European Association for Biometrics
eab
Human Identity in Europe

EAB RPC 2022

12-14 September

Report

9th EAB Research Projects Conference 2022

The 9th edition of the EAB Research Projects Conference (EAB-RPC) took place at Fraunhofer IGD in Darmstadt from the 12th to the 14th of September 2022. After a two-year hiatus due to COVID-19, the conference was once again held in person. The conference was organised by the European Association of Biometrics (EAB) with the support of eu-LISA through its Governance and Capabilities Unit, DG HOME, Fraunhofer IGD and Halmstad University.

The EAB-RPC gathers the identity research community once a year to share perspectives on the state of biometrics and identity management technology in Europe, as well as to present the most recent updates on biometric research from across the continent. The primary goal of the conference is to bring together stakeholders from government, industry, and academia, including representatives from outside Europe, and enable them to share and exchange insights and best practices, and identify the gaps that are persisting in the field in order to determine the best way to move forward.

The conference is currently the largest event on research funded by the European Union in the area of Biometrics and Identity Management. Over the previous successful editions, EAB-RPC has become the main forum in Europe where attendees can simultaneously: promote research carried out in biometrics, forge new links and networks, and identify the appropriate partners for possible future project applications. This year's edition welcomed participants from academia, industry, and government, **13** different projects were presented.

Day 1

On Monday afternoon, Mr Krum Garkov, Executive Director of the European Agency eu-LISA, delivered the keynote address. The keynote, "Towards a New Information Architecture for Border Management and Internal Security in the EU," focused on the EU's future biometric vision and its integration into the Union's broader security context.

In his speech, Mr Krum Garkov emphasised that the digital transformation is omnipresent and affects every aspect of safety and security, whether it is migration security or information security. Furthermore, the pace of these transformations is intensifying, generating new stakeholders and elevating the importance of biometrics.

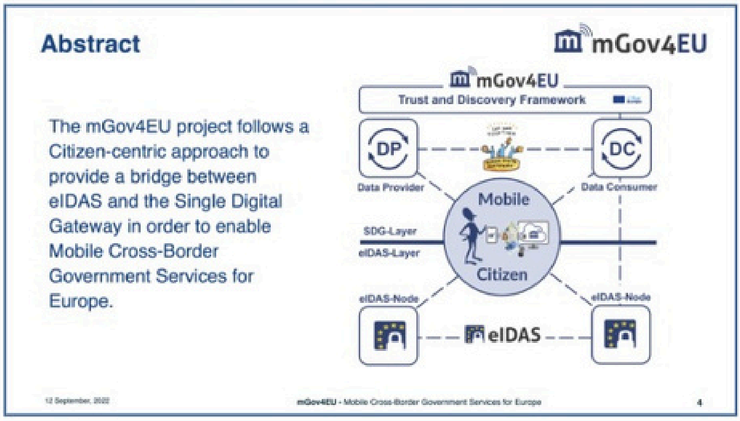
The digital transformation is especially important for the European citizens living within the Schengen Area, where 420 million people have the privilege of freedom of movement. Today, that privilege is considered as a commodity which comes with the citizenship of one of the 26 Schengen Area countries. People have the luxury of being able to move to study, to work, and to build their lives in a choice of 26 states. Digital technologies are the building blocks for the future of the EU and the benefits the Schengen Area offers to its residents already demonstrate their value.

Together, eu-LISA, the Member States, and the EU Commission are reshaping the Schengen Area's digital landscape with the goal of bringing modern, effective identity management to the EU and all of its institutions. Pilot projects on the digitalisation of visas or travel documents, for instance, serve to accomplish this objective. The development of horizontal and comprehensive European identity management would contribute to increased security across the EU, more efficient border management, and would positively impact the justice systems across the EU. The development of this new identity management architecture necessitates contributions from stakeholders at all levels. Furthermore, the EU must strive for strategic autonomy in the sector, which translates into independence from vendors from the rest of the world in fields such as AI, biometrics, and 5G.

Other challenges that the EU will face as it moves forward are not strictly technical in nature, as highlighted by Mr. Krum Garkov, but instead focus on the disparities between the rapid pace of technological development and the inadequate pace of accompanying legislation. The EU faces a critical challenge in safeguarding individuals' privacy rights, as enshrined in EU values, and at the same time, creating legislation that keeps up with technological developments, does not limit the existence of technology, but only governs its use.

The next crucial step for the EU, at the member level, is capacity building, knowledge sharing, and training. As emphasised in the keynote, citizens must have a solid understanding of how biometric technologies operate and can be applied. This will foster a culture of trust between EU citizens, EU institutions, and other relevant stakeholders, allowing the EU to achieve high social acceptance levels for biometric solutions and build public confidence that biometrics are being used for legitimate reasons and will not compromise their privacy.

After the opening keynote, the session on ongoing projects was opened with three presentations of the **Mobile Cross-Border Government Services for Europe (mGov4EU)** project. First, Rachelle Sellung (Fraunhofer IAO), gave an overview of the mGov4EU project, which is nearing its half-way point to completion. The project follows a Citizen-centric approach to provide a bridge between eIDAS and the Single Digital Gateway in order to enable Mobile Cross-Border Government Services for Europe. Until now, the project established the reference architecture, developed multi-disciplinary requirements for the pilots, conducted qualitative stakeholder research and created a trans-disciplinary evaluation method. Following that, Carsten Schmidt (University of Tartu) gave an overview of the three project-related pilots: the online voting pilot, the smart mobility pilot, and the mobile signature pilot. The pilots' objectives include determining if it is possible to undertake cross-border authentication in a mobile



Abstract

mGov4EU

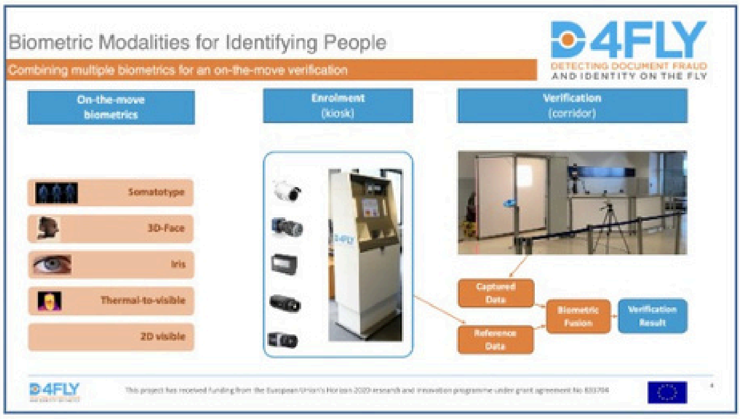
The mGov4EU project follows a Citizen-centric approach to provide a bridge between eIDAS and the Single Digital Gateway in order to enable Mobile Cross-Border Government Services for Europe.

