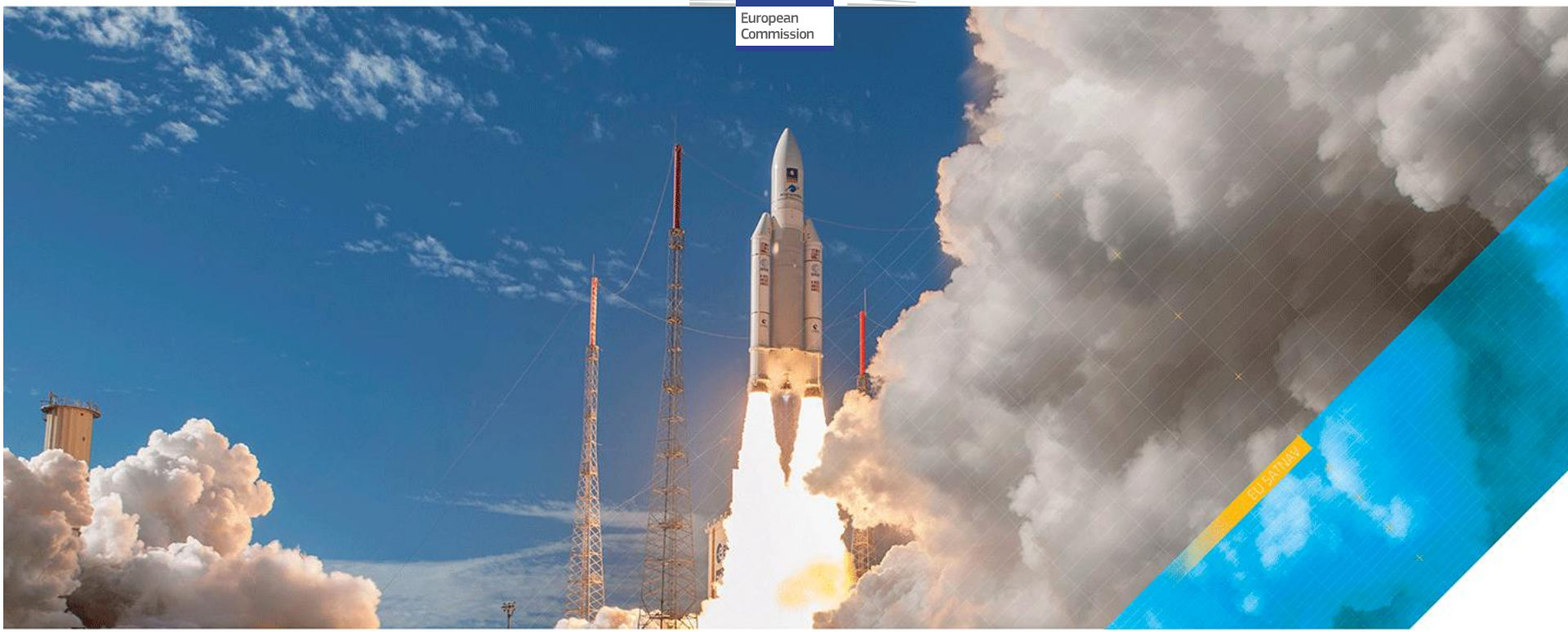


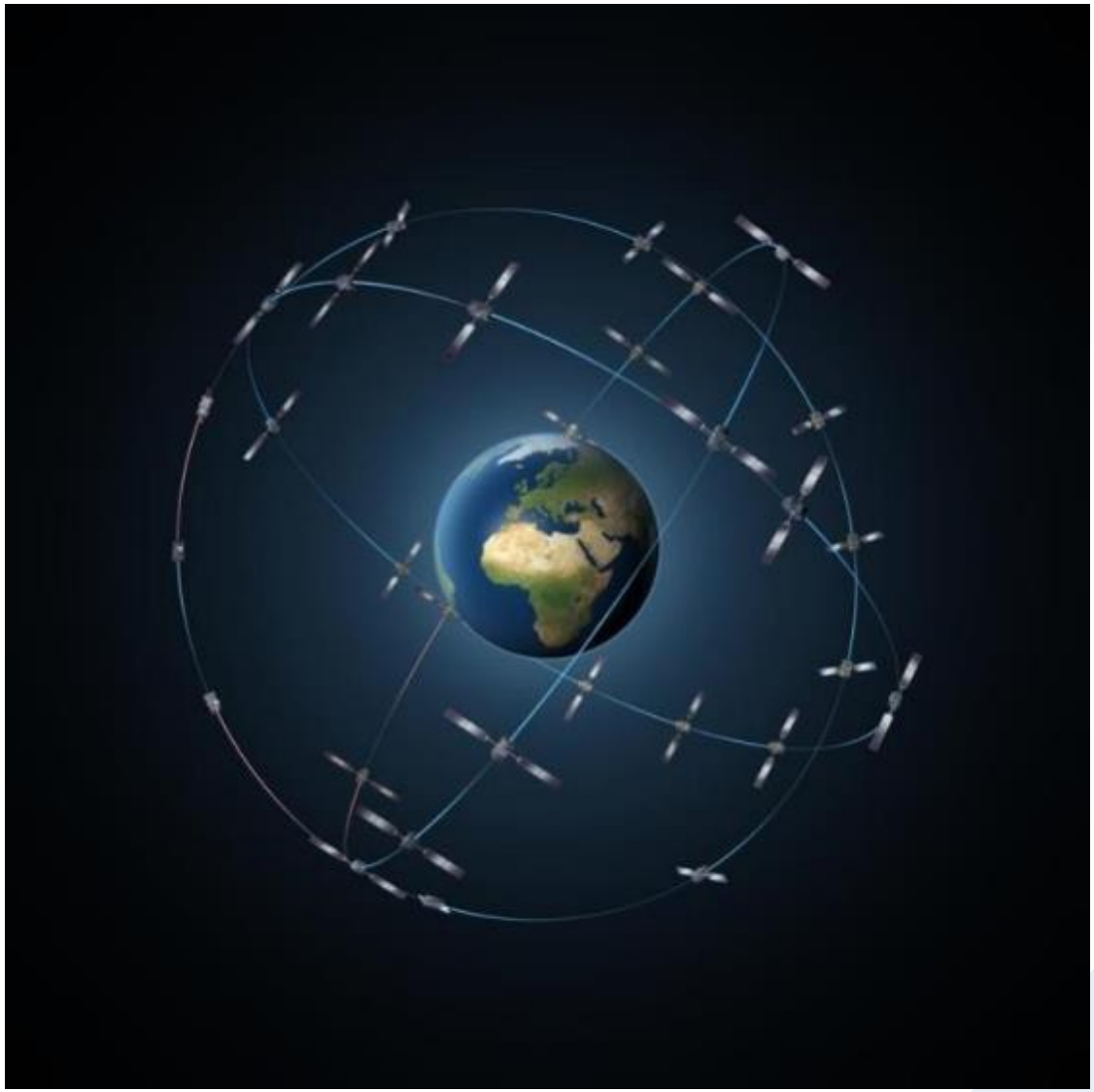
Emergency Warning Satellite Service in Galileo

Eric Guyader, European Commission, Galileo and EGNOS programme

ICG 17 • Madrid, October 2023

Eric.Guyader@ec.europa.eu

GALILEO TODAY



– 28 satellites in orbit

– Remarkable performance

– Operational services, or in roll-out phase

– Strong link with users, market and industry

– Modernization on-going

GALILEO SERVICES

GALILEO EGNOS
NAVIGATION MADE IN EUROPE

Now, Then, & Next

Open Service (OS)

