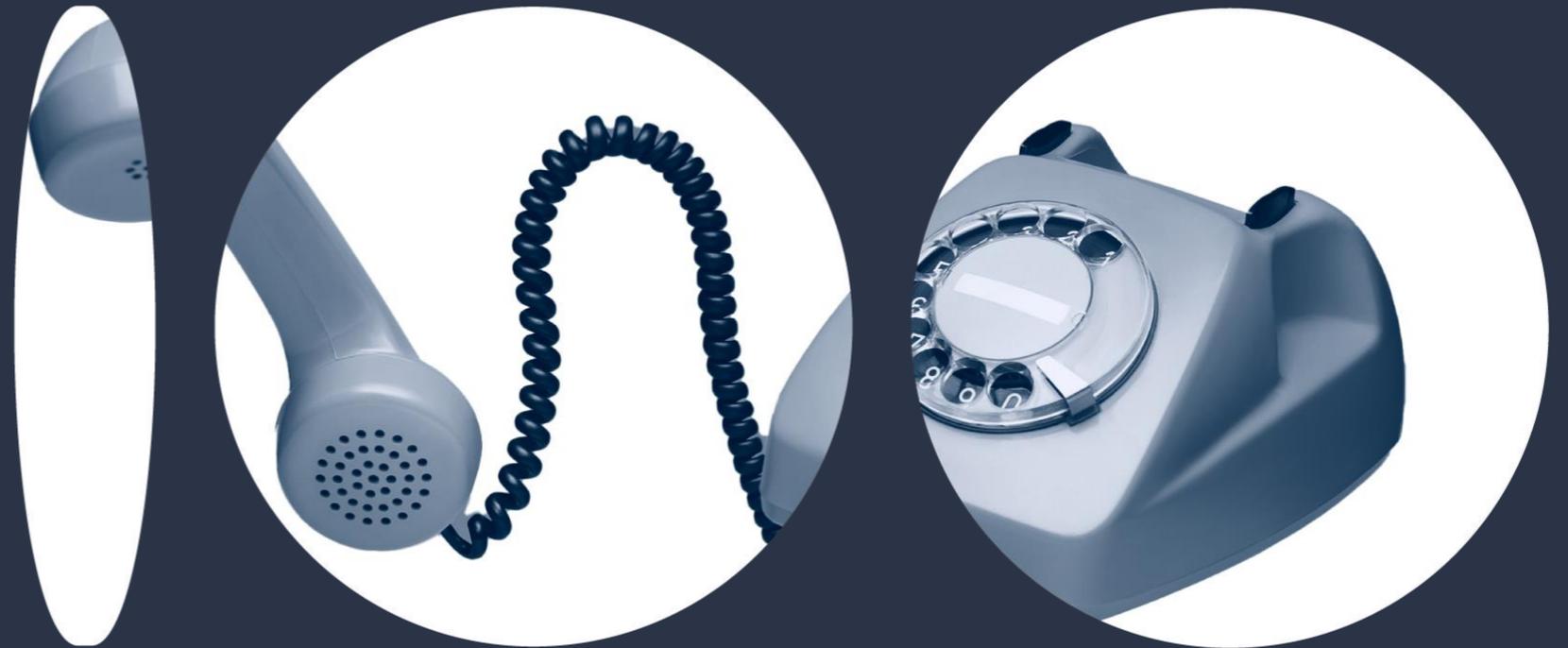
# 5G bubbles, a disruptive technology for Security and Defense

"A totally differential leap to **Communications Technologies**"



**Low Latency**

**High Bandwidth**

**Multiple users at the same time**

"This allows us to have an **advantage in**"

**Change operation mode**

**Carry out operations 24/7**

**Robotize human activities**

**Perform night operations**

100 Telefónica

# Stand alone, ultra-low latency environments

"This **5G bubble private network** capacity allows us to complement the network, in those places **without coverage** or **in crowds**"



**Areas without Network Coverage**

**Areas with Network Congestion**

"This allows us to **provide**"

**Bandwidth**

**Quality of service**

**Operations robotization**

Telefónica

# We adapt to deployment environments

"We manage to **deploy** our **technology** in different situations"

