

***BIOMETRICS CONSORTIUM 2003
CONFERENCE***

***Exploring the Use of Face Recognition
Technology for Border Control Applications
- Australia's Experience -***

Fiona Fraser

Director

Traveller Strategies

Australian Customs Service

fiona.fraser@customs.gov.au

Drivers – Feb 2001

- **Increasing nos. passengers**
- **Larger aircraft**
- **Airport infrastructure at its maximum**
- **Increased security arrangements (US legislation)**



Australian context

- **Finger-prints not widely used – criminal conviction association;**
- **Frequent flyer group small;**
- **Historical data-base of good quality images;**
- **Immigration process already automated except face-to-passport check.**

Face recognition only choice!

- **Most acceptable biometric for Australians;**
- **Links to existing data-bases;**
- **Manual back-up by Customs officer;**
- **Consistent with ICAO recommendations.**

Will FR work?

- **Testing on one-to-one applications not readily available;**
- **FR access control systems operating effectively in Europe in banks, pharmaceutical company, nuclear power plant etc.**
- **FR has a bad rap because of face-in-the crowd**
- **Let's do our own tests and see what we can do!!**

Technology Trial – late 2001



- **Undertaken by Biometrics Institute in accordance with BWG Best Practices;**
- **4 products shortlisted following RFI;**
- **1000 x 2 passport style images (images taken 0 to 20 months apart);**

Technology Trial – results

- **Cognitec best performing system;**
- **80.1% with 1% FAR**
- **Relatively consistent across a range of variables;**
- **No performance degradation over 20 months.**