- Free and Open Positioning Navigation & Timing (3 frequencies + improvements)
- Emergency Warning Satellite Service + Advanced timing + SSV

Public Regulated Service (PRS)

- Encrypted, more robust, unlimited & uninterrupted access
- PRS evolutions

Search and Rescue (SAR) - contribution

- Forward link + acknowledgement "return link“ + RBA + TWC + DPS

High Accuracy and Authentication

- High accuracy services + OSNMA
- Advanced signal authentication services

Safety-of-Life (SoL) - contribution

- Multilateral Workplan for aviation adoption (ARAIM+EGNOSv3)

BACKGROUND

- **Global trend to develop Disaster Risk Reduction technologies:**
  - United Nations' Sendai Framework for Disaster Risk Reduction: "*Substantially increase the availability of and access to* ***multi-hazard early warning systems*** *and disaster risk information and assessments to people by 2030*"

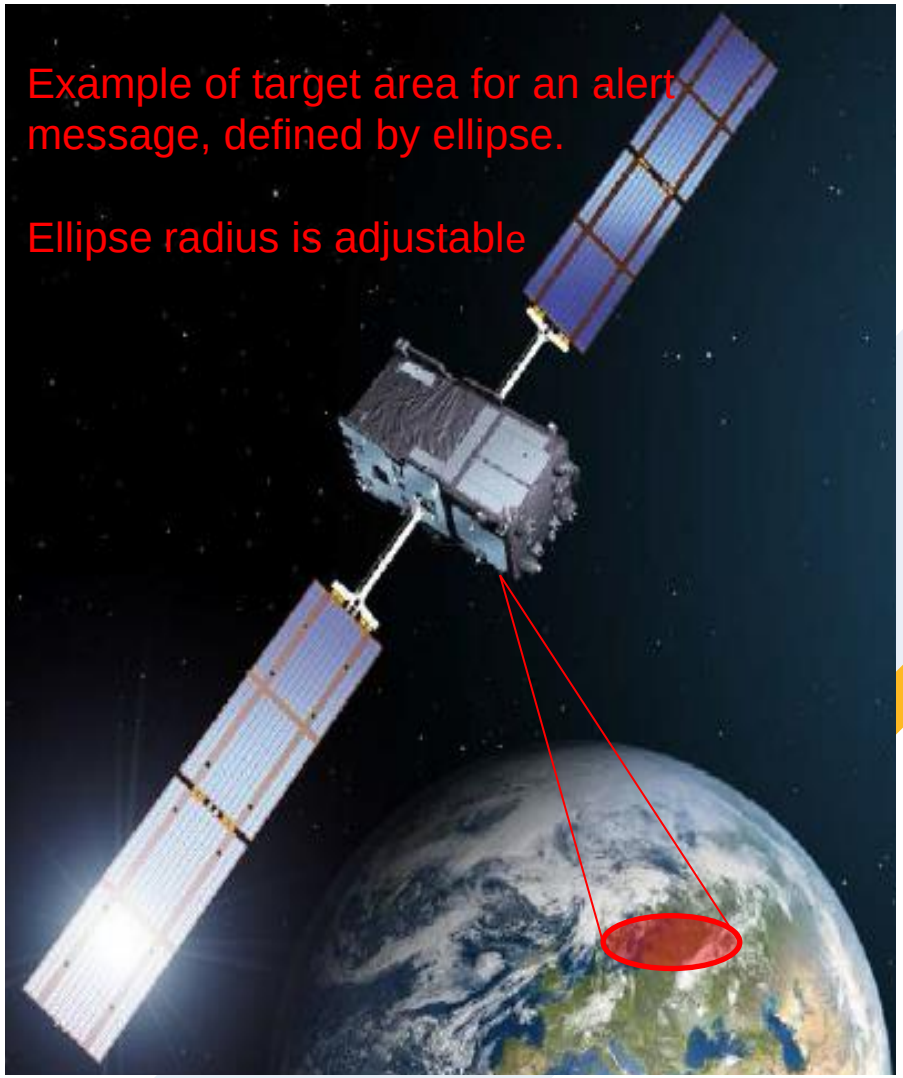
- **Galileo contribution to this target**: Emergency Warning Satellite Service (EWSS)

