SENATE LEGAL AND CONSTITUTIONAL LEGISLATION COMMITTEE
AUSTRALIAN CUSTOMS SERVICE

Question No. 175

Senator Ludwig asked the following question on 2 December 2004:

Can the Minister provide the number of air passenger referrals to:
  a) DIMIA
  b) Health

The answer to the honourable senator's question is as follows:

As reported on page 58 of the Customs Annual Report 2003-04:

  a) 278 398

  b)   3 682

SENATE LEGAL AND CONSTITUTIONAL LEGISLATION COMMITTEE
AUSTRALIAN CUSTOMS SERVICE

Question No. 176

Senator Ludwig asked the following question on 2 December 2004:

In respect of Smartgate can you make available the independent review that was conducted in respect of Smartgate system?

The answer to the honourable senator's question is as follows:

The independent report of the Technical Analysis of the SmartGate project, is attached.

Technical Analysis of the SmartGate Project: Public Report

James L. Wayman and Anthony J. Mansfield
United Kingdom Biometrics Working Group
February 6, 2003

Introduction

SmartGate is an automated border processing system using facial recognition technology. Enrolled travellers (limited under the current implementation to volunteering Qantas crew), instead of queuing in the primary line for a face-to-passport check by a Customs officer, have the option to use a self-processing kiosk which will read the machine readable zone (MRZ) from the passport, photograph their face, and perform an automated face-to-enrolled photograph check. A SmartGate kiosk contains a passport reader, cameras at three different heights, provides instructions and feedback for users security measures, links to the face recognition system and the security database, and opens a gate when the user's face matches their SmartGate enrolment and their passport details match those in the Qantas crew manifest. All of these elements – passport data capture, facial imaging, facial recognition, Customs passenger processing security systems and crew manifest interface, during both enrolment and passenger processing, and the ultimate gate operation – are components of the SmartGate system.

Evaluation

Purpose

In June 2003, Australian Customs requested that Tony Mansfield and I "…undertake a high level analysis of the SmartGate system…[and] develop an overarching report which brings together all the components of the evaluation". Specifically, we sought to document the effectiveness of the facial recognition component of the system, the overall effectiveness of the SmartGate system as a whole, and to make recommendations as to the continuation, discontinuation, or expansion of the program in the future.

In this report, we ask the questions: "Does the current Stage 1 SmartGate project meet the objectives listed in the National Resource Assessment (NRA) proposal?" and "Does the current SmartGate project provide a platform for the introduction of self-processing more generally, as proposed in the Passenger Processing Re-engineering Project Business Case.

Both the NRA proposal and the Business Case list the following motivations for the SmartGate project, as quoted from [2].

- *Passenger numbers, which have doubled in the last 10 years, are again predicted to double in the next 10 years…*
- *The increase in passengers will primarily occur during the morning peak period…*
- *There is only limited room, physically, for Customs to expand at most airports…*
- *Passport Australia are proposing to include a biometric template with the new M-class Australian passport …*

Owing to pressure arising from the U.S. Enhanced Border Security and Visa Entry Act of 2002, work by Passport Australia and the International Civil Aviation Organization (ICAO) toward storage of a facial biometric image on new Australian passport has increased in intensity since the SmartGate business plan was written.

Objectives
The NRA proposal lists the following Stage 1 objectives:
1. To develop and introduce a system of self-processing utilising biometric technology to confirm identity;
2. To develop and successfully introduce an interface with Customs passenger processing security systems;
3. To improve and streamline the existing crew facilitation process while maintaining the integrity of the border; and
4. To introduce a self-processing system for crew which will provide a platform for the introduction of self-processing more generally.

Elements
In our study, we collected our own performance data through direct system observation and reviewed in depth SmartGate data logs, memos, press coverage, and a number of reports done on the project. Included in these was a technical performance analysis performed by the Defence Science and Technology Organisation (DSTO) using a test plan we created.