**5G for Fixed Environments**

**5G in high-capacity Fixed Deployable Environments**

**5G Vehicular on the move**

**5G Naval on the move**

**5G NTN**

**100** Telefónica

# Our Tactical 5G solution

## "**Transversal** technology with a capacity that will run on all **infrastructure axes**"



**Secure Coms.**

**Robotics**

**Artificial Intelligence**

**Sensors**

**Command & Control**

## "**5G** solution with the **capabilities** that are being **developed**"

**Cyberdefense**

**Cyberspace**

**National Security Agencies**

**Telefónica**

# Robotics and augmented reality in critical situations

# We have the ability to integrate all types of robots

"The integration of **AI** in **robotics**, the *"killer application"* in **5G Coms** "

**Aerial robots**

**Ground Robots**

**Maritime robots**

**Underwater robots**

**"Sustainable** solutions with the **environment"**

**Consumption reduction**

**Reduction of monetary costs**

**Reduce response times**

**Possibility of operating 24/7**

100 Telefónica

# The democratization of airspace with drones

## "Receive and analyze information in real time for decision making"

**Security**

Safeguard the security of state security forces and thanks to the use of robots and drones

**Information**

The processing of information with AI means that we can decide operations faster

**Control Centers**

Possibility of operating all this in a remote and virtual Command & Control Center allows us to be more efficient in all scenarios

**100** **Telefónica**

# One robot, different uses

"The **sensorization** of robots allows us multiple uses without giving up safety"



**Hardware**

**Sensors**
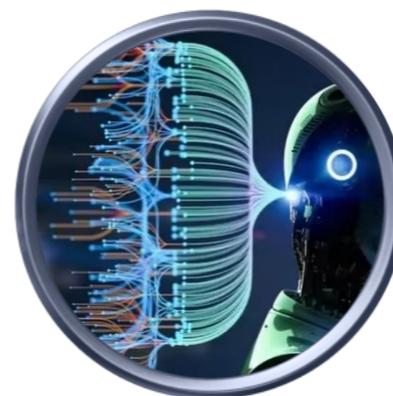
**Artificial Intelligence**

"**Unlimited** capacities, thanks to **sensors + AI**"
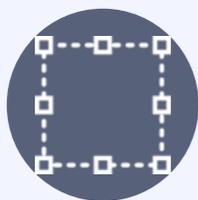
**Safety & Security**

**Surveillance & Patrol**

**Search & Rescue**

**Logistics**

100 Telefónica

# A metaverse for emergencies?

Really?
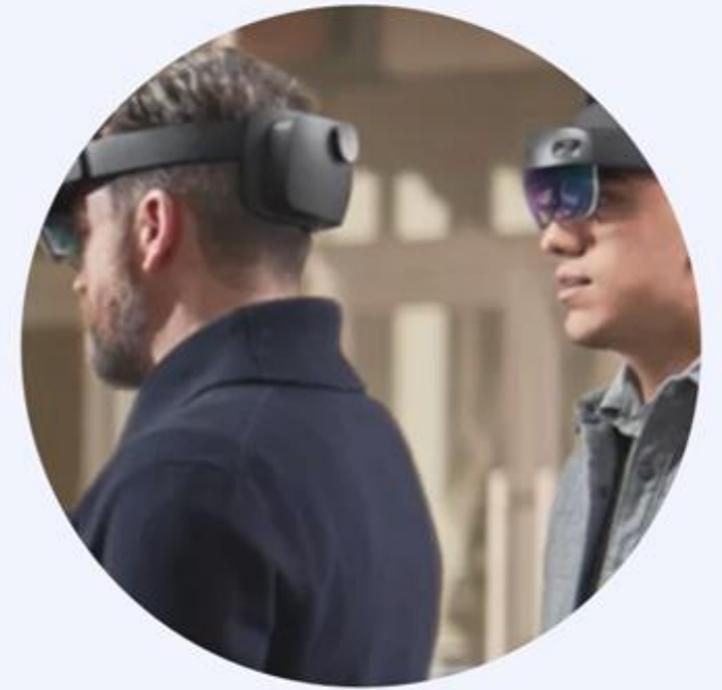
# Deployable distributed command post

"We are a key **support** for decision-makers in **complex scenarios**"

We simplify complexity by presenting crucial information visually and accessibly. With generative AI, we learn and maximize available options, ensuring clarity and confidence in every decision.

