



How efficient process design and smart technology ensures high quality biometrics acquisition for EES at sea (and land) borders

Border control scenarios for sea (and land) crossing points



Larger harbours

Applying airport processes at larger harbours



Temporary ports

Portable solutions for temporary sea border checks



At sea

Mobile ad-hoc checks at sea



Land border

Applying sea and air border processes to land border

Border control scenarios for sea and land crossing points



How are processes integrated efficiently into the existing infrastructure?

Which smart technology can be used?

How to ensure high quality biometrics acquisition according to the EES regulation?

Larger ha

border

Applying a
processes at larger
harbours

sea and air
border processes to
land border

Scenario 1: Applying airport processes at larger harbours





Solutions for larger border crossing points



secunet(easygate)



secunet(bocoa)
secunet(easytower)



secunet(easykiosk)

Why is the acquisition of high quality facial images so important for the EES?



- EES database will contain several hundred millions identities of TCN
- According to the EES regulation, for each first-time registration (enrolment) a full 1:N identification has to be conducted to perform deduplication and check for misuse
 - » Every falsely classified identity has to be manually checked by a border guard
 - » This results in much higher processing times and longer queues in the end
- To achieve low error rates, high quality acquisition of biometric data is key
 - » EES regulation requires to compulsory comply to ISO/IEC 19794-5:2011 for the acquisition of facial images → important also for law enforcement purposes

How can that be achieved?

- » Use frontal image acquisition height adjustable camera systems at every border crossing point where TCNs are registered for EES!
- » Use diffuse lighting to ensure homogenous illumination throughout the captured face and to avoid shadows and hot spots!
- » Use user guidance and process indicators in self-service systems to let travellers capture their faces easily, intuitively and fast!



ISO/IEC 19794-5:2011 compliant



ISO/IEC 19794-5:2011 non-compliant

Scenario 2: **Portable solutions for temporary sea border checks**





Flexible suitcase for fast and secure border control processes



- Modular platform for providing a suitcase system with different hardware components
- High protection of sensitive biometric data due to proven SINA architecture possible
- Dust- and waterproof system when closed
- Compact, robust and portable

Possible versions and variations

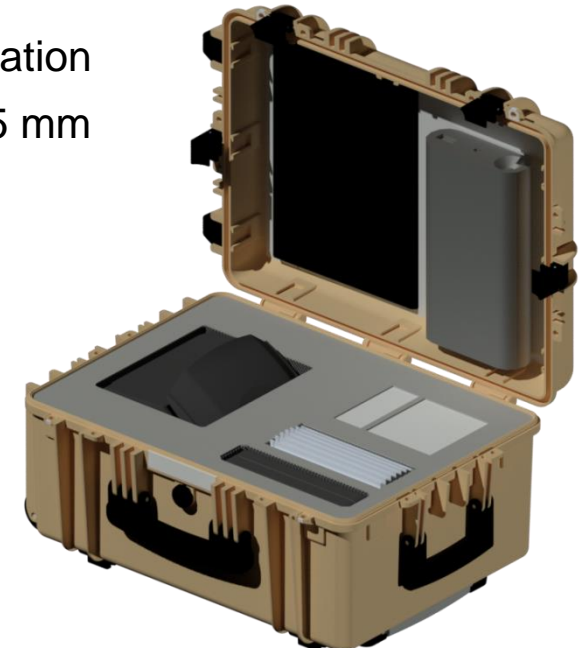
■ IDkit extended

- » Focus on law enforcement and enrollment tasks
- » Includes additional palmprint reader and signature pad
- » Battery for up to 5-6 hours operation
- » Additional antennas for 4G network connection
- » Only one plug towards laptop
- » Dimensions: 627 x 475 x 292 mm



■ IDkit light

- » Focus on functionalities needed for EES
- » Lightweight solution
 - » No signature pad
 - » Flat and lightweight fingerprint reader
 - » Digital camera for facial recognition
 - » Tablet instead of laptop
- » Battery for independent operation
- » Dimensions: 410 x 340 x 205 mm



Scenario 3: Mobile ad-hoc checks at sea



Mobile ad-hoc checks

Using fully integrated equipment

- » Ruggedized tablet, IP65 protected
- » MRZ reader, RFID reader
- » 4-finger reader
- » High-quality facial camera including lighting

Using standard smartphone equipment

- » Android or iOS smartphone
- » With NFC reader (or additional sleeve for iPhones)
- » Use integrated camera for facial image acquisition
- » Use additional (e.g. wireless) 4-finger reader