Specifically, our tasks included:
1. Assessment of the Defence Science and Technology Organization (DSTO) technical test plan [4] against the Best Practices testing principles of [5];
2. Review and comment on the DSTO technical testing report [3];
3. Review and comment on all additional evaluation documentation [6-9];
4. Assessment of the overall system performance (including technical performance) against the objectives of both the NRA proposal [1] and the business case [2] referenced in the proposal;
5. Making recommendations for the termination, continuation or expansion of the project based on the overall assessment against the objectives of [1] and [2].

It is our finding that these original objectives have been met. This objective has been fully achieved, as documented in references [3,9,10] and in our own observations of the system.

Customs SmartGate trial
To date only Stage 1 of SmartGate – for Crew Self-Processing – has been approved and funded. This stage has run since November 2002, with a single SmartGate kiosk at Sydney airport, which is used by Qantas aircrew only. One of the goals of Stage 1 is to provide a platform for the introduction of self-processing more generally.

As of this writing, approximately 4400 aircrew have been enrolled in the system and about 84,000 transactions have occurred.

The Challenges of Operational Testing: A Cautious Approach

There are many challenges in performing a test on operational systems:

1) Both system and human performance evolve during the testing process.
2) Captured image data may be inadvertently changed or biased by the capture process.
3) "Ground truth" base sources of any unexpected system difficulties cannot be assessed precisely because the difficulties were not planned for.

Consequently, it is important to proceed with great caution, using as many forms of redundant evaluation data as possible. Our study was based on four independently collected, but complimentary forms of data:

1) Matching experiments conducted with Customs computers using images previously collected during operations.
2) Tests done directly on the SmartGate system by Customs employees – sometimes appearing as themselves and sometimes as "zero effort" impostors against the SmartGate database.
3) Logging of human observations of SmartGate performance by both DSTO and ourselves.
4) The automatic SmartGate event logs.

We reviewed and commented on three versions of the DSTO test plan. All of our comments were considered and incorporated into the final plan executed by DSTO [4]. We acknowledge that Best Practices [5] is generally weak in the area of operational testing. Consequently, there was little specific guidance in the document that could be relied upon by DSTO in creating the SmartGate evaluation plan [4]. Further, the operational data collected by the system were not optimal for a Best Practices-style evaluation. DSTO did an excellent job of interpreting and extrapolating the basic Best Practices philosophy into a workable test plan using the available data. Necessary departures from Best Practices are appropriately noted in the plan.

We reviewed the DSTO report [3] in detail and were very pleased with the level of care expended and the detail of their analysis. We have commented directly to DSTO on their results, but we found no major shortcomings given the inherent limitations of the operational data collected by the SmartGate software. The system was being continuously tuned and upgraded during the course of data collection, which added to the difficulties of evaluating such a moving target. DSTO was very careful to limit the scope of their findings to that clearly justifiable by the data.

The operational data collected was limited by two primary factors:

1. Image collection and storage occurred at a rate of five images per second until a match was made. This biased the data in the direction of collecting many images that did not match, but only one that did match, the enrolment templates.
2. Collected images were cropped and JPEG compressed for storage. These images when replayed into the image comparison software did not yield the same comparison scores as the uncropped, uncompressed images received by the operational SmartGate system.

It is our strong opinion that the DSTO test plan was the best possible approach to understanding SmartGate performance given the available operational data.

We are satisfied that we have accounted for any and all discrepancies between these data sources and have arrived at supportable conclusions regarding SmartGate operations.

How Effective is SmartGate?

Enrolment

In addition to the 5 facial images taken simultaneously from slightly different angles during the SmartGate enrolment process, passport and airport security card (ASIC) photographs were also collected from enrolling air crew. Of the enrolment face images used in the trial, only the passport and airport security identity card (ASIC) images have any variation in image age. DSTO could therefore only analyse how image age affects performance using these image sets.

The pilot needs to continue for a longer period to properly analyse for how long an enrolment image will provide an acceptable performance level.

