

The logo for INGENIOUS features the word in a bold, black, sans-serif font. The letter 'O' is replaced by a stylized circular graphic consisting of concentric blue and white rings, a central red dot, and dashed lines extending horizontally and vertically. The background of the slide is a light blue, semi-transparent image of a dog's head.

INGENIOUS

# AR for First Responder: INGENIOUS perspective

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RESPOND-A Workshop April 2021

This project has received funding from the European Union's Horizon 2020 research and innovation programme and the Korean Government under grant agreement No 833435



# Agenda



- What INGENIOUS Is about?
- What End Users expect about AR?
- What AR is trying to achieve and and how?
- Where do we stand?

# INGENIOUS

## Consortium

- 6 End-users/First Responders
- 6 Specialised SMEs & Industries
- 1 Legal, privacy, ethical and social, human and security factors expert

10 RTOs and UNIs

23 partners from  
13 countries

## Duration

September 2019 – August 2022

## Overall budget

€8.961.111,25



# INGENIOUS at a glance



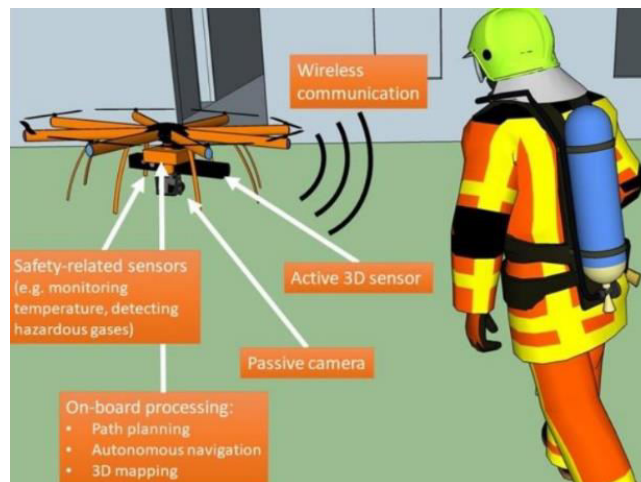
INGENIOUS will develop, integrate, test, deploy, demonstrate and validate a **Next Generation Integrated Toolkit (NGIT) for Collaborative Response**, which ensures high level of Protection & Augmented Operational Capacity to respond to the disaster scene.

*fully aware, fully connected and fully integrated*

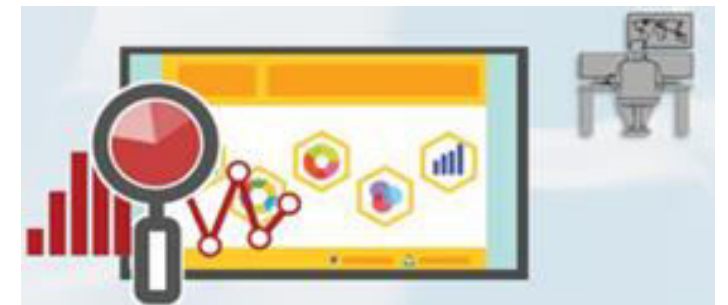
**1.** The NGIT builds upon the concept of “Smart” First Responders



**2.** The NGIT comprises of **Smart Devices in the Air and on the Ground**



**3.** The NGIT supports FRs with **multi-fusion and expert reasoning, a C3 and a COP platform** with AR capabilities and with **mobile applications**



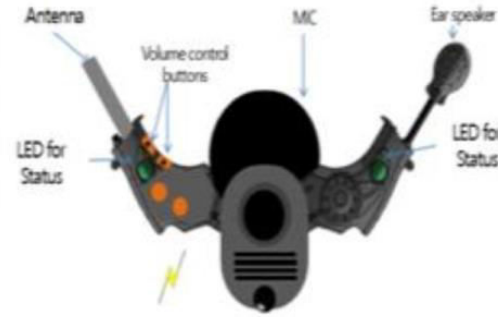
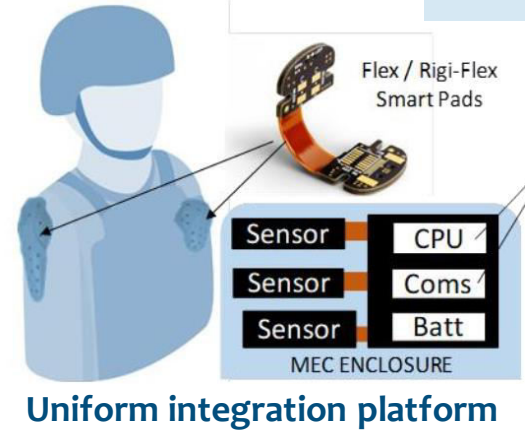
# 1. "Smart" First Responders