➢ **Use the GNSS satellite capacity for alert dissemination**

- Purpose: **Alerting the population** in case of a looming disaster (fire, storm, floods, tsunamis, volcano, industrial…)
- **National** Civil Protection entities **decide** to trigger the alert **and request** Galileo to broadcast a message.
- People receive the alert message on their **mobile phone/nav' device, or public signeage** displays the alert message (buildings, billboard, etc)

SERVICE CONCEPT (1)

- Dissemination of an alert message, including associated instructions to follow
- Global coverage
- Target area from local to continental scale
- Time to disseminate ~ minutes
- Available even when terrestrial communication networks are not working
- Available with standard personal devices (smartphone, car navigator, handheld…)
- Free of charge
- Alert message is authenticated
- **Complementary alert system to those already operated at national level**
  - ➢ **'the more systems, the better'**



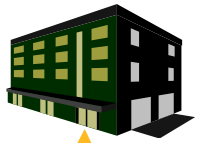
DOUBLE notification rule: receiver is located (1) **within the country** that emits the alert **AND** (2) **within the ellipse** encoded in the message

SERVICE CONCEPT (2)

OPERATION CONCEPT

National Emergency Centre

DECISION



CAP / XML

Galileo Emergency Service Interface

EWS Message Bit level

Civil protection

Galileo Ground Segment

Population

(smartphone,
car navigator, Handheld, smartwatch,
public display, sirens, etc)

The service is realised by three components:

Civil Protection Authorities **Galileo infrastructure** **end users**

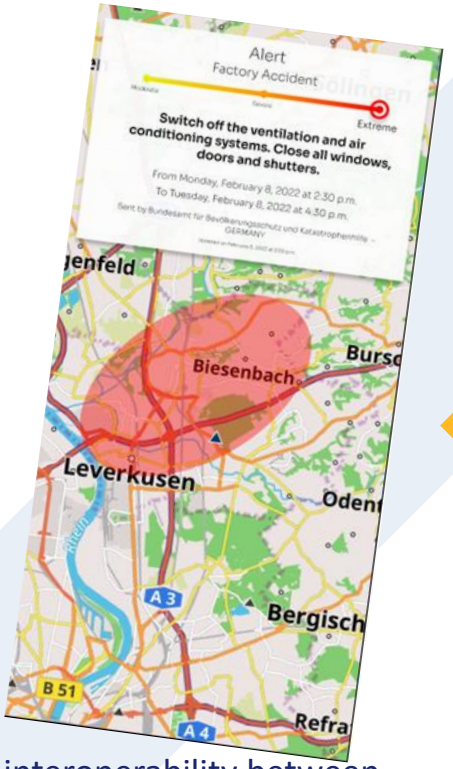
FORMAT OF THE ALERT MESSAGE (1)

Message Type 2 bits	Issuing entity 14 bits	Hazard type 7 bits	Hazard Characteristics 19 bits	Type of Instr. Library + version 4 bits	Instruction library 10 bits	Target area 49 bits	Specific settings 17 bits

Data fields 122 bits

Common EWSS Message format

- Message Type: Alert/Update/Test/Cancel
- Country ID: ID of the country from which the alert is issued.
- Provider ID: National agency raising the alert
- Event Category: Tsunami, Forest Fire, pandemic, volcano, storm, etc
- Severity: moderate/severe/extreme (or '*unknown*')
- Event Onset: Day/Hour/Minute, 7-to-14 days time horizon
- Duration: in hours, from < 0.25 h to 24 h (or '*unknown*')
- Target Area: 2D ellipse, with semi-axis ranging from 200 m to 2500 km
- Instructions: Generic instructions to population, taken from a library. (*combination of two instructions possible, to enrich the message*)
- Additional information for message customization *(magnitude of event, secondary ellipse for indicating safe destination, location of hazard, etc*)



Standard message

- Format jointly established with Japan Cabinet Office in 2022, allowing service interoperability between satellite systems Galileo and QZSS
- Several "GNSS" nations interested to adopt and implement it in their space systems

FORMAT OF THE ALERT MESSAGE (2)

Message format full description soon to be published !