Verification

We concur with the fundamental findings of the DATO report that:

> *The overall system performance at the chosen threshold was found to be characterised by a FRR [false reject rate] of approximately 4.7% and a FAR [false accept rate] in the vicinity of 1% for each presentation of a passport. This is consistent with the overall system FRR performance measured during the trial (FRR of 2.28%), which includes the possibility of a second presentation if there is a failure on the first. The FAR under these rules was not measured,*

Such performance is remarkably good for an operational facial recognition system. We know of no other such system with documented performance at this level. The DSTO report also noted that most of the successfully matched facial images were acquired within the first two seconds of the seven-second image collection period. This suggests that shortening the data collection period could decrease the false acceptance rate and processing time, without adding significantly to the false rejection rate. Finding the optimal collection time to increase throughput rates, decrease false acceptance rates, while not significantly impacting false rejection rate, is an area for further research.

Rejection rates for the facial recognition portion of the system are well below rejections caused by other portions of the system [9,10], such as the flight manifest and Customs passenger processing security systems processing. Consequently, we conclude that the facial recognition system is a documented success in this application.

Suitability of process – user's perspective
We found both the ACTSAFE [6] and ACNielsen [7] reports to be well done and helpful.

There were several suggestions in the ACTSAFE report which have not yet been implemented, but which could lead to lower error rates for the facial recognition system. Specifically, ACTSAFE noted some key observations regarding unsuccessful automatic transactions:
- *Participants looking at the Security camera located on the ceiling instead of the kiosk camera*
- *Aircrew interacting with other aircrew and Customs Officers whilst performing the transaction*

ACTSAFE suggested:
- *Positioning the passport reader at a greater level may encourage the user to look up to a higher level and therefore closer towards the cameras. Although with a passport reader positioned as high as 1370 mm, this may have implications in regard to the technology and the presence of the hand and passport within the tolerance range for the facial recognition functionality of the cameras.*
- *Provision of clear symbolic and possibly auditory instructions to 'look forward to the cameras' following the successful read of the passport, i.e. receipt of the green light.*

Other suggestions included the widening of the gates and the improvement of the general signage. Implementation of these suggestions could decrease both the false rejection error rates and the processing times of the system as reported in the DSTO technical evaluation, but additional testing will be required. We believe that upgrades to the SmartGate system should consider the ACTSAFE recommendations and include them where this is advantageous. This will be particularly important if participation in SmartGate is to be expanded beyond the current Qantas aircrew.

The ACNielsen report gives clear indication that the project has been successful in the eyes of the users. Among the many findings were:
- *98% of Qantas crew who use SmartGate at least some of the time said that they would prefer to use SmartGate than manual processing when entering or leaving an Australian airport.*
- *Only 4% of Qantas crew enrolled in SmartGate had any privacy concerns with using SmartGate.*

Approximately half of the surveyed users had suggestions for improving SmartGate. Chief among these was to improving reliability. We note that those rejected by the system during a transaction are not notified as to the cause, which could be related to Customs passenger processing security systems processing, incorrect manifest information from the airline, or incorrect user behaviours, such as passport placement. The August 2003 monthly activity log revealed the following causes for rejection:

1 day's performance
- •175 transactions
- •161 successful
- •12 Customs/Immigration referrals
- •2 false rejects
- •0 false accepts

These rejections could be interpreted by the users as poor SmartGate reliability. We believe that implementing the suggestions of the ACTSAFE report could serve to increase the perception that the system is reliable, but some perception of poor reliability might be unavoidable as long as there are any rejections for any reason.

The ACNielsen report concluded "After using SmartGate for up to 6 months or so, the vast majority of Qantas crew expressed a preference for SmartGate over the standard manual clearance process provided that SmartGate is reliable." We accept the Nielson conclusion as an indication that SmartGate has been quite successful in the opinion of the users.

Beginning with a pilot using a carefully controlled population (volunteering Qantas crew) in a single, carefully controlled environment (Sydney International Airport) was a wise and cautious decision designed to maximise the probability of success. We believe that the current pilot can now be cautiously expanded to other populations (such as crew from other airlines) and other locations (such as additional AU international airports). Consequently, we conclude that this objective has been met.

The DSTO study also measured processing times, indicating that the average SmartGate transaction took 17 seconds. If effectiveness is measured in terms of efficiency, than SmartGate also passes this test.