12 September, 2022 mGov4EU - Mobile Cross-Border Government Services for Europe 4

environment, retrieving voter authorisation via SDG, and identifying voters using national eIDs. The next speaker was Blaž Podgorelec (Graz University of Technology), who discussed the early prototypes created for the mGov4EU project. These include the eIDAS App, which offers an app-based client component for mobile eIDAS-based cross-border authentication processes, and a Digital Wallet App, which enables user data to be retrieved and stored via Provisioning Service on mobile devices. Extended eIDAS package envisions integration of the eIDAS App and the Wallet App, in order to reach support of Wallet-Based Authentication at Legacy (OIDC) Services. To conclude the presenters asked several questions to the audience in order to engage them in discussion and gather feedback.

Following a brief communication break, the project sessions resumed with two presentations of the progress on the **Detecting Document FrauD and iDentity on-the-fly (D4FLY)** project. D4FLY, as presented by Armin Reuter (VERIDOS), focused mainly on document verification, as well as, enabeling multi-biometrics ((somatotype, 3D-face, iris, thermal-to-visible, 2D visible) for on-the-move verification.

D4FLY created an enrolment kiosk and a biometric verification corridor, which were deployed for the first time in a field test in October 2021. The most recent version of the solutions includes novel sensor hardware based on advanced lightfield cameras, as well as novel algorithms. From August 2021 to June 2022, the new equipment was deployed for the third series of field tests and demonstrations. Since the first field test, significant improvements have been observed across all biometric modalities. Later, Peter Eisert (Fraunhofer Heinrich-Hertz-Institute) discussed the D4FLY project's Presentation Attack Detection technologies (PAD - addressing altered appearances with silicone masks, 3D printed masks, pictures, objects, and so on). The technologies include: using blood flow analysis to detect liveliness, CNN-based 3D Geometry classification improved by XAI analysis, iris PAD, thermal and THz imaging, multispectral imaging, and pulse rate measurement. The presentation demonstrated the advanced status of the presentation attack detection technologies developed in the project.

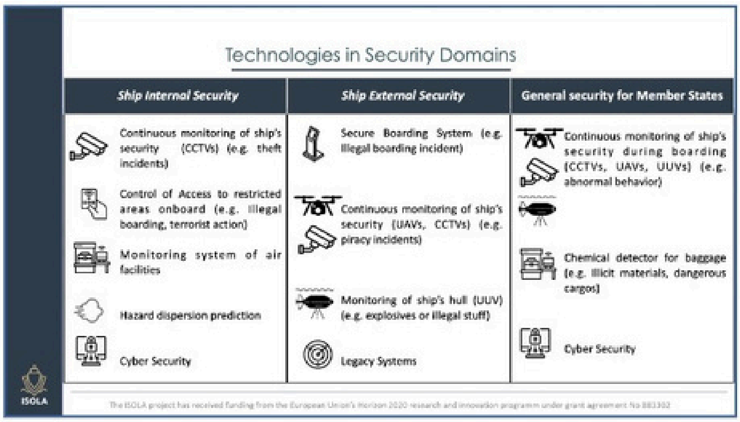


Biometric Modalities for Identifying People

Combining multiple biometrics for an on-the-move verification

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 833704

Christelle Baudry (IDEMIA) presented the project **Innovative & Integrated Security System On Board Covering the Life Cycle of a Passenger Ship Voyage (ISOLA)**. Because maritime transport facilitates trade and contacts between all EU nations, and 400 million individuals pass through EU ports, protecting citizens and economies from the consequences of illegal intentional acts against ships (hijackings, piracy, theft, drug smuggling, and cyber-attacks) becomes a major concern. ISOLA's goal is to achieve success in four areas of ship security: situational awareness, decision making support, communication and reporting, and protection of evidences. Furthermore, the project addresses the various security domains involved, which include ship internal security, ship external security, and general security for Member States. After providing an overview of the project, Christelle Baudry discussed one of five pilot use cases, which focuses on illegal boarding and stowaway incidents. ISOLA's biometric solutions, which include a secure mobile app and a secure kiosk, have been improved to be GDPR compliant by keeping the personal data on the smartphone and by being able to detect and track people not looking at camera or hiding their face. The upgraded systems have been deployed for a first rehearsal on a Greek ship with 400+ passenger capacity.