Tools & Services to protect them and enhance operational tasks

## FRs NGIT Components

- Helmet
- Uniform & wearables
- Boots
- K9 Units
- Protecting FRs
- Augmenting their situational awareness
- Allowing them to collaboratively respond



**Helmet & comms**

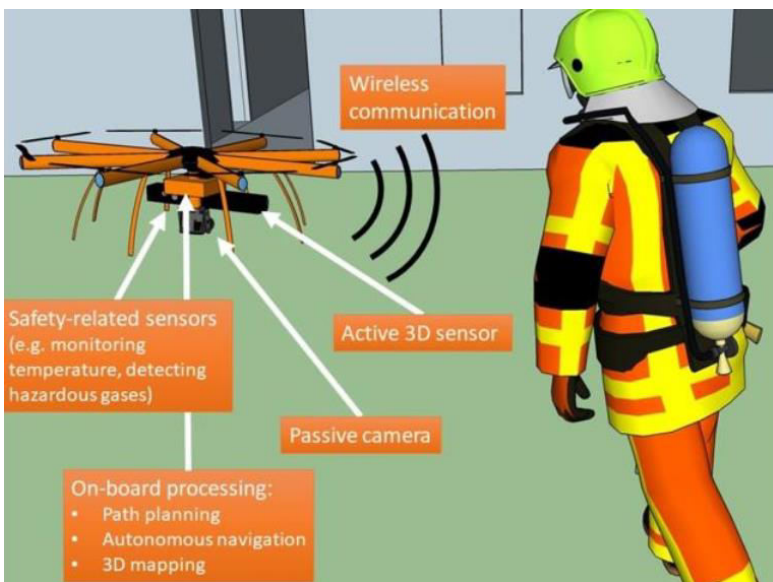
# 2. “Smart” Devices in the Air and on the Ground

Tools & Services operated by First Responders to protect them and enhance operational tasks

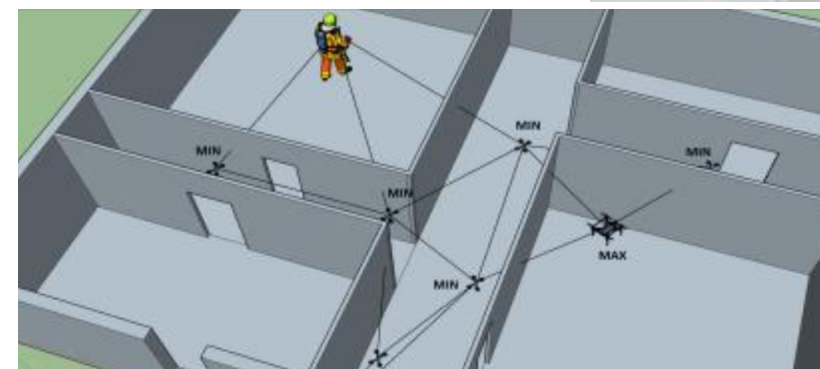


- Micro Indoor droNe (Deployable Positioning System)
- Multi-purpose Autonomous eXploring drone (monitoring & detecting)
- Ubiquitous resilient field communications

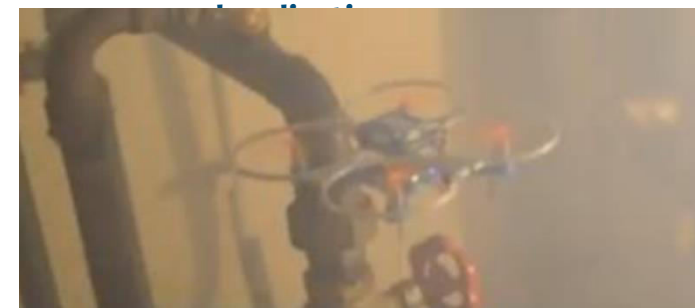
MAX platforms will be able to enter from openings of various structures and **navigate autonomously** indoors, collecting 2D and 3D data of unexplored areas carrying a **multitude of sensors**.