Recommendations

SmartGate has been shown to be effective in expediting the processing of Qantas aircrew. Should SmartGate be expanded to include additional populations, such as aircrew from other airlines?

Although SmartGate has been shown to be effective at the current level of deployment, there is no data available to assess the overall cost savings associated with the SmartGate program. Given the low number of total travellers using the system (about 200 aircrew per day), it is unlikely that SmartGate can recover its development costs without expansion to additional populations. The current concept would be most reasonably expanded to additional Qantas aircrew, international aircrew from other cooperating airlines, and to frequent flyers, and to these same groups at Australian international airports other than Sydney. Further system development, such as improved user interfaces, might be necessary to maintain the potential error rates at their current acceptable level.

Conclusions
Tony Mansfield and I conclude that SmartGate has met the original program objectives. The performance levels currently attained by SmartGate are remarkably good for an operational facial recognition system, and we know of no other such system with documented performance at this level.

We find that SmartGate has streamlined the customs and immigration process for the Qantas crew volunteering for the program, while maintaining the integrity of the Australian border. The participating Qantas crew have shown strong preference for the new system.

Additionally, the recent recommendation by the International Civil Airline Organization (ICAO) that facial recognition be the preferred biometric measure for border crossing documents has lead to unexpected international interest in the SmartGate system as a prototype of future ICAO-compliant border crossing systems.

We believe it is desirable to continue the SmartGate project, and extend participation to non-operational aircrew, to aircrew of other airlines, and to frequent flyers.

Documents Reviewed

In the course of this analysis, the following documents were relied upon:

[1] F. Fraser, "National Resource Assessment Proposal", Internal Customs Document, April 2001

[2] AU Customs, "Passenger Processing Re-Engineering: Business Case", September 2001

[3] I. Graves, et al, "SmartGate 2003", DSTO, September 2003

[4] I. Graves, "Plan for Assessing Customs SmartGate System", July 2003

[5] A.J. Mansfield and J.L. Wayman, "Best Practices of Testing and Reporting Biometric Device Performance", version 2.01, UK Communications Electronic Security Group, August, 2002

[6] L. Gunning, "Analysis of the Smartgate Kiosk", ACTSAFE Australia, June 2003

[7] ACNielsen, "SmartGate Survey: Final Report", June 2003

[8] Australian Customs Service, "SmartGate Evaluation Plan", June 2003

[9] Monthly SmartGate activity logs

[10] Monthly reports from reports from Australian Customs Service to Department of Immigration and Indigenous Affairs

[11] "Face scan technology fails at the border – Updated", The National Business Review, 04/03/2003

[12] T. Pullar-Strecker, "Customs defends security system", Dominion Post, 10/03/2003

SENATE LEGAL AND CONSTITUTIONAL LEGISLATION COMMITTEE
AUSTRALIAN CUSTOMS SERVICE

Question No. 177

Senator Ludwig asked the following question on 2 December 2004:

Can you also indicate when the appointment of SAGEM Australasia was made and how much in the contract being paid to SAGEM and what is the proposed outcome of the partnership with customs in respect of Smartgate?

The answer to the honourable senator's question is as follows:

Please refer to the response to Parliamentary Question on Notice 3102 asked on 29 July 2004. The response was provided on 30 November 2004. The answer is unchanged. A copy of the reply is attached.

(Question No. 3102)

Senator Ludwig asked the Minister for Justice and Customs, upon notice, on 29 July 2004:

(1)Did SAGEM Australasia Pty Ltd recently win a contract to work with the Australian Customs Service on its SmartGate border control system.

(2)How many other companies submitted tenders for this contract.

(3)Who decided on the winning tender.

(4)When is SmartGate expected to be in operation.

(5)What is the cost of the tender.

(6)What training is needed to operate SmartGate.

(7)What information technology backup will be available during the implementation and subsequent operation of SmartGate.

Senator Ellison —The answer to the honourable senator's question is as follows:

(1)Yes. Customs conducted an open Request for Proposal procurement process for a Strategic Partner for the development of automated border control in late 2003, which resulted in a Head Agreement being signed with SAGEM Australasia Pty Ltd in May 2004.

