An Integrated EO-based Toolbox for Modernising CAP Area-based Compliance Checks and Assessing Respective Environmental Impact

Authors: O. Sampson, N. Iliakis, V. Tsiakos, M. Krommyda, A. Amditis

Presenter: Orestis Sampson

Institute of Communication and Computer Systems Athens, Greece

Contact email: orestis.sampson@iccs.gr

Presenter: Orestis Sampson

Orestis Sampson received his Master's degree in 2017 in Computer Games Engineering from the University of Newcastle, UK. He is currently a Software Engineer for Augmented Reality applications at the Institute of Communication and Computer Systems Athens, Greece.

His interest lies in Computer Graphics and low level programming.

Farmers in the epicenter: An augmented reality enabled geotagged photos framework with high degree of quality and trust

ACKNOWLEDGMENT

This work is a part of the DIONE project. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870378.

The DIONE project proposes a close-to-market area-based direct payments monitoring toolbox that addresses the Modernised Common Agricultural Policy (CAP) regulation of using automated technologies to ensure more frequent, accurate and inexpensive compliance checks.

DIONE GEOTAGGED PHOTOS FRAMEWORK

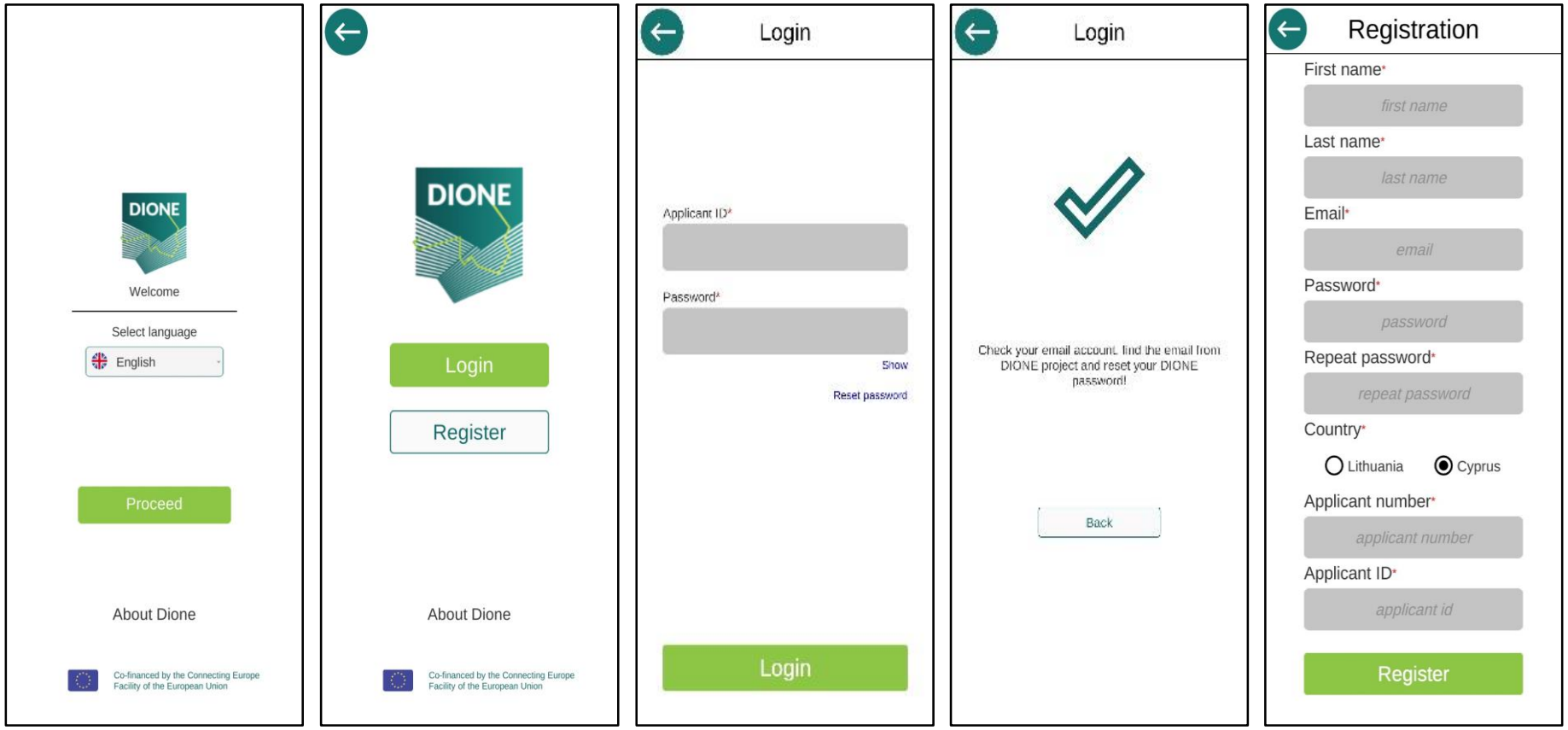
- Complement EO data sources with reliable ground based parcel information
- Useful for:
  - ✓ Small-parcel dominated regions
  - ✓ Inconclusive assumptions

