Biometrics on the Move

Overview of contactless biometrics

Biometric	Advantage	Disadvantage	Pre-enrolment	Use Case
Voice	• Ideal for mobile	• Uniqueness?	• Always	• Pre-travel
Fingerprint	• Very unique • Present in some eIDs	• Need a free hand within touch distance • Incompatibility with contact FP?	• Only if not in eID or eID is not available	• ABC with eID or visa
Iris	• Very unique • Crowds • Distance	• Sunglasses • Light/angles	• Always	• ABC + on-the-move
Face	• Always in eID • Crowds • Distance • Subject can be unaware	• Uniqueness? • Sunglasses • Light/angles	• Only if eID not available	• Pre-travel • ABC • Gateless • Land borders
Others	• ?	• ?	• ?	• ?

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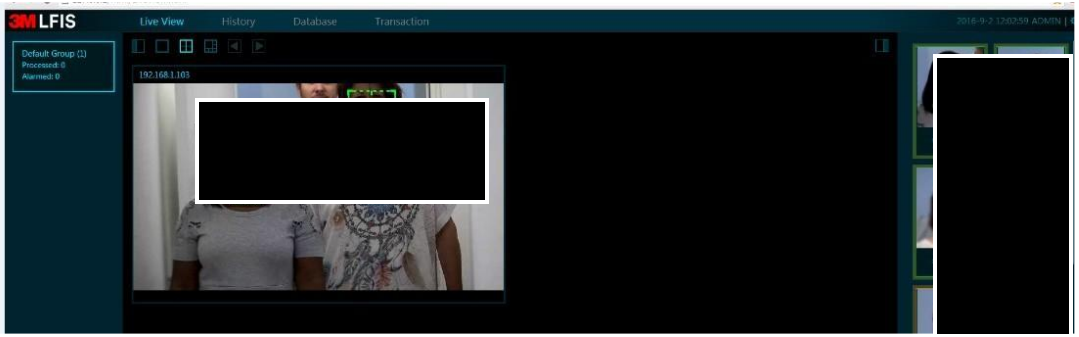
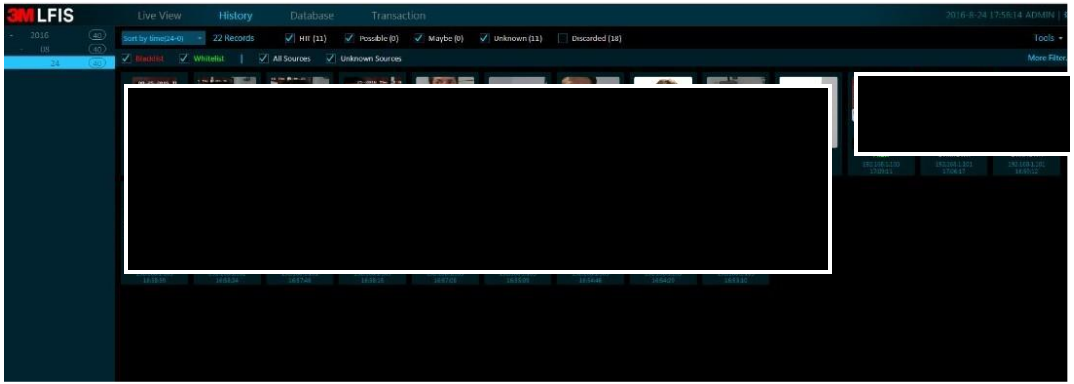
Contactless video based m:n Face Recognition

* How does it work?
* How powerful is it?
* Restrictions and challenges
* Application for borders





Gemalto Live Face Identification System

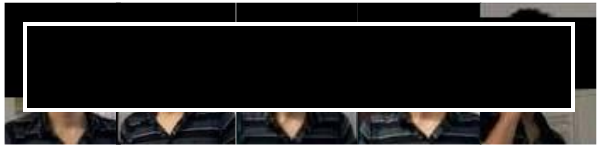
How does m:n work?