(2)11 companies submitted proposals.

(3)Tim Chapman, National Manager Passengers Branch, Australian Customs Service approved the evaluation committee's recommendation of the preferred proponent.

(4)SmartGate is a trial, not a production system. The trial commenced at Sydney International Airport in November 2002 and will be extended to another airport and additional users in late 2004.

(5)The agreement with SAGEM Australasia that resulted from the Request for Proposal procurement process provides the framework for specific contracts to be formed but it does not guarantee any work. Under the Head Agreement there is a notional amount of $500 000 for works in 2004/05.

(6)SmartGate was designed to be very intuitive and new users are provided with a Help Card at the time of their enrolment. All Customs officers working at the related airports attend SmartGate briefing sessions and those directly related to the operation of the kiosk undertake specialised training.

(7)In the event of any failure of the system, the backup is to revert to existing manual processing systems utilising the passenger processing IT system.

SENATE LEGAL AND CONSTITUTIONAL LEGISLATION COMMITTEE
AUSTRALIAN CUSTOMS SERVICE

Question No. 178

Senator Ludwig asked the following question on 2 December 2004:

Could you update the amount of money that has been collected through the passenger movement charge both for the current financial year and the total of the previous year since it was implemented?

The answer to the honourable senator's question is as follows:

Financial year	PMC Collected Total ($m)
1994/95*	64.1
1995/96	147.8
1996/97	174.5
1997/98	189.0
1998/99	200.1
1999/00	226.2
2000/01	242.8
2001/02	283.6
2002/03	290.5
2003/04	329.8
2004/05 (to 30/11/04)	147.3

* PMC commenced on 1 January 1995

Question No. 179

Senator Ludwig asked the following question on 2 December 2004:

What percentage of passengers are now processed before arrival in Australia using the Advance Passenger Processing system?

The answer to the honourable senator's question is as follows:

This question was previously asked as Parliamentary Question on Notice 2636 on 2 March 2004 and answered on 1 April 2004. The answer is unchanged. A copy of the reply is attached.

Customs: Advance Passenger Processing System

(Question No. 2636)

Senator Ludwig asked the Minister for Justice and Customs, upon notice, on 2 March 2004:

(1) What percentage of passengers is now processed before arrival in Australia using the Advance Passenger Processing system.

(2) Is this figure in line with expectations for the system's performance.

(3) Are any full-time Australian Customs Service (ACS) personnel exclusively employed on Advance Passenger Processing; if so, at what Australian Public Service (APS) levels are these personnel employed.

(4) Are any part-time ACS personnel exclusively employed on Advance Passenger Processing; if so, at what APS levels are these personnel employed.

(5) Are any aspects of the maintenance and/or utilisation of the system contracted out to other government agencies, or to the private sector; if so, what is the cost of this.

(6) How many airlines' passenger information databases are currently available to ACS for passenger analysis.

(7) What percentage of the total number of airlines that fly to Australia does this represent.

(8) When is the linking of airline passenger information databases with the ACS expected to be completed.

(9) Does this linking form a component of the system; if not: (a) are any full-time ACS personnel employed on accessing airline passenger information; and (b) at what APS levels are these personnel employed.

(10) Are any part-time ACS personnel employed on accessing airline passenger information; if so, at what APS levels are these personnel employed.

(11) Is access to airline passenger information free of charge from the airlines concerned; if not, what is the total cost to ACS of accessing this information.

Senator Ellison—The answer to the honourable senator's question is as follows:

(1) The Advance Passenger Processing (APP) system is operated by the Department of Immigration and Multicultural and Indigenous Affairs (DIMIA) and is used to identify - at the time of check-in that a passenger has a valid authority for travel to Australia and to provide the carrying airline with authority for the passenger to board the aircraft. I am advised by DIMIA that approximately 96% of passengers arriving in Australia by air are processed through the APP system before boarding.

(2) I am advised by DIMIA that the proportion of passengers processed via APP is consistent with expectations.