Joint effort EU-Japan (Galileo-QZSS)

Photo © EC/DG ECHO, Viktoria Jeras

EXAMPLE

Type of alert

Type of hazard

Severity of hazard

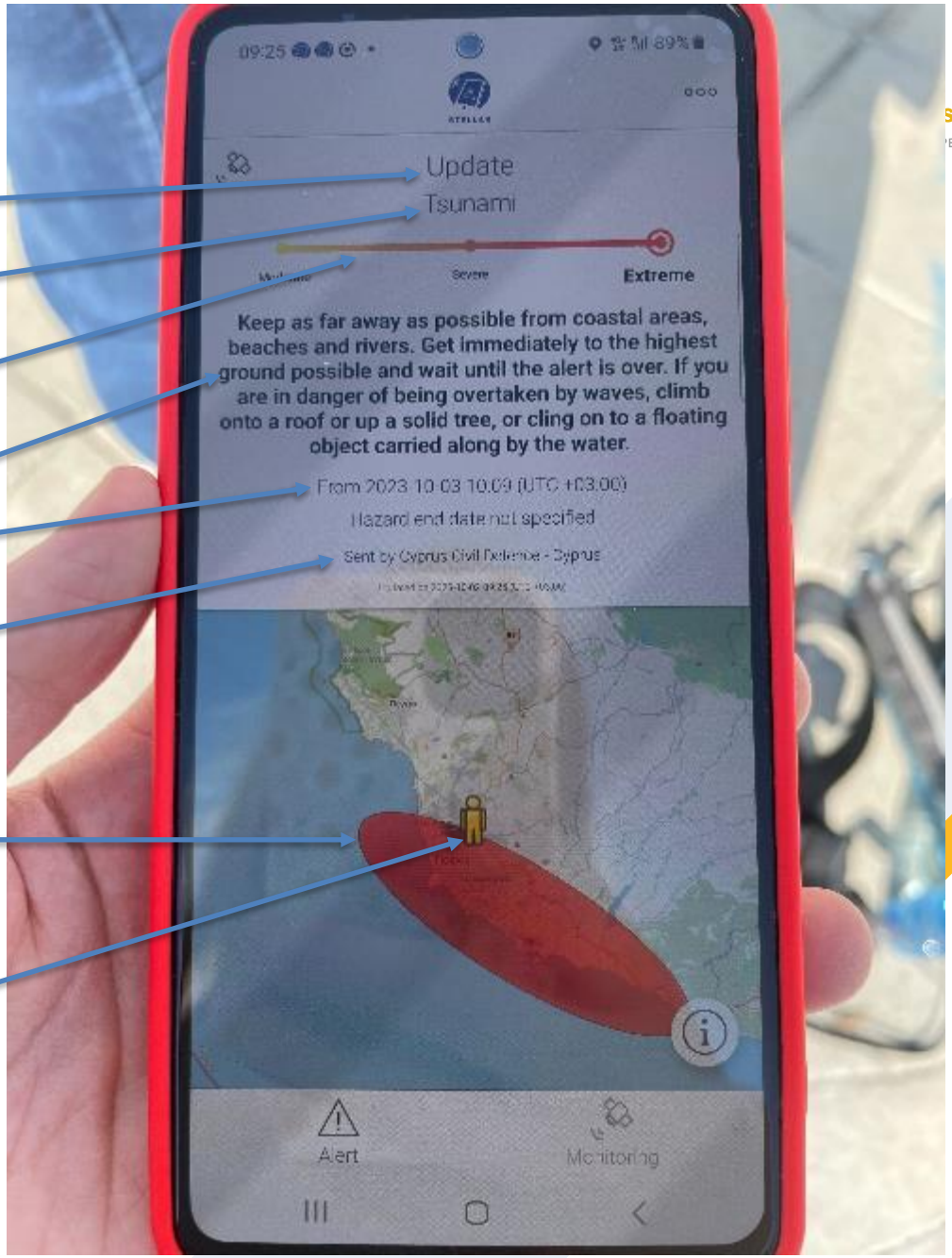
Instruction

Chronology of hazard

Originator of alert

Alert area (ellipse)

YOUR POSITION



STATE OF PLAY – OVERVIEW

- **Introduction of the capacity in the Galileo system**
  - On-going engineering activity to adjust the system and allow encapsulation of alert content in Galileo signal
  - Connections of MS civil protection agencies to the system: 2024
  - Service declaration: 2025

- **Bilateral and Multi-lateral contacts with civil protection stakeholders**
  - EU Member States
  - European Union's Civil Protection and Humanitarian Aid Operations (DG ECHO)
  - Japan (Cabinet Office, AIIT)
  - United Nations (UNESCO, EWS4ALL, ICG)
  - Interested nations

- **Publication of documentation**
  - Message format (2023)
  - Receiver guidelines, service definition document, Signal ICD (2024)