STEP 1: An IP camera takes let's say 25 frames per second

STEP 2: System saves say 1 in 5 frames and makes a scene from them

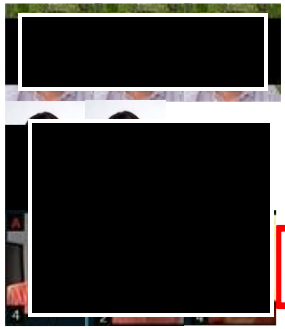
STEP 3: These several (m) images of 1 person are formed to make a model and are matched against models of many (n) people in the hot list

Model



Matching

Database



MATCH

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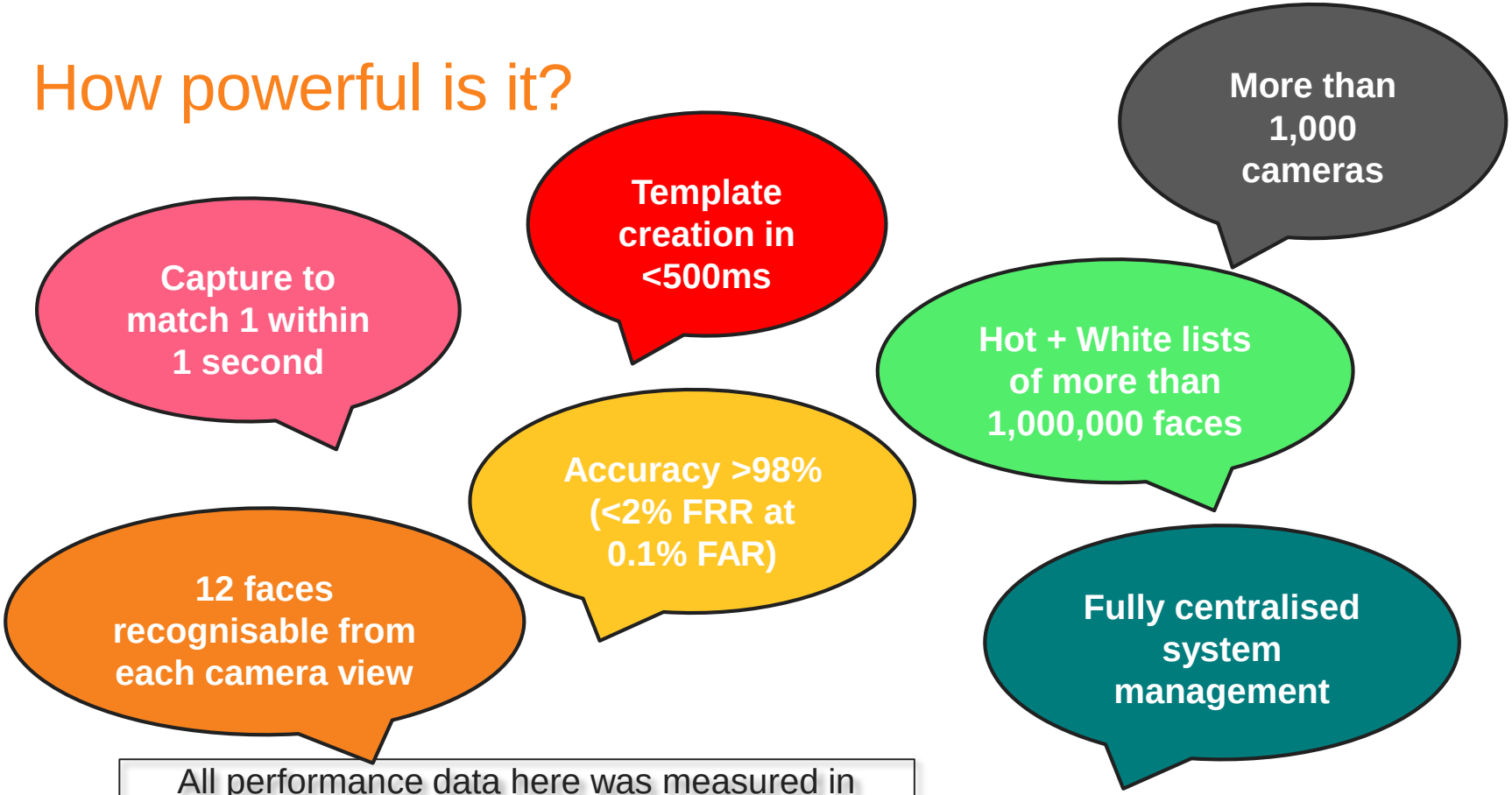
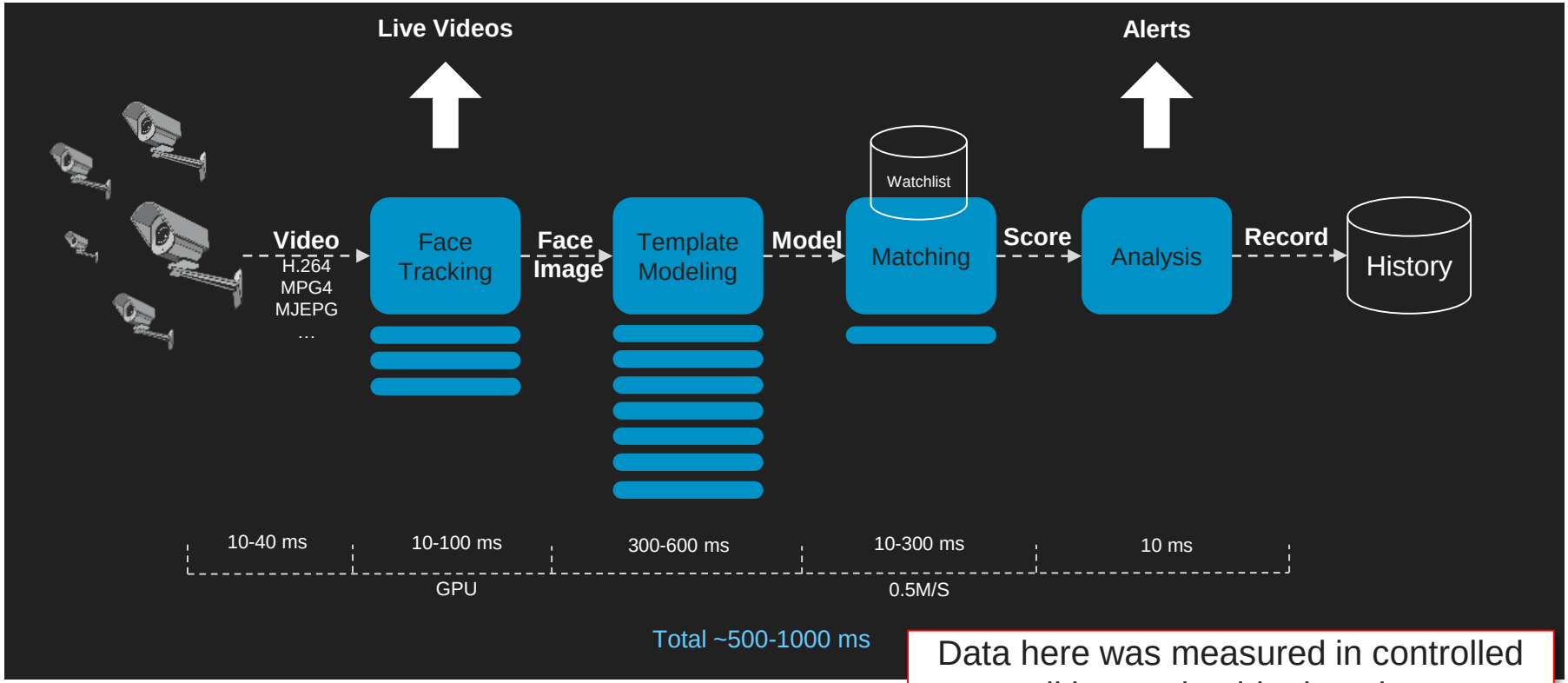
Demo of system (colleagues in our London Office)

How powerful is it?