- Geo-tagged photos framework consists of:
  - ✓ Mobile application used by the farmer to capture the photos supported by AR features
  - ✓ Server side process for the validation and integrity of the received information

- ✓ **Available on Play Store**
- ✓ **Integrated with Paying Agencies in Cyprus and Lithuania**
- ✓ **270+ downloads since November 2021**

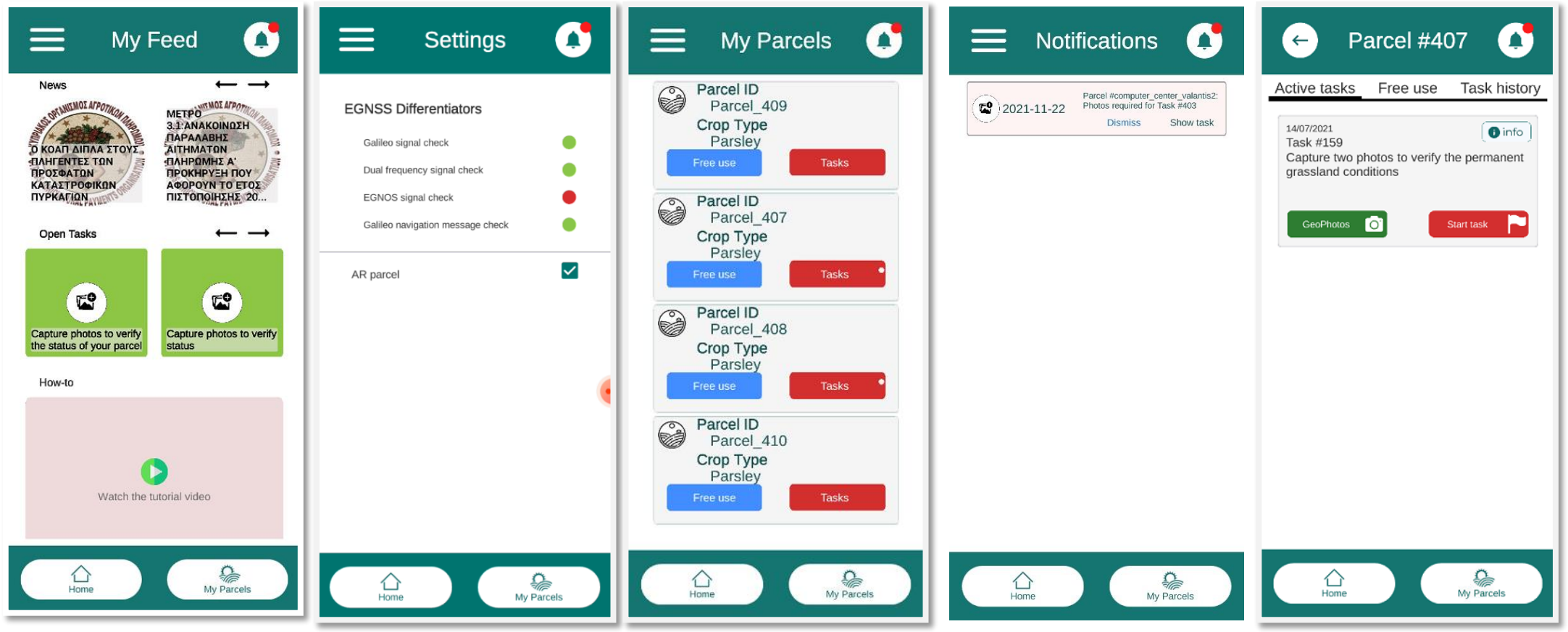
DIONE GEOTAGGED PHOTOS FRAMEWORK

User authentication



DIONE GEOTAGGED PHOTOS FRAMEWORK