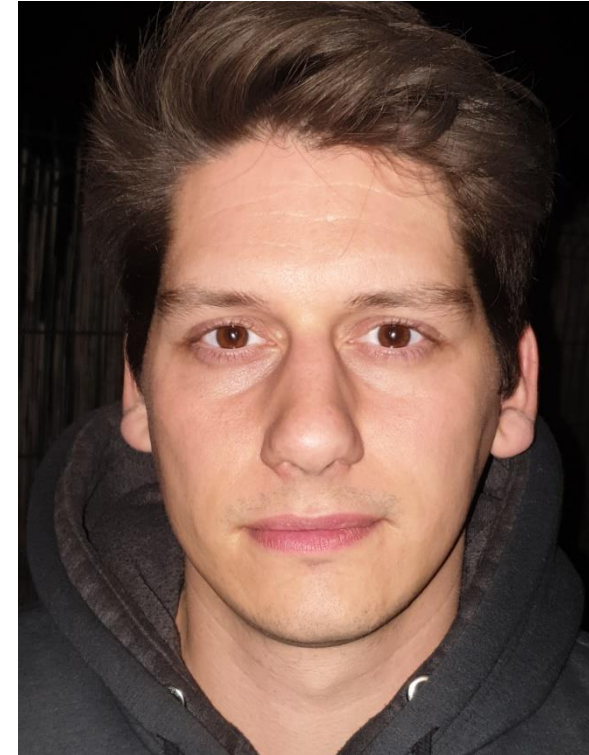
Evaluation of mobile facial image quality

- Evaluation of more than 600 images
- Used devices
 - » Chameleon 8 Pro
 - » iPhone 7+
 - » Samsung Galaxy S9+
- Tested scenarios / environments
 - » Inside, with daylight
 - » Inside, with lighting
 - » Outside, sunshine
 - » Outside, darkness
 - » Outside, cloudy sky
 - » Outside, dawn
 - » In a bus / coach
 - » At train station
- Different distances from person to camera



General outcomes of evaluation

- Minimum eye distance of 120px (according to Implementing Acts) can be achieved
- Minimum resolution of 800x600px of cropped full frontal image (according to Implementing Acts) can be achieved
 - » Except for iPhone 7+ at a distance of 70cm



Test setting 1: Bright, natural environment with daylight

- Inside with daylight, outside with cloudy sky, ...
- Results
 - » Many ISO/IEC-19794-5 compliant images captured
 - » Sometimes problems with uniform lighting of the image



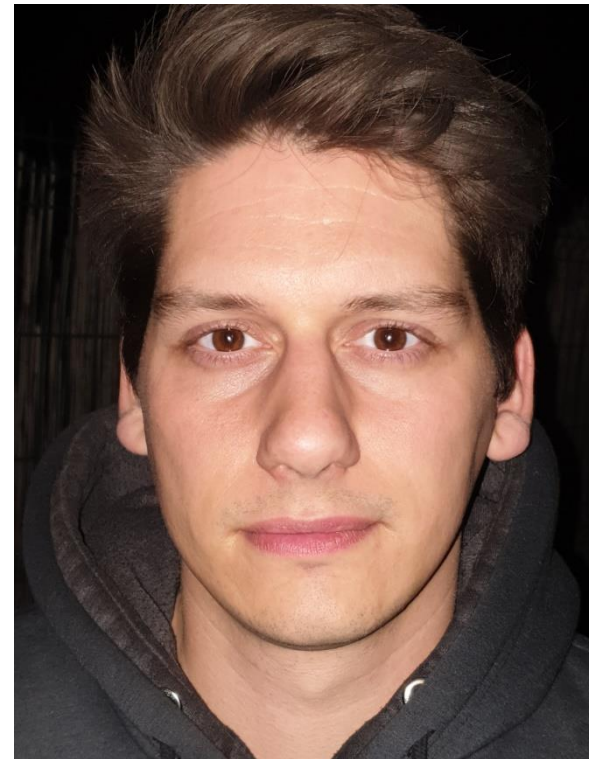
Test setting 2: Environment with additional light sources

- Inside with lighting, outside with sunshine, in a bus / coach, at train station, ...
- Results
 - » Problems with uniform lighting (shadows in the face)
 - » Problems with hot spots (due to non-diffuse additional light sources)



Test setting 3: Dark environment

- Inside / outside darkness, dawn, ...
- Results
 - » Problems with uniform lighting and hot spots
 - » Sometimes exposure problems
 - » Sometimes sharpness problems



Summary and recommendations for mobile face acquisition

- By carefully selecting the mobile device with regards to resolution of the camera (eye distance, size of cropped images) standard mobile equipment can be used
- Ensuring frontal image acquisition is not challenging in mobile scenarios
- Main challenge is to
 - guarantee uniform lighting and to
 - avoid hot spots!
- Recommendations
 - Use integrated lighting of devices (if possible use diffuse lighting)
 - Add guidance for the officer into the GUI of the mobile application to ensure proper positioning during capture
 - Including to ensure optimal distance between camera and traveller
 - Try to use bright, natural environment for the acquisition process
 - Especially if used for first-time enrolment

Comparison of mobile approaches



+ Advantages

- One fully integrated device, no separate peripheral components
- Designed for operational outdoor use, ruggedized solution
- Dedicated high-quality facial camera including lighting

- Drawbacks

- Higher price than standard smartphone equipment
- Additional large device besides (existing) smartphones
- More weight than smartphone



- Further use of existing standard smartphones possible, no additional device for officer
- Lower price than fully integrated devices
- Less weight than integrated device

- No special ruggedized equipment
- Additional fingerprint reader needed
- No dedicated high-quality facial camera with lighting (depending on selected model)

Scenario 4: Applying sea and air border processes to land border



Mapping from sea to land border



Sea border



Land border

Scenario 1:
Applying airport
processes
at larger harbours



- Cruise ships
- Ferries
- ...



