



Citizenship and  
Immigration Canada

Citoyenneté et  
Immigration Canada



**Biometrics Planning Project**

**Biometrics Field Trial**

**Evaluation Report**

**Canada**

© Her Majesty the Queen in Right of Canada, represented by the Minister of Public Works and Government Services Canada, 2008.

Cat. no. Cj4-2/2008E  
ISBN 978-0-662-47667-2

Aussi disponible en français sous le titre : Mise à l'essai de la biométrie sur le terrain.

---

---

## TABLE OF CONTENTS

<b>1. Executive Summary</b>	<b>1</b>
<b>2. Introduction</b>	<b>3</b>
<b>3. Biometrics Field Trial</b>	<b>5</b>
3.1 Purpose	5
3.2 Scope	5
3.3 Restrictions on scope	6
3.4 Description of the Biometrics Field Trial	6
<b>4. Evaluation of the Field Trial</b>	<b>9</b>
4.1 Evaluation methodology	9
4.2 Field trial findings	10
<b>5. Program integrity—Usefulness of Biometrics in Strengthening Identity Management and in Detecting Fraud</b>	<b>12</b>
5.1 Overview	12
5.2 Identity management	13
5.3 Conclusion	15
<b>6. Biometric System Performance</b>	<b>16</b>
6.1 Background	16
6.2 Facial recognition	19
6.3 Fingerprint recognition	26
<b>7. Impact on Clients and Public Acceptance</b>	<b>39</b>
7.1 Client demographics	39
7.2 Client survey	40
7.3 Employee feedback on experiences with clients	40
7.4 Media and public inquiries	41
<b>8. Organizational and Operational Impacts</b>	<b>42</b>
8.1 Context	42
8.2 Overview	43
8.3 Impact of the field trial on volumes	45
8.4 Impact of the field trial on work processes, human resources and facilities	47
8.5 Impact of the field trial on processing times and service standards	51
8.6 Employee feedback	57
8.7 Toronto Refugee Intake Centre	60
8.8 Headquarters Matching Centre (HQC)	60
8.9 Conclusions	61

---

---

<b>9. Privacy Considerations .....</b>	<b>62</b>
9.1 Introduction .....	62
9.2 Privacy risk mitigation measures taken during the field trial.....	62
9.3 Conclusion.....	63
<b>10. Lessons Learned from the Field Trial.....</b>	<b>64</b>
10.1 Strengthening identity management of clients .....	64
10.2 Client service.....	65
10.3 Privacy .....	66
10.4 Forward-planning lessons .....	66
<b>11. Conclusion.....</b>	<b>69</b>
<b>Appendix A – Acronyms.....</b>	<b>A1</b>
<b>Appendix B – IT Hardware and Equipment .....</b>	<b>B1</b>
<b>Appendix C – Performance Indicators .....</b>	<b>C1</b>
<b>Appendix D – Description of Preparations for the Field Trial .....</b>	<b>D1</b>
<b>Appendix E – Photo Specifications .....</b>	<b>E1</b>
<b>Appendix F – Field Trial Brochure.....</b>	<b>F1</b>

---

---

## 1. Executive Summary

### Background

The increasingly global economy, the advent of low-cost air travel and the growing wealth in emerging economies have all contributed to a rapid rise in the transnational movement of people. That increase in movement brings with it an increase in irregular migration through identity and document fraud, and, therefore, concern—on the part of governments and citizens alike—about the ease with which criminals and would-be terrorists can exploit weak identity systems to travel between countries.

Around the world, governments and industry have developed new tools to improve border security, better manage the growing flow of people and mitigate the attendant risks to health and security. Many countries have already implemented such tools, which often involve the use of biometrics—the automated recognition of individuals based on unique physical features such as fingerprints.

In Canada, Citizenship and Immigration Canada (CIC) and the Canada Border Services Agency (CBSA) have been using biometric technology for some time now to identify people in the refugee, immigration enforcement and border facilitation programs.

Building on that expertise, CIC designed a field trial to assess the broad impacts of biometric technology on CIC and on the CBSA and to do the following:

- Assess biometric technology as a tool for improving program integrity
- Assess the impact of biometrics on client service in Canada’s visa and entry programs
- Explore the organizational and procedural impacts of biometrics
- Understand the costs of implementing biometric technology

### Description

The field trial was conducted over six months at two visa offices abroad, at two land ports of entry, at one airport, and at one refugee intake centre. All temporary resident visa applicants who appeared at those sites during the field trial were required to submit photos and fingerprints. Photos were collected at the visa offices, and fingerprints were collected at the point of first contact with the client—either the visa office or the port of entry.

Privacy was an important consideration in the design and implementation of the biometrics field trial. The Office of the Privacy Commissioner (OPC) was consulted starting at the design stage. The privacy mitigation measures recommended by the OPC were followed and the new personal information collected (clients’ biometric) was treated with the utmost care. All personal information gathered during the field trial was collected for statistical purposes only and stored in a secure database, and all requirements of Canada’s *Privacy Act* were strictly adhered to. The fingerprints collected were not used to make decisions on the approval of visa applications, the admitting of individuals to Canada or on the acceptance of refugee protection claims.

---

---

## Evaluation methodology

Performance indicators were developed during the planning process, and the biometrics field trial was evaluated through system reports, site visits by an evaluator, client and employee surveys, and reviews by forensic specialists.

## Key findings

### Program integrity

- Fingerprint and facial recognition—either alone or together—can yield highly accurate results.
- Biometric technology is effective in detecting fraud.

### Client service

- Full implementation of biometrics would require changes to service standards.
- Compliance with photo standards presents service challenges. Photo capture is strongly recommended if facial recognition is to be implemented fully.

### Organizational and procedural impacts

- Renovations, additional employees and training were all required in order to implement biometrics to even a limited extent. Full implementation of biometrics will have an even greater effect on the facilities and resources required to deliver services.
- Integrated data systems are recommended for full implementation of biometrics.
- Ergonomics is an important issue in workstations with limited areas.

### Costs

The field trial provided insight into the following:

- The costs of biometric technology.
- The impact of biometric processes on current data systems and on workflow.
- Human resource requirements, facility requirements, contracting and vendor costs, unit costs for equipment and the demand on network capacity to transmit new data.

---

---

## 2. Introduction

Canada is facing the challenge of having to manage the growing transnational movement of people brought about by the increasingly global economy, the advent of low-cost air travel and the growing wealth in emerging economies. Greater mobility means increased irregular migration facilitated through identity and document fraud, and therefore, more concern about criminals and would-be terrorists exploiting weaknesses in identity systems to travel between countries.

Around the world, governments and industry have been developing new tools geared to better managing the growing flow of people and to mitigating the attendant risks to health and security. Many of these new tools involve biometrics—the automated recognition of individuals based on their behavioural and biological characteristics.

One factor driving the implementation of biometrics at CIC is the need to link a record created in one office with a subsequent application in CIC's or in the CBSA's operations. Managing a client's identity by recording biometric data can help verify that client's identity when he or she interacts with CIC or the CBSA later on. When verification is required, it could be performed as a simple check of the computer and, when in question, be reviewed by a qualified forensic specialist.

Using biometrics for identity management could help achieve a number of program and security objectives:

- **Reduce visa fraud.** Clients would become known under one unique identifier and therefore could not apply again under a different name. Repeat applications under fraudulent identities would be vastly reduced.
- **Provide a link between visa and refugee programs.** CIC processes thousands of refugee protection claimants annually who appear in Canada with no identity documents but who would have needed a visa to enter Canada. Understanding the migration link, tracking misrepresentation in visa applications and confirming the identity of undocumented claimants is a program integrity priority. Searching by the name and date of birth that is provided by the client has proven insufficient.
- **Ensure entitlement to enter Canada.** The CBSA has no automated way of ensuring that a client arriving in Canada and seeking entry is the same person as the client who was approved for a visa. Biometric verification upon entry to Canada offers a fast and effective way to facilitate the entry decision process.
- **Speed up background checks.** Searching by name is a cumbersome way to perform background checks, and it often produces poor results because of changes in client names or different spellings of similar names. Biometrics would significantly improve the speed and accuracy of immigration and criminal background checks.
- **Enhance identity management to improve client service.** With biometric-based identity management, a broad range of client service options become feasible with no negative impacts on program integrity. For example, using a biometric to secure a client's identity during the first interaction with that person could enable the client to conduct subsequent interactions through a secure Internet channel.

---

---

Many countries have already adopted new measures to improve border security and to facilitate migration flows, including the following:

- **E-passports:** Over 30 countries are issuing passports containing secure chips in order to automate reading of the document on entry.
- **Advance passenger information:** Canada and the United States (US) were at the forefront of advance passenger screening.
- **Electronic travel authorities:** Australia leads the world in electronic pre-clearance.
- **Biometric visas and entry:** The US has captured biometrics as part of their visa and entry process since 2004, the United Kingdom began in 2006, and Europe will be introducing biometrics in their visa process in the coming years.

Australia has predicted that most entries into that country will soon be automated through the use of biometrics and entry kiosks. The US, under the US-VISIT program, has been collecting two fingerprints from all foreign nationals (except most Canadians) when they apply for a visa and when they enter the US at both land border crossings and at airports since 2004. The United Kingdom (UK) now uses a biometric visa, which was implemented for nationals of all countries in 2006, and it has announced that by 2010 all entries into the country will involve a biometric check. These success stories show that biometric technologies, which are reshaping travel, can help strengthen the integrity of migration management.

CIC and CBSA have long recognized the need to mitigate against the entry into Canada of persons who pose a security risk. CIC and the CBSA have invested significantly in enforcement measures that use biometric technology to identify people: the refugee and immigration enforcement programs both use an automated fingerprint identification system (CIC/CBSA LiveScan) that is linked to the Royal Canadian Mounted Police (RCMP). The CBSA was also one of the first organizations to use biometrics to facilitate the entry of low-risk, frequent travellers, through the CANPASS Air/NEXUS programs, which use iris recognition.

Building on that expertise, CIC implemented a limited, six-month operational field trial in October 2006 to assess the broad impacts of biometric technology on CIC and CBSA employees, clients and processes.

This evaluation report describes the findings of the field trial and the lessons learned from it, based on the original field trial objectives in the following areas:

- Program integrity
- Client service
- Organization and procedures
- Costs

---

---

## 3. Biometrics Field Trial

### 3.1 Purpose

In 2004, CIC allocated \$3.5 million to design, implement and evaluate a six-month operational field trial to explore how biometrics could be used in Canada's visa process and to facilitate entry into Canada, enhancing program integrity and client service. The specific objectives can be summarized as:

- Measuring biometric technology as a program integrity tool.
- Understanding the impact of the introduction of biometrics on client service for Canada's visa process and entry facilitation.
- Exploring the organisational and procedural impacts of biometric implementation.
- Understanding biometric program costs so they can be measured against benefits.

The CIC and CBSA experience during the field trial, as well as evaluation results, will be used to inform forward planning.

### 3.2 Scope

The field trial ran for six months at two visa offices abroad (Hong Kong and Seattle), at the Vancouver International Airport (VIA), at the Douglas and Pacific Highway ports of entry in British Columbia, and at the Refugee Intake Centre in Toronto, Ontario. During those six months, all clients who appeared at the participating offices to apply for a temporary resident visa, a study or work permit, or to claim refugee protection were required to provide biometric data.

Field trial sites were chosen in order to:

- **Ensure a diversity of clients representing many nationalities.** Hong Kong and Seattle are transit hubs and therefore serve a global population. Their selection ensured that the population was not homogenous.
- **Measure the service effects of in-person enrolment.** Both visa offices serve most clients in person. Adding the field trial activities was expected to have little impact on operations but would allow for the collection of enough data to measure the impact on service.
- **Ensure maximum entry verification.** Overseas offices were matched with the most likely entry points into Canada, thereby allowing for the greatest potential for collecting biometrics for verification purposes.

---

---

### 3.3 Restrictions on scope

The following conditions applied during the field trial:

- Children aged 14 or under, as well as diplomats and government officials travelling on government business were not required to participate in the enrolment of fingerprints.
- Provisions were made for clients who were unable to enrol fingerprints.
- The field trial test did not perform biometric matching in real-time. Decision makers for visa approval, entry to Canada and refugee claims were not privy to the results of biometric matching performed at CIC National Headquarters (NHQ).
- All biometric information and matching data were isolated in a testing database with highly restricted access and verified by forensic specialists to ensure that the system yielded a correct result.
- The field trial client biometrics database was destroyed in July 2007 in keeping with CIC's privacy commitments.

It is important to note that the USA PATRIOT Act did not affect the field trial. Although the supplier was an American company, the biometric database was owned by the Government of Canada and housed in a restricted access location at CIC NHQ in Ottawa.

### 3.4 Description of the Biometrics Field Trial

The biometrics field trial involved the introduction of fingerprint and facial recognition technologies to the processing of temporary resident visa applicants (students, workers and visitors) and refugee claimants.

#### 3.4.1 *Type of biometrics collected*

##### ***Photos***

CIC temporary resident visa applicants are routinely required to submit their photos as part of the application process. In order to maximize the accuracy of facial recognition technology, photos received at the time of application were required to meet new CIC photo standards and specifications (See Appendix A – Photo Specifications) based on the International Civil Aviation Organisation's (ICAO) photo standards for size, pose, lighting and other related specifications. Non-compliant photos were rejected through a quality assurance process at the visa office and clients were required to submit new photos.

Photos were scanned, re-sized and saved to a contactless chip placed in the client's passport under the Canadian visa seal. More details on the use of a chip can be found in section 3.4.2.

##### ***Fingerprints***

Ten inkless, flat fingerprints were collected for the purpose of enrolment at the time of the first in-person contact with the client—at the visa office or port of entry. During enrolment, clients were asked to place four fingers from their right hand, then four fingers from their left hand, and then two thumbs together on the glass of the fingerprint reader.

---

---

After clients had enrolled 10 fingerprints at the visa office, on subsequent entries into Canada through a participating port of entry, they were asked to provide only one fingerprint (usually the index finger) for the purpose of verification. The system then compared the presented fingerprint to all (usually 10) of the fingerprints enrolled at the visa office. This was done for two reasons:

- With all 10 fingerprints in the system, we can eliminate the possibility of requesting a match for a finger that is not on file, which would produce a false rejection.
- The officer is given some control over which finger is presented for comparison.

These capabilities will be important to the success of a fully deployed system.

If the client applied for and received their visa by mail, and subsequently entered Canada through a participating port of entry, they were asked to provide all 10 fingerprints for the purpose of enrolment.

### ***Toronto Refugee Intake Centre***

Photos and fingerprints are required from refugee claimants in Canada. Data collected at the Toronto Refugee Intake Centre during the six-month field trial was included in the database for the purposes of matching and analysis.

The volume of enrolments at the Toronto Refugee Intake Centre during the field trial were deemed to be significant enough to enhance the technical testing under the field trial and presented the possibility to test match enrollees who moved from the visa program to the refugee program. The Toronto Refugee Intake Centre processes the largest volume of refugee claims per year in Canada. The potential for identity fraud for clients crossing over between the visa and the refugee programs was identified as a security gap that biometrics could address.

#### ***3.4.2 The use of chips to identify field trial clients***

Since field trial clients constituted a very small portion of travellers at the participating ports of entry, there was a need to identify them quickly at the primary inspection line (PIL) in order to collect fingerprints for verification, or for enrolment for mail-in applications. A chip was placed in the client's passport under the Canadian visa seal, for quick identification at the port of entry. The chip contained an image of the client photo submitted at the time of application, a field trial client number and an indication whether or not the client had enrolled fingerprints. When field trial client passports were read at the port of entry, this information was displayed on a small PC Tablet for the port of entry officers (PIL officers at VIA, and to the immigration secondary officers at VIA and the Douglas and Pacific Highway).

As a chip tampering detection method, a digital signature was created and added to the chip automatically by the system's software. When the chip was read, the system would indicate whether the expected digital signature was present or, if not, would display an appropriate message to the officers.

---

---

### ***3.4.3 Analysis and matching***

The biometric (photo and fingerprint) information was encrypted according to Government of Canada standards and transmitted via a protected channel to a secure database at CIC NHQ in Ottawa, where biometric matching and analysis were conducted.

For more details on the usefulness of biometrics in detecting fraud at CIC and performance of the biometric system, see Chapters 5 and 6 respectively.

## 4. Evaluation of the Field Trial

This section describes the evaluation methodology and provides a brief overview of some key results obtained. These results are described in greater detail in the remainder of this report.

### 4.1 Evaluation methodology

The evaluation of the biometrics field trial was guided by performance indicators which were developed prior to the launch of the field trial. Detailed indicators were developed under four key objectives as listed below in **Table 4-A**.

**Table 4-A: Field trial evaluation framework**

Objective	Outcomes measured
<b>1. Identity Management and Program Integrity</b>	
<i>Goal: To measure biometric technology as an identity management and program integrity tool</i>	
I1	Identity management outcomes
I2	Facial recognition system performance
I3	Fingerprint recognition system performance
I4	Fingerprint and facial recognition fusion performance
I5	Overall biometric system performance
<b>2. Client Service</b>	
<i>Goal: To understand the impact of the introduction of biometrics on client service for Canada's visa and entry programs.</i>	
C1	Client facilitation
C2	Client relations
C3	Public Opinion
<b>3. Operational Impact</b>	
<i>Goal: To explore the organizational and procedural impacts of biometric implementation.</i>	
O1	Visa office impacts
O2	Port of Entry Impacts
O3	Usability of Refugee Biometric Data
O4	Centralised Matching Impacts
O5	Ergonomics
O6	Human Resources Impacts
<b>4. Cost Factors</b>	
<i>Goal: To understand biometric program costs so that they can be measured against benefits.</i>	
C1	Implementation costs

Performance indicators were developed for each objective (See Appendix C – Performance Indicators). The field trial yielded significant data through a broad range of measurement tools, including:

- **Biometric system reports** for measures relating to system performance, timing and suggested matches
- **CIC system reports (CAIPS) and available local statistics** for a portion of the operational impact measures for visa offices
- **Forensic specialist review** to judge photo and fingerprint quality, and to review system suggested matches
- **Site visits** where CIC Project Team members observed the field trial and interviewed employees, including supervisors
- **Client surveys** conducted at the Hong Kong and Seattle visa offices during the last month of the field trial; and
- **Problem reports, status updates and periodic conference calls** with supervisors at the field trial sites.

## 4.2 Field trial findings

The biometrics field trial yielded enough data to allow for a thorough evaluation. The following tables provide some notable statistical findings from an analysis of the field trial data:

**Table 4-B: Biometrics field trial volumes at a glance**

ITEM	VOLUME
Total client enrolments at all field trial sites <sup>1</sup>	18,264
Enrolments at both visa offices	6979 <sup>2</sup> (photo only)
	7875 (photo and 10 fingerprints)
Hong Kong	8,516
Seattle	6,338
Number of enrolments at ports of entry	338 <sup>3</sup>
Enrolments at Refugee Intake Centre	3,410 (photo and 10 fingerprints)
Field trial arrivals detected at participating ports of entry	: 548 (Douglas/Pacific Highway)
	-: 934 (Vancouver International Airport)
	1,482 TOTAL:
Number of times field trial clients presented one finger for verification at ports of entry	1,020

<sup>1</sup> Includes temporary resident visa applicants in Hong Kong and Seattle, refugee claimants at the Refugee Intake Centre, and multiple enrolments. Clients who applied more than once during the field trial period, either in Hong Kong or Seattle, had their photos and/or fingerprints enrolled every time.

<sup>2</sup> Includes minors (under 14 years old) and mailed-in applications.

<sup>3</sup> 10-fingerprint enrolments only – all photos were enrolled at visa offices.

It is interesting to note that even during the limited field trial period there were 364 repeat clients. Most of these clients applied twice (usually after being refused the first time) but a few applied three or four times during the six month period. This shows the potential to facilitate these repeat clients by enrolling their biometrics initially, and then only verifying them at subsequent encounters.

**Table 4-C: Interesting field trial facts**

ITEM	VOLUME
Field trial clients claiming refugee status in Canada	12 <sup>4</sup>
Multiple enrolments (biometric matches)	394 <ul style="list-style-type: none"> <li>• 182: only photos available for the repeat clients (mail-in applications, not seen in Vancouver)</li> <li>• 195: both photos and fingerprints available for the repeat clients</li> <li>• 17: only fingerprints available<sup>5</sup></li> </ul>
Number of clients who applied multiple times	364
Clients correctly matched using only facial recognition with system recommended threshold	98.4%
Clients correctly matched using only fingerprints with system recommended threshold	97.9%
Clients correctly matched using both facial and fingerprint recognition	100%

<sup>4</sup> Includes three irregularities found: one client committed identity fraud by assuming a different name; and two clients were refused visas and then travelled to Canada with improperly obtained or fraudulent documents using their original names. See Section 5.

<sup>5</sup> See Section 6—Biometric System Performance under CIC conditions—for more information.

---

---

## 5. Program integrity—Usefulness of Biometrics in Strengthening Identity Management and in Detecting Fraud

### 5.1 Overview

The field trial demonstrated the capacity to fix client identity using biometrics and to increase confidence in decisions relating to client identity.

Field trial enrolments for visa applications totalled 14,854. Of those 14,854 enrolments, 394 matches were made because of multiple enrolments. Those match results show that biometric technology is a highly effective way to manage client identity:

- **97%** of the fingerprint and facial biometrics enrolled were of high quality.
- When facial and fingerprint recognition were combined, the system made matches in **100%** of cases.
- Verification was accurate in **96%** of cases (see Section 7 for details).

In the 394 matches, the biometric search engine made a link to a previous field trial interaction. Of these, 12 matches were of particular interest from a program integrity perspective:

- One case was a clear case of fraud. The person had two separate applications under two different identities – one in the temporary visa program and one in the refugee protection program. The biometric system enabled CIC to make a link between the two identities, which would otherwise have been impossible.
- Two cases involved applicants who had been refused visas and who later reappeared as refugee protection claimants. The biometric system enabled CIC to make a link to previous visa data, which would normally have had to be done manually.
- In nine cases, the clients were issued visas and later claimed refugee protection. The biometric system enabled CIC to make a link between the refugee and visa data. This type of link, if there is full biometrics implementation, would enhance the decision-making process.

---

---

## 5.2 Identity management

### 5.2.1 *Managing client identities*

Biometric technologies like the fingerprint and facial recognition technologies tested under the field trial have undergone significant industry testing to establish their effectiveness as identification tools. CIC wanted to test these technologies in day-to-day operations.

The field trial was designed to yield a statistically significant number of identification matches in order to test the quality and performance of biometric technology as an identity management tool.

CIC measured the following aspects of the performance of the field trial system:

- The quality of the collected biometrics, combined with performance measurements used in the industry
- The accuracy of matches with the number of repeat enrolments at the visa offices and at the Refugee Intake Centre
- The accuracy of matches with the number of clients who, once enrolled with a set of 10 fingerprints, enrolled one fingerprint at a port of entry for verification

Those key accuracy measurements gave CIC a better understanding of the benefits of biometric tools for its visa programs.

CIC manages a broad range of programs such as the temporary and permanent resident visa programs and the refugee protection program. Clients who apply under one program often appear later to change their status (for example, from visitor to student or from worker to permanent resident). As a result, CIC has many repeat clients. By providing an automated link to a previous application, biometric technology can help ensure that immigration officers have access to important case data, which can help them detect clients who try to obscure their immigration history by changing their name or date of birth and which can strengthen the level of trust between clients and CIC.

The field trial successfully tested the capacity of biometric technology to aid in managing the identity of repeat clients, in linking of case history and in detecting identity fraud.

### 5.2.2 *Visa program integrity*

Out of the 14,854 client enrolments in the field trial, 364 clients (2.5%) applied more than once. As a result, CIC had the following volumes of biometric samples for test purposes:

- 377 pairs of photos
- 212 pairs of fingerprints
- 195 pairs of photos and fingerprints together

---

---

Using the pairs of photos, testing showed that 98.4% of clients within this group were matched correctly using facial recognition technology alone; 97.9% were matched correctly using fingerprint technology alone; and 100% were matched correctly when fingerprint and facial recognition technologies were combined.