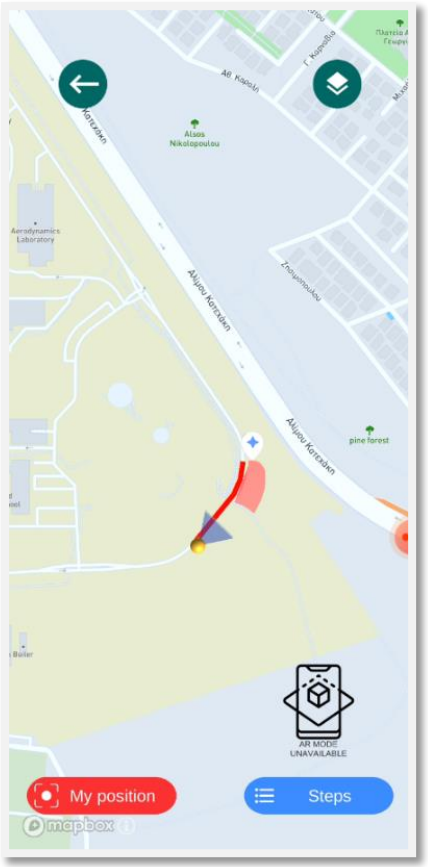
Content visualisation, settings, push notifications

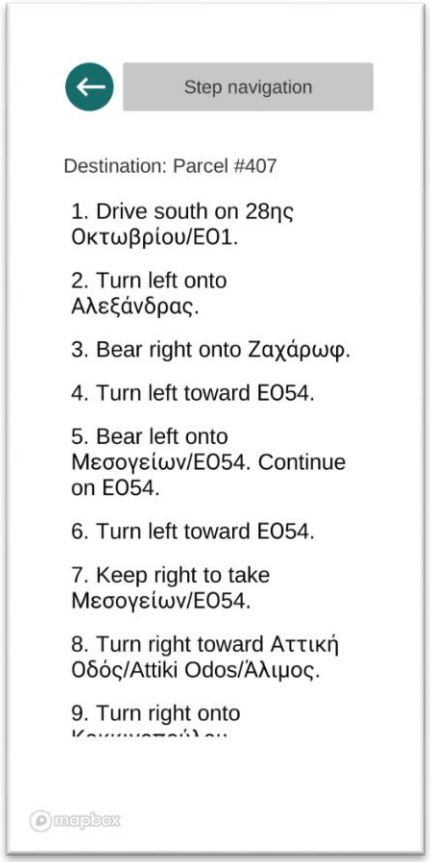


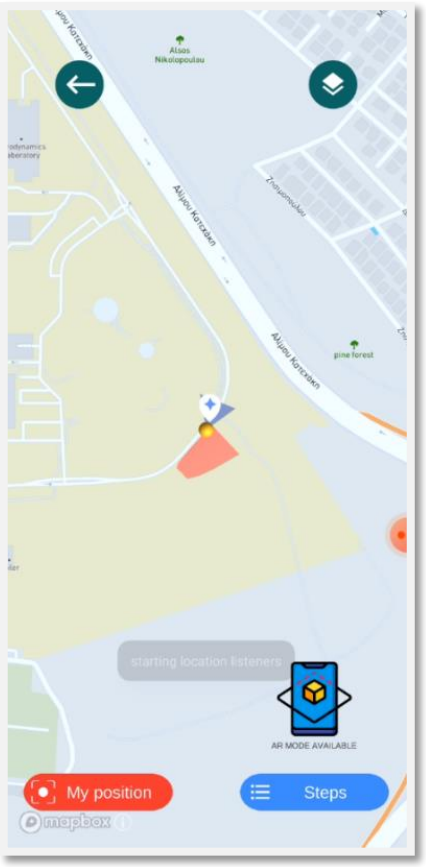
DIONE GEOTAGGED PHOTOS FRAMEWORK

Map navigation

- Route is rendered between the user position and Parcel position
- Button to change the map layers
- Button to focus the map view to the user position
- Button to display a page with text directions to the Parcel
- Button to switch to the AR session