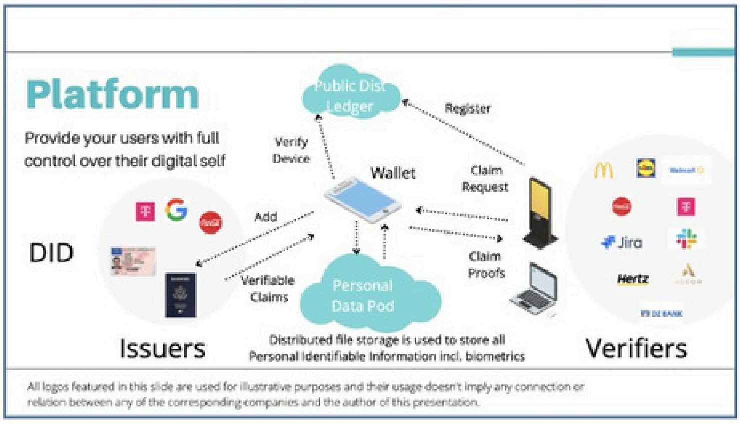
Technologies in Security Domains

Ship Internal Security	Ship External Security	General security for Member States
Continuous monitoring of ship's security (CCTVs) (e.g. theft incidents)	Secure Boarding System (e.g. illegal boarding incident)	Continuous monitoring of ship's security during boarding (CCTVs, UAVs, UUVs) (e.g. abnormal behavior)
Control of Access to restricted areas onboard (e.g. illegal boarding, terrorist action)	Continuous monitoring of ship's security (UAVs, CCTVs) (e.g. piracy incidents)	
Monitoring system of air facilities		Chemical detector for baggage (e.g. illicit materials, dangerous cargos)
Hazard dispersion prediction	Monitoring of ship's hull (UUV) (e.g. explosives or illegal stuff)	
Cyber Security	Legacy Systems	Cyber Security

ISOLA

The ISOLA project has received funding from the European Union's Horizon 2020 research and innovation programm under grant agreement No 883302

The final presentation of the day was by Pedro Torres from SME **YooniK**. The presentation discussed Self-Sovereign Identity solutions and their implications for biometrics. Pedro Torres described the inefficient and time-consuming identity solutions that are currently in use (i.e. the need to bring a passport to an airport). As presented, the goal of the YooniK platform is to not only give customers a superior experience by providing them with a single wallet app for all their needs, but also ensuring data privacy (only the



Platform

Provide your users with full control over their digital self

DID

Issuers

Verifiers

Public Dist Ledger

Wallet

Personal Data Pod

Verify Device

Register

Claim Request

Claim Proofs

Add

Verifiable Claims

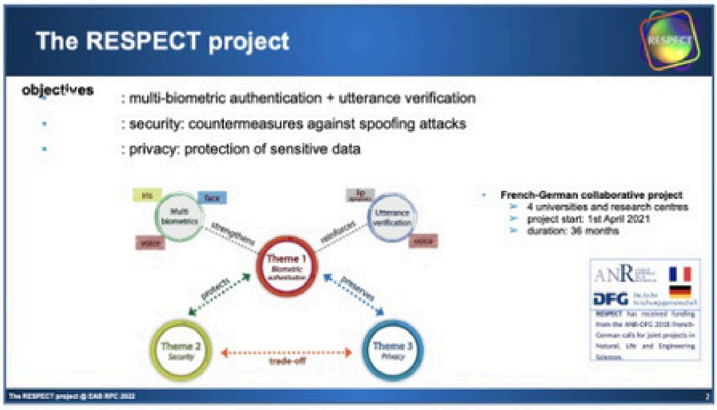
Distributed file storage is used to store all Personal Identifiable Information incl. biometrics

All logos featured in this slide are used for illustrative purposes and their usage doesn't imply any connection or relation between any of the corresponding companies and the author of this presentation.

user has control over the data and is able to share selectively and with zero-knowledge proof) and decentralisation (no central authority governing the self-sovereign identity wallet). These components are designed to provide a hands-free and private user journey that can be used in a variety of industries, including retail, digital workplace, banking and fintech, healthcare, and hospitality.

Day 2

The second day of the conference opened with three presentations of the **RESPECT** project. Marta Gomez-Barrero (Hochschule Ansbach) set the stage by presenting recent advancements on unknown Presentation Attack Detection (PAD) for face and voice data. The distinction between face image PAD and voice PAD, as well as RESPECT's approach to textural voice PAD, were discussed. Several promising PAD approaches have been developed with the goals of accuracy, reliability, and a high security threshold. Following that, Massimiliano Todisco (EURECOM) presented compelling research on diagnosing COVID disease using AI analysis of voice recordings. The presentation demonstrated that auditory-based features of voice, cough and breath can be used to make a reliable diagnosis of COVID using a machine learning model consisting of a bi-LSTM network.. The solution's performance is comparable to antigen tests, and benefits include cost-effectiveness, early diagnosis, hygiene security (contactless), and the ability to monitor the patient continuously. Antitza Dantcheva (Inria) gave the third presentation from the RESPECT project, discussing manipulation detection in digital images and videos, as well as generative models for video generation. She gave an overview of Latent Image Animator (LIA), a motion retargeting tool that does not require explicit structure representations. The research goes beyond the current state of the art by incorporating a motion dictionary that enables the model to remain general to all generation settings.



The RESPECT project

objectives

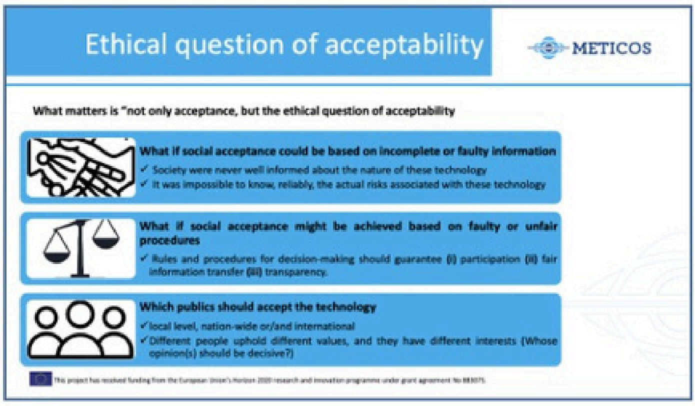
- : multi-biometric authentication + utterance verification
- : security: countermeasures against spoofing attacks
- : privacy: protection of sensitive data

- French-German collaborative project
  - 4 universities and research centres
  - project start: 1st April 2021
  - duration: 36 months

RESPECT has received funding from the ANR-DFG 2018 French-German calls for joint projects in Natural, Life and Engineering Sciences.