All performance data here was measured in controlled conditions using ideal equipment

Capture to Match in under 1 second



Data here was measured in controlled conditions using ideal equipment

Accuracy

Biometric accuracy is expressed as x% False Reject Rate (FRR) at y% False Acceptance Rate (FAR)

In our internal tests Gemalto's LFIS system (v4.5) produces 1.95% FRR at 0.1% FAR

Means:

* Using a pass score of 2,900 points where 1 person in 1,000 is falsely accepted across the border, ~2 people in 100 will need to be referred to a border guard for checking

* Using a pass score of 3,000 points where 1 person in 10,000 is falsely accepted across the border, ~4 people in 100 will need to be referred to a border guard for checking

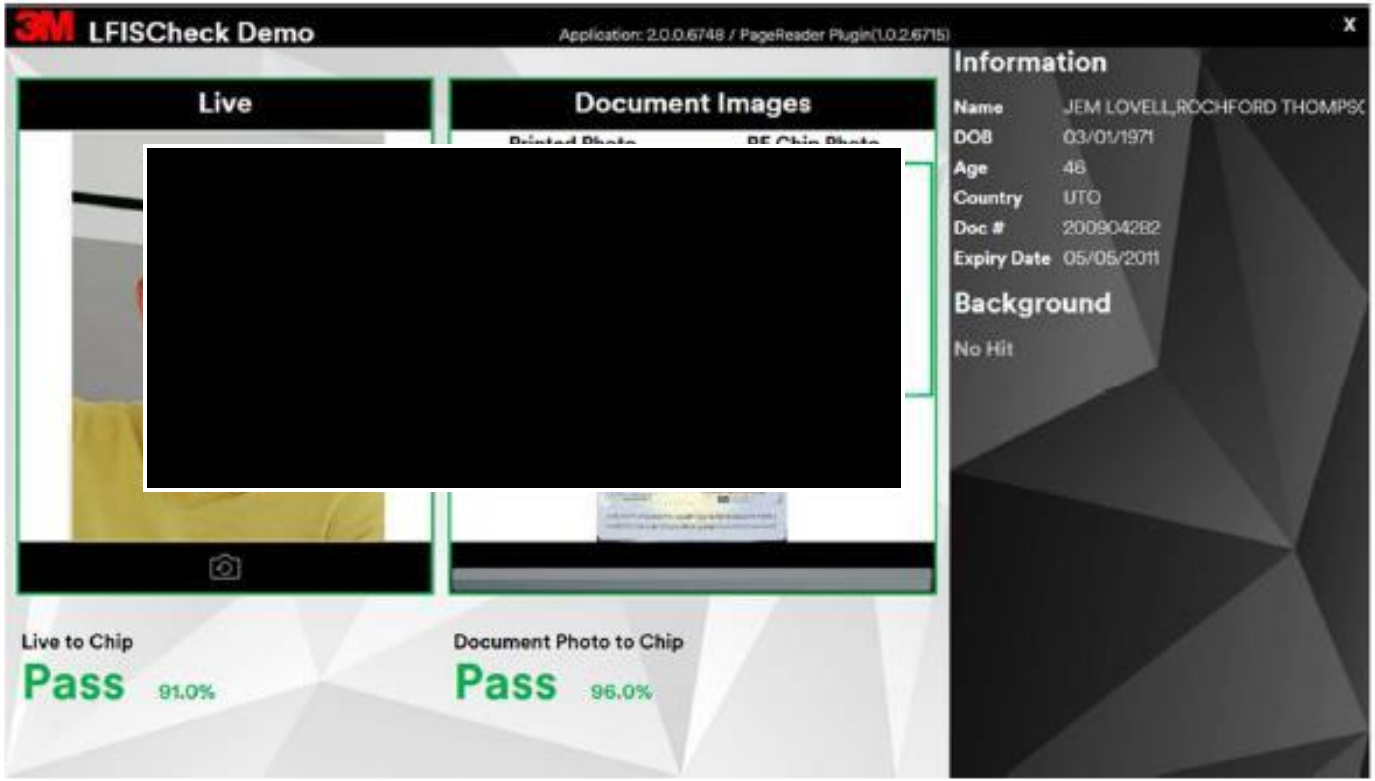
In tests, human border guards miss ~5-10%, depending on ethnicity of traveller