# Products

## "We are a key **support** for decision-makers in **complex scenarios**"

### Strategic Environment
### XRF**Colossus**

Multitouch tables and tablets.



Designed to enhance real-time control and supervision at a strategic level.

### Operational Environment
### XRF**Sandbox**

Mixed reality and distributed advanced command posts.



Consolidates data from multiple sources into a single interface, providing a 'multi-source' and 'multi-user' experience at operational and/or strategic levels.

### Tactical Environment
### XRF**FieldCompanion**

Mobile devices.



Mobile application (online/offline) through which deployed brigades and units communicate and receive real-time tracking information. It enables command centers to monitor the movement of assets and resources in the operational theater.

Telefónica

# XRF
# Sandbox



**Orlando, FL Nov 2022 - Scenario: Cartagena, Murcia**
Virtual meeting with users from Spain (Madrid & Gran Canaria) and USA (FLorida).

Telefónica

MWC 2024

**XRF**
**Field Companion**

☰



mapbox

ⓘ
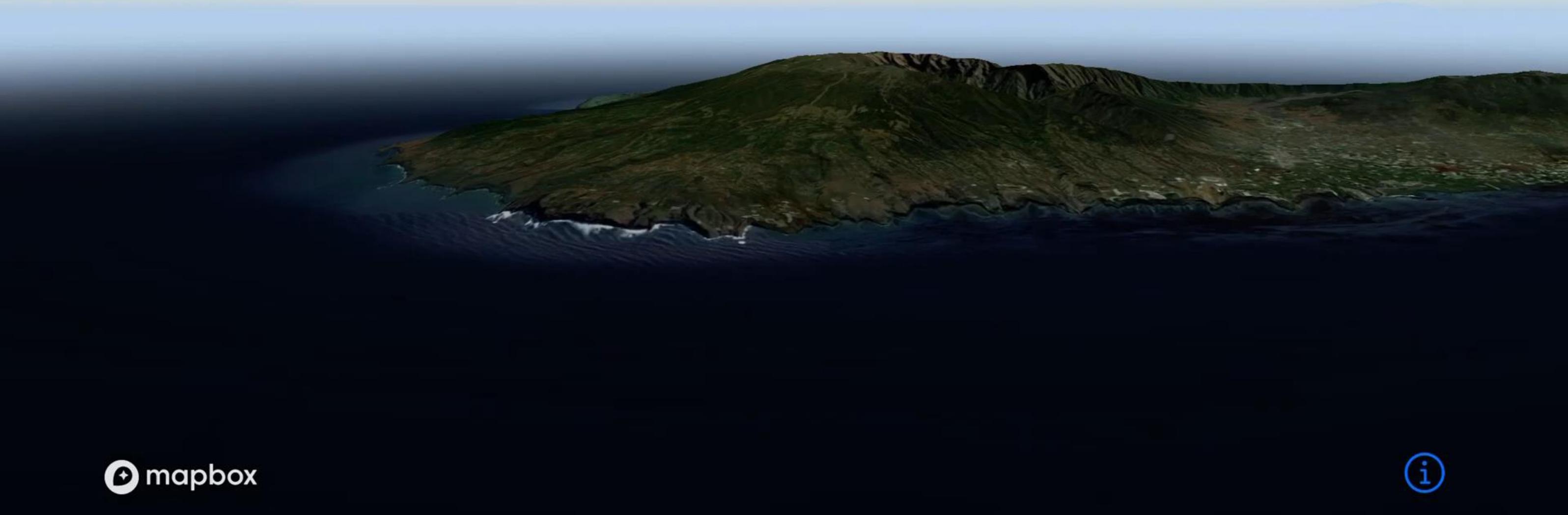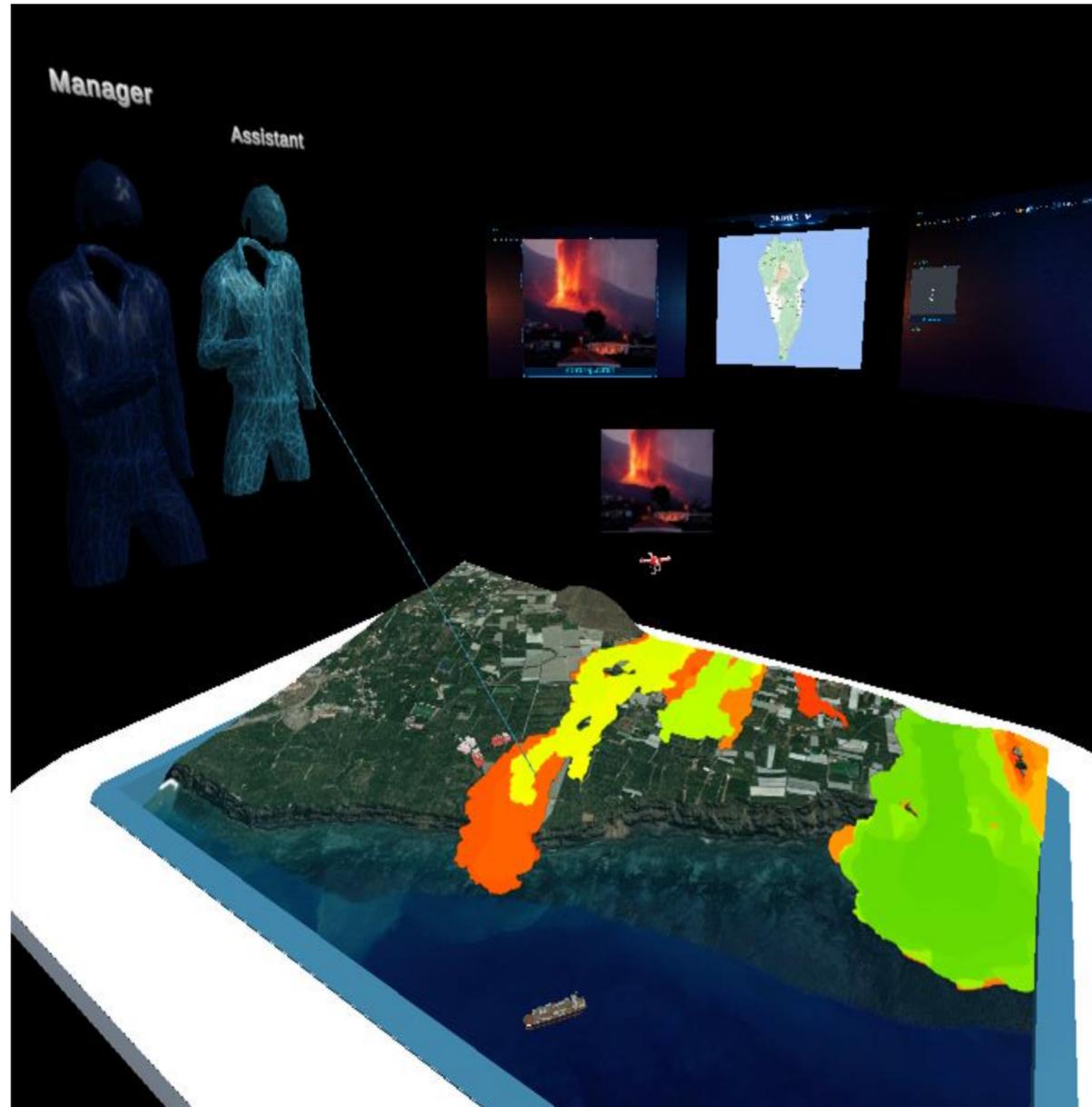
# Generative AI



- **Interface for emergency procedures.** We developed a voice-command tool that actually talk to you and answer any question you may have about any specific manual or procedure, going directly to the point. It applies generative artificial intelligence algorithms (on-premises) to process large datasets, documents, and multimedia resources, summarize them, and present them in the command center interface in audio and/or text format, in multiple languages.

- **Meeting translations.** Half-duplex voice service to translate virtual meeting conversations.

- **AI-driven decisions support.** It interprets complex scenarios and suggest action recommendations based on pre-trained doctrines. It is capable of containing simulation models for emergency management training scenarios such as floods, maritime spills, lava eruptions, forest fires, and specific emergencies like chemical explosions and gas clouds.

Telefónica

# Use Case:
# WildFire & Vulcano

# Use Case:
# Valencia Port

**Telefónica**

since 1924