The RESPECT project @ EAB RPC 2022 2

Following that, the **METICOS** project was presented by three presenters. Mohamed Abomhara (Norwegian University of Science and Technology) provided an overview of the project, which aims to build a platform for monitoring and predicting the social impact and acceptability of modern border control technology. According to the presentation, while incorporating biometrics technology into border control has many advantages, it also raises significant concerns about personal privacy, human dignity, social inclusion/exclusion, and the potential for discrimination. Furthermore, the presentation emphasised that achieving social acceptance cannot take precedence over ethical questions of acceptability, as social acceptance may be derived, for example, from incomplete or faulty information about the technology. Finally, the presentation highlighted the three goals that the community should strive towards: raising societal awareness, creating personalised messages for citizens of various backgrounds and levels of knowledge, and incorporating ethics into engineering programming and computer science education and training. Sarang Shaikh (Norwegian University of Science and Technology) then explained the development and implementation of a social sensing toolkit, which collects data from online data sources (Twitter) and physical data sources (traveller TAM survey questionnaire dataset) to analyse and estimate the activity and interactions between migrants/travellers, border staff, and border control technologies for technology acceptance prediction. Subsequently, Georgia Gkioka went over the Data Analytics Framework for Monitoring Technology Acceptance of Smart Border Control (SBC) Technologies. Data analytics in the METICOS project serve several purposes, including harmonising the data from heterogenous sources by developing a data model, providing a portfolio of Machine Learning, statistical algorithms and data analytics techniques, uncovering patterns regarding acceptance and efficiency of SBS Technologies, and exposing the results of the analysis to end-users through an interactive dashboard. Currently, the project is preparing for real-life pilots, which will be launched in 2023.



Ethical question of acceptability

METICOS

What matters is "not only acceptance, but the ethical question of acceptability

What if social acceptance could be based on incomplete or faulty information

- ✓ Society were never well informed about the nature of these technology
- ✓ It was impossible to know, reliably, the actual risks associated with these technology

What if social acceptance might be achieved based on faulty or unfair procedures

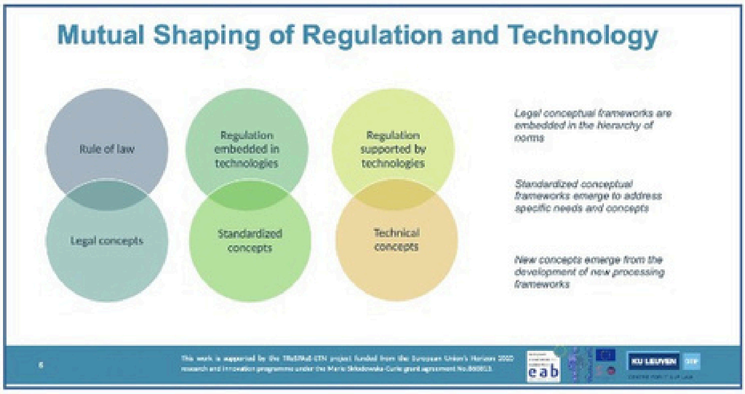
- ✓ Rules and procedures for decision-making should guarantee (i) participation (ii) fair information transfer (iii) transparency.

Which publics should accept the technology

- ✓ local level, nation-wide or/and international
- ✓ Different people uphold different values, and they have different interests (Whose opinion(s) should be decisive?)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 883075.

The presentation was followed by a lunch break that allowed for lively discussions, exchange of insights, and networking. Projects session resumed with three presentations of the **TRaining in Secure and PrivAcy-preserving biometrics Early Training Networks (TReSPAsS ETN)**, which aims to provide a new type of security protection and privacy preservation. Dailé Osorio-Roig (Hochschule Darmstadt) presented her research on the use of quality scores to reduce workload in biometric identification. The quality of a biometric sample was defined in the study based on its utility for recognition (score computed by image quality assessment methods), which is dependent on the character and fidelity of the sample. The proposed workload reduction system includes indexing samples based on quality scores and then retrieving subjects with the nearest quality scores. The proposed system takes into account various biometric quality assessment methods (face images, fingerprints, and irises). The experimental results revealed that the search space for each biometric characteristic can be significantly reduced depending on the variation in sample quality: face (38%), fingerprint (29%), and iris (31%). Future research envisions using large-scale databases analysing more quality factors and experiments in realistic scenarios. Future research envisions using large-scale databases analysing more quality factors and experiments in realistic scenarios. Later, in her presentation titled "In Search of a Sound Conceptual Framework for the Use and Regulation of Biometric Data," Lydia Belkadi (KU Leuven) focused on the conceptual and legal aspects of the use of biometric data. The study revealed the difficulty in aligning the legal, standardised, and technical aspects of biometric technologies, all of which use different conceptual frameworks. Furthermore, those frameworks are used for a variety of purposes. As a result, as stated in the presentation, there is a need to identify unifying conceptual links that would allow for coherent regulatory and research efforts. The final presenter, Wanying Ge (EURECOM), introduced a plan to build an Automatic Speaker Verification (ASV) system that can tell whether the enrolment and test utterances originate from the same speaker. Furthermore, the system would include a spoofing countermeasure (CM) system that would determine whether or not the test utterance is genuine.



Mutual Shaping of Regulation and Technology

Rule of law
Regulation embedded in technologies
Regulation supported by technologies
Legal concepts
Standardized concepts
Technical concepts

Legal conceptual frameworks are embedded in the hierarchy of norms

Standardized conceptual frameworks emerge to address specific needs and concepts

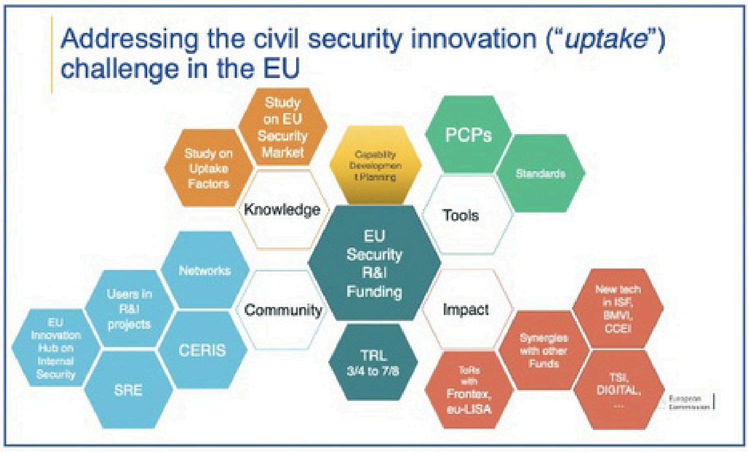
New concepts emerge from the development of new processing frameworks

6

This work is supported by the TReSPAsS-ETN project funded from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No.860813.