Restrictions and Challenges

Restriction	Solution
Face needs to be visible	Need to remove helmets/sunglasses
Lighting	Darkfighter/Lightfighter* cameras to handle poor illumination
Face at a long distance	48 pixels between the eyes is achievable with multiple high res cameras
Angle of pitch and pose from camera to face	Position cameras carefully Need an algorithm not restricted at 15 degree angles
Fast moving faces	Faster shutter speed
Density of crowd	Good algorithm
Using existing cameras	HD or better, ONVIF compliant cameras are generally needed

- Darkfighter and Lightfighter are camera brand names from HIKVision. Other brands are available

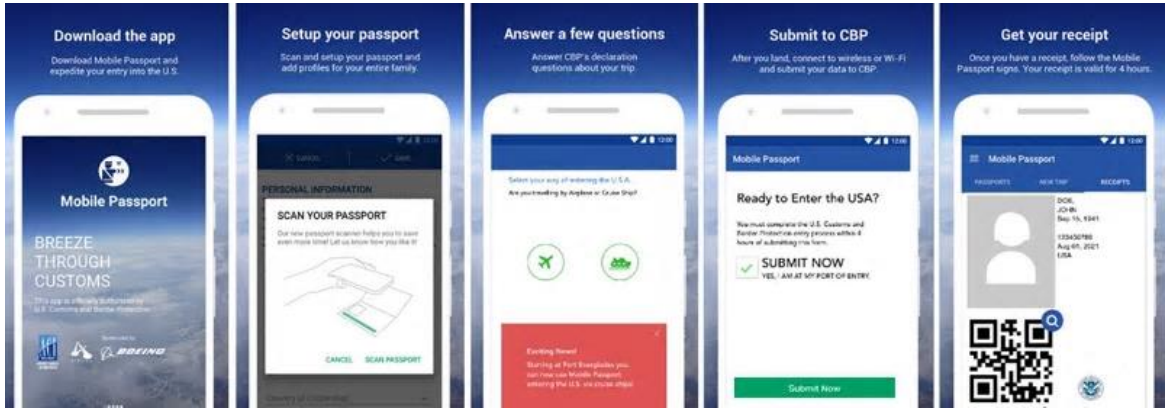
Scenario 1: Border desk or e-kiosk/e-gate 1:1:1 match



Scenario 2: Pre-travel ID notification

Collect a selfie and passport image from the passenger's mobile device before travel

* Submit with Advance Passenger Information (all travellers)
* Submit with ETIAS (Schengen visa waiver travellers)
* Submit with Registered Traveller Scheme applications (fast track travellers)
* Submit before travelling to EU to make an asylum claim ???



Scenario 3: Gate-less border control

Needs to be a two-part operation:

1. Pre-travel enrolment or kiosk at port to authenticate passport
2. Facial capture on the fly

Suitable for airport or cruise

Scenario 4: Land borders

Needs to be a two-part operation:

1. Pre-travel enrolment (Registered Traveller with ALPR enrolment?)
2. Facial capture in-vehicle

Would require dedicated fast track lanes to be created

Conclusion

* Video-based face recognition has a lot to offer
* Face rec on the move was not tested in the Smart Borders pilots but should be