### ***5.2.3 Entry management using a fingerprint biometric***

The field trial also tested the capacity of fingerprint technology to verify clients on entry. Clients who had their 10 fingerprints enrolled at a visa office provided a single fingerprint at one of the participating ports of entry for comparison against their previously enrolled fingerprints.

During the field trial, of the 7,875 clients whose fingerprints had been enrolled at a visa office, 918 subsequently appeared at a field trial port of entry and had a single fingerprint verified. The field trial tested the capture of a verification fingerprint but did not send back a match or hit result in real time to the examining officer at the port of entry.

Verification was successful in 96.1% of cases, and no known cases of fraud were detected. In the other 3.9% of cases, the forensic specialists found the fingerprints to be of too poor quality to assess whether a match existed. Since no employees at port of entry sites participating in the field trial reported a client not matching their displayed visa photo, it seems credible that no fraud was attempted.

### ***5.2.4 Identity management across the client continuum***

During the field trial, the biometric samples of 14,854 visa applicants were compared against those of 3,410 refugee protection claimants to test whether clients had moved between programs. In 12 cases, visa applicants became refugee protection claimants during the six months of the field trial. Those 12 cases break down as follows:

- Nine cases involved individuals with valid visas presenting the same biographic data when they made their refugee protection claim. The biometric system enabled CIC to establish an automatic link back to the visa applications.
- Two cases involved individuals who had been refused visas and who had travelled without proper documentation to Canada to make a refugee protection claim. Again, the biometric system enabled CIC to trace these cases back to the initial visa application.
- One case involved a person making a refugee protection claim under another name and date of birth and concealing the fact that they had come to Canada with a visa. This instance was a clear case of identity fraud and shows that biometric tools are needed to prevent abuse of CIC's programs. In this case, both facial recognition and fingerprint systems were highly accurate.

The 12 cases were discovered as a result of 13 biometric matches. In six cases, matches were made based on both facial and fingerprint data; in two cases, based on facial data alone (no fingerprints were enrolled for those clients at the field trial sites); and in five cases, on fingerprint data alone, because the system deemed that the client's Refugee Intake Centre photos did not match those submitted at the visa office. For more information on matching and photo quality, see Section 6.

---

---

### **5.2.5 Biometrics as a deterrent**

Other countries that have already implemented biometric systems have generally found they deter fraudulent activity.

Although hard to prove, there is some evidence to suggest that the field trial did deter visa recipients from arriving in Canada through the participating ports of entry. Before the field trial, client volumes for the same six-month period in previous years were reviewed. In addition, a detailed survey of where visa recipients were expecting to land in Canada was conducted in Seattle. Based on those two analyses, without considering a possible deterrence factor, 71% of field trial clients were expected to arrive in Canada through either the Douglas or Pacific Highway land border crossings or through the Vancouver International Airport.

The purpose of that collection exercise was not only to plan the resources required for the field trial but also to have current comparison data at the end of the field trial to see whether the numbers dropped dramatically enough to conclude a deterrent effect.

Ultimately, only 10% of field trial clients arrived at one of the participating ports of entry, showing a marked difference between expected and actual arrivals.

One significant factor that may have changed travel patterns was the introduction of direct flights between Hong Kong and Toronto, which operated daily during the field trial. Clients who opted for this route would not have been verified in the field trial.

The sole case of identity fraud in the field trial involved a person claiming refugee protection at the Refugee Intake Centre in Toronto.

### **5.3 Conclusion**

Biometric technology is an effective tool for confirming identity and detecting fraud. Matching performance was found to be high. Based on the accuracy of the results for clients known to have had multiple encounters with CIC, both fingerprint and facial biometrics performed well in identifying those clients.

Analysis of the data confirms that biometrics can fix the identity of an applicant and confirm linkages between business lines. Expanding the use of biometrics would increase CIC's ability to detect cases of misrepresentation and abuse of programs, and would provide a strong link to previous immigration records (such as a previous visa overstay or a previous refugee protection claim). In addition, mandatory biometric verification would likely have a deterrent effect.

---

---

## 6. Biometric System Performance

### 6.1 Background

This section describes the findings on the performance of the biometric systems during the field trial. It covers the quality of the fingerprints and photos collected and the matching performance of both biometric systems. The performance indicators are listed in Appendix D: Evaluation Methodology.

The field trial involved collecting, for the purpose of enrolling, 10 fingerprints and one photo every time a client applied for a visa at the participating visa offices and then, when the client arrived at a participating port of entry to Canada, collecting one fingerprint for the purpose of verification, to see if the person who travelled to Canada was in fact the same person who received the visa.

All matching was conducted at the Headquarters Matching Centre (HQC). Matching involved searching the digitized photos and fingerprint images against the field trial database for all 18,264 client enrolments, which consisted of 14,854 temporary resident visa applications and 3,410 refugee protection claims.

#### 6.1.1 Types of automated biometric matching

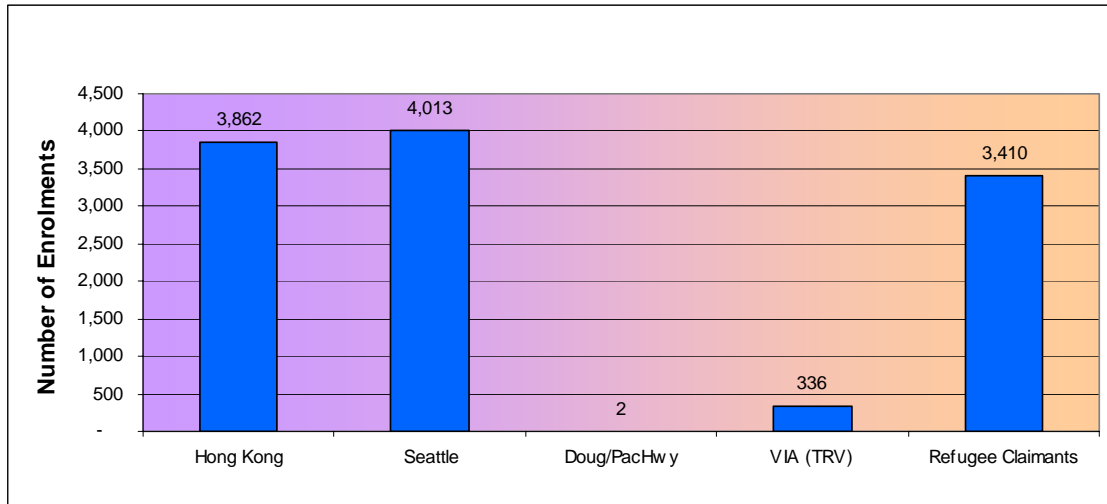
Three types of biometric matching were conducted during the field trial:

- **One-to-many matching of all photos** of clients applying. Photos enrolled as part of the field trial were compared with each other to identify duplicates and to detect possible fraudulent attempts. Of the 18,264 client enrolments, 41 had no photo associated with them as a result of operator error, and two (2) failed to enrol. This matching process therefore involved comparing all 18,221 photos with each other. The results of these 332,004,841 individual facial recognition matches are presented in Section 6.2.
- **One-to-many matching of 10 fingerprints** from all 11,623<sup>6</sup> sets of fingerprints enrolled. The breakdown is provided in **Figure 6-A**. This process helped determine the number of duplicate attempts made either legitimately, by clients making multiple applications to obtain a visa, or fraudulently. This matching process involved comparing all 11,623 sets of up to 10 fingerprints with each other. The results of these potentially 135,094,129 individual fingerprint matches are presented in Section 6.3.

---

<sup>6</sup> 8,213 fingerprint sets from visa office clients seen in person and 3,410 sets from refugee protection claimants. There are no fingerprints for field trial clients who mailed in applications and who did not enter Canada at Vancouver.

**Figure 6-A: Initial fingerprint enrolments**



- **One-to-one matching of a single fingerprint** presented at the port of entry for comparison against that client’s 10 originally enrolled fingerprints. The process matched 918<sup>7</sup> single fingerprints presented at a port of entry by visa clients to the corresponding file number look-up of the enrolled 10-fingerprint set.

Where a comparison yielded one or more possible matches—when the matches had a biometric similarity score above CIC’s defined threshold—the forensic specialists evaluated the suggested matches and either accepted or rejected them. Under the rules of the field trial, in neither the reject or accept scenarios was the resultant data provided to any of the participating ports of entry or visa offices, or to the Refugee Intake Centre.

### **6.1.2 Forensic specialist review of suggested automated biometric matching**

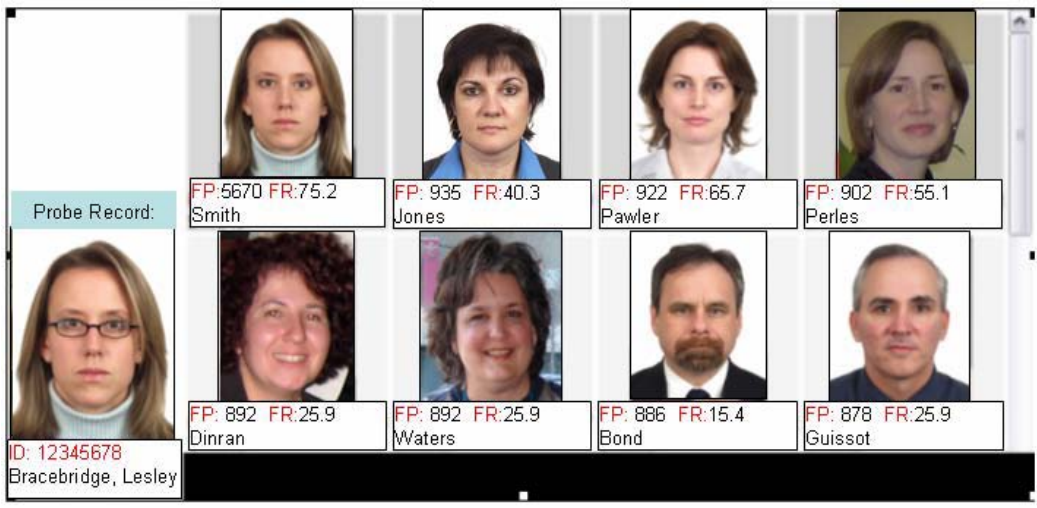
The forensic specialists who reviewed the suggested matches used screens similar to those shown below.

Matches could either be performed on an individual query basis or in batches. The user performing the matching at the HQC could choose whether to match based on face only, on fingerprint only, or on a combination of both. When matching based on a combination, the user would specify whether the match results were to be sorted by face primary or by fingerprint primary.

<sup>7</sup> While 1,020 one-finger captures for verification purposes were performed during the field trial, only 918 could be enrolled into the biometric system (converted to a biometric template file).

**Figure 6-B** shows a sample Level 1 match review screen.<sup>8</sup> For this match, an individual probe record was matched by face primary. All facial recognition scores are above 72.25, the threshold that the forensic specialists set for the field trial as reflecting the best balance between correct matches and false rejects. The screen also shows the fingerprint scores, the name and the date of birth (if available). Having both scores together proved highly useful for analysis.

**Figure 6-B: Level 1 match review screen**



Source: Demo records

\*Probe—A biometric template that is used to search against a database(s)

**Figure 6-C** shows a sample Level 2 review screen. This screen was used to view a selected matching result image—photo, thumb and index fingerprint—side-by-side with the probe (the original photo) being searched against the database.

**Figure 6-C: Level 2 match review screen**



Source: Demo record

**Figure 6-D** shows the Level 3 screen for a fingerprint. This screen was used to enlarge the probe and result images side-by-side.

<sup>8</sup> All sample screens show test subjects, who did not participate in the field trial.

**Figure 6-D: Level 3 match review screen**



Source: Demo record

## 6.2 Facial recognition

### 6.2.1 Facial recognition enrolment performance

For the total 18,264 enrolments, 18,223 had photos (41 records had no photos). Of those, 14,816 photos were from visa applicants, whose photos were scanned into the system at the visa offices at 300 dots per inch, and 3,407<sup>9</sup> were from refugee protection claimants, whose photos were taken using LiveScan at the Refugee Intake Centre in Toronto.

Enrolment times for photo collection included scanning and cropping, which took approximately 10 seconds, plus approximately 30 seconds for the photo to be saved to the server. This included time to create a highly compressed 3.25 KB photo, for which the purpose was writing it to a chip, and available for subsequent query display.

### Failure to enrol photos

The field trial system attempted to enrol each scanned photo and gave each photo a quality score from 1 to 100. If a photo could not be enrolled, the system would give the photo a score of zero and move it to the “Failed to Enrol” section of the database.

Of the 18,223 photos for enrolment, only two (2) failed to enrol, for a total of 18,221 successfully enrolled photos for matching purposes. The first case was a photo of a child taken too close to the camera and posed at a 30-degree angle. In the second case, the facial recognition software could not enrol the image because the individual had an eye injury.

<sup>9</sup> A total of 3,410 refugee protection claimants' photos were enrolled, 3 did not end up with any photo on file. File corruption is suspected.

---

---

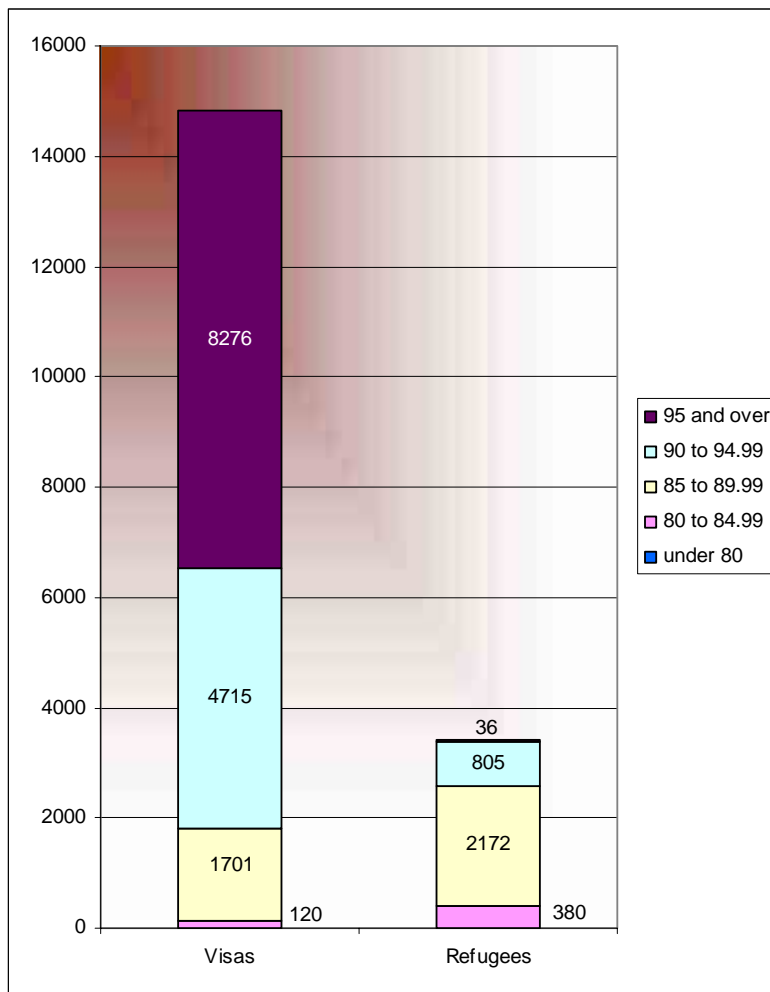
## Photo quality

Photo quality was examined from three perspectives:

- The system-generated photo enrolment score
- Compliance of selected samples with International Civil Aviation Organization (ICAO) standards, as analysed by forensic specialists at three different periods of the field trial versus before the start of the field trial
- Compliance of all photos clients who were verified at a port of entry with ICAO standards, as analysed by forensic specialists

**Figure 6-E** shows that the biometric system found scanned visa photos to be of higher quality than refugee claimant photos for facial recognition.<sup>10</sup>

**Figure 6-E: System-generated photo quality scores**



<sup>10</sup> Photos with extremely low quality scores (14 for visas and 80 for refugees) could not be represented on this graph.

Figure 6-F shows that while the system-generated scores for visa applicants were higher than those for refugee claimants, there was little difference between genders.

**Figure 6-F: System-generated scores for visa applicants and for refugee protection claimants by gender**

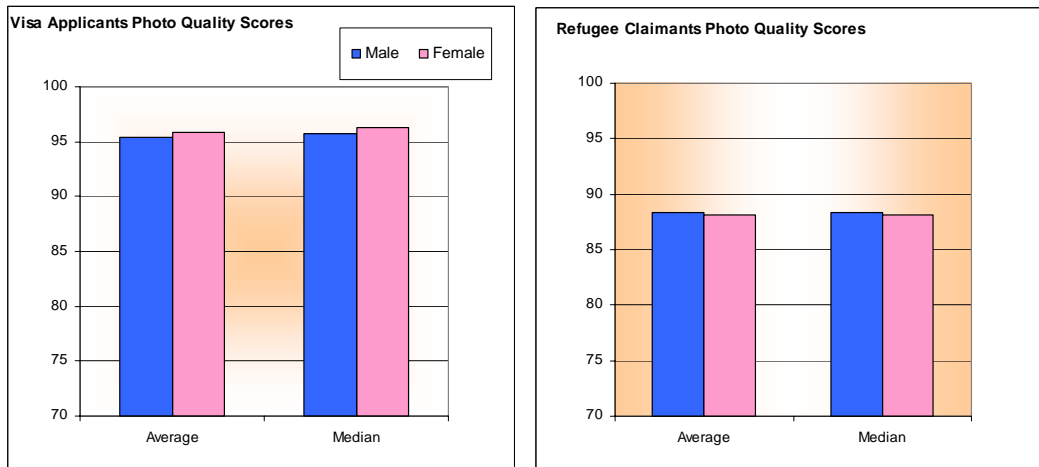
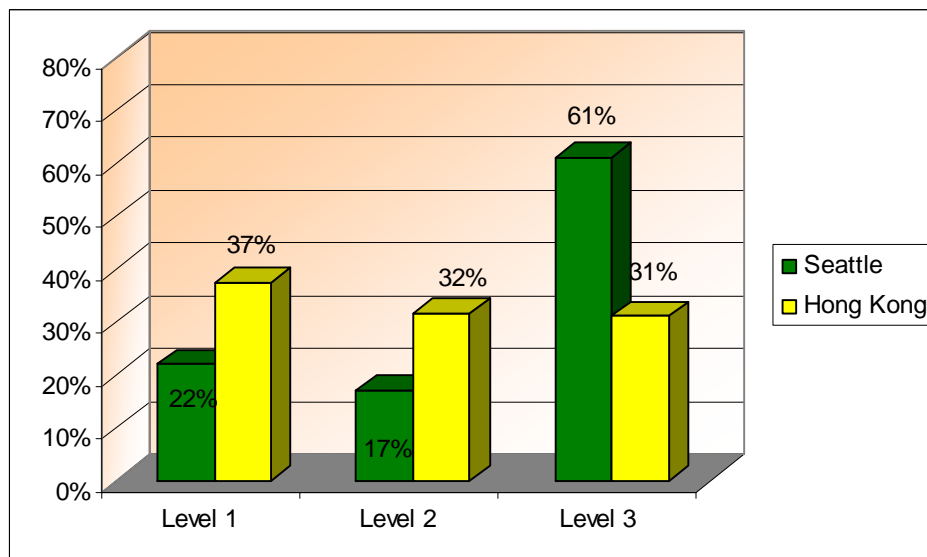


Figure 6-G indicates the compliance level as determined from a review of 300 sample photos from visa offices before the field trial. The quality of photos prior to the Trial, in terms of compliance with ICAO standards, was quite low. Hence, the implementation team enhanced the photo specification training tools and guidelines prior to launching the Trial.

**Figure 6-G: Visa office compliance with ICAO standards—Pre field trial**



---

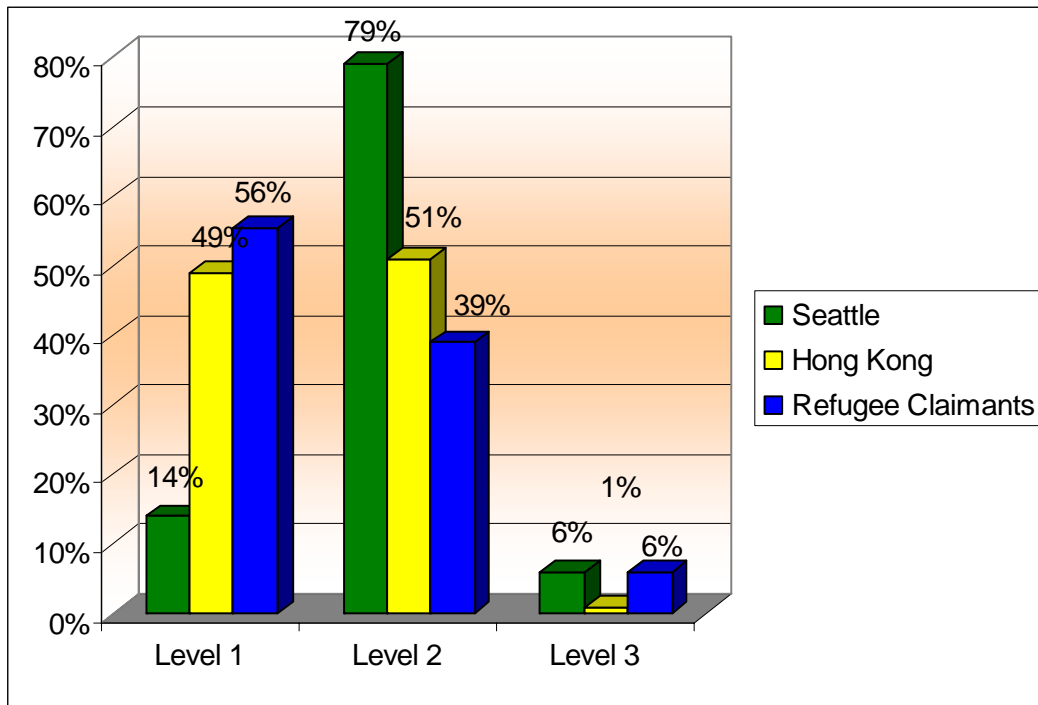
---

## Definitions

- Level 1: Meets all ICAO specifications
- Level 2: One or two ICAO minor violation(s)
- Level 3: Major ICAO violation(s)

**Figure 6-H** indicates the compliance level as determined from a review of 600 sample photos throughout the field trial. The quality of field trial photos in terms of compliance with ICAO standards improved greatly **during** the Trial and became quite high.

**Figure 6-H: Compliance of photos with ICAO standards—During field trial**

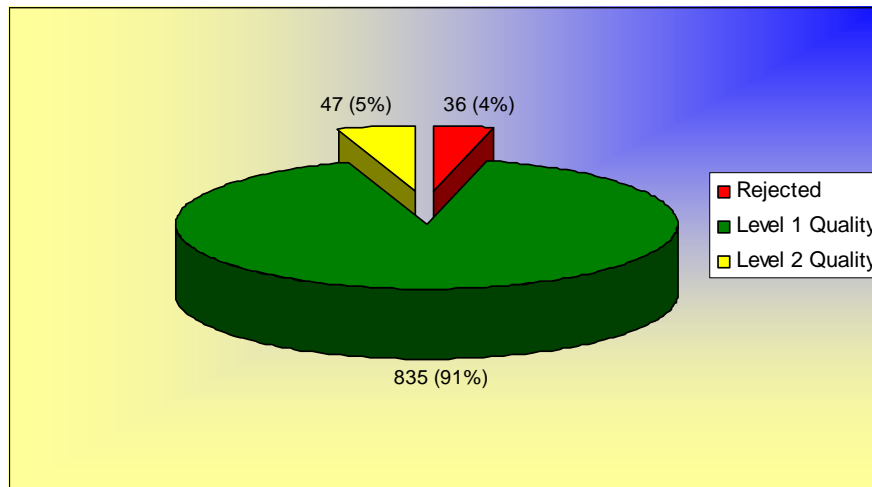


---

---

**Figure 6-I** shows the results of the forensic specialist assessment of a sample of photos from clients who were verified at a port of entry during the field trial.

