SmartGate™ Update 2018
The World’s Longest-running Face-Based Automated Border Crossing (ABC) System

James L. Wayman, John Bowes and Joshua Abraham
Contractors, Department of Home Affairs, Government of Australia
Usual and not-so-Usual Caveats

• John, Josh and Jim are scientific contractors to the Department of Home Affairs. They do not speak for the Department.
• Any deviation from any past or future statements by Home Affairs indicates a misunderstanding on our part.
• The name “SmartGate” is trademarked by the Department of Home Affairs
• SmartGate has changed our thinking about biometrics
  – Biometrics without “enrollment”
  – Thresholds do not control FNMR
  – ABC systems can be cost effective
  – Much more than pattern recognition technology
Support for Efficient Border Crossing

• Obviously, border security
• But also

Tourism drives Australia’s trade in services
• Tourism accounted for half of all services exports in 2015-2016.
• International visitors collectively consumed $34.2 billion worth of goods and services in Australia.
• Education-related travel services…$19.9 billion -- Trade Minister Media Release 2017
No Compromise on Passenger Privacy Allowable

- High priority given the privacy of all travelers, whether or not they use SmartGate
- SmartGate uses the data stored on the smart chip embedded in the ePassport. This data is exactly the same data that is on the bio-data page of each passport (i.e., name, date of birth, passport number…)
- No data is written by SmartGate to the passport or passport chip. Passports are not stamped.
- Passenger movement data is only disclosed as allowed under Australia law, whether or not the passenger has an ePassport or uses SmartGate.
- SmartGate complies with all aspects of the Privacy Act 1988
  - Only obtain data required to process passengers and aircrew across the border
  - Store data securely and accurately
  - Use or disclose the data only for the purpose for which it was collected or as otherwise required or authorized by law
- The Office of the Federal Privacy Commissioner has assumed an active involvement in the SmartGate Program from inception
Where We are Today

AUD $96.3 million project from 2015–2020

Passenger Volumes

<table>
<thead>
<tr>
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<th>2015-2016</th>
<th>2016-2017</th>
<th>2017-2018</th>
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<tbody>
<tr>
<td>Travellers (inc.crew)</td>
<td>40.7 million</td>
<td>43.7 million</td>
<td>46.0 million</td>
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<tr>
<td>SmartGate clearances</td>
<td>14.9 million</td>
<td>24.2 million</td>
<td>26.0 million</td>
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Where We Started 2003

- Arrivals Only
- Qantas Aircrew
- 5 photo enrollment
- 92.1% verification rate @1% FMR

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Challenges of the Airport Environment

- Airport lighting and signage controlled by airport owner
- Collections cannot be “ICAO compliant”
- AU passports photos currently submitted by applicants
- Passengers expecting different process
- Ongoing human factors development
Three Versions of SmartGate Now Operating

• Differing Concepts of Operations
• Differing passenger demographics
• Differing designs and algorithms
• Differing performance stats

1. Arrivals 2007 “Series One”
2. Arrivals Upgrade now piloted at CBR
3. Departures since 2016
“Series One” Two-Step Arrivals Process: Kiosk and Gate

Step 1

Step 2
Facts and Figures: Arrivals

• Arrivals SmartGate (Series 1) commenced Aug 2007 (Brisbane Airport)
• FY 2017-2018: 10.3 million inbound passengers (7% FY increase)
• Age restrictions:
  – citizen or non-citizen aged 16 years or older, or
  – an Australian citizen aged 10 to 15 years old and travelling with at least two adults
• Eligible passports:
  – Canada - China
  – France - Hong Kong
  – Ireland - Japan
  – Korea - Macau
  – New Zealand - Singapore
  – Sweden - Switzerland
  – Taiwan - United Kingdom
  – United States of America
• 79% of all inbound travellers were SmartGate eligible; 57% used SmartGate
Major arrivals SmartGate upgrade now being piloted at Canberra International Airport
Departures SmartGate
Departures SmartGate

- Available for all travelers, regardless of age or passport
- Families processed at Assisted Processing Gates
- Installed at all major international airports in 2015
- Two step process at the gate
- Both chip and print image are captured
  - Non e-Passport holders always referred to primary processing
- 3 customs officers for 6 gates
  - Clearance
  - Escort
  - Primary line
- 110+ travelers processed per hour
Biometric Referrals: Departures
(monthly ‘16- ‘18)

airport 1

airport 2

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All
Non-ePassport VIZ vs Chip Images

VIZ

Chip

Interpupil Pixels

Gray-Scale Histogram

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Setting Thresholds

- FMR is a strong function of threshold
  - Monotonically increasing
- FNMR is a very weak function of threshold
  - Monotonically non-increasing
- \( P(\text{Score} | \text{ground truth}) \) cannot be inverted
- Thresholds cannot be "optimized"
  - Priors and costs cannot be modeled
- Set threshold to meet strategic requirement for zero-effort FMR
- Seek improvement in resulting FNMR through human factors

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FMR Testing: “On-line” vs Simulation

• Experimental FMR
  – 80+ volunteers with 100/2 real ANZ passports
• Simulation FMR
  – Stored passport images and video sequences
• Gate dependent FNMR
  – Are we at algorithmic limit?
Conclusions

• SmartGate (Arrivals) has operated successfully as a voluntary system for eligible travelers since 2003 through numerous technology upgrades
• New Arrivals system rolling out now
• SmartGate was expanded in 2015 to welcome all outgoing passengers with 90% contactless processing goal
• Remaining development will focus on human factors in a cross-cultural environment. (The really hard part!)
• We invite you to Australia to experience both SmartGate and Aussie hospitality