High level design of MAX

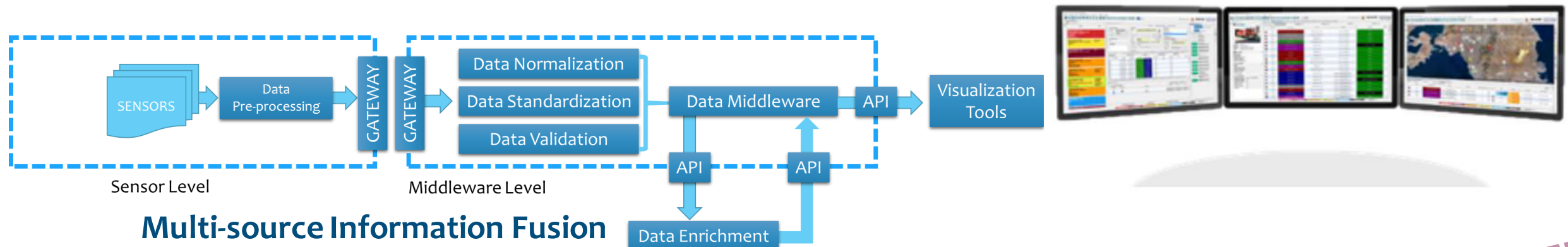


MINs swarm formation to improve indoor

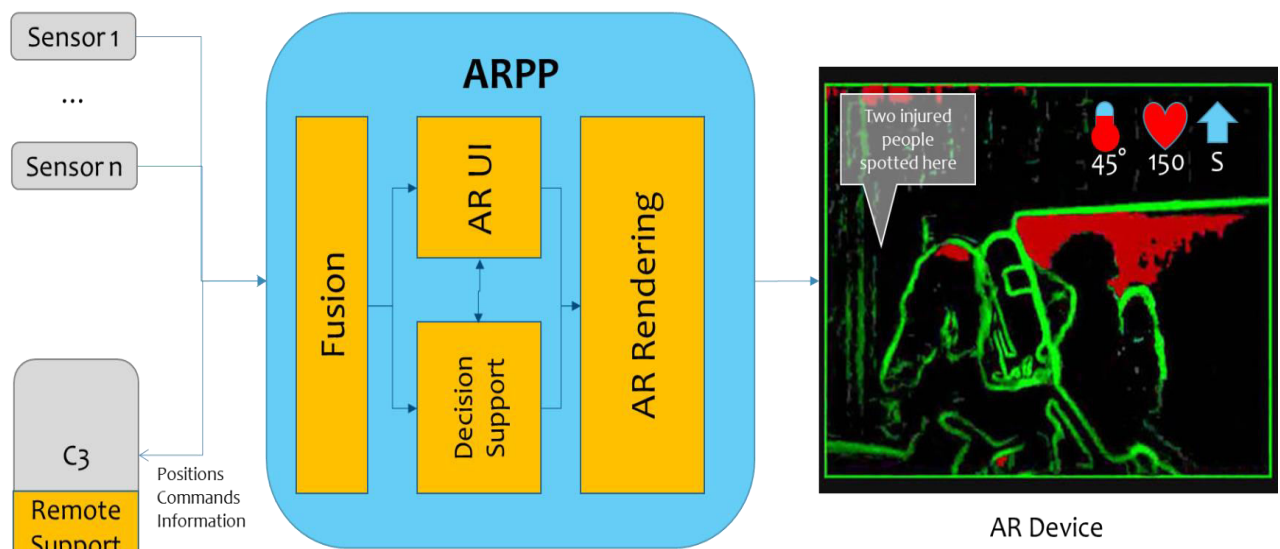


Collision based navigation in cluttered, unknown environments

# 3. Augmenting the Common Operational Picture, C2 and FR Apps



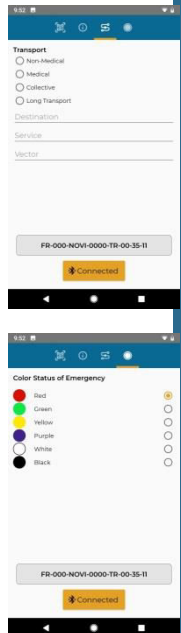
Multi-source Information Fusion



Augmented Reality (AR) functions

## Mobile Application Kit

- Patient Face recognition
- Triage & Patient tracking
- Multilingual
- Social media
- Worksite Operations