**Figure 6-I: Forensic specialist assessment—Photos of clients with a fingerprint verification record on file**



Source: Verifications Evaluation by Forensic Specialists

### Quality definitions

- Level 1    Photos accepted
- Level 2    Photos accepted but with a slight ICAO violation
- Level 3    Rejected = Several ICAO violations

Many aspects of the facial recognition software were analysed for accuracy. Approximately 80% of the photos were examined for quality. The very few problems detected occurred when CIC photo specifications had not been followed. This could likely be eliminated with experience and proper guidance.

The problems encountered included the following:

- **Lighting:** Some of the photos had either too much or too little lighting, causing them to be too dark or too washed-out for all of the features to be seen.
- **Heads turned left, right, up or down:** The turning of the head caused significant problems for the search engine, especially when the head was turned up or down.
- **Eyeglasses:** Eyeglass frames that cut across the top of the eyes and glare in the lens created problems for the search engine.
- **Hair:** Hair obstructing facial features also caused problems.
- **Small photos:** Some photos were simply too small, which made viewing difficult.

---

---

### 6.2.2 Facial recognition matching performance—Alone and in combination with fingerprints

There were 18,221 successful enrolments in the field trial. Matching pairs of photos were only found when individuals applied more than once for a visa or applied for a visa and then made a refugee protection claim.

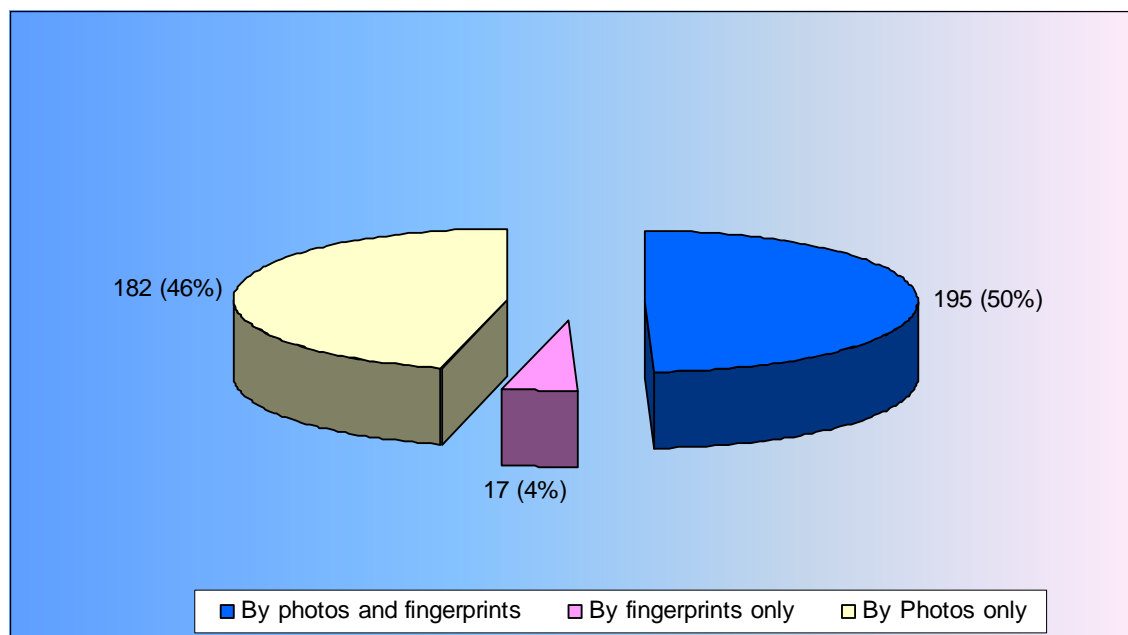
Based on name searches, queries of existing CIC systems and extensive biometric match reviews, it was determined that 364 individuals interacted with CIC at least twice during the field trial and therefore provided at least two photos. Some of these individuals applied three or four times during the trial.

Those situations enabled CIC to analyse the matching performance of the biometric system. The analysis showed that possible matches totalled 394. The 30 pairs above the 364 individuals who interacted with CIC at least twice during the field trial results from instances of individuals applying three or four times.

Of the 394 pairs (**Figure 6-J**):

- 195 times CIC had both photos and fingerprints to use for matching
- 182 times CIC had only photos to use for matching
- 17 times CIC had only fingerprints to use for matching (due to operational errors)

**Figure 6-J: Breakdown of biometric matching**



The suggested matches in the hundreds of suggested matches would often follow a trend. For example, if the person had long hair, then most of the suggested matches would have long hair. If the person had glasses or head gear, then most of the suggested matches would have glasses or head gear.

---

---

However, this trend did not seem to pose a major problem. If the face of the person being compared was actually in the database, the system would find the correct match.

When the CIC photo specifications were followed, the facial recognition software proved to be an invaluable tool, successfully matching faces in a database of thousands, which a human being could never have accomplished in the same amount of time.

### **6.2.3 Correct identification matching for photo-only**

Of the 394 possible matches, 182 pairs of possible matches were found using *facial recognition only*, since these individuals did not submit two or more sets of fingerprints. In three cases, the facial recognition score was above the threshold set by the forensic specialists, so the system generated a false non-match count of 3 (a correct match percentage of 98.1%).

Of the 394 possible matches, there were 195 potential matches for whom it was possible to match using a combination of *both facial recognition and fingerprints*. Examining only the performance of the facial recognition system, the facial recognition score of the correct match was above the threshold set by the forensic specialists in 183 cases (**93.8%**).

In total, CIC had 377 potential matches using facial recognition. CIC's correct match count was 362 (**96.0%**). Of these correct matches, 98.8% were the top-ranked photo.

### **6.2.4 Correct identification matching for photo combined with fingerprints**

Of the 394 possible matches, 195 potential matches were found using a combination of *facial recognition and fingerprints*.

Examining the performance of both biometrics combined on this set of potential matches, CIC found the following:

- Using *either facial recognition scores or fingerprint matching scores* above their respective thresholds, all **100%** of matches were correct.
- Using *both facial recognition scores and fingerprint matching scores* and identifying a match only if both biometric results were above their respective thresholds, only 179 matches were made (**91.8%**).
- For the matches identified using both fingerprints and photos, CIC found that either biometric was adequate to confirm a positive match. However, using facial recognition or fingerprint recognition alone failed to identify two different pairs above the recommended threshold. The two false non-matches of facial recognition were not for the same people as the false non-matches for fingerprints. **When combined, both biometrics yielded all matches, as opposed to only 155 (98.7%) if either biometric was used alone.**

---

---

## 6.3 Fingerprint recognition

### 6.3.1 Fingerprint enrolment performance

Section 8 describes the enrolment times for all 10 fingerprints (the 4 + 4 + 2 slaps) and for the single fingerprint collected for verification. The remainder of this section deals with the quality of both types of fingerprints.

Fingerprint quality was examined from the following perspectives:

- The forensic specialists' assessment of the 10-fingerprint enrolment after reviewing approximately 3,000 samples taken during the field trial
- The system-generated fingerprint enrolment scores for all 10-fingerprint enrolments
- The forensic specialists' assessment of the 918 verification fingerprints and their 10-fingerprint enrolments contrasting with the system-generated scores
- Contrasting visa applicant versus refugee protection claimant template scores – A template is the biometric system-generated data used to match individuals to each other. Scores for template quality rather than scores for image quality were required, because records imported for refugee protection claimants did not include scores for image quality

### 6.3.2 10-Fingerprint enrolment quality assessment by forensic specialist

After conducting an initial assessment of the fingerprint quality by reviewing fingerprint images, several issues were identified. A review of fingerprints that were not enrolled by the fingerprint algorithm found that approximately 3,000 suitable impressions had not been enrolled.<sup>11</sup>

**Figure 6-K** shows examples of fingerprint impressions that were not successfully enrolled into the biometric system and were instead set aside in a “failed to enrol” file as images.

**Figure 6-K: Fingerprints that were not enrolled**



---

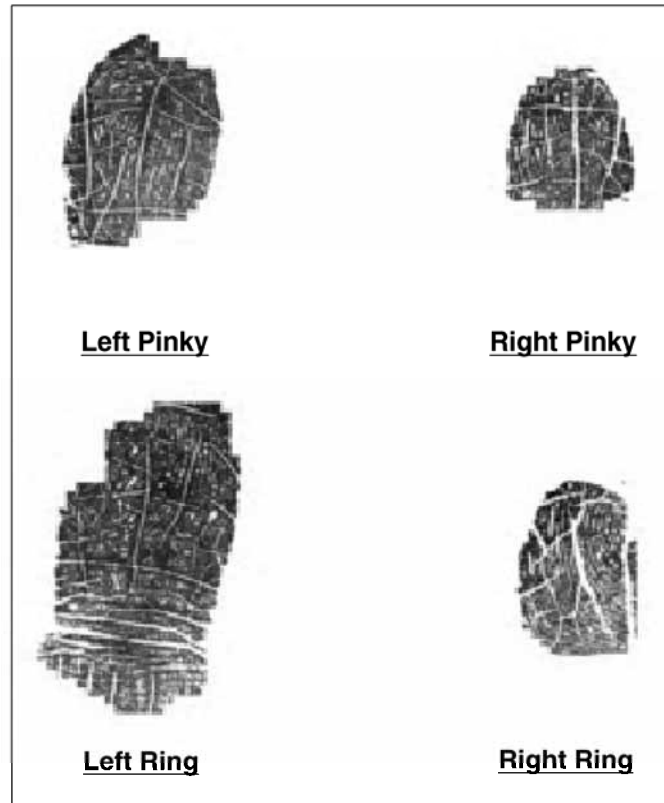
<sup>11</sup> This meant that 3,000 impressions of individual fingers (not 3,000 clients) were not available for matching until the issue was resolved. Matching was successfully performed after the software fix.

---

---

Initially, several high-quality images were not enrolled into the biometric system, while several poor-quality images were. See **Figure 6-L** for examples of poor quality images that were enrolled.

**Figure 6-L: Fingerprints that should not have been enrolled**



After the concerns were raised with the vendor, a new biometric algorithm was included in the software package and the issue was resolved.

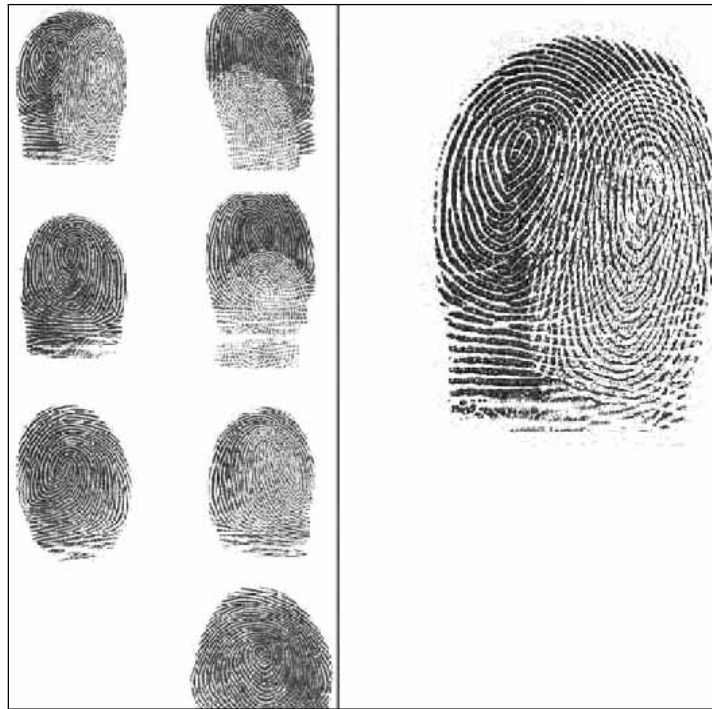
A second problem identified was *ghosting*—a different impression being included with the captured images for some fingerprint impressions. Often, the ghost image was of better quality than the actual impression. This problem seemed to occur in consecutive batches. The problem originated during the initial calibration process of the LS2 fingerprint capture devices. If a hand or fingers were present on the glass plate during the initialization of the device, the image of the hand or fingers would be included with each fingerprint impression taken on that device. This problem was rectified by issuing a communiqué requesting staff to ensure no prints were on the reader during its initialization process.

---

---

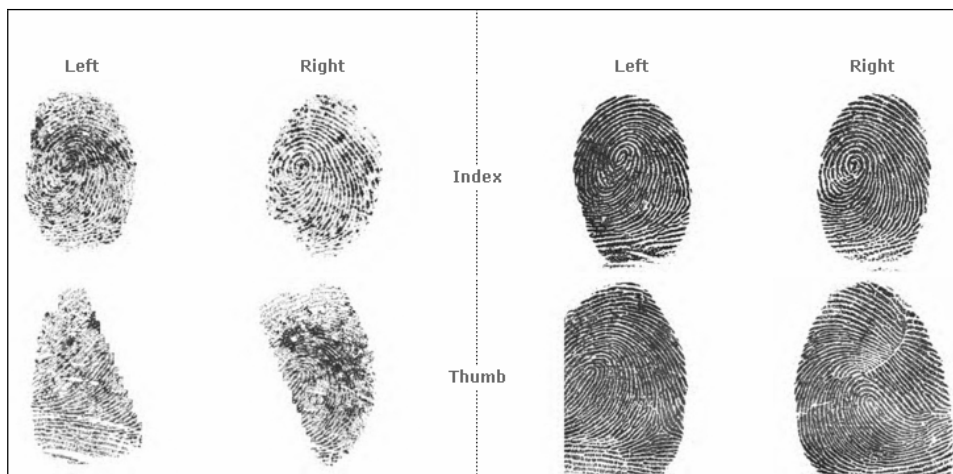
See **Figure 6-M** for examples of the ghosting problem identified.

**Figure 6-M: Ghosting**



Another problem encountered was cropped images, in which a portion of the fingerprint image was cut off. This problem occurred because the fingerprint slaps were taken outside of the acceptable scan area and resulted in only part of some fingers being recorded. This issue was caused by a combination of operator error and software. The images came from visa offices and port of entry immigration secondary environments. The Headquarters Matching Centre encountered these cropped fingerprint images primarily in the single fingerprints collected for verification purposes. Because the displayed acceptable scan area does not precisely match the actual acceptable scan area, operators may not have known that the images were not being correctly captured. However, some images were so cropped that it seemed that the operator did not ensure that the client's fingerprints were placed in the correct area. (Note: Because of the operational and facility-related constraints, operators could not always see where clients had placed their fingers.) See **Figure 6-N** for an example of cropped images.

**Figure 6-N: Cropped fingerprints**      **Figure 6-O: Cut-off fingerprints**



The overall quality (85% to 90%) of the fingerprint impressions was excellent. Any poor impressions usually stemmed from the subject’s age or from other factors. The poor-quality images did not result from the equipment or the operator but from the client’s fingerprints having insufficient ridge detail to be captured.

The forensic specialist’s assessment of quality was based on the analysis of the overall fingerprints for clarity—how clearly the friction ridge detail is transferred from a three-dimensional object (skin) to a two-dimensional object (glass platen).

When evaluating a fingerprint, the following three levels of detail are looked at (a standard for fingerprint specialists around the world).

**Level 1 detail** refers to the overall pattern shape of the unknown fingerprint—a whorl, loop or some other pattern. This level of detail cannot be used to individualize, but it can help narrow down the search.



---

---

**Level 2 detail** refers to specific friction ridge paths—overall flow of the friction ridges and major ridge path deviations (ridge characteristics) like ridge endings, lakes, islands, bifurcations, scars, incipient ridges, and flexion creases.



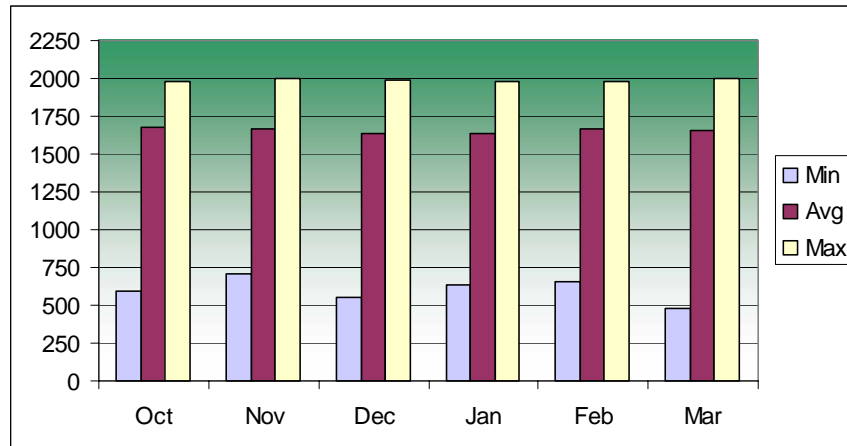
**Level 3 detail** refers to the intrinsic detail present in a developed fingerprint—pores, ridge units, edge detail, scars etc.



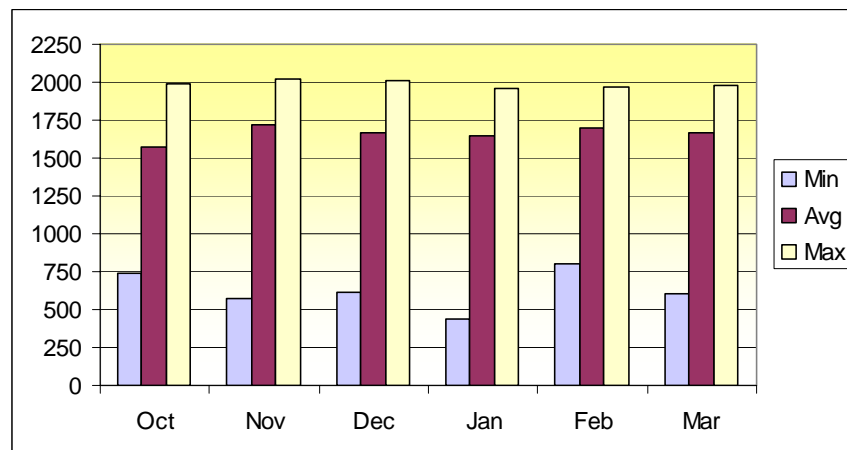
### 6.3.3 System-generated fingerprint enrolment evaluation

The biometric system's auto-generated fingerprint enrolment scores for all of the field trial's 10-fingerprints enrolments are presented below. **Figures 6-P to 6-Q** show that the biometric system gave fingerprints from both participating missions about the same average score.

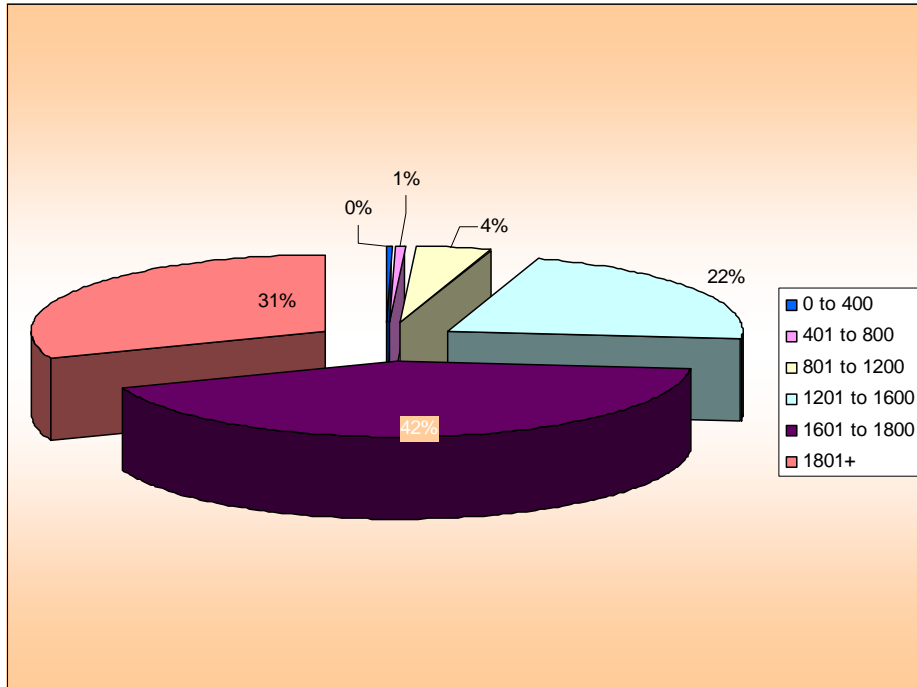
**Figure 6-P: Seattle Fingerprint Scores by Month**



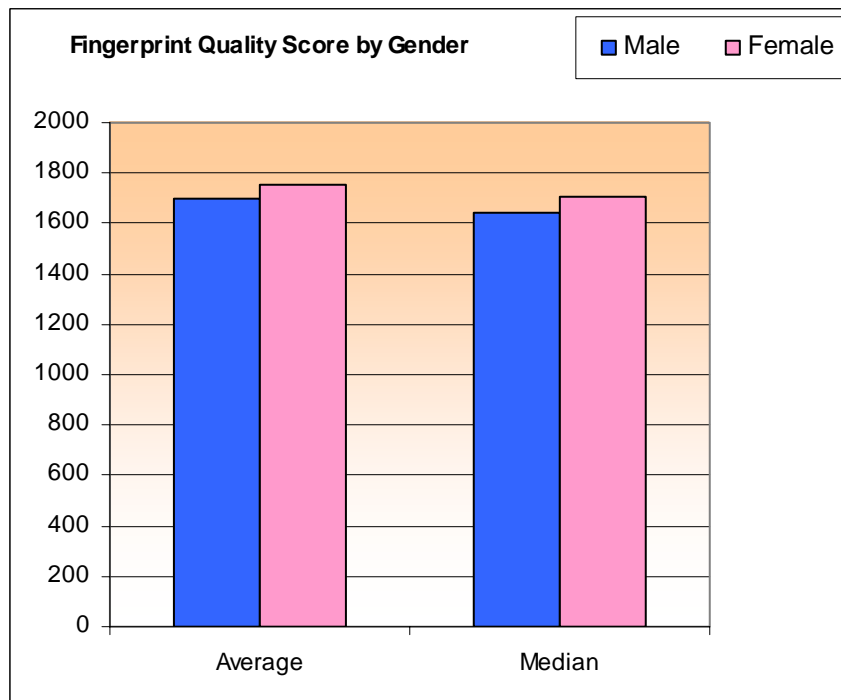
**Figure 6-Q: Hong Kong Fingerprint Scores by Month**



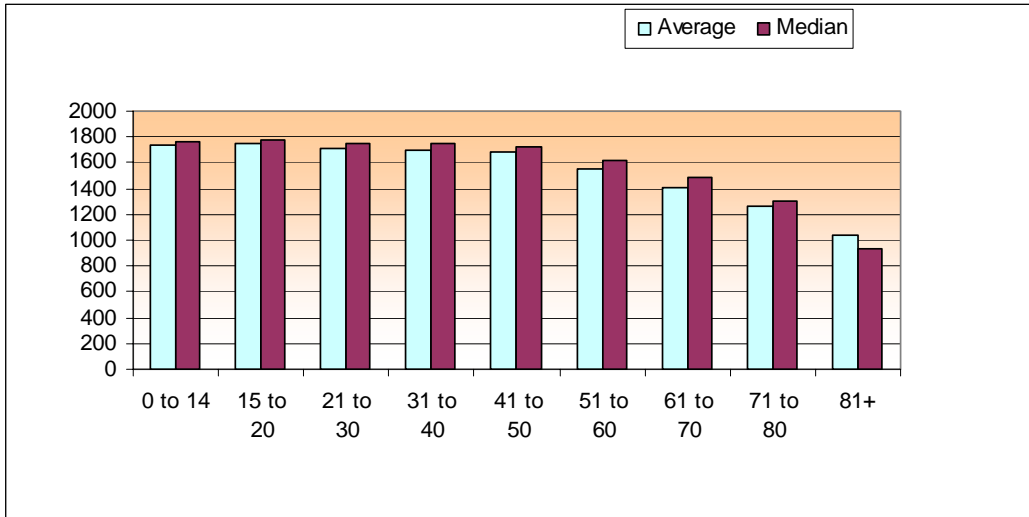
**Figure 6-R: Breakdown of Automated 10-Fingerprint Quality Scores**



**Figure 6-S: Fingerprint Quality Score by Gender**



**Figure 6-T: Fingerprint Quality Score by Age**



**6.3.4 Forensic specialist assessment of verification fingerprint enrolment**

Forensic specialists examined the images enrolled in the biometric system and their quality scores. **Tables 6-A** and **6-B** show the system-generated scores, along with the forensic specialists’ assessment of how the fingerprints would be judged using forensic specialists’ standard definitions.