Scenario Trial, Sydney

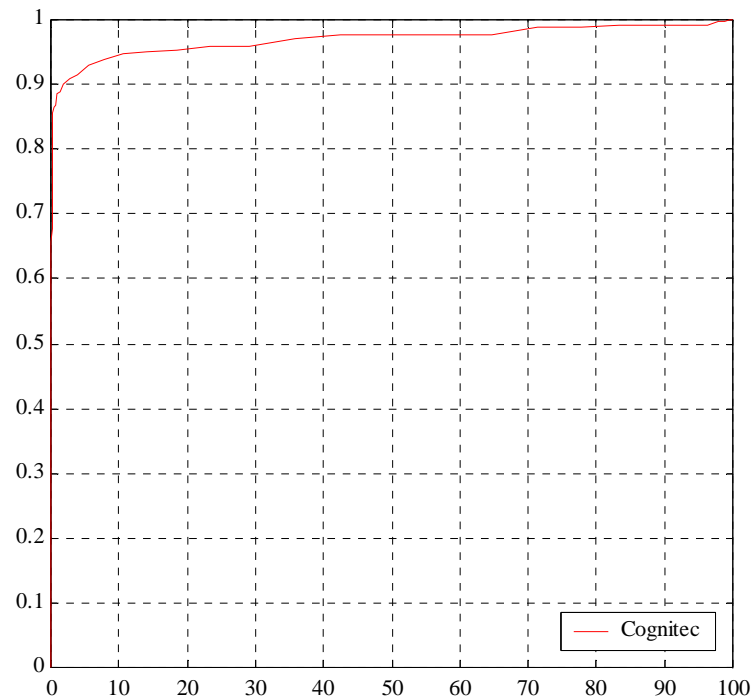
Airport – Mar 2003

- **97 Customs officers making 336 live presentations. Varying ethnicity.**

Scenario Trial – Mar 2003

Results with Single Passport Style Image

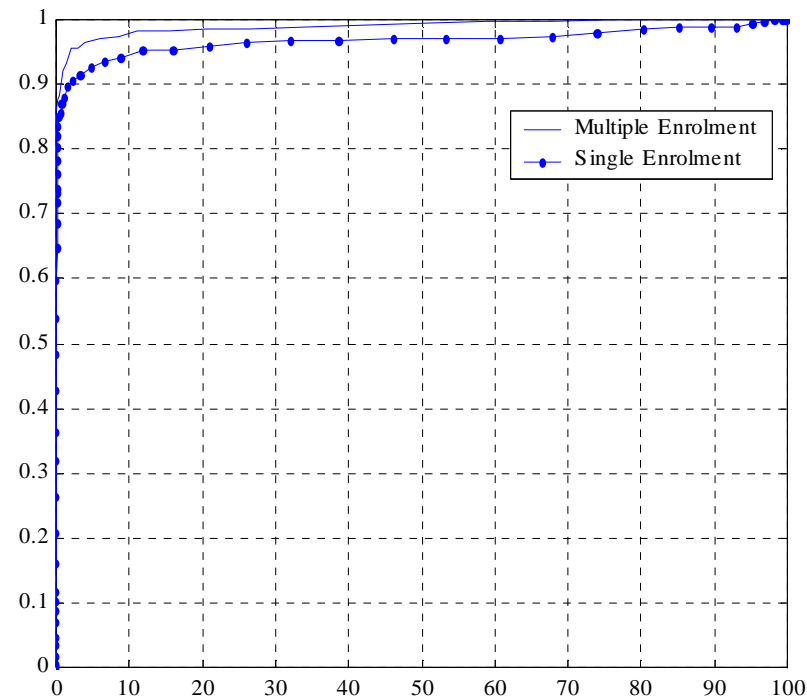
- **87.6% verification rate at 1% FAR**



Scenario Trial – Mar 2003

Results with 3 images (variable quality)

- **92.1% verification rate at 1% FAR**



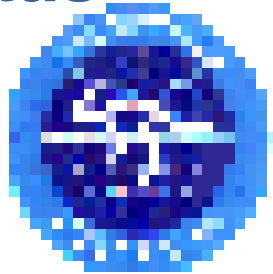
Operational Trial

Hypotheses

- **FR could perform better than humans inspectors in border crossing application;**
- **With better quality and multiple enrolment images performance would approach that of other biometrics.**

Introducing SmartGate

- **SmartGate is a pilot system for automating aircrew processing using face recognition;**
- **It has been initiated in partnership with DIMIA and Passports Australia with co-operation from Qantas**



Objectives

- **To automatically verify the identity of aircrew and streamline their processing;**
- **To interface with existing immigration system; and**
- **To provide a platform for an automated passenger processing system**

*5 photo
enrolment
process*



Enrolment process

- Check passport and scan MRZ
- 5 images at different angles
- < 1 minute



SmartGate Step by Step

Step 1

- Place passport on reader
- Checks person is enrolled
- Passport still valid?



Step 2

- Face recognition

FaceVACS Journal 

Enrollment | **Verification** | **Identification** | **Administration** | **Event**

Newest Entries
TransactionID: OK PersonID: Time: OK

Verification

TransactionID	SG-NSWVS02-1038359227-457
TransactionTime	2002-11-27 12:07:08
StationName	SG-NSWVS02
AuthName	SYSTEM
PersonID	KENNAUSF7558817
TokenID	KENNAUSF7558817
Threshold	0.68
Result	Successful

Image 3 / 3 **Reference Image**



Image Properties

Source	Cam1-Viewport0
Similarity	0.740366
Result	Successful

Produced by FaceVACS Journal - Copyright © 1997-2002 Cognitec Systems GmbH. All rights reserved.

Step 3

- **Expected movement confirmed**
- **Immigration / Customs checks completed**

Step 4

- **If successful**
 - movement recorded
 - proceed through gate

Facts and figures

- **Around 4000 crew enrolled**
- **> 45 000 transactions performed**
- **Transactions < 10 seconds**
- **98% verification rate**
- **Most referrals to manual process not related to fr.**

1 day's performance

- **173 transactions**
- **160 successful**
- **10 Customs/Immigration referrals**
- **3 false rejects**
- **0 false accepts**

Evaluation Process

- **Interdepartmental evaluation committee;**
- **Data analysis (DSTO);**
- **Survey of Qantas aircrew;**
- **Ergonomics assessment;**
- **Live intruder tests;**
- **Meta-evaluation by Dr Jim Wayman and Dr Tony Mansfield.**

Qantas Crew Survey Results

- **Conducted by AC Nielsen;**
- **530 crew surveyed;**
- **70% of all Sydney based aircrew enrolled;**
- **SmartGate preferred method of border clearance for 98% of aircrew;**
- **85% of aircrew prefer SmartGate to other automated systems;**
- **96% of aircrew have no privacy concerns;**
- **Main issues are getting API and gate.**

Ergonomics Assessment

- **SmartGate kiosk observed to offer high percentage of successful transactions for experienced user;**
- **Kiosk generally good use of convention and consistency;**
- **Clearer instructions required on placement of passport + auditory instructions;**
- **Better signage required.**

