New Zealand SmartGate

Using Quantitative Performance Information to Improve Convenience and Security

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Outline of Presentation

• Introduction to SmartGate New Zealand
• Goals of an ABC System
• Meeting the Goals
• Operational Performance Testing
• Examples of Lessons Learned
• Issues for the Future
• Conclusions
SmartGate New Zealand

- Two Stage System
- Kiosk – Insert passport, Answer questions, Receive Ticket
- Gate – Insert ticket, Look at cameras, Proceed through gate or See customs officer
- Separate area with distinctive styling
- Directly visible from normal queue area
SmartGate New Zealand

- Lab testing followed by single gate pilot in 2009
- Operational deployment began in late 2009
- Used for both arrivals and departures at Auckland, Wellington and Christchurch airports
- Initially only Australian and New Zealand ePassport holders but now accepts UK and US
- Over 8 Million travellers processed
- Accepts travellers from 16 years old and up
- Three different algorithm versions have been used operationally in less than 5 years
SmartGate New Zealand

- Next-Gen SmartGate Plus
- Single Stage System – Passport Reader at Gate
- Trial in 2013 at Auckland Departures
- Substantial Overhaul of Hardware and Software for Facial Recognition
- Improves traveller processing time and biometric accuracy
Goals of an ABC System

• Reduce Costs - Fewer customs officers and less airport space per thousand passengers processed

• Reduce Traveller Processing Time – Both average and max time for a traveller to clear customs and immigration

• Maintain or Improve traveller experience

• Enhance or Maintain Border Security – Introduce no new gaps or workarounds, facial recognition must be at least as accurate as an interview with an officer
Meeting the Goals

- Reduce Costs
  - Easy to measure
  - SmartGate gates take approximately half the width of primary inspection lanes and the kiosks fit in the standard queuing area
  - Four to six SmartGate gates can be managed by one Customs officer with one additional officer at kiosks
  - Equivalent primary lanes would require 4 to 6 officers and sometimes a queue marshal
- SmartGate New Zealand saves space and staff resources in comparison to manual inspection
Meeting the Goals

- Reduce Traveller Processing Time
- First way to measure
  - Calculate Average and Maximum time for passenger to be processed through customs hall using traveller movement simulator with historical load pattern
- Second way to measure
  - Provide enough kiosks (about 3 per gate) that gate processing time is the limiting step then compare gate time to average primary inspection lane time
- Current SmartGate gate on arrival takes 14 seconds per traveller whereas primary inspection lane takes 25 seconds
Meeting the Goals

• Maintain or Improve traveller experience
• Hard to measure
• Very important for a voluntary system
• Random surveys indicate very positive traveller feedback with over 95% approval rating
• Approximately 70% of eligible NZ and Australian travellers at airports with SmartGate choose to use it
• Many others want to use it, but are travelling with children or ineligible friends
• Approximately 36% of all passengers arriving at airports which have SmartGate were processed by SmartGate
Meeting the Goals

- Enhance or Maintain Border Security
- How do we measure the security of existing processes?

Spoofing
Lookalikes
Human Examiner Facial Comparison Accuracy

FAR
Operational Performance Testing

- In situ testing of a deployed system without altering normal operating characteristics
- Need minimum core metrics of FTE, FTA, FRR, FAR and throughput
- Need to separate performance based on:
  - Location (airport name and arrivals or departures)
  - Device (individual kiosk or gate may be at fault)
  - Time Period (evaluate impact of changes)
  - Demographics (age, nationality, gender)
- Requires separation of genuines and imposters
Operational Performance Testing

• Solution is to simulate the biometric aspects of an operational gate in an offline computing environment
• Use nightly backup of the border control database so we don’t impact operational responsiveness
• Replay individual standing at the gate with their own passport (genuine) and with other passports (imposters)
• Generate a full report with all relevant graphs and a summary section with info for managers
• Try to identify false identity claims (“the doc swap”)
• Approximately 0.02% to 0.1% of all travelers are found to make false identity claims
Operational Performance Testing

- Allows immediate feedback when changes are made
- Successful ABC system depends on making changes to adapt to local conditions, experience of travellers, etc.
- Illumination environment (gate and external)
- Traveller instructions (text, videos, signage, etc.)
- Training for customs officers
- Expansion to additional nationalities
- Changes to minimum age to use the system
- Updates to new hardware or matching algorithms
- Changes in ePassports
Lessons Learned

• Lighting and Illumination (Both gate illuminators and external airport lighting count)
Lessons Learned

• Sometimes border security requires thresholds be changed
• Without detailed operational performance testing border security would have been compromised and nobody would have realized it
• September 15-29, 2010, Max Acceptable FAR = Y
• Wellington Arrivals – GFRR = X, GFAR = 0.9Y
• Auckland Arrivals – GFRR = 2.1X, GFAR = 0.8Y
• Christchurch Arrivals – GFRR = 1.1X, GFAR = 1.3Y
• No verifiable reason for increased GFAR
• Solved by increased match threshold at Christchurch Arrivals only
Lessons Learned

- When camera hardware or matching software change, you need to recharacterise **EVERYTHING**

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<th>GFAR</th>
<th>GFRR</th>
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<td>66-74</td>
<td>0.3Y</td>
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- Match thresholds may need to be changed with age
Issues for the Future

• Some people ignore the directions (improved camera systems needed to handle poor pose)
• To expand participation, need to allow families with kids to use SmartGate (performance and legal issues)
• More countries in ICAO PKD
• Better feedback loop with passport issuers
• New Zealand passport quality improved since 2009
• Australia and New Zealand – GFRR = x
• UK – GFRR = 2x – Passport quality could be better
• US – GRR = 4.5x – Passport quality is unsuitable for ABC
Conclusions

• Properly implemented ABC systems save money, ensure border security and speed passenger processing
• NZ SmartGate has been an amazing success and has surpassed all project goals
• Without operational performance monitoring, this would not have been possible
• Future system upgrades (SmartGate Plus) will improve pose issues and allow younger travellers
• Passport issuers need to focus more on quality since ePassports need to be good enough to support ABC