**Table 6-A**

System score range	#	%
Range 1: 90-100	29	3%
Range 2: 80-89	274	30%
Range 3: 70-79	314	34%
Range 4: 60-69	251	27%
Range 5: 50-59	28	3%
Range 6: >50	22	2%
<b>Total</b>	<b>918</b>	<b>-</b>

**Table 6-B**

Forensic specialists’ assessment range	#	%
Range 1: 90-100	74	8%
Range 2: 80-89	303	33%
Range 3: 70-79	304	33%
Range 4: 60-69	153	17%
Range 5: 50-59	33	4%
Range 6: >50	51	6%
<b>Total</b>	<b>918</b>	<b>-</b>

**Table 6-C** shows how the above values translate into forensic specialists' standard definitions.

**Table 6-C**

<b>Forensic specialists' ranking</b>	<b>#</b>	<b>%</b>
Level 3 (Range 1,2)	377	41.1%
Level 2 (Range 3,4)	457	49.8%
Level 1 and below (Range 5,6)	84	9.2%
<b>Total</b>	<b>918</b>	<b>-</b>

**Table 6-D** shows the difference between the system score and the forensic specialists' assessment.

**Table 6-D**

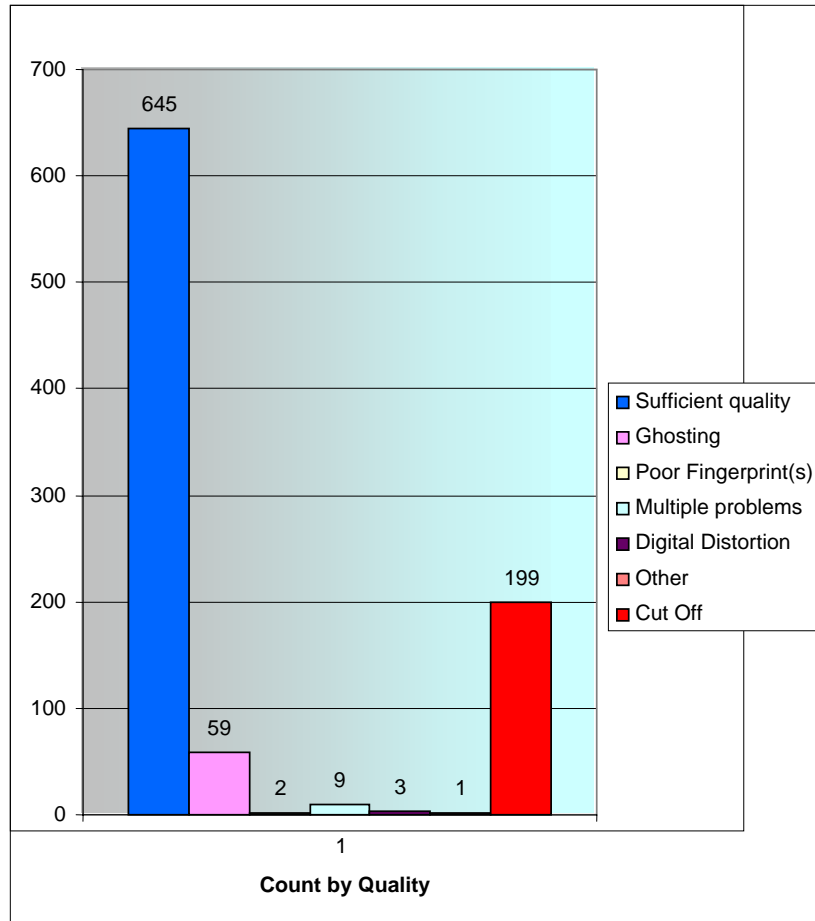
<b>Forensic specialist assessment</b>	<b>#</b>	<b>%</b>
<b>Agree with system</b>	557	61%
<b>Disagree with system</b>	361	39%
<b>Forensic specialist Increased score</b>	232	25%
<b>Forensic specialist Decreased score</b>	129	14%
<b>Total</b>	<b>918</b>	<b>-</b>

**Table 6-E** and **Figure 6-U** show the quality of the fingerprints (all 10), as assessed by the forensic specialists, for those sampled with the verification fingerprints captured.

**Table 6-E: Quality of verification fingerprint**

<b>Forensic specialists' comment</b>	<b>#</b>	<b>%</b>
<b>Sufficient quality</b>	645	70%
<b>Ghosting</b>	59	6%
<b>Cut off</b>	<u>199</u>	<u>22%</u>
<i>Bottom</i>	39	4%
<i>Side</i>	4	0%
<i>Top</i>	146	16%
<i>Multiple areas</i>	10	1%
<b>Poor fingerprints</b>	2	0%
<b>Multiple problems</b>	9	1%
<b>Digital distortion</b>	3	0%
<b>Other</b>	1	0%
<b>Total</b>	<b>918</b>	<b>-</b>

**Figure 6-U: Quality of Verification Prints as per Forensic Specialist**

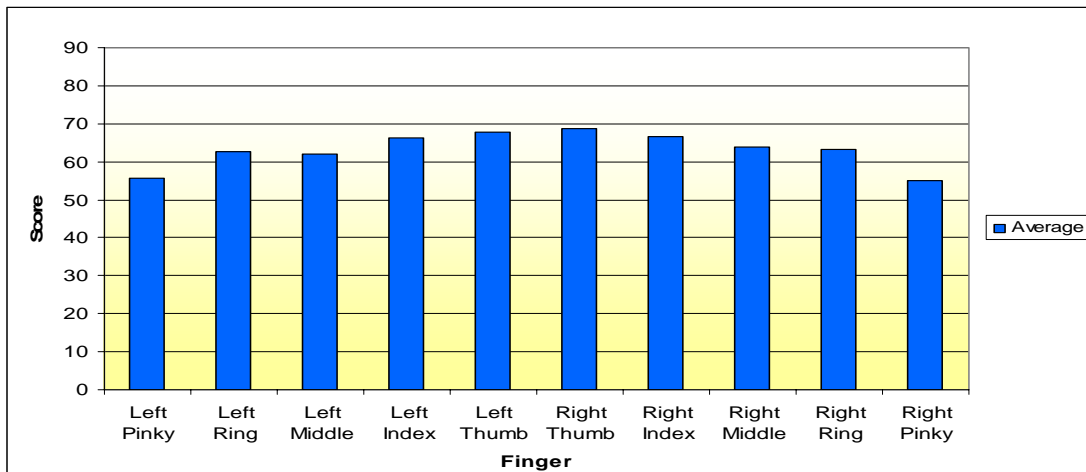


Analysis by the forensic specialists showed that approximately 70% of the time the fingerprints were of suitable quality. Several factors, including ghosting, made the fingerprint impressions of lesser quality. Because ghosting was discovered early in the field trial and was corrected, it should not have any significant consequence in the future. Another problem, which accounted for 22% of all problems, was the cutting off of portions of the impressions. Some of the fingerprints had the top, sides or bottom cut off, making searching difficult. This problem is easily corrected using updated software and better training for the operators. Any other problems were minor and did not account for more than 1% of all problems. The most significant were poor impressions lacking sufficient friction ridge detail owing to ageing or work.

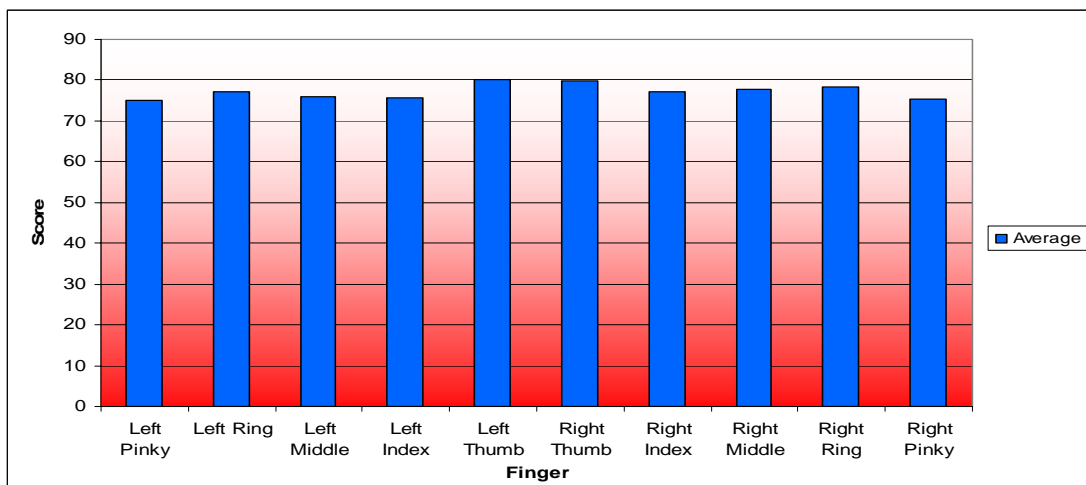
### 6.3.5 Visa applicants' enrolment scores versus refugee protection claimant enrolment scores

For refugee protection claimants, the NIST (National Institute of Standards and Technology) record from the LiveScan system does not provide fingerprint image quality scores; it does, however, provide template enrolment scores. Since this metric is also available for visa fingerprints, **Figures 6-V** and **6-W** contrast the 10 slap fingerprint sets collected from visa applicants with 10 rolled sets<sup>12</sup> collected from refugee protection claimants.

**Figure 6-V: TRV Fingerprint Template Quality Score**



**Figure 6-W: Refugee Fingerprint Template Quality Score**



<sup>12</sup> Rolled prints refer to the more traditional way of capturing a person's prints in which each finger is "rolled" from fingernail to fingernail. This results in a larger and more complete print. Slap prints are a relatively newer and only include the pressed surface of the print.

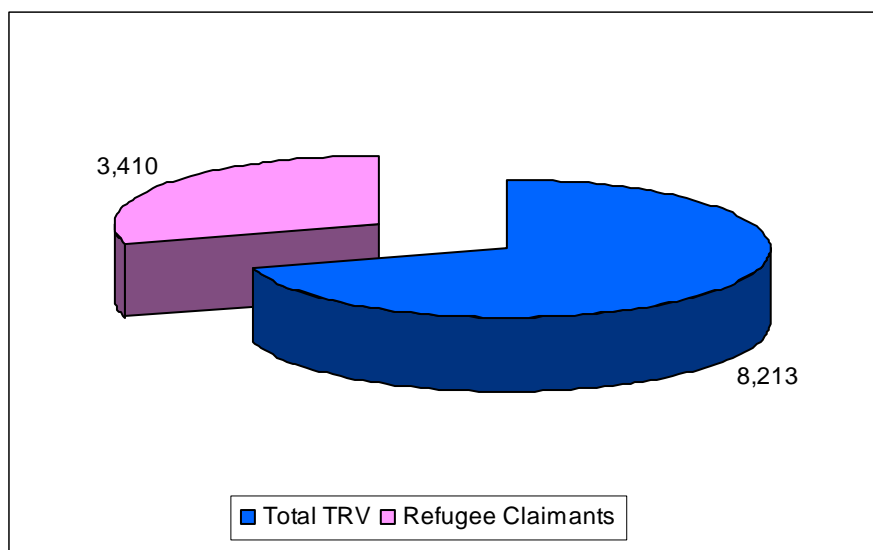
---

---

### 6.3.6 Fingerprint matching performance—One-to-many identification

Of the 18,264 files created during the field trial, 8,213 sets of 10 fingerprints were collected from visa applicants and 3,410 sets from refugee protection claimants, yielding a gallery\* of 11,623 10-fingerprint sets, as seen in **Figure 6-X**.

**Figure 6-X: Count of Initial 10-fingerprint sets**



\*A Gallery is the set of enrolled biometric images that will be searched against.

Matching on multiple 10-fingerprint sets was possible in the case of individuals who did one of the following:

1. applied multiple times for a visa
2. applied for a visa and made a refugee protection claim

As described in section 6.2.2, the field trial consisted of 18,264 client enrolments, and 364 individuals interacted with CIC at least twice during the trial. There were a total of 394 pairs of possible matches.

The results for fingerprint matching when combined with facial recognition are presented in 7.3.2.

### 6.3.7 Correct matching for identification

Of the 394 possible matches, 17 pairs of possible matches using *fingerprints only* were found because individuals had provided incorrect or invalid photos. In all cases, the matching score was above the threshold set by the forensic specialists, so the system generated *a correct match rate of 100%*.

Of the 394 possible matches, there were 195 possible matches using a combination of *facial recognition and fingerprints* were found. Examining only the performance of fingerprinting, the scores of the correct matches were above the threshold set by the forensic specialists in 191 cases (97.9%).

In total, CIC had 212 potential matches using fingerprints, and the correct match count was **208 (98.1%)**. When CIC increased the threshold to boost the correct match rate to 100%, CIC would have included 2 (0.9%) incorrect matches (also known as false matches).

### 6.3.8 Matching performance—One to one

Of the 8,213 sets of 10 fingerprints prints collected from visa applicants, 918 single fingerprints taken at the ports of entry were enrolled into the biometric system for one-to-one matching purposes. Although all clients were instructed to present their right index finger, CIC asked that the system compare the presented fingerprint with all (usually 10) fingerprints enrolled. This request was made for two main reasons, which are expected to be desirable for a fully deployed system:

- All 10 fingerprints are in the system anyway. Comparing a single fingerprint against the person’s set of fingerprints eliminates the risk of either the officer requesting or the traveller placing the wrong finger, thereby causing a false rejection.
- This approach reduces the likelihood of a traveller trying to trick the system with a fake fingerprint by enabling the officer to request any finger at random.

The verification results are shown below. The unsuitable fingerprints were judged by the forensic specialists to be of too poor quality to assess whether or not a match existed.

**Table 6-F** presents, for verification, counts and percentage for correct acceptances, false rejects and false acceptances. In six cases, operational errors led to the wrong fingerprint being acquired.

**Table 6-F**

***Forensic specialists’ verification matching results***

<b>System responses</b>	<b>#</b>	<b>%</b>
<b>Unsuitable fingerprints</b>	<b>36</b>	<b>3.9%</b>
<b>Total useable fingerprints</b>	<b>882</b>	<b>96.1%</b>
<i>Correct acceptances</i>	810	91.8%
<i>False rejects (same person, low score)</i>	52	5.9%
<i>False acceptance (high score, wrong person)</i>	14	1.6%
<i>Wrong fingerprint / person not verified</i>	6	0.7%
<b>Total</b>	<b>918</b>	<b>100.0%</b>

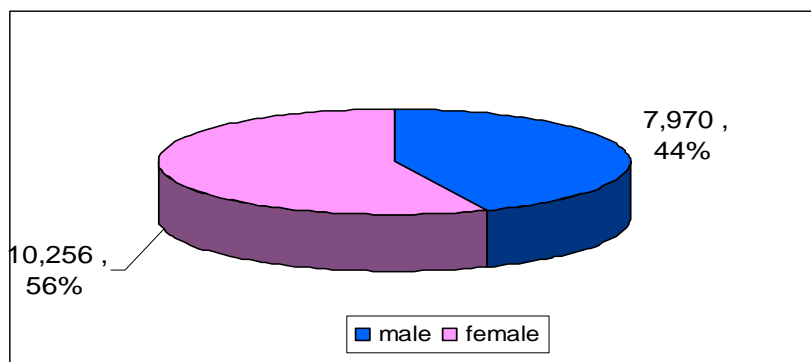
## 7. Impact on Clients and Public Acceptance

This section describes how clients were affected by the enrolment process and their impression of biometrics, employees' impressions on the impact of the field trial on clients, and public reception to biometrics.

### 7.1 Client demographics

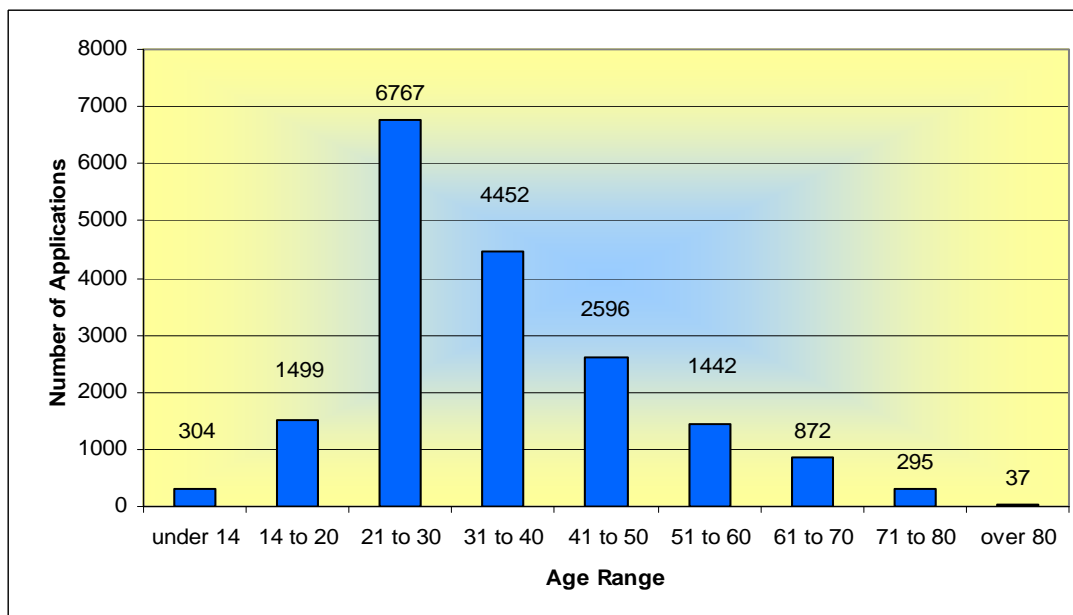
When analysing the impact of the field trial on clients, it is helpful to understand client demographics.

**Figure 7-A: Applications by gender**



**Figure 7-A** shows that the majority of clients (56%) participating in the field trial were female.

**Figure 7-B: Applications by age**



The largest age groups participating in the field trial were 21 to 30 years, followed by 31 to 40 years.

---

---

## 7.2 Client survey

Clients in visa offices were surveyed in order to assess the impact of the field trial on them. A questionnaire was developed at CIC NHQ and administered by visa office employees in Hong Kong and Seattle to every visa applicant during the last month of the field trial. After submitting their application, clients completed a hard-copy questionnaire while waiting for their receipt.

A total of 1,203 respondents participated in the survey (margin of error: 2.9%, 19 times out of 20) which was made up of two sub-samples:

- 594 respondents in the Hong Kong office (margin of error: 4.1%, 19 times out of 20)
- 609 respondents from the Seattle office (margin of error: 4.1%, 19 times out of 20).

### 7.2.1 Summary of results

- Most respondents (56%) became aware of the field trial when they arrived at the visa office. Less than one in three (28%) found out about the field trial from the CIC Web site; and 10% found out from family and friends.
- More than three-quarters of respondents (78%) reported that their photos were accepted the first time they were submitted. Respondents from Europe (92%), the Philippines (87%), Africa and the Middle East (84%) and Taiwan (81%) were most likely to report that their photos were accepted the first time.
- Almost nine out of ten respondents (87%) were able to give their fingerprints on the first try.
- Almost all respondents (97%) said that the fingerprinting machine was at just the right height.
- A majority of respondents (52%) indicated that the fingerprinting process was quicker than they expected.
- Generally, respondents felt that it would be useful to have a screen on which to see their fingerprints as they enrolled them (47% very useful, 27% fairly useful).
- Two-thirds (65%) of respondents—85% of respondents from Seattle and 45% from Hong Kong—replied that they had been required to provide fingerprints previously.

## 7.3 Employee feedback on experiences with clients

CIC and CBSA employees were interviewed during the field trial to get feedback on their experiences and their observations on the impact of the field trial on clients.

There were no client complaints from clients at any of the field trial sites regarding the process for collecting biometric information. However, the strict enforcement of the CIC Visa Photo standards in the Seattle and Hong Kong visa offices did cause client service challenges in the early phase of the field trial. Although the photo standards were published on the CIC Web site and distributed to local photographers, many clients were initially unaware of this. At the beginning of the field trial, clients were applying for visas with photos that did not comply with the photo standards. When clients' photos were rejected and they were asked to bring in new photos, they became distressed. However, as client awareness grew, photo compliance also increased. In the last month of the field trial, more than three-quarters of the field trial clients (78%) reported that their photos were accepted the first time they were submitted.

---

---

For fingerprint enrolment, employees in Seattle believed that the process would be faster and the level of client frustration would be significantly reduced if there were specific visual aids to facilitate the enrolment process. Conversely, employees in Hong Kong believed that such visual aids would only serve to confuse the clients. This could mean longer processing times because the next steps would need to be explained. It was, however, noted that language plays a significant role in the ease and efficiency of the enrolment process and that further communications material for the public (see section 10 for suggested material) may alleviate client uncertainty about the information collection process for enrolment and/or verification purposes.

In conclusion, clients had no complaints about the biometric enrolment as they seemed to accept it as a new requirement for obtaining a Canadian visa. However, CIC can take steps to improve the biometric enrolment experience for clients by taking their suggestions under consideration.

#### **7.4 Media and public inquiries**

CIC received very few inquiries from the public and no complaints related to the field trial during the trial period. The CIC National Call Centre received two requests for information on the biometrics field trial, while the Minister of Citizenship and Immigration received one request for information.

CIC has monitored public opinion on biometrics since 2003. Polls conducted in March 2007—while the field trial was in operation—showed that 90% of Canadians support the use of biometrics by the federal government to conduct background checks on non-Canadians wanting to enter Canada. Eighty-eight percent (88%) of Canadians support the use of biometrics to verify the identity of non-Canadians applying for an immigration visa.

Some concerns over privacy and transparency were raised in the media prior to the launch of the field trial.

Several articles were written about the biometrics field trial. Some articles mentioned commitments made to the US and Canada's efforts to enhance security and identity measures, while others referred to public concerns about access to personal information and lack of trust in the technology. However, one mentioned the benefit of being able to identify suspects or criminals by using biometrics.

Here are some of the media articles written about the field trial:

- “Immigration to test biometrics,” *Ottawa Sun*, **October 2, 2005**
- “Facial scans, digital fingerprints to be compiled for border security project,” *Canadian Press Newswire*, **October 16, 2005**
- “Biometric screening program planned,” *Vancouver Sun*, **May 6, 2006**
- “Canada considers fingerprinting visa applicants,” *The Toronto Star*, **May 10, 2006**
- “Canada test biometrics in immigration field trial,” *www.securitydocumentworld.com*, **June 6, 2006**
- “From the editor – Border and Biometrics,” *The Public Safety & National Security Magazine*, **November 2006**

---

---

## 8. Organizational and Operational Impacts

This section focuses on the impact of incorporating biometric collection into operations at the field trial sites: the Seattle and Hong Kong visa offices, the Douglas and Pacific Highway land border crossings, and the Vancouver International Airport and Toronto Refugee Intake Centre.

### 8.1 Context

The **Seattle** visa office is one of CIC's smaller offices. Its 14 employees handle both temporary resident and permanent resident applications. The Seattle visa office processed 6,955<sup>13</sup> temporary resident applications in 2006.

The Seattle visa office receives most of its client applications in person (76% during the field trial). Same-day visa service is offered for visitor visa applications. There are 60 seats in the waiting room, 5 interview booths and 4 counters. In 2006, weeks ahead of the field trial, the Seattle visa office moved to a commercial building in a busy office and shopping district of downtown Seattle.

**Hong Kong** is one of CIC's larger visa offices. The Temporary Resident Unit alone comprises 18 employees and occupies half of an office floor in a commercial building in the business district. In 2006, 7,974<sup>14</sup> Temporary Resident Visa applications were received.

There is same-day visitor visa service for walk-in clients. There are 150 seats in the waiting room, and up to 18 counters, including interview booths, are available for meeting with clients.