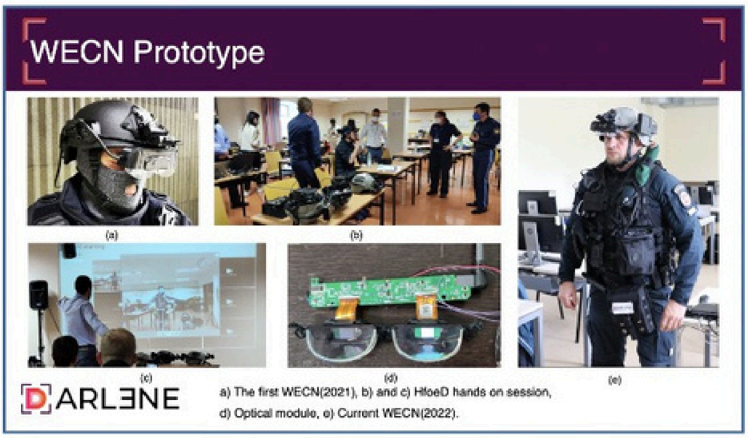
The experiments conducted revealed that through joint optimisation, the ASV can assist the CM in better detecting spoofed utterances. However, the CM cannot provide any speaker-related information and the ASV tends to become over-fitted to the seen speakers.

The day was capped off with a demo session that gripped the full attention of the attendees. The demo session began with a presentation on the **EU's Civil Security Innovation Policy** delivered by Giulio Mancini (European Commission HOME.F2 Innovation and Security Research). The presentation covered various EU research and innovation policies and programs, such as Horizon 2020 and Horizon Europe, as well as the requirements for participation. Programs range from topics covering combating crime and terrorism through disaster preparedness and critical infrastructure protection to border management and customs. The presentation also discussed the challenges presented by the levels of uptake of research results, such as market fragmentation and institutionalisation, limitations of existing funding schemes, and a misalignment of demand and supply. To address these challenges, Pan-European Networks of Practitioners and Other Security Actors, which operate in regional, thematic, and cross-country domains, were established. Giulio Mancini also mentioned the Horizon Europe, Digital Europe, Border Management and Visa Instrument (BMVI), Internal Security Fund (ISF), Asylum, Migration and Integration Fund (AMIF), and Customs Control Equipment Instrument (CCEI) with the related calls and funding.



Addressing the civil security innovation ("*uptake*") challenge in the EU

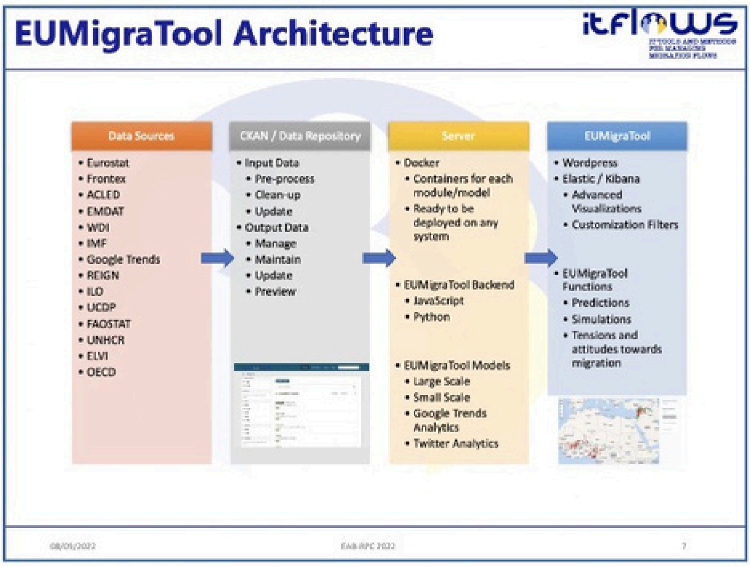
Study on EU Security Market
Study on Uptake Factors
Capability Developmen t Planning
PCPs
Standards
Knowledge
Tools
EU Security R&I Funding
Networks
Users in R&I projects
Community
Impact
New tech in ISF, BMVI, CCEI
EU Innovation Hub on Internal Security
CERIS
Synergies with other Funds
TRL 3/4 to 7/8
SRE
ToRs with Frontex, eu-LISA
TSI, DIGITAL, ...
European Commission



WECN Prototype

a) The first WECN(2021), b) and c) HfoeD hands on session, d) Optical module, e) Current WECN(2022).

Nikolaos Dimitriou (Inf. Tech. Institute Centre of Research & Technology) then provided an overview of a prototype developed as part of the Deep Augmented Reality Law EnforcemeNt Ecosystem (DARLENE) project. The prototype consists of a WECN helmet (wearable edge computing node) with AR glasses and a portable computation unit (Jetson Xavier AGX) attached to the helmet, which is integrated with a sensor network inside a building or other interior/exterior space. The device would provide police officers with real-time computer vision (e.g., segmentation, pose estimation), communication with other nodes, visualisation of analytic results, and monitoring of the officer's Field of View (FoV). These capabilities could be used, for example, to detect individuals passing through the space with a concealed weapon. Currently, one of the prototype's biggest challenges is power efficiency, as it can only run for short periods of time.