# Testing & Field Validation



A rich programme that contains:

- **27 Laboratory** Integration and Testing sessions (LITs),
- **18 Small Scale** Field Tests (SSTs) and
- **2 Large Scale Field Validation** demonstrators/exercises (FSXs)

FRs will have to respond to several combinations of cases in several scales - standalone or in parallel – with or without cascading effects

- [Industrial accident, Building fire]
- [Earthquake/Explosion damaged building, Flooded enclosed space/Maritime SAR]
- [Earthquake/Explosion damaged building, Fire covering large rural/forestry area]
- [Earthquake/Explosion damaged building, Flooded enclosed space]
- [Earthquake/Explosion damaged block of buildings, Flooded wide area and enclosed space]
- [Absence of comms after disastrous event, worksite and indoor comms between FRs, with victims to the HQ/Maritime SAR]
- [Earthquake/Explosion damaged building]
- [Triaging after large earthquake/explosion]
- [Attack in public space, Patient biometrics after triaging in earthquake]
- [Large earthquake near shore with cascading effects, e.g. chemical leakage, comms failure]
- [\* attacks in multiple locations]

The logo for 'INGENIOUS' features the word in a bold, black, sans-serif font. To the right of the text is a circular graphic composed of concentric blue rings and a central red dot, with dashed lines extending from the center to the edges, resembling a target or a technical diagram.

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**What the end users expect about AR?**

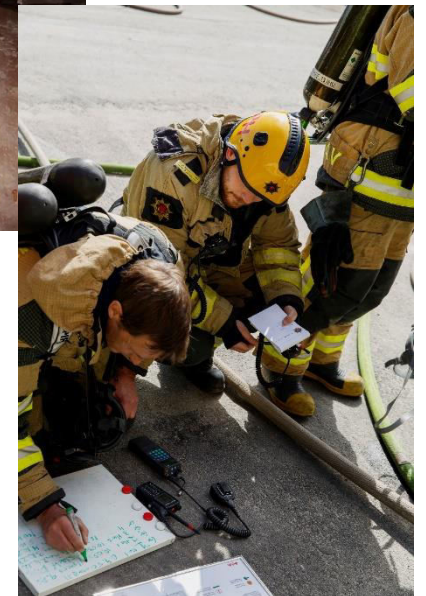
# What the end users expect?

- Safety comes first
- Data presented must be
  - Transparent and/or not hinder the FoV
  - Non-obstructive to FR field activities
  - Non-intrusive and relevant for person using it



# What the end users expect?

- Relevant information depends
  - **On the situation:** fire / terrorist attack / gas leakage / natural disaster...
- **The task at hand:** SaR, put out fires, treat injured people, ...
- The command level of the person using it
  - **Field operator:** Minimal
  - **Team leader:** Related to the team
  - **Operator at the control centre:** Overview



# What the end users expect?

- Capability to work indoor & outdoor



# What the end users expect?

- Voice input to applications
- Real-time provision of alert & messages
- Visualise teammates position
- Hand free interaction with other components
  - Triage & patient tracking for instance





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**What will AR (try to) solve and how?**



# What will AR solve and how?

- It's about compromises
  - To get the best out of the latest AR technologies
    - **AR must not be a gadget:** Propose relevant features
    - **Keep it simple:** Do not increase the mental load
  - Taking into account AR technical limitations
    - Hardware not design yet for operational use (outdoor, wide area,...)
    - It's challenging to display geo-localized information for uncontrolled environment
- AR in INGENIOUS primarily addresses field operators