The **Douglas** land border crossing is a Canada/US crossing point for many tourists in the lower mainland of British Columbia (I-5 and Highway 99). The **Pacific Highway** border crossing, which is approximately 1 km from the Port of Douglas, serves primarily commercial and bus traffic. Total traveller volume for the Douglas and Pacific Highway crossings during the field trial was 68,016 for immigration secondary, where the field trial was conducted.

During the first five months of the field trial, the two ports of entry had a common complement of 35 border service officers who worked at both the Douglas and the Pacific Highway crossings. After a reorganization at the port, up to 50 CBSA officers began rotating through immigration secondary.

The **Vancouver International Airport (VIA)** receives many travellers from Asia. Until 2006, it was the only airport in Canada that received direct flights from Hong Kong. The VIA has 33 booths at the primary inspection line and two interpreter booths for travellers needing language assistance. For the field trial, 25 primary inspection line booths and both interpreter booths were fit-up with equipment.

---

<sup>13</sup> CIC Overseas IT System (CAIPS) Statistics

<sup>14</sup> Ibid.

CIC created a new work unit especially for the field trial—the **Headquarters Matching Centre (HQC)**. A secure lab at CIC headquarters in Ottawa was chosen as the site for the HQC. Since CIC had no forensic expertise, two experienced former RCMP forensic specialists<sup>15</sup> were hired to work part-time on reviewing the biometrics of field trial clients.

## 8.2 Overview

In general, all field trial sites were able to cope with the field trial with the extra resources assigned. The field trial had more impact on the Seattle and Hong Kong visa offices, because they saw more field trial clients than the Douglas, Pacific Highway and VIA offices. The Refugee Intake Centre in Toronto had no change to its processes and thus was not impacted by the field trial.

An overview of total enrolments of photos and fingerprints during the trial for visa clients is shown in **Table 8-A**.

**Table 8-A: Summary of enrolments**

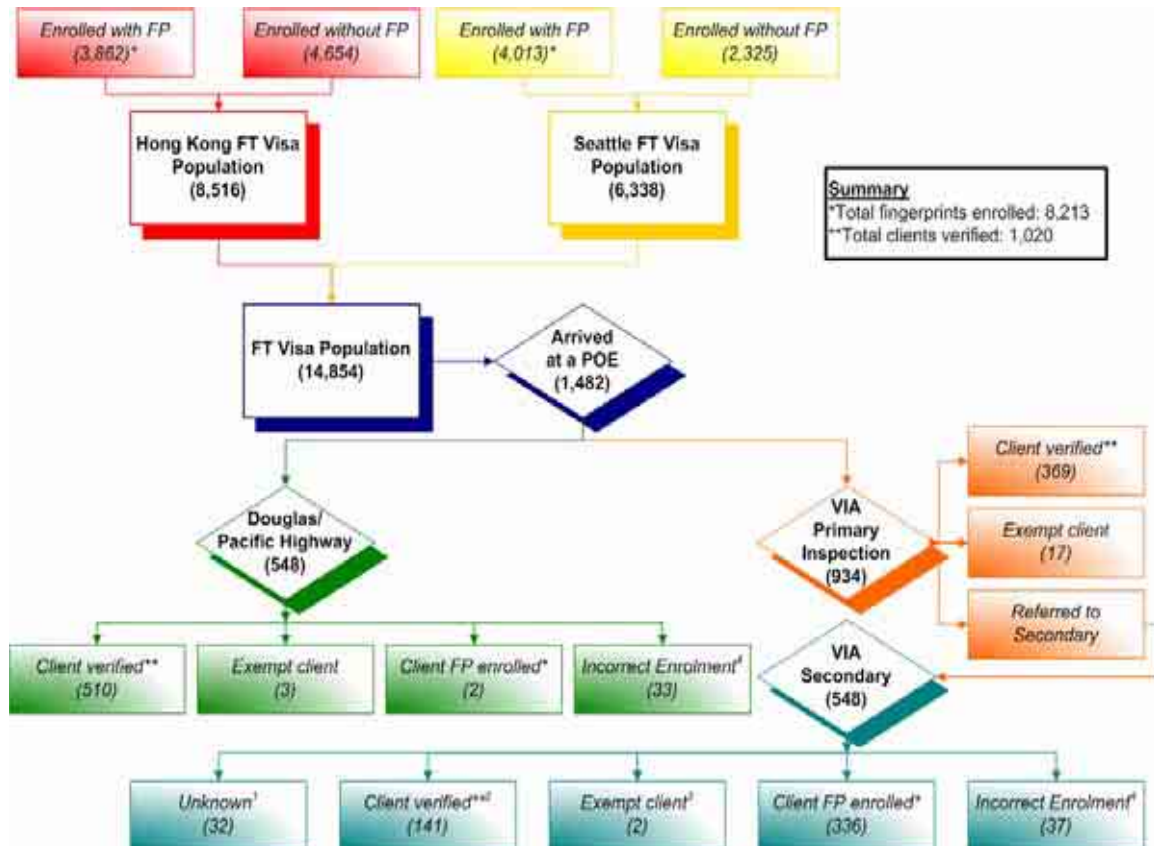
Hong Kong			Seattle			Total		
Fingerprinted	Photo Only	Total	Fingerprinted	Photo Only	Total	Fingerprinted	Photo Only	Total
3,862	4,654	8,516	4,013	2,325	6338	7875	6,979	14,854
45.35%	54.65%		63.32%	36.68%		53.02%	46.98%	
Landed at			Landed at			Landed at		
VIA	683	8%	VIA	251	4%	VIA	934	6%
Douglas & Pac	2	0.02%	Douglas & Pac	546	9%	Douglas & Pac	548	4%
<b>Total</b>	685		<b>Total</b>	797		<b>Total</b>	1,482	10%

A total of 1,482 field trial clients arrived at the participating ports of entry between late October 2006 and mid-April 2007—548 at the Douglas and Pacific Highway land border crossings and 934 at the VIA. Field trial clients at the VIA who had not enrolled their 10 fingerprints in Hong Kong or Seattle were sent to immigration secondary. Immigration secondary also received field trial clients if the primary inspection line was experiencing technical difficulties with the field trial equipment.

<sup>15</sup> Each specialist had over 35 years' experience with the RCMP, 30 of them in crime scene forensics, which included formal training in the RCMP's main fingerprint bureau and in photo recognition. Both were certified for presenting fingerprint evidence in court.

The field trial at the ports of entry transactions are described in the flow chart below. The numbers represent the number of transactions. The visa office population is in fact the number of enrolments at that location. Note that there are more enrolments than clients because some clients applied (and therefore enrolled) multiple times.

**Figure 8-A: Port of entry (POE) field trial output model**



**Legend** *FP - Fingerprints*  
*POE – Port of entry*

**Notes**

- Unknown**—visa arrivals detected at the VIA primary inspection line but for whom no biometric processing took place in immigration secondary. This likely resulted from other immigration-related processing taken place (for example, one of the 32 unknown events is a visa holder who made a subsequent refugee claim).
- Client verified**—VIA immigration secondary captured 141 verification fingerprints during the field trial. This resulted from VIA primary inspection referring the client to secondary without capturing a verification fingerprint. This situation may have been caused by technical problems or operational constraints.
- Exempt client**—During the field trial, VIA immigration secondary detected two clients who were exempt from fingerprint processing. These clients were referred to immigration secondary for reasons outside the scope of the field trial.

- 
- 
4. **Incorrect enrolment**—Officers at the Douglas and Pacific Highway ports of entry, as well as immigration secondary at VIA captured, full 10-print fingerprints from 70 clients who were previously enrolled in Seattle or Hong Kong. These 70 clients should have been verified. As the field trial clients constituted a small proportion of travellers, border service officers were not using the biometric system regularly. Some could even go several weeks without using the system. The erroneous re-enrolment of fingerprints occurred throughout the field trial.

### 8.3 Impact of the field trial on volumes

The biometrics field trial took place during what is considered to be a low-volume season for the field trial sites.

In **Hong Kong**, the field trial did not appear to discourage people from applying at the visa office. Total temporary resident application volume increased 16.5% from the previous year, making it the second largest increase by volume in that region. The Hong Kong visa office reported that the field trial did not change the volume of people who applied by mail.

While the **Seattle** visa office received fewer visa applications than in the same period the previous year, analysis shows that the decrease resulted from a large drop (10%) in visitor applications. Since Los Angeles also experienced a similar drop in visitor applications over the same period, it appears that other factors are affecting cross-border travel.

**Table 8-B: Change in volume of temporary resident visa applications from same period previous year—North America**

Application site	Change in application volume from field trial period 2005-06 to 2006-07
Buffalo	+3%
Detroit	+6%
Los Angeles	-4%
New York	+2%
Seattle	-6%
Washington	+2%

Analysis shows that Seattle clients did not apply less in person in order to avoid having fingerprints enrolled. Analysis of the number of mail-in versus walk-in clients showed that more people applied in person during the field trial compared with the same period the previous year—a 10% decrease in mail-in applications overall.

**Table 8-C: Comparison of walk-in with mail-in visa applications in Seattle.**

	Mail-in	Walk-in	Change in mail-in from same period previous year
Visitor	29.0%	71.0%	-13.3%
Student	20.8%	79.2%	-8.7%
Worker	22.7%	77.3%	-8.0%
Total-Average	24.2%	75.8%	-10.0%

**Douglas/Pacific Highway.** During the field trial, 109,669<sup>16</sup> travellers went through immigration secondary, where the field trial was performed. Some were field trial clients, but most were not. No appreciable volume impact could be attributed directly to the biometrics field trial.

**VIA.** No overall volume impact at the primary inspection line because of the biometrics field trial was reported.

For both the land border crossings and the airport, the number of field trial client arrivals is only a small portion of the total number of travellers who pass through those ports of entry.

**Table 8-D: Volume of arrivals at field trial ports of entry**

Field Trial Site	Field Trial Period	Previous Year-Field Trial Period	Change from Previous
Douglas/Pacific immigration secondary	109,669	129,383	-18%
VIA primary inspection line	1,995,735	1,937,282	3%
VIA immigration secondary	85,306	86,043	-1%

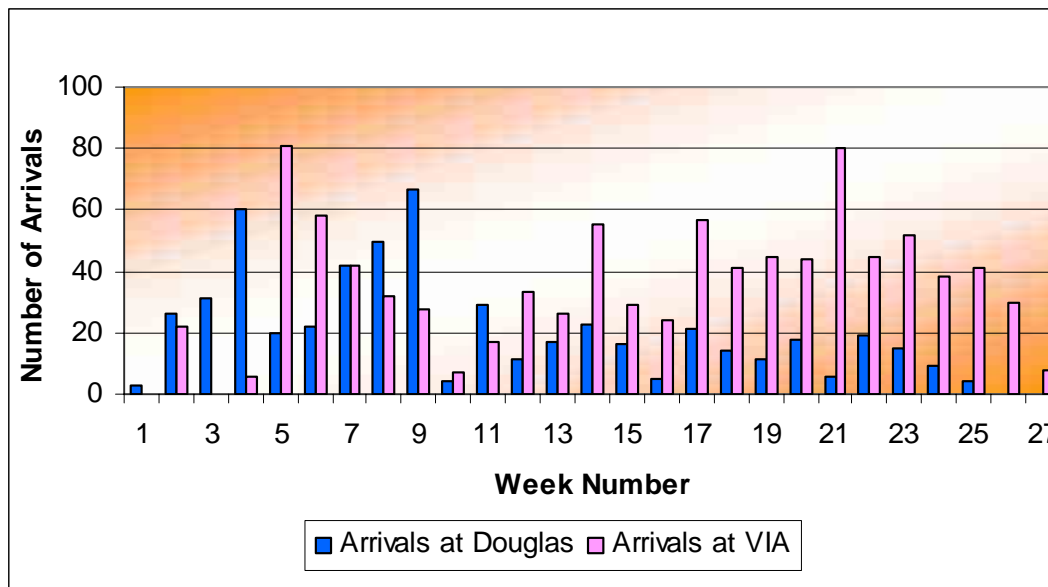
However, even during peak periods, the number of field trial client arrivals at the participating ports of entry was considerably less than expected—only approximately 10% of field trial clients who enrolled at the Hong Kong and Seattle visa offices landed at VIA, not 70%. This could stem from the following factors:

- Low season
- A direct flight from Hong Kong to Toronto was added in the months before field trial launch, giving clients from Hong Kong another entry point to Canada
- Equipment problems (described further in this section)
- Deterrence (the biometrics field trial locations were publicized in advance of the trial—discussed further in Section 5)

<sup>16</sup> Source: Local POE statistics

**Figure 8-B** shows a number of distinct periods where the number of arrivals decline. The first decline could stem from the slow period between Christmas and the New Year. The subsequent declines may stem from system problems. However, since even the peak numbers are much lower than expected, seasonal and equipment issues seem to only partly account for overall low arrival numbers.

**Figure 8-B: Field trial client arrivals by location during field trial**



Source: System reports

## 8.4 Impact of the field trial on work processes, human resources and facilities

### 8.4.1 Visa offices

**Impact on work processes.** The biggest challenge experienced by both visa offices was the **enforcement** of CIC’s new visa **photo standards**. The Hong Kong visa office started enforcing photo standards for its clients well before the field trial (January 2006), and the Seattle visa office started enforcement a few weeks before the field trial (October 2006). Although the photo standards were published on the CIC Web site, many clients initially did not know about the standards. Clients’ applications were only accepted once the photos met the published standards. Walk-in clients could easily have new photos taken by a photographer within a two-block radius. Visa office employees and in some cases the manager, had to counsel upset clients, which they found stressful.

Clients who mailed in their applications were notified that their photos failed to meet the standards and their applications were returned. A paper copy of the photo standards brochure was included in the return package. Tracking these additional application returns was an extra workload for visa office employees and had a bigger impact on the Seattle visa office. The Seattle visa office reported that employees spent three hours a week mailing back applications because of non-compliant photos.

**Table 8-E: Impact of photo standards on mail-in visa applications, October 2006 to March 2007**

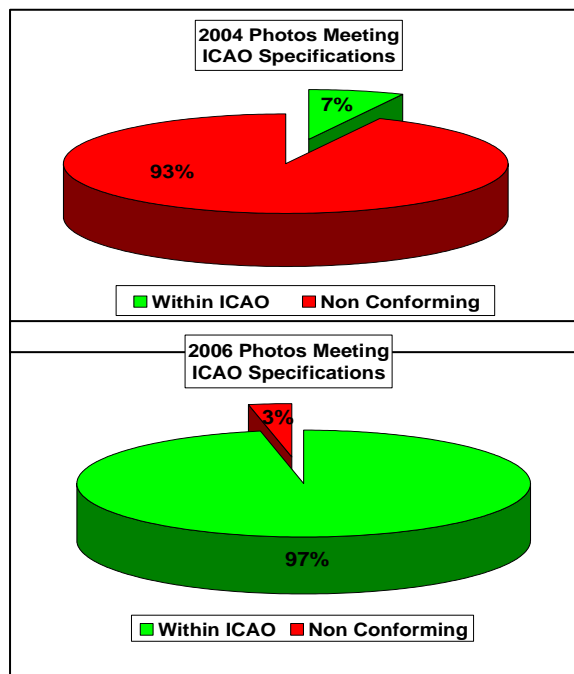
Visa Office	Number of Returned Applications	Number due to non-compliant photo	% Photo Related
Hong Kong	150	109	73%
Seattle	749	583	78%

Source: Visa office statistics

Application photos improved over time as clients better understood the new photo standards and understood that they had to submit photos that met those standards. Before enforcement of standards, only 7% of client photos from Hong Kong and Seattle were compliant.

A manual sampling of 600 photos from applications at both offices during the field trial showed that 97% of the photos that were scanned into the field trial system met CIC standards.

Analysis shows that the longer the enforcement was in effect, the better the quality of photos and the lower the number of mail-in applications that had to be returned to clients due to non-compliant photos.



A complication for Seattle was that the US standards for photos in travel documents differ from ICAO photo standards, which is the basis of the CIC visa photo standards. This confused some photographers and clients.

### Technical problems

**Defective chips.** Both visa offices experienced a high number of defective chips—approximately 13% in total, evenly split between Hong Kong and Seattle. This deficiency added an extra step in the visa issuance process—employees had to check whether the information relating to the field trial was written correctly to the chip and had to repeat the entire chip-writing process if the chip was defective.

---

---

**Ghosting.** While reviewing the quality of fingerprints enrolled, the HQC noticed that a small percentage of fingerprints had a second fingerprint (a “ghost” fingerprint) overlaid onto the main fingerprint. This situation applied to sets of consecutive field trial clients. When the fingerprint capture process started for the first time after the biometric application had been begun, the fingerprint reader went through a one-time initialization process. If a person’s hand was on the glass during the process, **all subsequent** fingerprints taken would have the ghosting effect. This lasted until the application was closed and re-started and the fingerprint readers re-initialized. If there was nothing on the glass when the re-initialisation occurred, no ghosting occurred with subsequent fingerprints. This problem was rectified through better instructions to the enrolling officers.

**Impact on human resources.** Both visa offices were given resources to temporarily hire additional employees to help implement the biometrics field trial. The Hong Kong visa office took on three locally engaged employees, and the Seattle visa office took on two. Both offices lost one trained person, and the replacements were trained on-the-job by colleagues previously trained by the CIC Project Team.

The Hong Kong visa office created a new dedicated unit of three employees to scan clients’ photos and enrol fingerprints. Employees who created client files in CIC systems and printed visas took on the additional task of writing the biometrics of successful temporary visa applicants to the chips.

In Seattle, a smaller visa office, photo and fingerprint enrolment was largely conducted by the same two or three employees, with the officers’ assistants rotating through some parts of the new field trial processes. This may have affected the officers’ workload. At both visa offices at least one Canada-based officer was responsible for overseeing the field trial and for liaising with CIC NHQ. These officers also performed minor troubleshooting duties and consulted the training manual.

At both visa offices, impact on IT employees was greatest immediately before and during the start of the field trial because they were involved in planning, setting up and installing the biometric system. Both visa offices reported minimal IT problems during the field trial and received local IT support, with occasional CIC NHQ guidance. However, the Seattle office did report that strong local IT support was essential to the success of the field trial.

**Impact on waiting room.** During the field trial in Seattle, up to three intake windows were opened to clients. It was reported that there were up to 40 people in the waiting room at one time for various types of applications. Fingerprint readers were placed at two intake windows and at one interview booth. In the Hong Kong visa office waiting room, a small waiting area near the two fingerprint reader equipment booths was set aside for field trial clients—denoted as “Zone C—Biometrics”.

---

---

## 8.4.2 Ports of entry

**Impact on workflow.** The majority of the biometric processing at the ports of entry consisted in capturing a single fingerprint for verification. This constituted an extra step in the examination process. As mentioned in section 5.2.3, 918 enrolled clients subsequently appeared at participating ports of entry and had a single fingerprint verified.

In nearly 83% of instances where a verification fingerprint could have been captured, CBSA officers successfully captured an image on the first try. Other officers were able to capture a verification fingerprint after two attempts. Over 10% of clients required two attempts to have a fingerprint captured, likely because of language barriers between the officer and the client at the primary inspection line or because the fingerprint capture device timed out while instructions were being given to the client at the interpreter's booth.

**Table 8-F: Attempts to capture verification fingerprints**

Field Trial IDs by Number of Verification Attempts		
Verification attempts	Clients	%
1	850	82.93%
2	111	10.83%
3	31	3.02%
4	13	1.27%
5	8	0.78%
6	6	0.59%
7	0	0.00%
8	0	0.00%
9	1	0.10%
Unknown	5	0.49%
Total	1025	100%

*Source: System reports*

### Equipment problems impacting workflow

**Chip-related problems:** At the Douglas and Pacific Highway border crossings, some visas contained chips that could not be read. This was likely caused by problems with the chips. When chips could not be read, field trial procedures were abandoned.

Problems also occurred with the chip readers at the VIA primary inspection line. The chip reader, temporarily affixed to the Borderguard passport reader with a plastic silver-painted bracket, became detached owing to the adhesive becoming heated from continuous use of the readers. In mid-January 2007, it was discovered that 7 of the 15 primary inspection line booths generally dedicated to foreign national visitors had had their chip readers detached and set aside. It is not known how long they had been detached. Because they had been set aside, many primary inspection line officers assumed that the system was not functioning and did not perform verifications. It is estimated that this continued for about five weeks. The problem was rectified once CIC's team was informed of the situation.

---

---

**PC tablets:** Technical problems occurred with the PC tablets at the VIA. Some tablets crashed intermittently into March 2007. A site visit on January 30, 2007 by members of the CIC Project Team confirmed that seven primary inspection line tablets were not working. A software fix, developed by the vendor and installed approximately three weeks later by local IT staff, resolved the problem.

In addition, since the tablets were switched on 24 hours a day, seven days a week, users could see the tablets “reset themselves” periodically, which caused confusion among users and led them to believe that they could not perform the field trial procedures. A software fix later rectified the auto reset.

In addition, some of the tablets were mistakenly configured to only identify a field trial client rather than to also request their verification fingerprint. In the original concept of operations, the user was to have had the choice between identifying and verifying a field trial client. The concept of operations at the start of the field trial eliminated the identification option, but the button remained on the PC tablet. Users were instructed not to choose that option. The option was eliminated in the next release of the software at the end of January 2007.

**Fingerprint reader problems at Douglas.** Seven weeks before the end of the field trial, one of the fingerprint readers had software problems. Since there was a low volume of travellers, the one working fingerprint reader system was deemed sufficient to handle field trial clients, and the terminal with the problems was not used for the remainder of the field trial.

**Ergonomic issues.** Ergonomic problems were experienced at the VIA on both the primary inspection line and at immigration secondary. The placement of the chip reader on the Borderguard passport reader meant that an officer’s arm movement could displace the reader. This, coupled with the technical issues described earlier, led to the detachment of some of the readers. At immigration secondary, the fingerprint readers, placed on the client counters, were too high for some clients and were not bolted down.

**Impact on human resources.** Normal staffing levels and schedules were maintained during the field trial.

## **8.5 Impact of the field trial on processing times and service standards**

### **8.5.1 Visa offices**

Both visa offices enrolled their walk-in clients using the equipment and extra human resources allocated, while maintaining their client service levels. Both visa offices had to make adjustments to the field trial workflow design shortly after the launch of the field trial to maintain their same-day visitor visa service. The low-season volumes during the field trial period were also a factor in maintaining service levels.

**Table 8-G: Temporary resident visa applications at Hong Kong and Seattle visa offices during field trial**

	Applications Received		Applications Finalized		Backlog		% Backlog	
	2005-06	2006-07	2005-06	2006-07	2005-06	2006-07	2005-06	2006-07
<b>HK</b>	7963	7974	7839	7845	124	129	2%	2%
<b>Seattle</b>	7418	6955	7335	6961	83	-6	1%	0%

*Source: Visa office statistics*

**Biometrics processing times overview.** The biometrics field trial added extra processing time to every temporary resident application. Enrolling 10 fingerprints and performing chip-related tasks could take up the majority of processing time, especially in instances of technical glitches. Most of the added steps could be removed if the biometric system is fully incorporated into CIC's overseas system and if chips are not used.

**Table 8-H: Hong Kong additional per- client processing times due to field trial (in seconds)**

Task	Minimum	Maximum	Median
10-Fingerprint enrolment	18	See note * below	62
Affix photo onto photo card	4	6	5
Scan and crop photo	8	10	9
Other biometric file creation related	15	30	22.5
Write and QA chip	30	50	40
Affix chip to passport	5	10	7.5
Total	77s (1min 17s)	See note * below	152s (2min 30s)

*Source: System reports and on-site observations*

By mid-trial, it was observed the Hong Kong visa office biometrics enrolment unit had become extremely efficient at enrolling photos and multi-tasking field trial processes.

