

New Zealand SmartGate

Using Quantitative Performance Information to Improve Convenience and Security

Dr. John W. M. Campbell
IBPC 2014

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

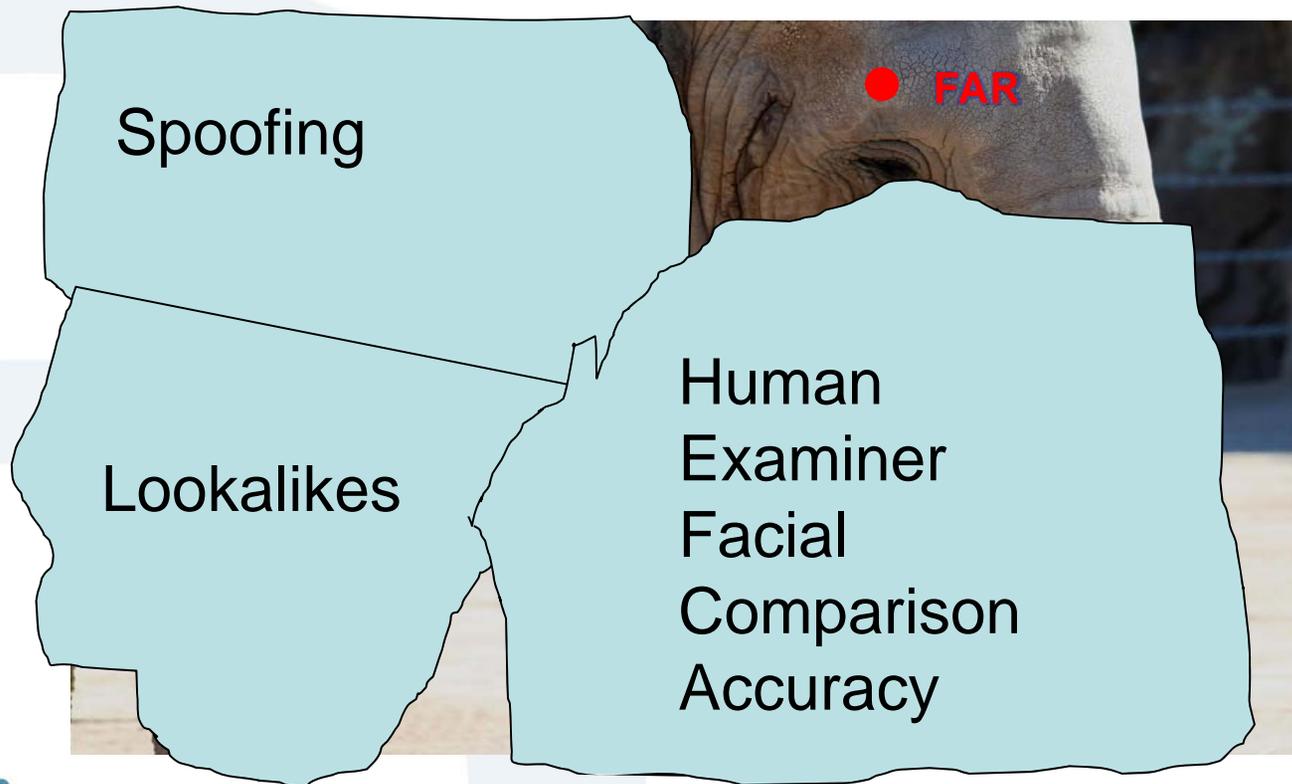
- Reduce Traveller Processing Time
- First way to measure
 - Calculate Average and Maximum time for passenger to be processed through customs hall using traveller movement simulator with historical load pattern
- Second way to measure
 - Provide enough kiosks (about 3 per gate) that gate processing time 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?



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**

Age Range	GFAR	GFRR
16-23	0.2Y	2.3X
24-31	0.2Y	1.6X
32-39	0.3Y	1.1X
40-47	0.8Y	1.1X
48-55	0.7Y	X
56-63	Y	X
64-71	1.1Y	X

Age Range	GFAR	GFRR
12-20	0.7Y	2.4Z
21-29	0.6Y	1.6Z
30-38	0.5Y	1.2Z
39-47	0.6Y	Z
48-56	0.5Y	Z
57-65	0.4Y	1.2Z
66-74	0.3Y	1.1Z

- 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