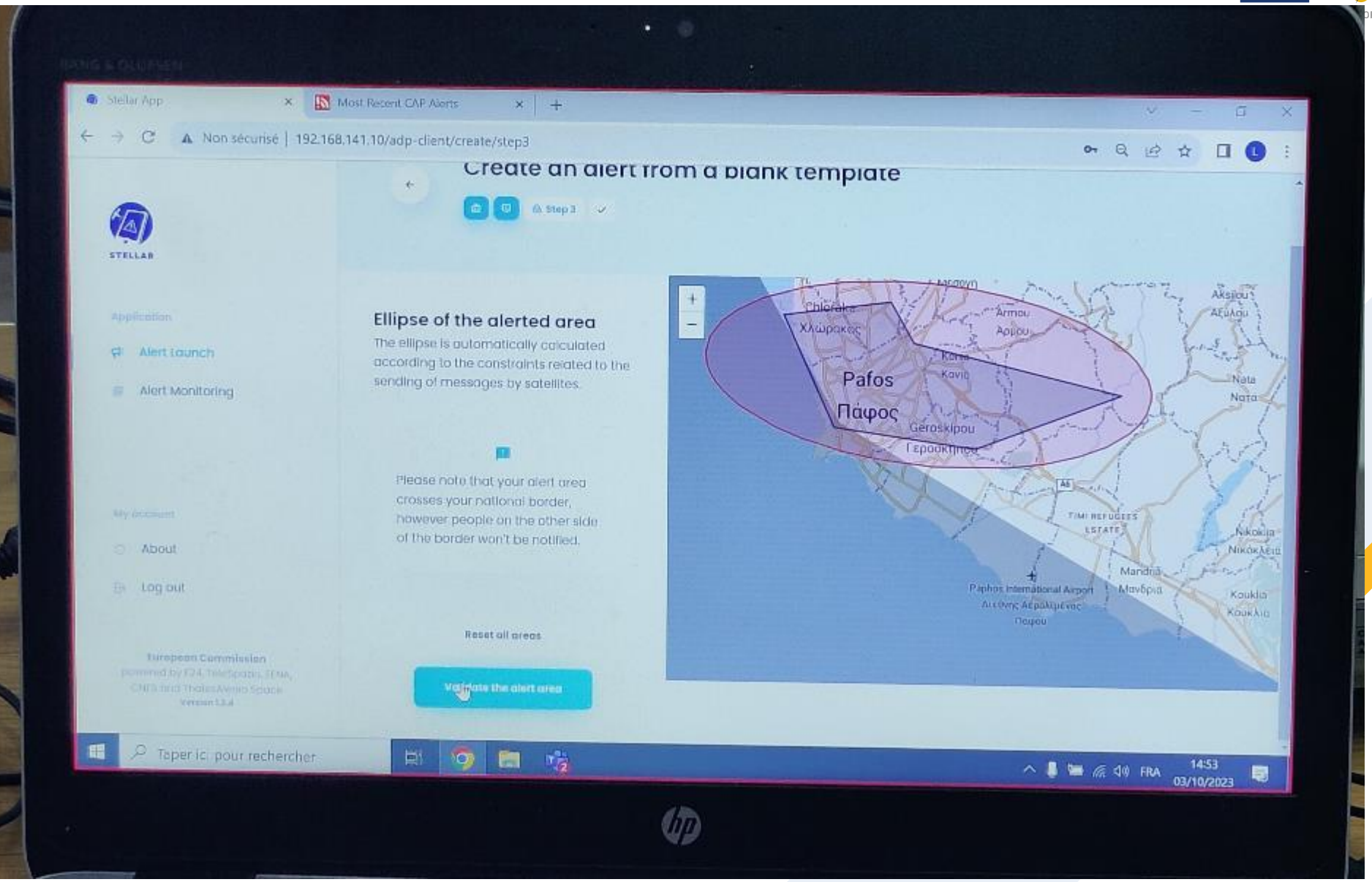
STATE OF PLAY – DEMONSTRATIONS

- **Field demonstrations in 2023**
  - France (June ‘23), Germany (June ‘23), Cyprus (Oct ‘23) ☑
  - Last demonstration scheduled January ‘24, in Belgium / Luxembourg