- Large land border crossing points
- Cars, buses, coaches
- Pedestrians
- ...

Scenario 2:
Portable solutions
for temporary sea
border checks



- Yachts
- Pleasure boats
- ...



- Smaller, temporary land border crossing points
- ...

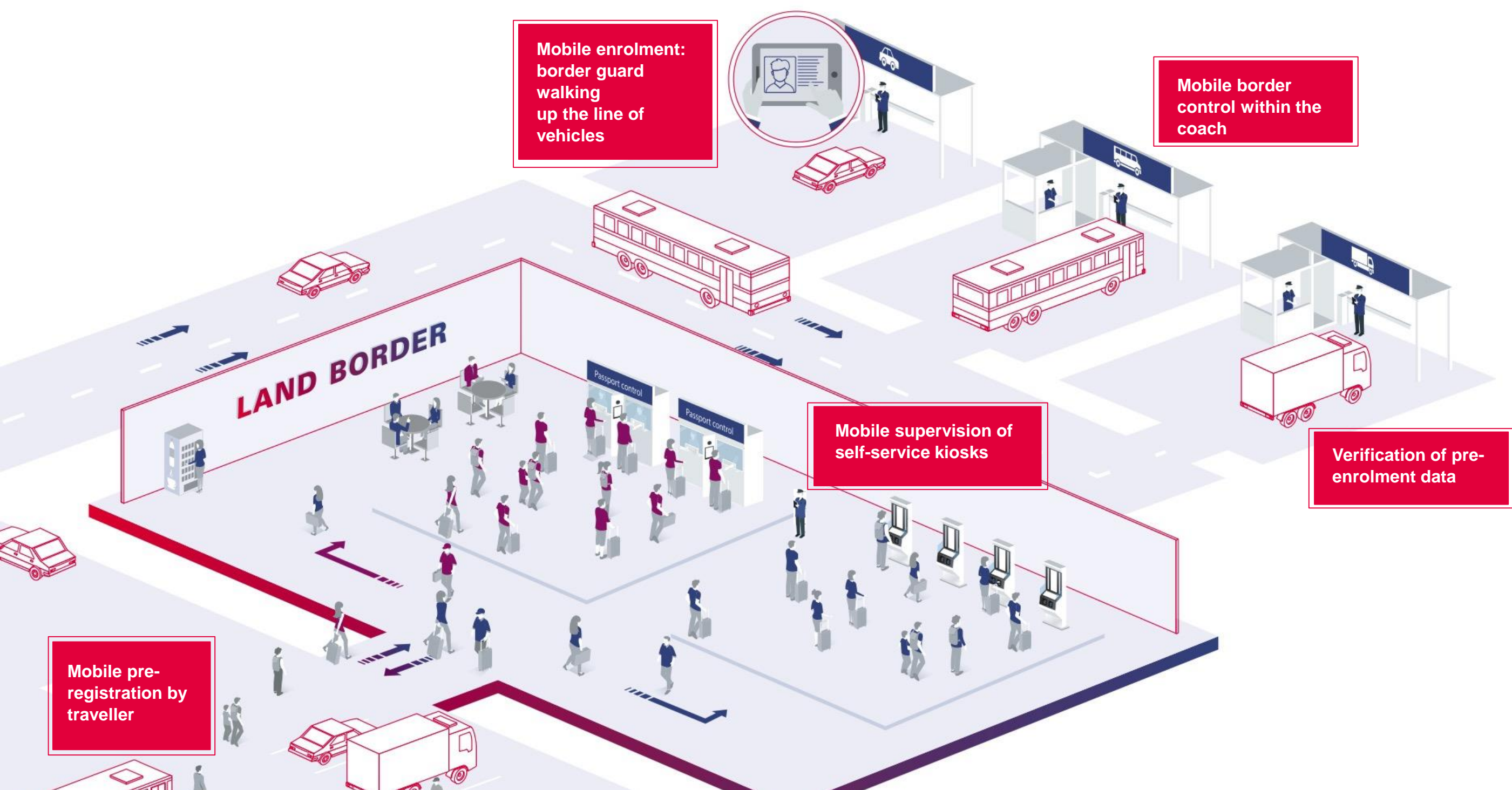
Scenario 3:
Mobile ad-hoc
checks at sea



- Cargo ships
- Fishing boats
- ...



- On the road
- Trains, coaches
- ...



Key messages and takeaways

- Sea and land border processes are similar
- Quality of biometric data is key
 - » Mobile acquisition of high-quality facial image is possible – although challenging
 - » Based on concrete scenario best mobile device should be selected
- Deployment of modular, flexible and standard-compliant solutions is advisable
- Processes are as important as technology
 - » Engage with all relevant stakeholders as early as possible
- Pilot projects may give concrete results on applied processes and selected technology



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