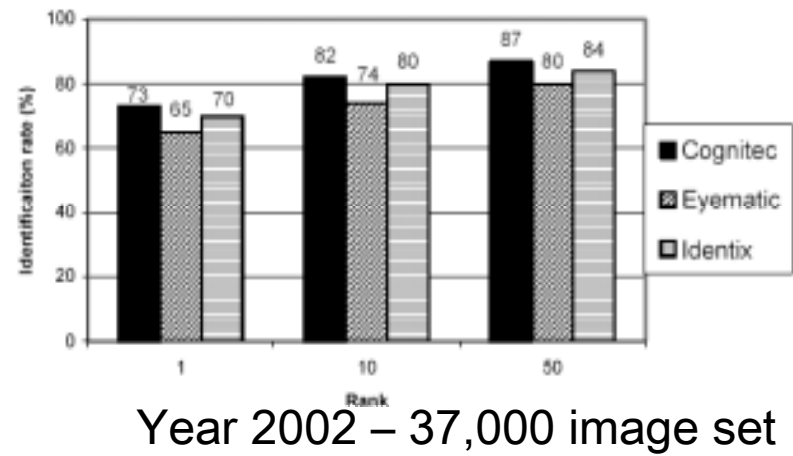
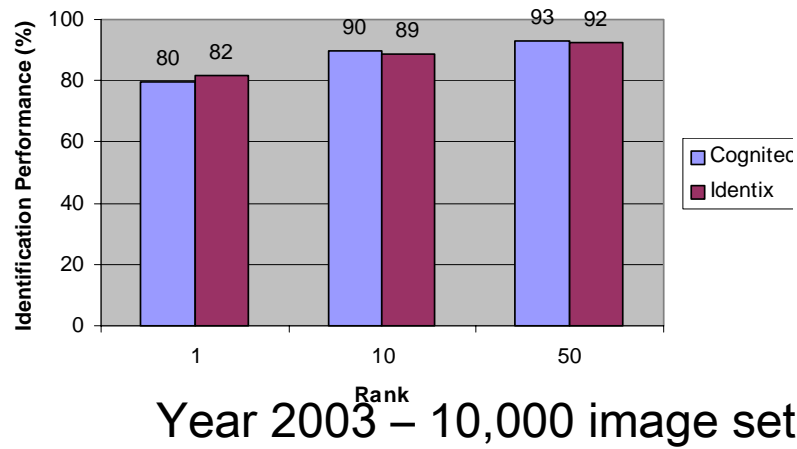
Early results – data analysis

- **Not possible to replicate FRR observed for live transactions (<2%) due to image cropping and loss of resolution;**
- **Impact on FAR unknown. Live imposter testing required.**
- **Muliple images significantly better performance than enrolment of single centre image.**

Next Steps

- **Passports office has \$3m for further researching insertion of face biometric in passport;**
- **If Government funding available, SmartGate could be expanded other airports and other crew;**
- **Qantas keen to expand pilot.**

Australian Passports R&D Testing on genuine passport photographs throughout 2002/03 has yielded similar results to FRVT2002



FRVT2002

	Passports Australia	FRVT2002
Gallery Size	3 million enrolled	37,437 enrolled
Probe Images : Gallery Images Ratio	1:1	1:2
Comparison size	5000: 5000+gallery	N:2N
Age	Random (incl babies)	>= 18
Age of Database	0-3 years	0-3 years
Expression	Various	Mainly neutral
Capture	Scanned - various headsize	Live - consistent headsize
Ethnic Group	Random – very diverse	Mexicans
Eye Finding	All Automatic	All Automatic
Rank 1 Match Rate (5000)	80-82%	80%
Best 2 vendors	Cognitec, Identix	Cognitec, Identix

Passports Australia Results(10,000 images)

Findings:

- Males are easier to recognise than females.
- Identification rates for males are 7% higher than that of females.
- Older people are easier to identify than younger people.
- For every ten years increase in age, on average performance increases approximately 2-3%.

FRVT2002 Results(37,000 images)

Findings:

- Males are easier to recognise than females.
- Identification rates for males are 6%-9% higher than that of females.
- Older people are easier to identify than younger people.
- For every ten years increase in age, on average performance increases approximately 5%.

Questions



Passports Australia Photo Matching

Probe



Gallery



**For further information
contact**

terry.hartmann³²@dfat.gov.au