**Table 8-I: Seattle additional per-client processing times due to field trial (in seconds)**

<b>Task</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Median</b>
10-Fingerprint enrolment	14	See note * below	37
Affix photo onto photo card	4	6	5
Scan and crop photo	8	10	9
Other biometric file creation related	20	30	25
Write and QA chip	40	70	50
Affix chip to passport	5	10	7.5
<b>Total</b>	<b>94 (1min 34s)</b>	<b>See note * below</b>	<b>156 (2min 36s)</b>

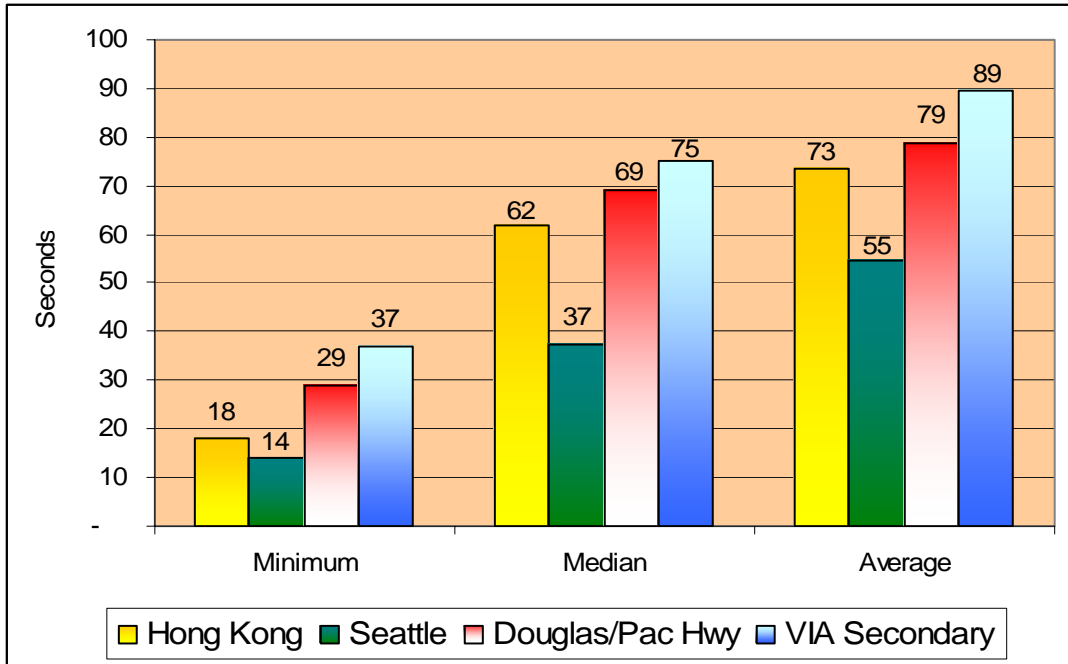
*Source: System reports and on-site observations*

*\*These times reflect the total time required to fingerprint a client, including multiple capture attempts. Fingerprint enrolment time starts when the system user clicked “Print Capture” and ended with the completion of the last fingerprint (the right thumb). This means that the time shown in Table 8-J likely includes time spent speaking with the client in addition to time spent actually enrolling the fingerprints. Maximum times are not presented since most operators initialized the enrolment devices at the start of the day and well prior to the arrival of the first client – thereby exaggerating maximum values.*

Extra time had to be devoted to cases where photos were non-compliant. For walk-in clients, this meant explaining the standards to them and requesting compliant photos. For mail-in clients, this meant extra time (3 hours/week) to log and return the application.

**Fingerprint enrolment.** The visa offices enrolled the 10—fingerprint set of most of the field trial clients and had lower median times for enrolment than the ports of entry.

**Figure 8-C: Summary of 10-fingerprint enrolment times (in seconds)**

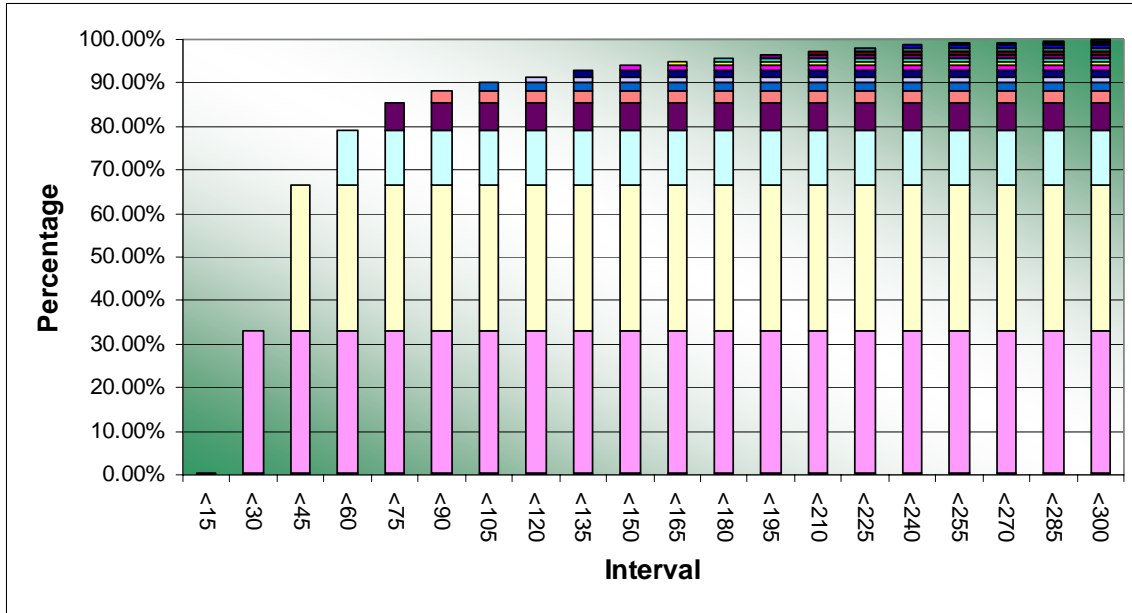


Source: System reports

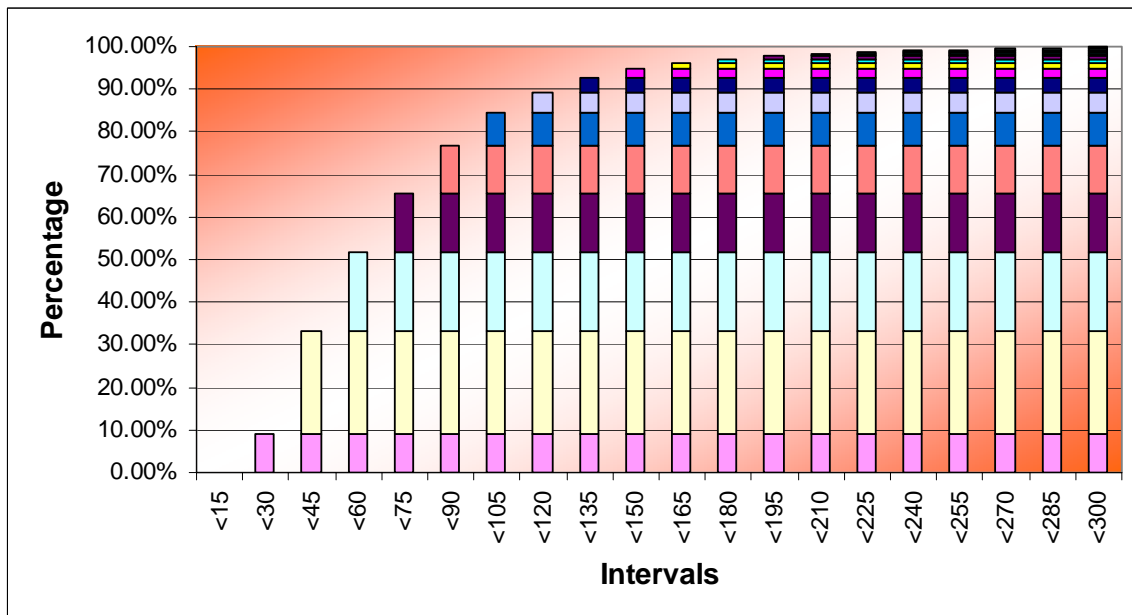
At both visa offices, 90% of the 10-fingerprint enrolments took place under 120 seconds. Even the lengthiest enrolments took less than five minutes. The Seattle visa office staff, who enrolled the most clients out of all the field trial sites, performed 80% of the 10-fingerprint enrolments in less than 90 seconds. See Figure 8-C for all data points.

Employees at the Hong Kong visa office took longer to enrol fingerprints. In wishing to obtain the recommended score of 60, they took advantage of the flexibility of trying multiple capture attempts rather than simply taking the first enrolment that the biometric system would accept (less than 60).

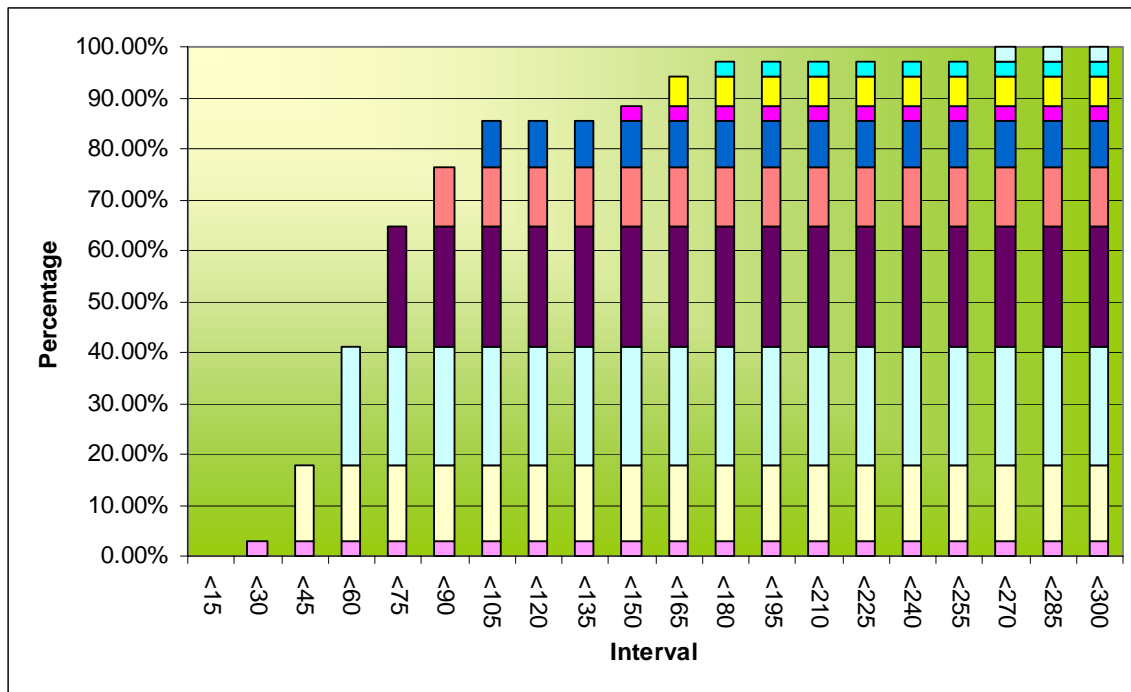
**Figure 8-D: Seattle cumulative 10-fingerprint enrolment times (in seconds)**



**Figure 8-E: Hong Kong cumulative 10-fingerprint enrolment times (in seconds)**



**Figure 8-F: Douglas/Pacific Highway cumulative 10-fingerprint enrolment times (in seconds)**



### 8.5.2 Ports of entry

During the field trial, primary inspection line officers at the VIA maintained client service standards. The typical one-fingerprint verification at the primary inspection line took 20 seconds. There were no overall delays—if there were equipment problems, officers reported that they either “swapped clients” or sent the clients to immigration secondary. The greatest operational impact reported was at the interpreter’s booth where, according to those officers interviewed, the field trial added about one to two minutes per client. That finding confirms feedback from other officers at ports of entry that fingerprint verification was easier when there was no language barrier and when clients could understand the officer’s instructions.

No operational impact was reported during the field trial at VIA immigration secondary. While more clients were sent to immigration secondary because of the field trial, the low volumes (20 field trial clients per day at most and, as per **figure 8-A**, a total of 548 during the Trial) made it manageable.

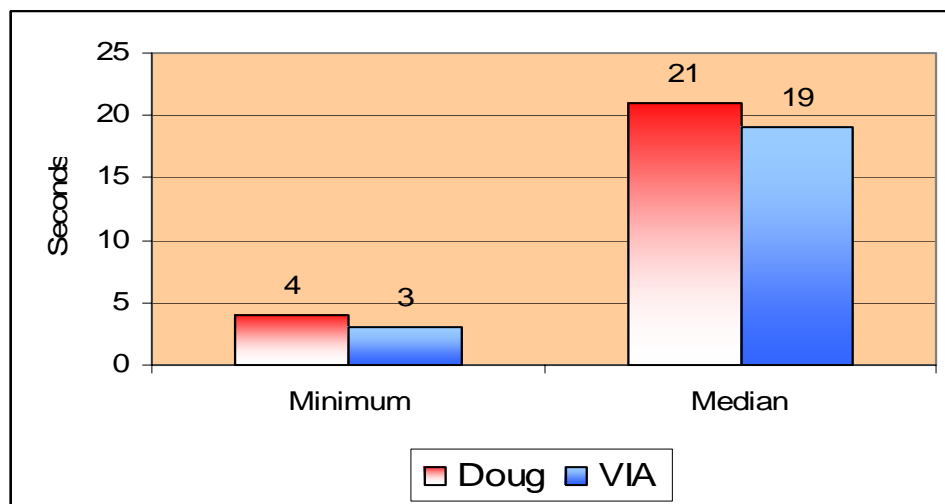
Some employees at secondary reported that the field trial added up to five minutes to their examination process. This time included the time to wait for an available counter equipped for the field trial, but excluded client queuing time, and the time it took to walk the client to a fingerprint reader. Immigration secondary had three readers installed over 14 counters.

Client service at **Douglas and Pacific Highway** immigration secondary was largely unaffected, since visa holders at these border crossings were routinely sent to immigration secondary even before the field trial. Furthermore, the period of the field trial was considered a low-volume season. The additional processing time per client depended on the officer’s experience with immigration secondary and with the biometric system. While one officer reported that it took an

additional two to five minutes per client, another reported that the entire process, including the secondary examination process took four minutes. Immigration secondary examination timings are greatly influenced by individual travellers' circumstances.

When there were no equipment problems, one-fingerprint verification was quite fast. Fingerprint verification was done using different equipment at the land border and at the airport. Verification time started as soon as the chip in the visa was detected. In other words, it included the officer interview time if the client was not fingerprinted right away. **Figure 8-G** shows one-fingerprint verification times by location.

**Figure 8-G: One-fingerprint verification times at ports of entry (in seconds)**



*\*Maximum times are not presented since most Secondary operators initialized the fingerprint devices at the start of the day and well prior to the arrival of the first client – thereby causing inflated maximum values.*

## 8.6 Employee feedback

### 8.6.1 Experience with the biometrics system

#### Visa offices

- Seattle users rated the biometrics system from fairly user-friendly to very user-friendly. In Hong Kong, the biometric enrolment unit staff found the biometrics system very user-friendly. Of all the user groups interviewed, Hong Kong users seemed to be the most comfortable with the system, likely because they used the system daily.
- The fingerprint feedback screen was deemed fairly to very useful in Seattle and extremely useful in Hong Kong, particularly the score feature. Concern was raised at both visa offices that the screen gave no explanation for a low score and what could be done to get a better score (more pressure, moisten hands, etc).
- System users in Hong Kong reported that at times the system was fast, at times too slow, and that it occasionally froze.
- The time it took to save fingerprints on the system was deemed fairly acceptable to not very acceptable. The Seattle intake clerk who did most of the fingerprint enrolment expressed concern about the speed.

- 
- 
- The time it took to save the information to the chip was deemed fairly acceptable.
  - Both visa office users found that fingerprint reader glass became dirty and could affect results (seen as black flecks in the user feedback screen). They thought that there was a need to clean and disinfect it regularly. (Evaluator's note: CIC wanted to see the effect of dirt on the glass. From what was reported during the field trial, the glass did not need to be cleaned after every client, but only as required.)
  - Users wanted the fingerprint reader to be more sensitive so that clients did not have to press their fingers so hard.
  - Users wanted to be able to select the best fingerprint set if multiple sets were captured (retries). In some cases, the quality of the retake was worse than that of the original set.

### **Ports of entry**

- Douglas/Pacific Highway users found the system fairly to very user-friendly. User opinions at VIA were divided on whether the biometrics system was user-friendly.
- Fingerprint verification was not always done if no fingerprint reader was attached to the terminal where the officer was working. Because there were only two readers (and four counters) at both the Douglas and the Pacific Highway ports of entry, an officer at a terminal not equipped with a fingerprint reader would not disrupt an officer working on a case at a terminal that was equipped with a fingerprint reader, particularly if it was a busy period.
- The amount of time the system took to save the biometric information was found to be fairly to very acceptable.
- New users were added during the field trial, but each user did not necessarily have their own user ID to sign in. Several users used one generic user ID.
- Everyone found the fingerprint feedback screen for operators very useful.

### ***8.6.2 Training for the field trial***

#### **Visa offices**

- Staff interviewed felt that the CIC Project Team had spent enough time training them and that the training was useful. In Seattle, only the assistant to the Immigration Program Manager consulted the training manual for trouble-shooting purposes. In Hong Kong, staff only referred to the training manual once or twice; they directed their questions to their manager, to the project contact officer or to the CIC Project Team in Ottawa.
- Everyone appreciated having the Ottawa Project Team members on site when going live. One person mentioned that they would have liked a follow-up visit shortly after going live.

---

---

## Ports of entry

- Staff found the training fairly useful and felt that enough time had been devoted to it but pointed out that not everyone received training for the following reasons:
  - Some officers were absent the day of the training.
  - Officers could only train when the primary inspection line booths and immigration counters were not busy.
- Employees interviewed reported that they never used the training manual during the field trial. In March 2007, new employees started working in immigration secondary at the Douglas and Pacific Highway border crossings as part of a customs and immigration cross-training exercise.
- Almost all primary inspection line officers at the VIA who were interviewed received their training from on-site CIC Project Team members. Some commented that they would have expected to receive classroom training away from their daily work, as is usually done for major projects. No officer reported consulting the training manual, but many referred to an instruction sheet posted at many of the booths on the officer side.

### **8.6.3 Possible full biometrics implementation**

#### Visa offices

- Managers and staff noted that any full biometrics implementation, particularly a requirement to see every client in person, could have significant infrastructure, human resource and client service impacts. Managers at both visa offices stressed that service levels would need to be reviewed.
- Other specific suggestions for any future biometric system are covered in Section 10: Lessons Learned.

#### Ports of entry

- At VIA, primary inspection line officers' biggest concerns with regard to implementation of biometrics were the time to complete the process and the placement and maintenance of equipment, with slightly more officers citing the latter as their primary concern. Many officers commented that it would be worth the "extra time" if there were real-time matching feedback available. However, they did note that service standards would need to be reviewed.
- Most officers who provided feedback (all but one) thought that the photo on the visa chip was a very useful tool.
  - Immigration secondary officers commented that just getting a picture of the visa applicant during the field trial was a major step forward. At the moment, in cases of doubt as to client identity, they contact the visa office and ask for a photo of the client to be faxed. The quality of faxed photos is inferior to that of photos on the visa chip.
  - One officer summarized the value of biometrics as follows: "Matching the person to the documents presented, checking against known watch lists. This thing is the basis of our whole job".

---

---

#### **8.6.4 Other employee feedback**

- Visa office employees found the barcode sticker provided for input of data into the biometric system very useful and thought it should be used for all visitor applications.
- Chip-collision problem: Visa office employees reported one instance of an e-passport (with a chip). Putting the CIC visa chip resulted in an inability to read our chip. The example cited was a Thai passport. (Training instructions were not to put the CIC visa chip in e-passports).
- The superintendent of Passenger Operations, Immigration, had the following comment on the field trial:

“Although there were some minor issues surrounding ergonomics and durability, the system did not add significant time to passenger processing. The system has the potential to be a valuable tool in providing officers with quick and accurate traveller information to assist with their decision-making. Overall, the field trial was a positive experience with a system that was relatively easy to use.”

#### **8.7 Toronto Refugee Intake Centre**

Refugee protection claimants at the Centre have been photographed and fingerprinted using LiveScan units for about five years. The photos and fingerprint records of those who made refugee claims there during the field trial were delivered by the RCMP; holders of all in-Canada refugee protection claimant photos and fingerprints, were delivered to the CIC Project Team on a CD.<sup>17</sup>

#### **8.8 Headquarters Matching Centre (HQC)**

Two forensic specialists assessed the quality and made suggestions for improvement. The forensic specialists were required to confirm the matches (faces and fingerprints) suggested by the biometric system.

##### **8.8.1 Match performance forensic specialist review effort (one-to-one)**

On average, it took 30 to 40 seconds to review a verification probe. Verifying the fingerprint match could take anywhere from seconds to several minutes, depending on the quality of the fingerprint impressions. This is consistent with observations of other systems such as US-IDENT.

Generally, with a high-scoring fingerprint (70 to 95) it would take seconds, as long as the fingerprints had no distorted areas.

For fingerprints scoring from 40 to 60, where they are usually of poor quality, verification could take from one to several minutes, depending on the quality. After several minutes, if the fingerprints was not identified it was usually deemed to be unsuitable.

---

<sup>17</sup> In NIST format

---

---

## 8.9 Conclusions

The field trial had an impact on operations, adding some stress to visa office waiting room capacity and requiring additional staff to manage the increase in processing. These issues were manageable within the context of the limited scope field trial but would be more challenging if CIC moved to regular biometric collection as part of visa processing.

The use of chips in the visas introduced additional technical and operational complexity. Many of the equipment and ergonomic issues of the field trial would be avoided with full implementation of an integrated biometric system.

Employee support exists for the use of biometrics provided that resource and integration issues are addressed.

---

---

## 9. Privacy Considerations

### 9.1 Introduction

Privacy was an important consideration in the design and implementation of the biometrics field trial. The Office of the Privacy Commissioner was consulted starting at the design stage. For details on measures taken to protect field trial client privacy for this trial, see Appendix F.

### 9.2 Privacy risk mitigation measures taken during the field trial

This section briefly describes the measures taken by CIC during the field trial to mitigate privacy risks identified by the Office of the Privacy Commissioner. These risks were identified during initial consultations and are also listed in the Privacy Impact Assessment (PIA). CIC took care to ensure that:

- Program custodian accountability for personal Information was documented
- There was no Third party (vendor) access to personal information
- CIC and CBSA stayed within legal authorities
- There was no collection of new unnecessary personal information
- Notice of collection was given as required under the *Privacy Act*
- There was no improper retention and disposal of field trial information
- Due consideration was given to publishing in a Personal Information Bank (PIB)
- Departmental process on publicly available PIA was being followed
- A process was put in place to mediate any disputes regarding the accuracy of digital renderings of photos i.e. “That’s not my picture!”
- Procedures outlined in the Threat and Risk Assessment (TRA) were followed
- Information technology– documented procedures and training were followed
- Personal information management practices stayed within Treasury Board Secretariat guidelines
- Field trial privacy safeguards were communicated

Since the completion of the PIA, CIC has not identified any new privacy risks and is not aware of any complaints under the *Privacy Act* or any violations of TBS privacy and data protection policies and guidelines.

CIC followed all of the recommended government procedures on public notification and client communication, including establishing a complaint mechanism and clear accountability for the new personal information (biometrics) being collected.

---

---

Physical access to the biometric information during the field trial was restricted to authorized personnel. All access to the secure area was recorded, either by an electronic entry system or in manual log books that were kept specifically for this purpose. Encrypted biometric data was stored on a stand-alone server. Biometric matching was not done in real time. Personal information was used only for testing purposes during the field trial and was not disclosed to any person or party.

All biometric templates and associated personal data were destroyed on July 19, 2007-three months after the close of the field trial.

For matching purposes, the biometrics system generated anonymous templates which could only be identified by a field trial identification number. The field trial number was not linked to any other CIC or CBSA information system or file number.

### **9.3 Conclusion**

The privacy mitigation measures recommended by the Office of the Privacy Commissioner were followed and the new personal information collected (clients' biometric) was treated with the utmost care.