EUMigraTool Architecture

Data Sources
- Eurostat
- Frontex
- ACLED
- EMDAT
- WDI
- IMF
- Google Trends
- REIGN
- ILO
- UCDP
- FAOSTAT
- UNHCR
- ELVI
- OECD

CKAN / Data Repository
- Input Data
  - Pre-process
  - Clean-up
  - Update
- Output Data
  - Manage
  - Maintain
  - Update
  - Preview

Server
- Docker
  - Containers for each module/model
  - Ready to be deployed on any system
- EUMigraTool Backend
  - JavaScript
  - Python
- EUMigraTool Models
  - Large Scale
  - Small Scale
  - Google Trends Analytics
  - Twitter Analytics

EUMigraTool
- Wordpress
- Elastic / Kibana
  - Advanced Visualizations
  - Customization Filters
- EUMigraTool Functions
  - Predictions
  - Simulations
  - Tensions and attitudes towards migration

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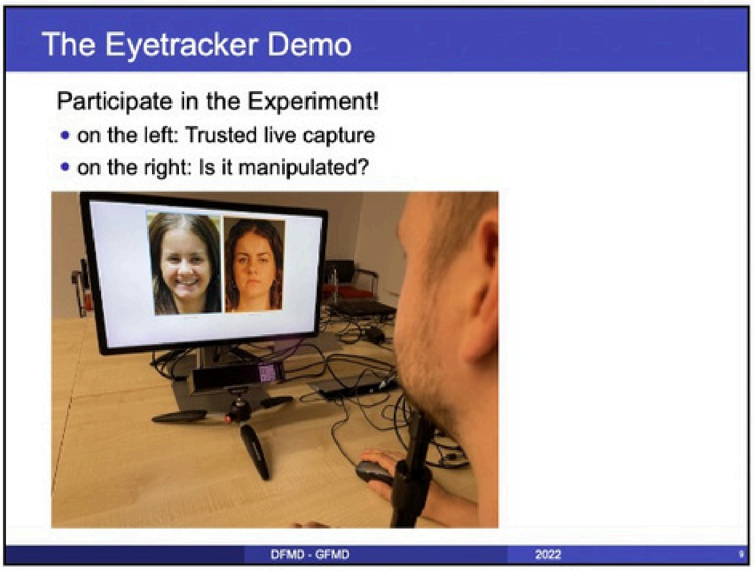
Following that, Georgios Stavropoulos (Inf. Tech. Institute Centre of Research & Technology) presented the project ITFLOWS with the developed EUMigraTool. The tool, which is based on neural network architectures and time series analysis, aims to provide accurate migration predictions, policy solutions for migration management and refugee integration in the EU, and solutions for reducing potential conflict/tensions between migrants and EU citizens. Users are currently testing a prototype of EUMigraTool platform, a part of which is freely available online upon registration.



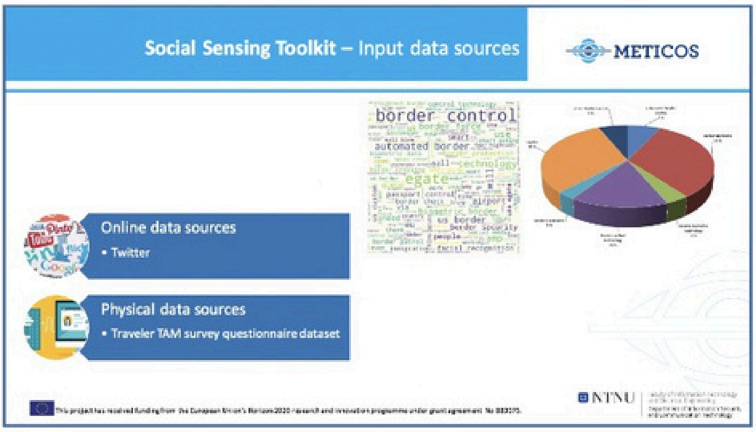
The Eyetracker Demo

Participate in the Experiment!

- on the left: Trusted live capture
- on the right: Is it manipulated?

DFMD - GFMD 2022 9

Christoph Busch (Hochschule Darmstadt) then demonstrated the DMFD - Darmstadt Face Manipulation Detection (DFMD) Test. The experiment looks into how good humans are at detecting face (image) manipulations and which facial landmarks humans look at when making those decisions. The experiment monitors human eye movements as they evaluate two images, one potentially manipulated and the other one not. The experiment compares the performance of Super-Recognizers to that of people with average face processing capacity. The experiment is still ongoing and has gathered results from over 400 experts. The conference attendees were invited to participate in the experiment in adjoined room.



Social Sensing Toolkit – Input data sources

METICOS

Online data sources

- Twitter

Physical data sources

- Traveler TAM survey questionnaire dataset

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 883075.

NTNU

Finally, Georgia Gkioka (National Technical University of Athens) and Sarang Shaikh (Norwegian University of Science and Technology) presented a demo component of the Social Sensing Toolkit from METICOS project, which was introduced earlier during the projects session.

Day 3

The third day of the conference opened with a keynote speech delivered by **Mr. John Boyd, Assistant Director, Office of Biometric Identity Management (OBIM) for the Department of Homeland Security (DHS).**

The keynote addressed the topic of Face Recognition Technology (FRT) in the U.S. Department of Homeland Security. He discussed the biometric trends observed by the DHS, the new approaches, standards, and demographic differentials in face recognition, as well as the next steps for advancement.

According to the IDENT Annual Services Report for Fiscal Year 2021, the total of face-centric transactions at DHS have increased significantly since 2018, and the United States has been steadily moving toward face-only transactions until the pandemic began in January 2020. Since the pandemic situation is improving and restrictions are being lifted, the demand for face-centric transactions is expected to return to pre-pandemic levels and continue to rise.

After the overview of the trends observed by the DHS, the keynote discussed the false non-match rates (FNMR) and their relation to demographic differentials. Mr. Boyd stated that many people believe there is no need to be concerned about the false match rate and instead focus on the false non-match rate. In this context, he emphasised the importance of image quality: if the image is of poor quality, it affects the false match and false non-match rates.