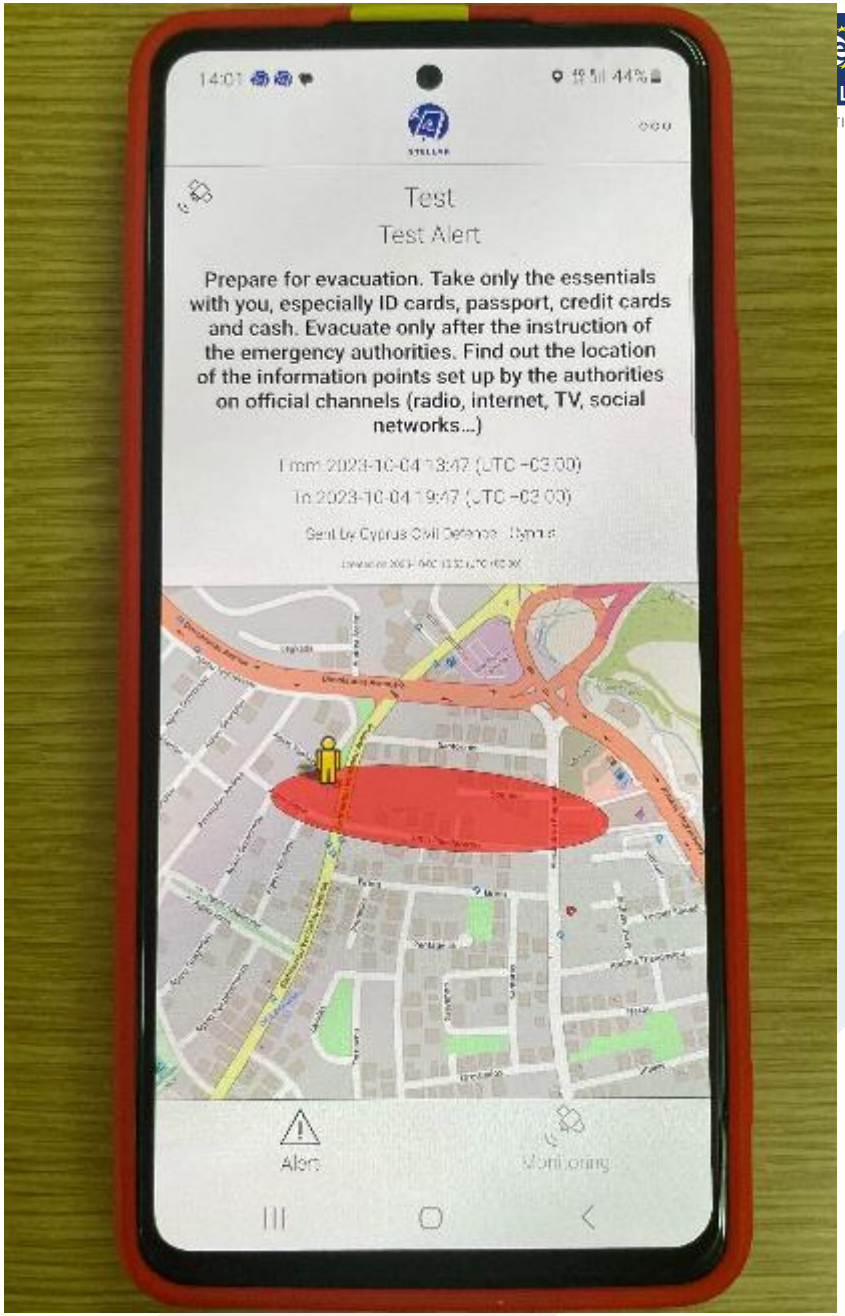
- **Purpose: organize end-to-end, in-field demonstrations of alert dissemination using the real Galileo system, and featuring:**
  - An HMI to experience the coding of the alert (*crisis room perspective*),
  - User experiences the reception and notification of an alert on smartphone (*end user perspective*),
  - Monitoring capacity to measure and report the performance of the service (*service provider perspective*).

- **Objective: show-case the potential of alert dissemination via satellite**
  - Civil protection authorities are invited to participate and experience live the characteristics and performance of the service, and provide feedback on performance, interface design and functionalities, and coherence with national doctrine, systems and protocols.

- **Workshop with participants and observers in February 2024**


Stellar App
Most Recent CAP Alerts
Non sécurisé | 192.168.141.10/adp-client/create/step3
Create an alert from a blank template
Step 3
STELLAR
Application
Alert Launch
Alert Monitoring
My account
About
Log out
European Commission
Ellipse of the alerted area
The ellipse is automatically calculated according to the constraints related to the sending of messages by satellites.
Please note that your alert area crosses your national border, however people on the other side of the border won't be notified.
Reset all areas
Validate the alert area
Pafos
Πάφος
Paphos International Airport
Taper ici pour rechercher
FRA
14:53
03/10/2023

All Clear - Emergency Warn...
Tsunami
Tsunami
Severe
Μείνετε όσο το δυνατόν πιο μακριά από παράκτιες περιοχές, παραλίες και ποταμούς. Πηγαίνετε αμέσως σε όσο το δυνατό μεγαλύτερο ύψος και περιμένετε μέχρι να λήξει η προειδοποίηση. Εάν κινδυνεύετε από τα κύματα, ανεβείτε σε κάποια στέγη ή σε κάποιο σταθερό δέντρο ή σκαρφαλώστε σε κάποιο πλωτό αντικείμενο που παρασύρεται από το νερό.


Test
Test Alert
Prepare for evacuation. Take only the essentials with you, especially ID cards, passport, credit cards and cash. Evacuate only after the instruction of the emergency authorities. Find out the location of the information points set up by the authorities on official channels (radio, internet, TV, social networks...)
Alert
Monitoring

THANK YOU

http://ec.europa.eu/galileo