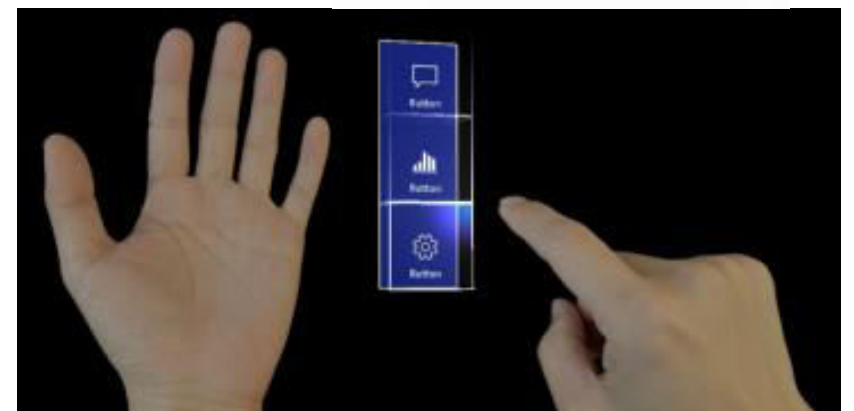
# What will AR solve and how?

- Selected devices for the project: ORA-2 / HoloLens 2
  - See through, wireless, wifi/Bluetooth
- **ORA-2: Augmented Reality (AR) device**
  - Lightweight
  - Enable plain AR
  - Easier to integrate into an helmet
- **HoloLens 2 (HL2): Mixed Reality (MR) device**
  - multiple sensors
  - Enable Extended AR => MR
  - Natural interactions by hands



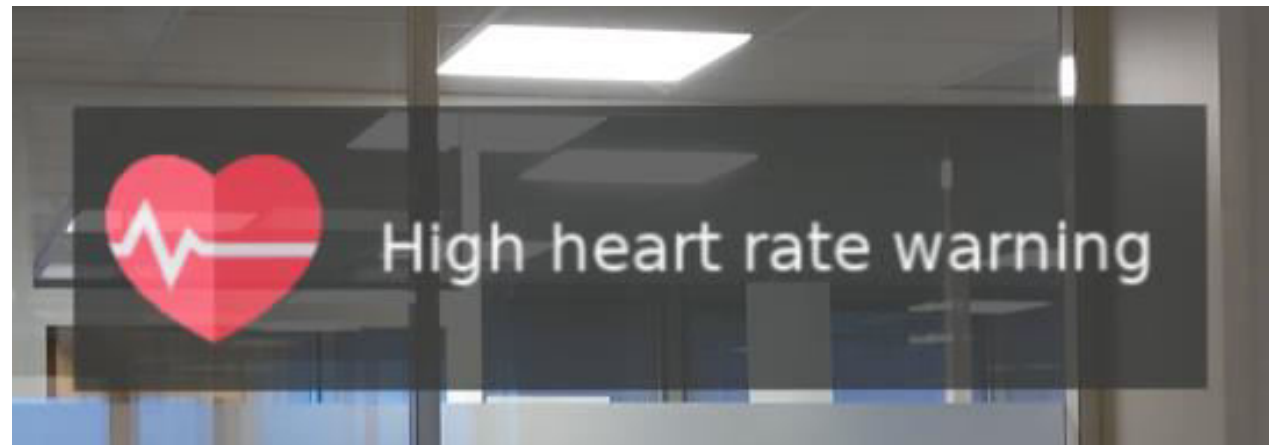
# What will AR solve and how?

- FRs tasks require full attention and usage of both hands
  - Heavily limits the type of devices they can bring and use
  - AR can enable true **hand-free** operations
    - **Voice command**, but
      - Limit the number of commands,
      - Differentiate them (and/or use keyword),
      - Environment can be noisy
    - **Mixed reality interaction: On demand UI**



# What will AR solve and how?

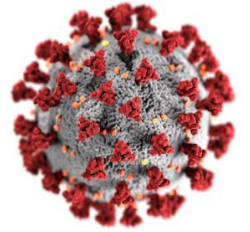
- AR can directly grasp the user attention, even in complex situations without any action from the FR
  - Visual notification displayed in front of him
- Can automatically fade out



# What will AR solve and how?

- Man made errors and disorganised emergency response from lack of information
  - AR is the next step in providing Situational Awareness to field units
    - Real time provision of visual notification
    - Annotation into the environment
      - Geo location of switch/valve
      - Risks / hazardous substance
  - And to control centre
    - Precisely report geo localized information or incident





- # Where do we stand?
- Presented AR/MR capabilities **remotely** to end users
    - But some already experience AR previously
  - Work on-going to create and tailor AR features to INGENIOUS use cases
  - 1st on site demonstration planned after the summer

# INGENIOUS

**Thank you for  
your attention**

• **Any Questions ?**

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