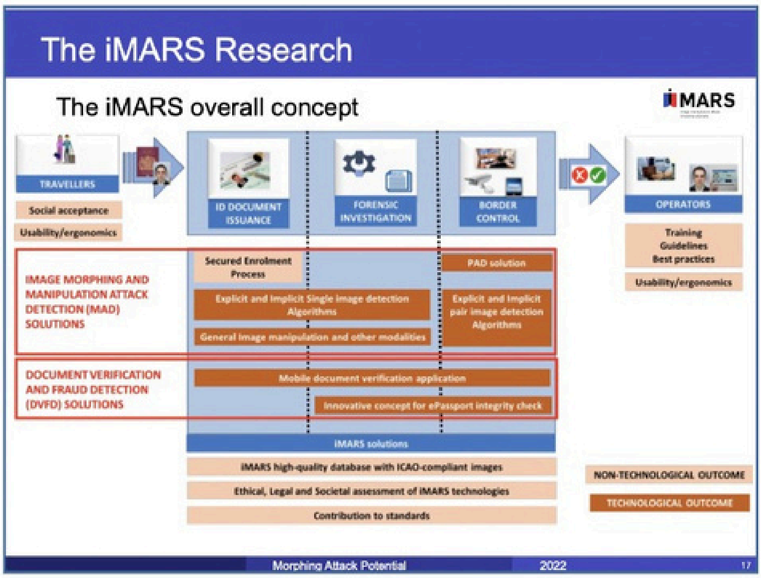
He then discussed the DHS' Automated Biometric Identification System (IDENT) biometric repository. The DHS used 1:M:N comparisons to reduce error rates when automatically comparing face images, and in 2022 it implemented 1:5:N comparisons. OBIM is also currently investigating new approaches to FRT, such as whether 1:5 average out-performs 1:most recent. The DHS is also exploring presentation attack detection (PAD) detection technologies and continues to collaborate with DHS Components to detect presentation attacks at collection points or in the back office.

The keynote underlined the need for standards that support the new approaches. This would entail updating the ISO/IEC 29794-1 Biometric Quality Framework standard and establishing the ISO/IEC 29794-5 Facial Image Quality standards. These standards, as envisioned by DHS, should include sections to allow for the consideration of FMR and sections to allow quality metrics to support 1:M score-level fusion.

The next step and goal for the DHS OBIM is to reduce traveller inconvenience, as well as fraud, which can be improved by reducing biometric errors and human factors. However, reducing those errors is difficult when one does not have control over the collection or own the reference image (e.g., passport photo). This issue could be addressed by improving the quality of facial images (error rate reduction) through collection advancements and the development of international quality standards to support multi-sample and multi-modal score level fusion.

Mr. Boyd concluded the keynote by providing an overview of the National Academies of Sciences study of FRT funded by OBIM and Federal Bureau of Investigation (FBI). The study is overseen by a committee of 14 members from government, academia, and industry. Its goal is to provide a description of the domain as well as recommendations to govern FRT use and performance. The study's final report is due in 2023.

Following the keynote address, Christoph Busch (Norwegian University of Science and Technology) provided an update on the **image Manipulation Attack Resolving Solution (iMARS)** project and its progress since 2020. The presentation emphasised the ICAO's principle of unique link — one individual - one passport —, which is jeopardised when passports with morphed face images are in circulation, allowing multiple individuals to use one passport. Morphing is thus a major threat, with over 1000 reported cases, and will have a significant impact on border security. The goal of the iMARS project is to create image morphing and manipulation attack detection (MAD) and



The iMARS Research

The iMARS overall concept

iMARS

TRAVELLERS

Social acceptance

Usability/ergonomics

ID DOCUMENT ISSUANCE

FORENSIC INVESTIGATION

BORDER CONTROL

OPERATORS

Training
Guidelines
Best practices

Usability/ergonomics

IMAGE MORPHING AND MANIPULATION ATTACK DETECTION (MAD) SOLUTIONS

Secured Enrolment Process

PAD solution

Explicit and implicit Single image detection Algorithms

Explicit and implicit pair image detection Algorithms

General image manipulation and other modalities

DOCUMENT VERIFICATION AND FRAUD DETECTION (DVFD) SOLUTIONS

Mobile document verification application

Innovative concept for ePassport integrity check

iMARS solutions

iMARS high-quality database with ICAO-compliant images

Ethical, Legal and Societal assessment of iMARS technologies

Contribution to standards

NON-TECHNOLOGICAL OUTCOME

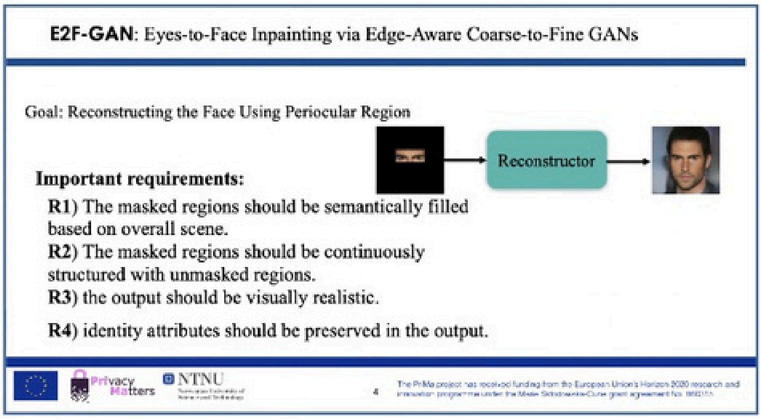
TECHNOLOGICAL OUTCOME

Morphing Attack Potential 2022 17

document verification and fraud detection (DVFD) solutions, as well as support research by standardising methodology and providing relevant training. The developed solutions will be then used in three areas: identification document issuance, forensic investigations, and border control. The presentation covered two Morphing Attack Detection scenarios: the single image morphing attack detection (S-MAD), which analyses only one suspected facial image, and differential morphing attack detection (D-MAD), which evaluates two images, one of which is a trusted Bona Fide image. Because developing robust algorithms suitable for operational scenarios will require more time, the iMARS project conducted an experiment to assess ID document examiners' ability in Morphing Attack Detection. The results of which were presented by Kiran Raja (Norwegian University of Science and Technology). The experiment is divided into two parts: the DMFD - Darmstadt Face Manipulation Detection Test (presented on the second day of the conference) and the GFMD - Gjøvik Face Manipulation Detection Test. The D-MAD experiment included 400 trials, while the S-MAD included 180 trials. The experiment investigated the overall accuracy of experts, the impact of facial examination training, document examination training, line of work, age, prior exposure to morphed images, and gender.