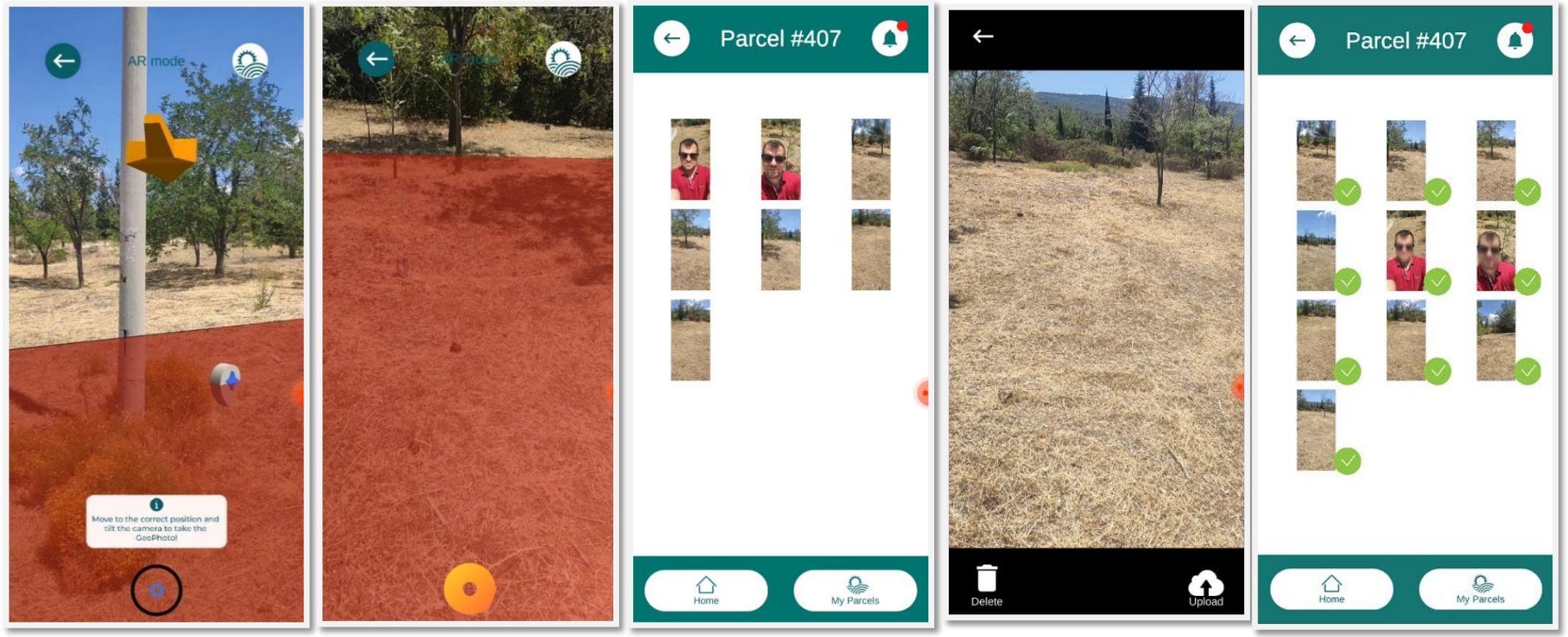






DIONE GEOTAGGED PHOTOS FRAMEWORK

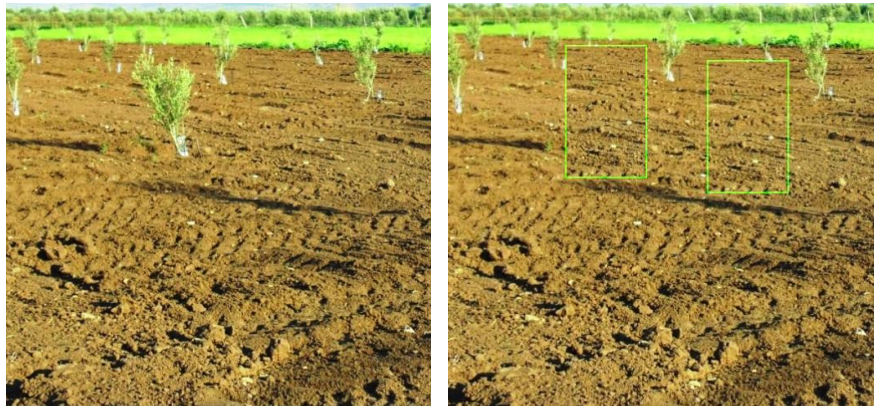
Augmented Reality



DIONE GEOTAGGED PHOTOS FRAMEWORK

- Validate origin of photo
  - Digital signature technique (cryptographically sign image)
  - Steganography technique (to hide and validate secret messages)

- Digital manipulation
  - Copy Move forgery detection (detection of duplicated regions)



DIONE GEOTAGGED PHOTOS FRAMEWORK

- Time Integrity
  - Exploiting Android API to recreate a near-precise clock independent of network access

```
local estimate of GPS time = TimeNanos - (FullBiasNanos + BiasNanos)
```

- Location integrity
  - A module has been developed, being capable to detect any external process/application that attempts to alter the position information/GPS of the mobile device
  - A dedicated algorithm has been developed allowing the exploitation of the open service navigation message authentication scheme (OSNMA).

DIONE GEOTAGGED PHOTOS FRAMEWORK

- Anonymization component
  - Blurring of personal information (i.e. face and license plate) is implemented and added in the framework

CONCLUSION – FURTHER WORK

- Application usage instructions and guidance to enhance UX.
- More work on the location accuracy solution:
  - Finalise the implementation of the EGNOS-EDAS augmentation, harnessing the required augmentation messages provided by the SISNet service of the EDAS platform.
  - Utilise filtering methods to stabilize existing position.
- With respect to the geotagged photos integrity framework, the OSNMA implementation needs to be integrated and subsequently a full test to be realised aiming to assess all the different cases.