(3) No.

(4) No.

(5) Customs has no role in the management or administration of APP and is not aware of contractual or other arrangements for this. This responsibility rests with DIMIA.

(6) Customs is presently connected to 12 airline reservation systems with 6 available for passenger analysis and 6 available for software development and testing.

(7) The 12 airlines represent 28% of airlines that operate scheduled passenger flights into Australia. The 6 airlines being analysed represent approximately 64% of passenger arrivals. This will increase to approximately 80% when analysis commences on a further 4 in June/July 2004.

(8) Customs expects to be connected to all passenger airlines reservation systems by the end of 2004.

(9) Yes. Linking to an airline reservation system is the first stage of the process. This is followed by development of analysis software for each specific airline system. There are eight full- time Customs staff employed in connecting to the airline systems and 27 full-time Customs staff employed on accessing passenger information. These total 1 x Customs Level 5 (EL 2), 2 x Customs Level 4 (EL 1), 6 x Customs Level 3 (APS 6), 6 x Customs Level 2 (APS 4-5) and 20 x Customs level 1 (APS 1-3).

(10) No.

(11) Yes.

Question No. 180

Senator Ludwig asked the following question on 2 December 2004:

Is this figure in line with expectations for the system's performance?

The answer to the honourable senator's question is as follows:

See the answer to Question No. 179.

Question No. 181

Senator Ludwig asked the following question on 2 December 2004:

Are any full-time Customs personnel exclusively employed in Advance Passenger Processing? If yes please provide numbers and at what level they are employed

The answer to the honourable senator's question is as follows:

See the answer to Question No. 179.

Question No. 182

Senator Ludwig asked the following question on 2 December 2004:

Are any part-time Customs personnel exclusively employed in Advance Passenger Processing? If so, at what APS levels are these personnel employed?

The answer to the honourable senator's question is as follows:

See the answer to Question No. 179.

Question No. 183

Senator Ludwig asked the following question on 2 December 2004:

Is the maintenance/utilisation of the Advance Passenger Processing system contracted out at all to other Government agencies, or to the private sector? If so, what is the total cost of this?

The answer to the honourable senator's question is as follows:

See the answer to Question No. 179.

SENATE LEGAL AND CONSTITUTIONAL LEGISLATION COMMITTEE
AUSTRALIAN CUSTOMS SERVICE

Question No. 184

Senator Ludwig asked the following question on 2 December 2004:

How many airlines' passenger information databases are currently available to Customs for passenger analysis? What percentage is this of the total number of airlines that fly to Australia?

The answer to the honourable senator's question is as follows:

Customs is presently connected to 30 airline reservation systems, of which 17 are available for passenger analysis and 13 for analysis software development and testing.

These 30 airlines represent 68% of airlines operating scheduled passenger flights to and from Australia, and account for approximately 94% of passenger arrivals into Australia.

The 17 airlines currently available for analysis account for approximately 84% of passenger arrivals. This will increase to approximately 86% of passenger arrivals when analysis software development is completed for a further 3 airlines by April 2005.

Question No. 185

Senator Ludwig asked the following question on 2 December 2004:

a)   When is the linking of airline passenger information databases with Customs expected to be fully completed?

b)   Does this linking form a component of the Advance Passenger Processing system? If not, are any full-time Customs personnel employed in accessing airline passenger information?

c)   At what APS levels are these personnel employed?

d)   Also, are any part-time Customs personnel employed in accessing airline passenger information?

e)   At what APS levels are these personnel employed?

The answer to the honourable senator's question is as follows:

a)   It is expected that linking to airline passenger databases will be fully completed by December 2005.

b)   No.

    Yes.

c)   Customs Levels 1 and 2. These are equivalent to APS levels 2 to 4.

d)   No.

e)   Not Applicable.

Question No. 186

Senator Ludwig asked the following question on 2 December 2004:

Does the accessing of airline passenger information come free of charge from the airlines concerned? If not, what is the total cost to Customs of accessing this information?

The answer to the honourable senator's question is as follows:

Yes.