Frontex's Henry Dillen then presented the **Multiple Identity Detector (MID)** Project Transition Phase of the forthcoming European Travel Information and Authorisation System (ETIAS). At the moment, European security and migration databases operate independently. These databases will be linked as part of an effort to strengthen the EU's internal security. As a result, the data currently stored in these systems will need to be processed. The interoperability regulations establish several components to achieve that goal: the European Search Portal, the Shared Biometric Matching System, the Common Identity Repository (CIR), and the multiple-identity detector (MID). The MID phase will take place from June to December 2024 and its team will be manually comparing biometric data, using specialised software. Frontex's MID team created four types of links between data sets from the eu-LISA Information Systems. Potential identity fraud and identity duplication profiles requiring manual verification of biometric and biographic data (fingerprints and facial images) will be assigned the yellow link-type. In this case, the goal would be to have a first-line team of biometric comparison experts and a second-line capacity of forensic experts to validate or correct the first-line reviewer, thus recategorising the yellow link assigned profile into one of the other three categories.

Afterwards, **Privacy Matters (PriMa) an Innovative Training Network (ITN**) was presented. There related presentations covered topics of the eyes-to-face inpainting, morphing applied to face templates, and the value of blockchain in biometrics. Ahmad Hassanpour (Norwegian University of Science and Technology) discussed research on Eyes-to-Face Inpainting via Edge-Aware Coarse-to-Fine GANs. The study's goal is to reconstruct a human face using only the periocular region, with the goal of increasing identity information as an output to improve FR system results. When a person wears a mask, recognition becomes more difficult; however, using the method proposed in the study, to "paint" the face, the accuracy of the recognition result increases. The method attempts to maintain the colour, facial expression, age, and gender. The second presentation, delivered by Mahdi Ghafourian (Universidad Autonoma de Madrid), considered a novel approach to ensuring security and privacy through the use of one-time biometric morphs (OTB-Morph). The study used one-time biometrics as a new type of cancelable biometric method that replaces the subject's template at the end of each verification session. It employs morphing as a transformation function for cancelable biometrics, morphing the client's genuine face and a random image. The proposed method increases the dissimilarity of the subject's template in the server's database while decreasing the dissimilarity between two consecutive verification sessions. The third study, which was given by Bilgesu Sumer (KU Leuven), investigates decentralisation, or Self-Sovereign Identity (SSI), via blockchain methods, giving individuals greater control over their data. Other blockchain advantages include zero-knowledge proof, cryptography and wallet, no vendor lock-in, limiting trackable data trails, ease of use, and interoperability. The study considered the relationship between the blockchain technology and the GDPRs and the related issues of accountability, as well as, the new trust service for identity management eIDAS 2.0.



E2F-GAN: Eyes-to-Face Inpainting via Edge-Aware Coarse-to-Fine GANs

Goal: Reconstructing the Face Using Periocular Region

Important requirements:

R1) The masked regions should be semantically filled based on overall scene.

R2) The masked regions should be continuously structured with unmasked regions.

R3) the output should be visually realistic.

R4) identity attributes should be preserved in the output.

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The PriMa project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 860315

The conference came to an end with a **roundtable discussion** about the upcoming operational launch of the **EES and ETIAS systems**. Almudena Diez de los Rios Flores of eu-LISA, John Boyd of DHS OBIM, and Daniel Bachenheimer of Accenture served on the panel, which was moderated by Fernando Alonso-Fernandez (Halmstad University) and Marta Gomez-Barrero (Hochschule Ansbach). The goal of the roundtable was to identify the challenges that systems such as ETIAS and EES might pose. It was also an opportunity to talk about research possibilities and identify key areas of future research focus. The speakers engaged in a dynamic debate, identifying several key challenges. Concerns regarding standards compliance, interoperability, data migration, data quality, and the need to define standards addressing face image quality emerged as the primary challenges related to the new systems. According to the experiences of Department of Homeland Security and other American agencies (DOD and FBI), developing the new data architecture, which includes moving data from the data centres to the cloud is a challenging process in terms of integration and costs. Additionally, the Extract-Transfer-Load (ETL) phase requires data cleansing, potentially involving multiple petabytes of data. Therefore, it is essential that large IT systems maintain a high data quality. Lastly, the importance of creating synergies between the machines, algorithms and the human in order to reach the best results was emphasised. The roundtable discussion, featuring three experts in policy making and in the management of large IT systems for border control provided an overarching view on the topic of entry into operation (EiO) of EES and ETIAS systems to the audience. It also highlighted that while the benefits to freedom, security and justice of these two systems are evident, their EiO also presents some new technological and operational challenges

Ms. Almudena Diez de los Rios Flores
eu-LISA

Mr. Daniel Bachenheimer
Accenture

Mr. John Boyd
DHS

Concluding Remarks

The EAB-RPC and the Darmstadt Biometric Week was well attended. Thus, a new edition of EAB-RPC will take place next year, on 18-20 September 2023. The EAB Research Projects Conference 2023 will again be co-located with the IEEE BIOSIG Conference during the Darmstadt Biometric Week.

About EAB

The EAB is the leading voice for biometrics and digital identity, for Europe. As a non-profit organisation, EAB represents and connects a growing community of biometrics and digital ID stakeholders from across Europe. Our purpose is to foster innovation, support networking across markets and stakeholders, and provide trusted and impartial advice. The EAB's membership includes the European Commission, business leaders, governments, institutes and academia. Members meet regularly at EAB hosted and partnered events and networking opportunities, across Europe.