---

---

## 10. Lessons Learned from the Field Trial

### 10.1 Strengthening identity management of clients

- Biometrics can help strengthen identity management of clients at CIC, because it can reliably link each client to an immigration decision. Implementing biometrics would strengthen the integrity of immigration programs and increase CIC's confidence in clients' identity.
- Biometrics can assist greatly in visa program integrity. Out of 14,854 visa applicants, 394 biometric highly accurate matches were found using an automated system. Even under the limited conditions of the field trial, biometrics helped CIC discover that one visa client had changed their identity after arriving in Canada and had claimed refugee protection. In a situation where decision makers would have real-time access to matching results, biometric matching could assist in validating identity and reducing the incidence of identity fraud. The same automated matching capability could be used to check previous immigration enforcement activities and criminal records.
- Using biometrics can help with client identity management across different CIC programs. During the field trial, 12 visa applicants came to Canada and made refugee protection claims. While 11 of them used the same name as on their visa, one did not. This case is considered fraud.
- Having an electronic photo of the visa holder has value for verifying identity at the port of entry.
- The combination of both biometrics (photos and fingerprints) proved to be better than either used alone. Facial recognition alone failed to identify two sets of photos above the recommended threshold. Fingerprint recognition alone failed to find two matches above recommended threshold. Because the two facial recognition false non-matches were not for the same people as the false non-matches for fingerprints, when combined together, using both biometrics yielded all matches.
- While fingerprints are, as expected from the large body of research, a much more accurate biometric, they alone cannot assist in all cases. During the field trial, 918 clients arrived at a port of entry and presented a single fingerprint that was compared against their previously enrolled 10-fingerprint set. Forensic experts reviewed each system-generated match, along with the images of all fingerprints and photos enrolled. They judged 36 fingerprint records (3.9%) to be of too poor quality to accurately assess whether or not there was indeed a match. In a fully deployed system, the ability of an officer to compare the retrieved photo with the live traveller will help in these cases.
- Verifying biometrics at the border may have deterred the entry of some clients at ports of entry participating in the field trial. While the number of field trial clients actually exceeded expectations, analysis shows that the portion detected at the participating ports of entry was much lower than expected (only 10% of field trial clients were detected at the participating ports of entry). Even allowing for mitigating factors such as the recent

---

---

direct flights from Hong Kong to Toronto and equipment issues at the airport, this is an extremely low number.

## 10.2 Client service

- **Service levels:** Current service levels at visa offices were maintained while collecting biometrics, but only through the use of additional human resources. The time to enrol and verify were, on average, judged to be acceptable and did not impede the flow of business. Nonetheless, some existing facilities had to be renovated in order to accommodate biometric enrolment equipment such as fingerprint readers. Mandatory in-person enrolment of biometrics at the visa offices could require significant investment in facilities (such as enlarged waiting rooms, more service counters) and human resources to accommodate the increased traffic.
- **Photos:** The field trial showed that it is definitely feasible to obtain photos good enough for facial recognition from most clients, at least in urban centres like Hong Kong and Seattle, if CIC's new visa photo standards are enforced consistently over many months. However, this has proven to be stressful for both employees and clients.

Demanding that photos comply with CIC photo standards requires an *extensive* information campaign in every locale to inform potential clients and photographers of the changes months before any full implementation. Posting on the Internet and creating brochures, as was done during the field trial, would need to be augmented by other media and means of communication, and by providing posters and brochures to officers and to travel agents, and perhaps even by holding press conferences. At a minimum, consideration should be given to placing the information on photo standards more prominently on CIC's Web site. Visa office employees also suggested that showing a video in the waiting room might be useful for walk-in clients. In some cases, the presence of the photo guidelines poster in the visa office waiting room was enough to have people quickly realize that they had to return with better photos.

Given the additional pressure that requiring compliant photos caused for operations and the extensive communication requirements, consideration may need to be given to having photos taken at the visa office. This way, the client would be certain to have photos that would be acceptable to CIC, and CIC would be certain that the photo has not been tampered with.

- **Client feedback:** Giving fingerprints to a CIC or CBSA official was not perceived as an issue for clients. Once clients were given an explanation for why they were being asked to provide their fingerprints, they seemed satisfied. For any full implementation of biometrics, CIC should make every effort to provide a clear reason for asking for a client's biometric through clear communications in order to maintain client satisfaction.
- **Client facilitation:** During the field trial, 364 clients were seen more than once by CIC. Processing of these repeat clients could have been facilitated using biometrics—either by not requiring them to enrol their 10 fingerprints at a subsequent encounter or by requiring them to give only one fingerprint to verify their identity instead of resubmitting their biographical and possibly other personal identifying information.

- 
- 
- **Not a 100% solution.** Both facial recognition and fingerprint systems on their own failed to enrol a very small number of clients. Client age, not gender, was a factor in the effectiveness of fingerprint recognition in the operational environment. During the field trial, it took more effort and time to get good-quality fingerprints from older clients. Field trial analysis showed that the time to take fingerprints is directly correlated to age. Specifically, it took significantly longer to enrol 10-fingerprint sets of clients over 70 years of age compared with younger clients. Fingerprint enrolment time becomes longer with each subsequent age group. At the port of entry, it was found that it took longer to verify one fingerprint of clients over 60 years old. If fingerprint recognition technology is to be used for full implementation, consideration should be given to having an upper age limit.

### 10.3 Privacy

The field trial showed that it is possible to collect biometrics and analyse them in a way that protects clients' privacy. Taking privacy into account early in the operational concept design stage was effective. Full implementation should duplicate as many of the privacy measures taken in the field trial as possible and applicable. Notably, any future biometric implementation would consider the physical security of data repositories, encryption, secure transmission, secure storage, audit, and investigation.

### 10.4 Forward-planning lessons

#### 10.4.1 Operations

- **The right workflow** is crucial to the successful implementation of biometrics. While every CIC visa office has a slightly different workflow and needs flexibility, the field trial has shown that **all the clients' biometrics must be collected in the same step and be saved to their record**, preferably with the client in attendance. When this does not happen, there is room for administrative error. During the field trial, when the photo scanning and the fingerprinting of the client occurred separately, there were six instances of the client's fingerprint being saved in another client's file. This was discovered when the clients' fingerprints verified at port of entry was found not to match the fingerprints on file.

The field trial also showed that biometric information collection needs to be incorporated at the correct point in the visa office's existing workflow. If not, biometric enrolment can significantly affect productivity. Since every visa office has a slightly different workflow, CIC NHQ should provide common universal principles but leave flexibility for local workflow management in any full implementation. In addition, operations management and queue management training with considerations for biometrics should be offered to immigration program managers before any full implementation.

- The "ghosting" effect experienced during the field trial, as well as the cases of administrative error due to workflow issues, suggests that **any full implementation of biometrics should include an initial period where no administrative actions are taken**. This period should be used for quality control of both the system and the work processes.

- 
- 
- **User training.** For any full implementation, a formal training program and schedule will be required for each user and to ensure that each user has time away from duties to be trained and is covered at work. Coaching the users after the training and having the coaches stay for the initial period of the system going live is also highly recommended. The field trial showed that users at sites where coaches stayed longer had a better understanding of the system and retained their training better. It is also highly recommended that basic training be given on what constitutes high-quality photos and fingerprints.
  - **Experience counts:** Of the four different user groups who participated in this field trial, the group who made **the fewest errors** was the group in Hong Kong who was specifically dedicated to biometric enrolments. They enrolled a multitude of clients every day and had an efficient work process where they made the most use of the system wait time.

Experience also makes a difference when it comes to enrolling a client's 10 fingerprints. The user group with the **lowest median time for fingerprinting** was the group that enrolled the most clients. There is a direct correlation between the number of clients a user group enrolled and the median enrolment time.

- Any full implementation would require human expertise to confirm the system-suggested matches. While the biometric system is accurate in most cases, suggested matches must still be confirmed. The number of suggested matches for human review can be adjusted depending on operational and program integrity requirements. It was found that while CIC employees could be trained to recognize faces, fingerprint match confirmation required a trained forensic specialist.
- Extra human resources will be required at visa offices if clients are enrolled at these offices. During the field trial, the visa offices were able to manage enrolling their walk-in clients and doing the extra back-office work with the additional resources assigned from the project. The impact of biometrics was seen to be greater on a smaller visa office.
- **Using chips in CIC visas adds technical and operational complexity, both at the visa office and at the border.** From an operational point of view, chips also add an extra step to the visa issuance process. This step can be particularly time consuming if visa offices receive defective chips. Quality control of the chips also becomes an issue.

The field trial also confirmed that chip collision would be an issue if CIC were to use chips in visas. In the only instance where employees mistakenly put the biometric field trial visa in an e-passport, they were no longer able to read the information on the CIC chip.

Using chips also requires extra equipment (chip readers and PC tablets) to be bought, installed and maintained. There were issues with these peripheral devices at the ports of entry during the field trial. In addition, in workstations with limited areas such as the primary inspection line at the VIA, ergonomics emerged as an important issue. The recommendation for any full implementation is to have an integrated system so that the need for chips, chip readers and PC tablets is eliminated.

---

---

#### 10.4.2 IT / Biometric systems

- For any full implementation, employees expressed desire for the following features:
  - Time to save fingerprints to the biometric system should be faster than during the field trial. Employees at every field trial site cited this.
  - A user fingerprint reading feedback screen that provides feedback from the system to let officers know how they can improve their score, in addition to the other feedback the system provided during the field trial. The field trial fingerprint feedback used most was the numerical score. The colour map was helpful for determining which finger needed to be pressed harder against the fingerprint reader
  - Option of a simple visual feedback to the *client* when they are enrolling their 10 fingerprints.
  - The ability to select the best fingerprint set if multiple sets were captured (retakes). In some cases the quality of the retake was worse than that of the original set.
  - Performance reporting capabilities should be defined in advance and built into the design, using lessons learned from this field trial. During the field trial, even though IT systems had reporting capabilities, the design did not anticipate how user behaviour would affect some measurements. For example, fingerprint verification start time was triggered by the chip in the visa being detected. If a traveller's passport was left on the chip reader during examination, the fingerprint reader timed out a number of times and verification time, calculated to end with the fingerprint being captured, may in fact be less than the time shown in the IT reports. A similar situation occurred with 10-fingerprint enrolment, the starting time being triggered by the user pressing "fingerprint capture."
- Strong local IT support is important to having a successful implementation, especially during the installation and initial launch stage. During the field trial, IT support required at the visa offices was minimal, but the chip readers and tablet PCs at the ports of entry required considerable IT attention from CIC Ottawa and CIC Regional Office to be resolved.
- For high-quality fingerprints, the glass of the fingerprint reader must be cleaned regularly but not necessarily after every client.
- For any full implementation at port of entry immigration secondary, there should be one fingerprint reader at each workstation. During the field trial, time was lost when officers and clients had to go to a workstation with a fingerprint reader or when those stations with fingerprint readers were unavailable. Any equipment should be secured to the workstation, and officer safety and ergonomics should be kept in mind.

---

---

## 11. Conclusion

The field trial has shown that biometrics technology could be extremely useful in strengthening identity management in Canada's immigration program and in enhancing the integrity of that program and of Canadian border security.

Biometrics were collected from many clients and verified with no major disruption to operations or to travellers at the field trial sites. The data collected in the operational environment was of good quality, which allowed highly accurate biometric matching at the Headquarters Matching Centre. Clients understood and accepted the requirement for enrolment and verification of their biometrics.

The technical issues that emerged during the field trial were in most cases addressed within the period of the field trial or could be addressed through better planning and technical design.

The field trial had an impact on operations, adding some stress to waiting room capacity and requiring additional staff to manage the increase in processing. These issues were also manageable within the context of the limited scope field trial but would be more challenging if CIC moved to regular biometric collection as part of visa processing. The experience from the field trial will inform future decision making, and the lessons learned will guide any future implementation.

CIC would like to thank its clients, as well as all CIC and CBSA staff who participated in the field trial.





**APPENDIX A**



---

---

## Appendix A: Acronyms

CBO – Canada-based officer

CBSA – Canada Border Services Agency

CIC – Citizenship and Immigration Canada

CSE – Communications Security Establishment

DFAIT- Department of Foreign Affairs and International Trade

ICAO – International Civil Aviation Organization

HQC - Headquarters Matching Centre

IT – Information technology

NHQ – National Headquarters

OPC – Office of the Privacy Commissioner

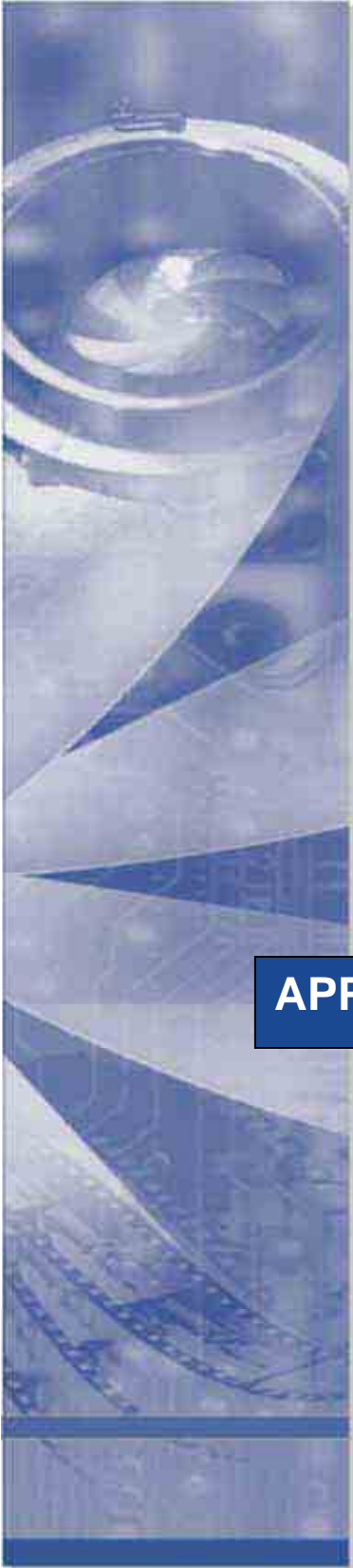
PIL – Primary inspection line

POE – Port of entry

VIA – Vancouver International Airport

TRV – Temporary resident visa





**APPENDIX B**



## Appendix B: IT Hardware and Equipment

Product Name	Use	Field Trial Locations
CrossMatch LS-2	10-print fingerprint capture	visa offices, land ports of entry, airport immigration secondary
CrossMatch LSCAN 100	single fingerprint capture	airport primary inspection
Fujitsu FI-5220C flatbed scanner	scan photographs	visa offices
Motion LE800 Tablet PC	run verification capture software	airport primary inspection
RAM Mount Motion LS800 Tablet Cradle	mount Motion LE800	airport primary inspection
SCM Microsystems SDI-010 chip reader/writer	detect and write to RFID chips	visa offices, land ports of entry, airport immigration secondary
InsideFR RFID chips (ISO 14443 Type B)	identify clients at time of entry to Canada	visa offices, land ports of entry, airport immigration secondary
ES312002-306 Unisys Server (2x Intel Xeon 3.00 GHz 4.00 GB RAM)	Central biometric server/database	CIC National Headquarters
Motorola Canada LiveScan LSS 3000N (existing CIC equipment)	enrol refugee claimants	land ports of entry, airport immigration secondary, refugee intake centre
Bar card readers/similar to CipherLab 1100 RETAIL Linear Imaging Scanner (existing CIC equipment)	generate client's unique identification number (field trial identification number)	visa offices
3M Inspection Passport Readers (existing CIC equipment)	populate biographical information	visa offices
CIC workstations: <b>International</b> CPU: P3 - 866 MHz Operating System: Windows XP Pro <b>In Canada</b> CPU: P3 - 733MHz Windows 2000 Pro	CIC workstations	visa offices, land ports of entry, airport immigration secondary, CIC NHQ

---

---

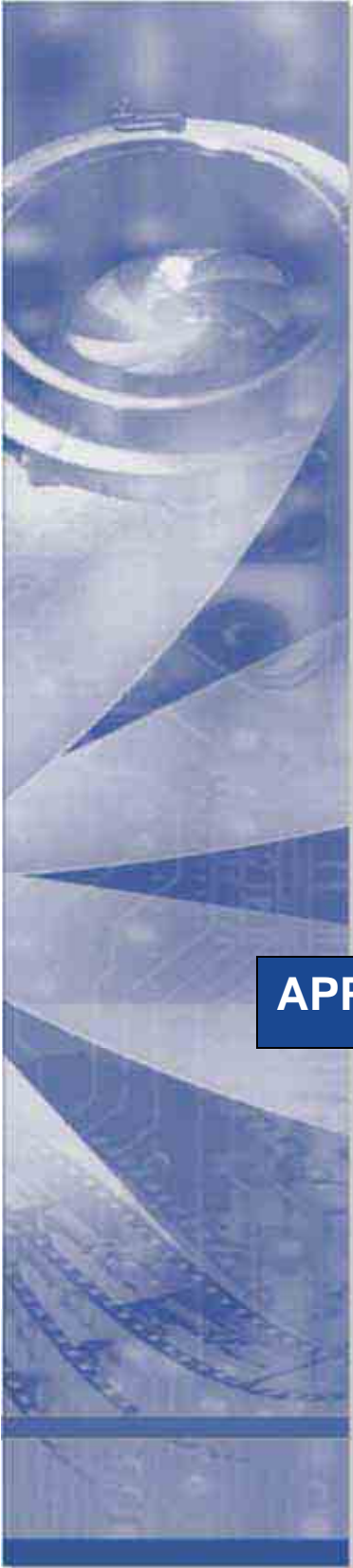
Extra servers were installed after the field trial's data was collected to carry out the high volume matching of photos and 10-fingerprint sets using:

- a) only facial recognition for biometric matching; and
- b) fingerprints as the prime and facial recognition as the secondary biometric matching.

This server configuration consisted of 3 servers and 8 desktop PCs:

Server A	2x Intel Xeon 3.00 GHz 4.00 GB RAM
Server B	2x Intel Xeon 3.60 GHz 4.00 GB RAM
Server C	2x Intel Xeon 3.40 GHz 2.00 GB RAM
Desktop PCs (8)	Intel Core 2 6400 @ 2.13GHz, 2.98 GB RAM

Microsoft Server 2003 SP1 was ghosted onto all 11 machines. The SQL Server 2000 and Apache Tomcat were then installed. A clone of the database was subsequently loaded onto all 11 machines.



**APPENDIX C**



## Appendix C: Performance Indicators

Item	Performance Indicator	Sub-Indicator	Methodology
<b>Program integrity</b>			
<b>I 1 Identity management outcomes</b>			
I1.1	Number of clients identified under multiple application identities before coming to Canada		Systematically via match score reports and follow-up case analysis
		Matches using photo	Systematically via match score reports of suggested photo matches and follow-up case analysis
		Matches using fingerprints	Systematically via match score reports of suggested fingerprint matches and follow-up case analysis
I1.2	Number of multiple fingerprint and photo enrolments at a visa office for same client		Systematic review of enrolment matches and follow-up case analysis
I1.3	Number of clients identified under multiple identities when coming to Canada		Systematically via match reports and follow-up case analysis
I1.4	Deterrent effect		Processing volume comparisons for all trial sites and analysis
<b>I2 Facial recognition performance</b>			
I2.1	Efficiency	Enrolment time	Custom report for timing of photo scanning
I2.2	Effectiveness	Failure to enrol photo	Biometric system report
		False matches for identification (one-to-many)	Biometric system report and expert analysis
		False non-matches for identification (one-to-many)	Biometric system report and expert analysis
		Correct identification matching	Biometric system report and expert analysis
		Photo quality	Biometric system report and expert analysis

<b>I3 Fingerprint recognition performance</b>			
13.1	Efficiency	Enrolment time for 10 fingerprints	Biometric system report
		Time for identification	Biometric system report
		Time for verification	Biometric system report
		Time for fingerprint verification capture	Biometric system report
		System wait times	Biometric system report
	Effectiveness	Failure to enrol (all 10 fingerprints)	Biometric system report and expert analysis
		Failure to capture verification print	Biometric system report and expert analysis
		False matches for identification	Biometric system report and expert analysis
		Correct identification matching	Biometric system report and expert analysis
		False non-matches for identification	Biometric system report and expert analysis
		False acceptance rates for verification	Biometric system report and expert analysis
		False reject rates for verification	Biometric system report and expert analysis
		Correct non-matches for verification	Biometric system report and expert analysis
		True acceptance rates for verification	Biometric system report and expert analysis
		System's biometric sample quality scoring/assessment	Biometric system report and expert analysis
<b>I4 Fingerprint and facial recognition performance</b>			
14.1	Effectiveness	Review based on results from facial recognition and fingerprints	Biometric system report

<b>I5 Overall biometric system performance</b>			
	Visa chips	Number/type of problems	Visa office reporting and information technology (IT) technical reports
	Chip readers	Number/type of problems	Visa office and port of entry reporting and IT technical reports
	10-fingerprint readers	Number/type of problems	Visa office and port of entry reporting and IT technical reports
	Photo capture device	Number/type of problems	Visa office reporting and IT technical reports
	Single-fingerprint readers	Number/type of problems	Port of entry reporting and IT technical reports
	Tablet PCs	Number/type of problems	Port of entry reporting and IT technical reports
	Server - software	Number/type of problems	Visa office / port of entry reporting and IT technical reports
	Server - hardware	Number/type of problems	Visa office / port of entry reporting and IT technical reports
	Network	Number/type of problems	Visa office / port of entry reporting and IT technical reports
<b>Client service</b>			
<b>S1 Client facilitation</b>			
	Repeat clients during the field trial	Volume and time to issue visa to repeat field trial clients	Custom report based on biometric system data
<b>S2 Client relations</b>			
	Awareness of the field trial		Survey
	Client's planned entry point to Canada		Survey
	Client attitudes and perceptions		Survey
	Client cooperation		Staff interviews
	Official complaints		Supervisor reports
	Access to Information Requests		NHQ reports
	Judicial review		NHQ reports
	Withdrawal of applications		Case processing system reports
	Client queries		Call centre, minister's office and mission reports

<b>S3 Public opinion</b>			
	Media coverage		Monitoring of reports in Canadian and foreign press
<b>Organizational/procedural impacts</b>			
<b>O1 Visa office impacts</b>			
	Achieving photo standards	Compliance with photo standards	Manual sampling of photos transmitted
	Photos returned to clients due to non-compliance		Visa office tracking and reporting
	Applications received by mail versus in-person		Visa office tracking and reporting
	Number of in-person pick-ups		Visa office tracking and reporting
	Number of applications processed		Visa office statistics generated from case processing system
	Visa chip performance		Visa office tracking and reporting
	Ease of visa chip handling	Time to affix visa with the chip	Visa office tracking and reporting
	Visa processing times	Additional time to conduct biometric activities	Visa office tracking and reporting
	Wait room time	Additional wait times to conduct biometric activities	Visa office tracking and reporting
<b>O2 Port of entry impacts</b>			
	Number of field trial participants seeking entry		Biometric system report
	Entry processing times	Additional time to conduct biometric activities	Biometric system report
	Number of booths open to field trial applicants at primary inspection line and at immigration secondary		Supervisor reporting
	Manual overrides/shutdowns of field trial on primary inspection line and immigration secondary	Number/type of problems	Supervisor reporting
	Referrals to Vancouver International Airport immigration secondary due to field trial		

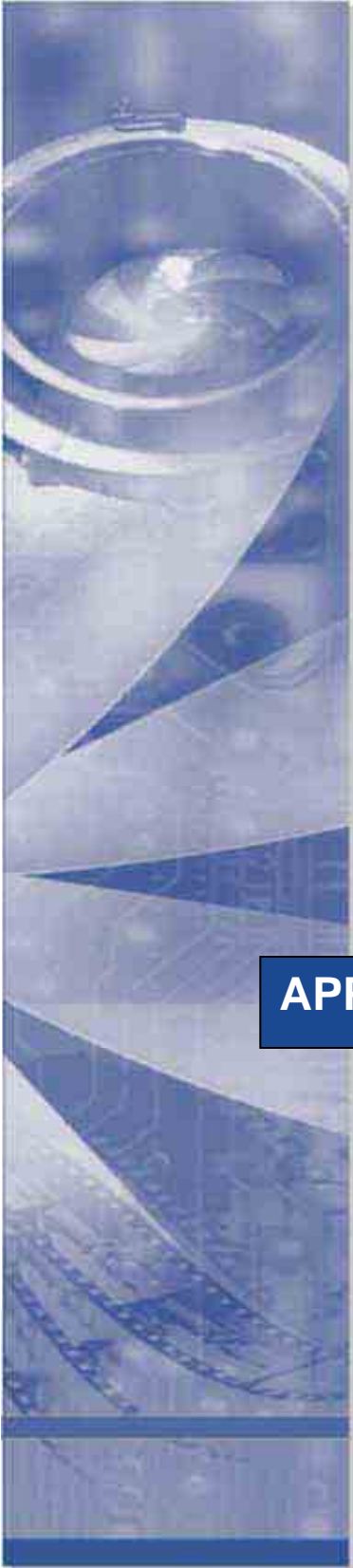
	Referrals to Vancouver International Airport immigration secondary due to visa anomalies	Tampering with biometric visa	Manual reporting
	Number of field trial participants being enrolled for fingerprints		Biometric system report
	Number of field trial participants refusing to enrol their fingerprints		Supervisor reporting
	Number of field trial participants' fingerprints verified		Biometric system report
	Verification time for photo on primary inspection line		Manual reporting
<b>O3 Usability of refugee data</b>			
	Number of refugee protection claimants enrolled		Biometric system report
	Photo quality		Manual reporting
	Fingerprint quality		Manual reporting
<b>O4 Centralized matching centre impacts</b>			
	Time to confirm a match suggested by the system		Biometric system report and analysis
	Time to confirm a non-match suggested by the system		Biometric system report and analysis
	Expert detection errors		Expert peer review
<b>O5 Ergonomics</b>			
	Ease of fingerprint enrolment at missions from clients' perspective		Manual reporting
	Ease of fingerprint enrolment at port of entry		Manual reporting
<b>O6 Human resource impacts</b>			
	Training requirements		Manual reporting
	Recruitment and retention		Manual reporting
	Occupational stress		Staff surveys

---

---

**Cost factors****C1 Implementation costs**

	Project management		Project management reporting
	Vendor/capital expenses		Project management reporting
	Human resources	New and specialized resource needs	Project management reporting
		Training costs	Project management reporting
	Facilities modifications		Project management reporting
	Equipment maintenance		Project management reporting
	IT/network impacts		Project management reporting



**APPENDIX D**



---

---

## Appendix D: Description of Preparations for the Field Trial

### 1. Concept of Operations Planning

Planning the field trial concept of operations included examining the flow of both clients and work at each site to determine how to incorporate field trial procedures into current operations, and deciding where to place equipment. Consultation took place with field trial sites and CBSA NHQ.

Architectural plans were either drawn or provided by the field trial site to assist with planning. In addition, the CIC Project Team from NHQ conducted in-person visits to each field trial site.

Finalising the concept of operations in an airport environment was challenging due to the high volume of travellers being processed and the requirement to have minimal impact on processing times. After the consideration of many options, field trial equipment was installed at all workstations at both PIL and immigration secondary.

While workflows for each site were agreed to during the planning of the concept of operations, it is worth noting that visa office workflows were adjusted shortly after the field trial launch. Each visa office developed a unique flow that worked best given the operating environment of each site.

### 2. Privacy Considerations

Since the introduction of the Government of Canada Privacy Impact Assessment (PIA) Policy in 2002, a government institution proposing to implement a new collection, use and disclosure of personal information, must first perform a privacy assessment to identify privacy risks in order to understand how those risks can be mitigated. In part, a privacy risk identifies a potential improper collection, use or disclosure of personal information with regards to legislation under the *Privacy Act* (PA) and policy under the Treasury Board Secretariat (TBS) Data Management and Privacy.

From a privacy perspective, CIC constructed the field trial to fully respect the privacy rights of visa applicants during the field trial. As stipulated by the Immigration and Refugee Protection Act (IRPA), any foreign national who makes an application may be required to provide photos and fingerprints.

In order to protect the privacy rights of the individual, the field trial was structured so that no administrative action or decision-making process of any kind at the participating field trial sites (granting of a visa or permission to enter Canada) would be taken as a result of the biometric data collected. Rather, the biometric information collected will be analysed by two forensic specialists located in a secure biometric laboratory at CIC NHQ at a later point in time. In addition, all biometric personal information will be destroyed within three months of the termination of the field trial.

---

---

CIC had a good working relationship with the Office of the Privacy Commissioner (OPC) during the formation of the field trial PIA as well as the accompanying action plan to mitigate the 13 privacy risks (shown below). An OPC PIA auditor commended CIC for submitting a draft PIA in advance of the field trial and for maintaining close contact with the OPC throughout the entire PIA process.

1. Program custodian accountability for personal Information not being documented
2. Third party (vendor) access to personal information
3. Not staying within legal authorities
4. Collection of new personal information – linkage to visa application
5. Not giving notice of collection as required by the *Privacy Act*
6. Improper retention and disposal of field trial information
7. Not publishing in the Personal Information Bank (PIB)
8. Not following departmental process on publicly available PIA
9. Dispute regarding the accuracy of digital renderings of photos (“That’s not my picture!”)
10. Following procedures outlined in the Threat and Risk Assessment (TRA)
11. Information technology – not following documented procedures and training
12. Personal information management practices not staying within Treasury Board Secretariat guidelines
13. Not communicating the field trial privacy safeguards

Prior to the launch of the field trial, CIC adopted all recommendations from the OPC.

During the planning stages of the field trial, the Director of the biometrics field trial was appointed privacy program custodian and led an informal team of employees that analysed field trial privacy issues and suggested options to resolve the issues. Every precaution was taken to protect personal information of field trial clients. Documentation of the team’s accountability was assumed by a senior project officer.

The contract with the biometrics system vendor contained privacy measures to protect personal information. All vendor employees were required to sign undertakings at the beginning of the contract to protect personal information.

---

---

CIC provided notice to clients of the collection of personal information, as required by the *Privacy Act*. A field trial guide for clients was published in the visa application section on CIC's Web site ([www.cic.gc.ca](http://www.cic.gc.ca)) approximately one month before the start of the field trial.

According to the *Privacy Act*, a Personal Information Bank (PIB) is required when personal information is collected by a government department. The field trial required a PIB because the biometric templates were available for test purposes. A PIB was created for the field trial and published on Info Source.<sup>18</sup>

During field trial preparation, CIC utilized existing departmental procedures when planning to respond to potential complaints. This included the use of the regional and local dispute resolution procedures, the CIC National Call Centre, the NHQ Ministerial Enquiries Division, and the NHQ Media Relations Unit. A three-employee team was identified to coordinate preparations among these various groups. A communications and complaints strategy was developed to manage a variety of potential complaints, including privacy and communications issues.

CIC produced a Threat and Risk Assessment (TRA) for the field trial and included it as an appendix to the PIA. The TRA specified that under both TBS and CIC security policies, all biometric templates and other personal information used in the field trial was to be encrypted for transmission purposes in order to address the risk of non-encrypted information.

CIC developed and documented specific security procedures required for the field trial and provided related training to employees involved in the field trial. Thorough security requirements for the biometrics field trial lab were developed and documented in a security manual.

Privacy safeguards were a key element in all CIC communications regarding the field trial. All communications products developed for field trial clients included details on the privacy safeguards established to protect personal information.

The PIA contained a communications plan, which highlighted communication activities targeted to the public. Notice of the field trial development was posted on the CIC Web site in April 2006, following the contract award to develop the field trial biometric system. On the day the field trial began, CIC published a notice of the field trial launch on its Web site.

---

<sup>18</sup> Info Source is a series of publications containing information about the Government of Canada, its organization and information holdings. It is a key reference tool to assist members of the public in exercising their rights under the [Access to Information Act](#) and the [Privacy Act](#).

---

---

### 3. Information Technology (IT) Preparations

IT preparations for the field trial included contracting a vendor to deliver a customized biometric system and the leasing and installation of equipment to be used during the field trial. Consultation took place with IT sections of CIC, CBSA and the Department of Foreign Affairs (DFAIT), for overseas IT network impacts.

#### 3.1. Design and Delivery of a Biometrics System

The biometric system was required to pass user and site acceptance tests prior to the installation of the field trial equipment. Certification of the system for CIC and DFAIT networks was also required to allow for the transition of field trial information across the two networks.

#### 3.2 Equipment

A full list of equipment installed at all sites can be found in Appendix B – IT Hardware and Equipment. The following two **Figures (3-1, 3-2)** outline the setup of the field trial equipment by site location:

**Figure 3-1:**

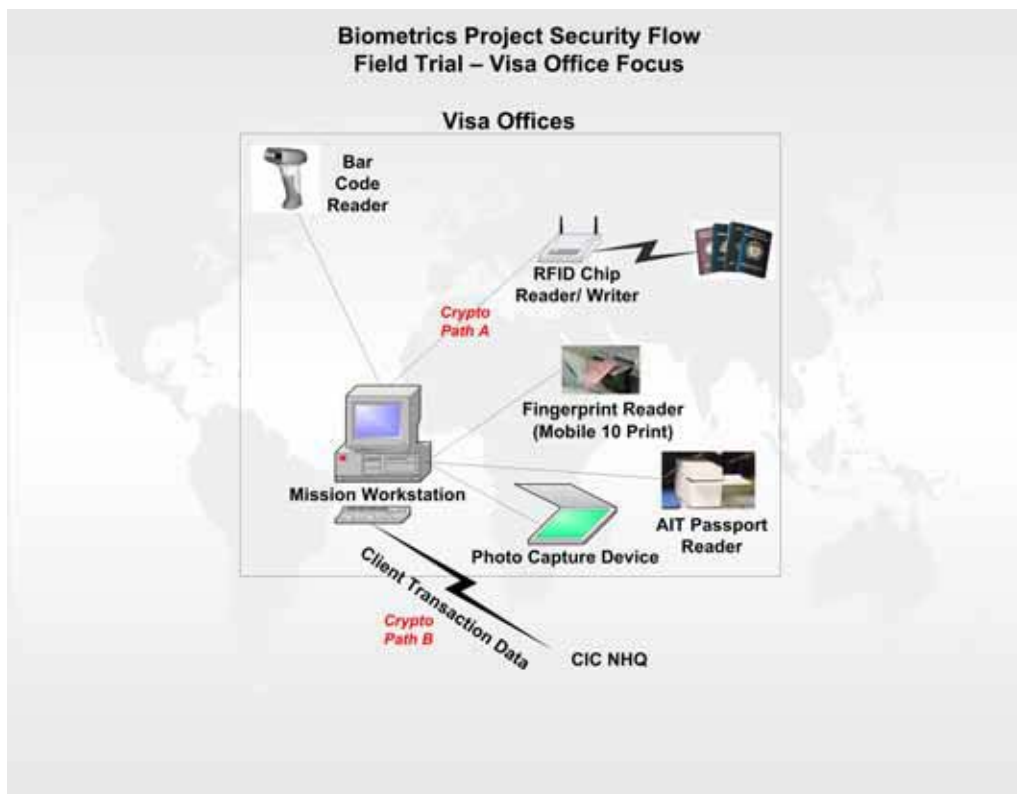
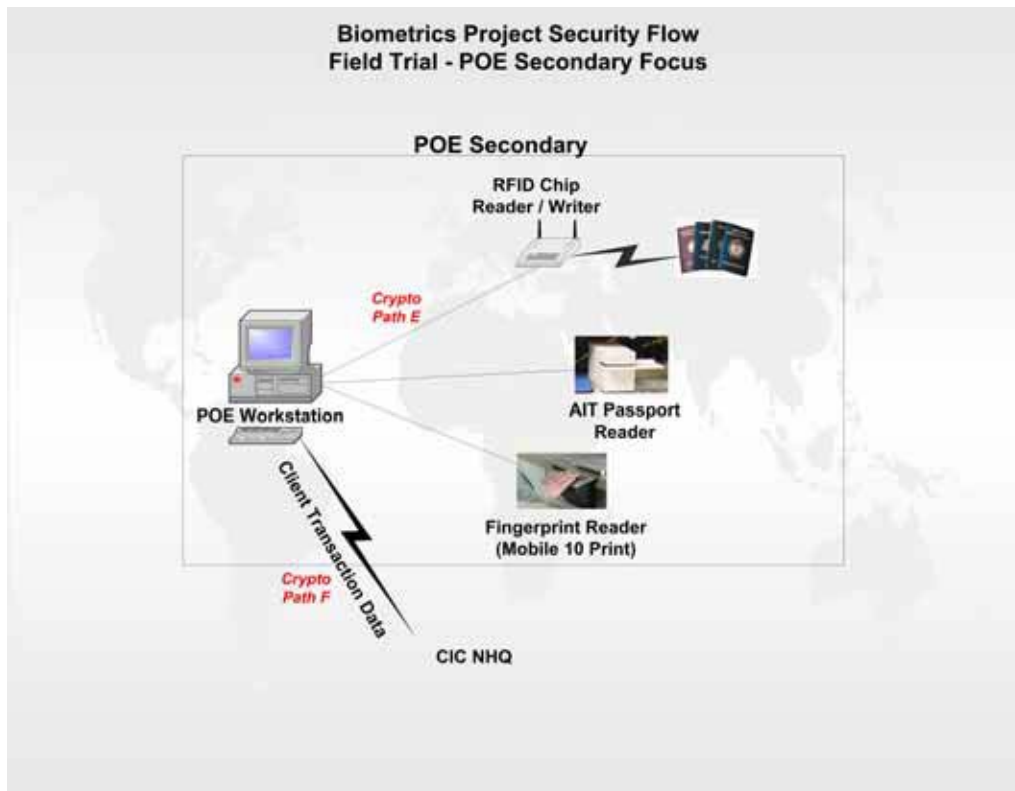


Figure 3-2:



**Stand Alone System:** Integration of the field trial biometrics system with CIC’s overseas visa processing IT system was not possible during the field trial due to operational constraints. As a result, an alternate method of entering client biographic data into a stand-alone biometrics system was developed by using automated passport readers to read the machine readable zone (MRZ) of client passports. Likewise, a stand-alone biometrics system was required in order for PIL employees to identify field trial clients.

This impacted on the type and amount of equipment required in the field trial and was the primary reason that chips were used to identify field trial clients upon arrival at a field trial port of entry.

**Installation:** Each site had unique environments to be considered when planning the installations. Detailed procedures were developed to assist port of entry installation. The CIC Project Team installed the field trial equipment with assistance from local IT employees. Installing in a phased approach allowed for lessons learned to be passed on to the subsequent field trial sites.

#### 4. Training

All training was provided to employees at field trial sites by the CIC Project Team. Training was designed to ensure that site employees were comfortable with the field trial software and process. The CIC Project Team stayed at each field trial site to observe the first day or two of operations and provide assistance, as required.

---

---

A number of tools, such as system guides and a policy manual, were created to assist with training across all field trial sites. In addition, training tools were created specific to each field trial site, such as training manuals and procedures, in consultation with site employees.

#### 4.1 Training for the Visa Offices

##### Objectives:

- Creating a new record and entering biographic data for a client
- Scanning and cropping photos
- Scanning 10 fingerprints
- Writing the required data to the chip and affixing the chip to a passport

**Seattle:** All 14 employees were trained over a period of three days. Classroom training of three separate groups was followed by hands-on use of the equipment in order for employees to become familiar with the process. One IT employee received training on how to install field trial equipment and on fundamental functionality of the system and system requirements in order to deal with technical issues.

**Hong Kong:** Approximately 16 employees were trained over a period of three days. A general presentation was given, followed by specific hands-on training to groups of three or four employees on specific duties and how to use the system. IT employees received additional training on how to install field trial equipment and on basic functionality of the system and system requirements in order to deal with technical issues.

#### 4.2 Training for the Ports of Entry

##### Objectives:

- Placing each passport properly on the reader to allow for the chip to be read
- Capturing a single fingerprint and 10 fingerprints (where required)

A one-page reference sheet was affixed to each workstation for quick reference so employees would not have to stop to refer to a manual should they encounter difficulties in remembering what steps needed to be taken to operate the system.

**Douglas and Pacific Highway:** Approximately 30 employees were trained over a period of two days. A combination of demonstrations, reviews of training material and hands-on practice using test cases were utilized. Supervisors were given extra training related to IT, such as the creation of new users and setting user privileges. In addition, regional IT employees responsible for Douglas and Pacific Highway and VIA received training on equipment installation and received a demonstration of the field trial equipment.

**VIA Immigration Secondary:** Approximately 60 employees were trained over a period of three days. A hands-on demonstration of the field trial process was given in sessions of 30 minutes at an available workstation. Two employees were given extra training related to IT, such as the creation of new users and setting user privileges.

---

---

**VIA Primary Inspection Line:** Approximately 130 employees were trained over a period of seven days. Hands-on training was provided using an available PIL workstation during times when flights were not arriving. Five employees were trained as super-users to troubleshoot specific IT issues.

## **5. Preparations for Facial Recognition – New Photo Standards**

Facial recognition results are greatly affected by the quality of the photo – better quality photos yield more accurate matching results. As part of the field trial planning, the CIC Project Team evaluated photos submitted by temporary resident applicants at the Hong Kong and Seattle visa offices and found that approximately seven percent of the photos submitted were within current international standards. The need was identified for CIC to establish and enforce enhanced photo specifications in general and specifically for the field trial so that the quality of matching would be adequate for testing.

As a result, new CIC photo specifications, concurrent with International Civil Aviation Organization (ICAO) standards and applicable worldwide, were developed and added to visa application requirements in September 2005. Field trial visa offices received printed copies of the new specifications in advance of the field trial start and shared this information with local photographers. To assist Hong Kong and Seattle with enforcing the new photo standards during the field trial, the CIC Project Team created tools for photographers, clients and employees to better judge photo compliance to the new standards. The Standards Council of Canada approved the tools and submitted them to the International Organization for Standardization (ISO) for consideration. ISO has agreed to incorporate the CIC developed tool into its future revised photos standards guidelines.

Analysis of photos received at Hong Kong and Seattle at the start of the field trial, after the creation and implementation of the new photo specifications, indicated that compliance to ICAO standards was at 97%.

## **6. Communications with Clients**

A field trial guide for clients was published in the visa application section on CIC's internet Web site ([www.cic.gc.ca](http://www.cic.gc.ca)) approximately one month before the start of the field trial. A notice of the field trial launch was also published on the CIC Web site.

At the visa offices, a field trial brochure was distributed to clients, see Appendix C. Included was an additional quick reference card on field trial procedures when entering Canada. In Hong Kong, quick reference cards contained a Chinese translation (simple and classical).

Also at the visa offices, clients were given a paper copy of the new CIC photo specifications (accompanied by a Chinese language translation in Hong Kong) that detailed reasons for non-compliant photos. Reference to field trial information on CIC's Web site was provided, as required.

---

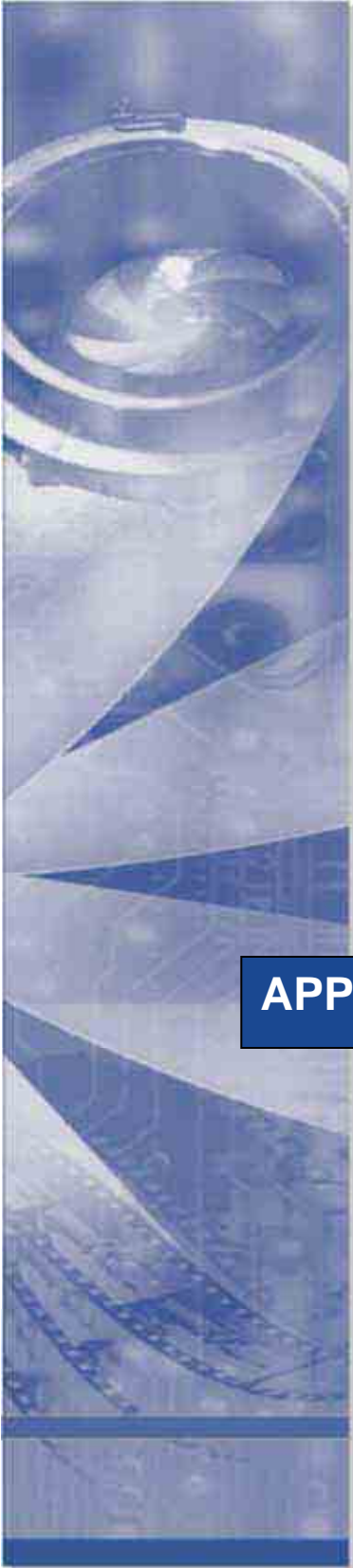
---

## **7. Communications with Stakeholders**

On June 14, 2005, CIC appeared before the Standing Committee on Citizenship and Immigration Canada on the biometrics field trial.

CIC NHQ hosted a briefing session in summer 2005 to inform stakeholders on the field trial. Representatives included: Association of International Customs and Border Agencies, Canadian Bar Association, United Nations High Commissioner for Refugees, Can/Am Border Trade Alliance, Canadian Internet Policy and Public Interest Clinic, Canadian Civil Liberties Association, Tourism Industry Association of Canada, Canadian Tourism Commission, Air Transport Association of Canada, and Professional Institute of the Public Service of Canada (PIPSC).

A separate briefing was held with CIC and CBSA union representatives to inform them of the upcoming field trial and to discuss steps to minimize impact on employees. Representatives included: Public Service Alliance of Canada (PSAC), Professional Association of Foreign Service Officers (PAFSO), and Canada Employment and Immigration Union (CEIU).



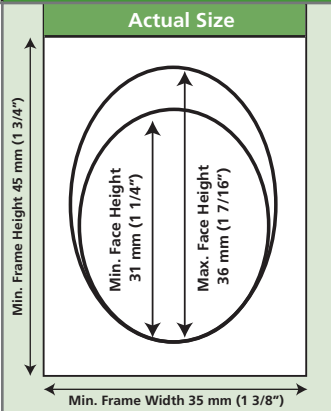
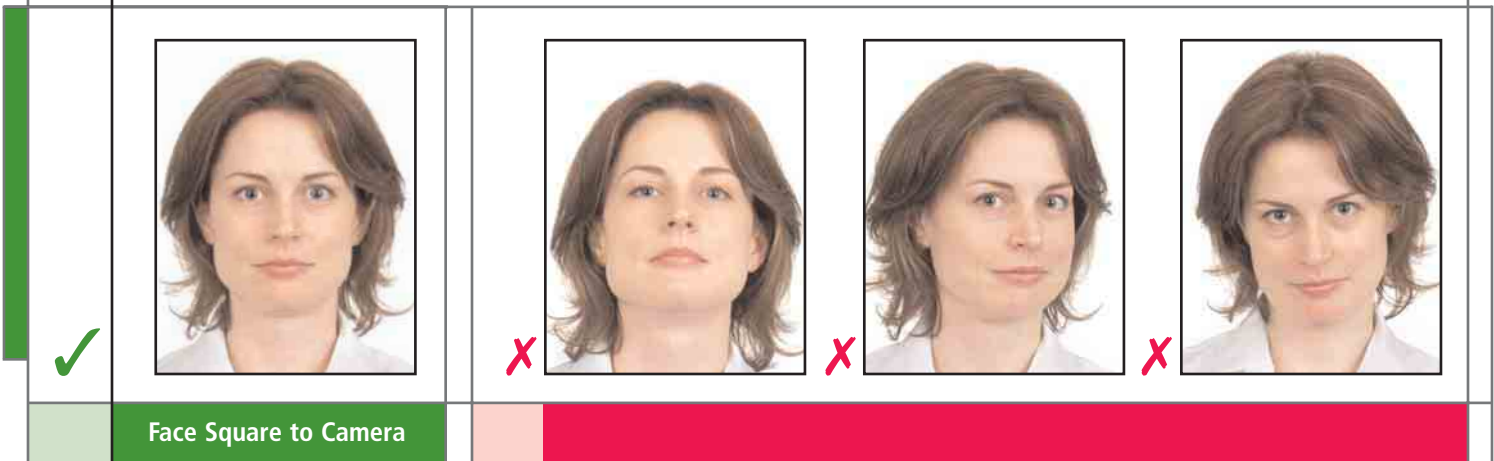
**APPENDIX E**





Visa Application

» **PHOTOGRAPH** Specifications



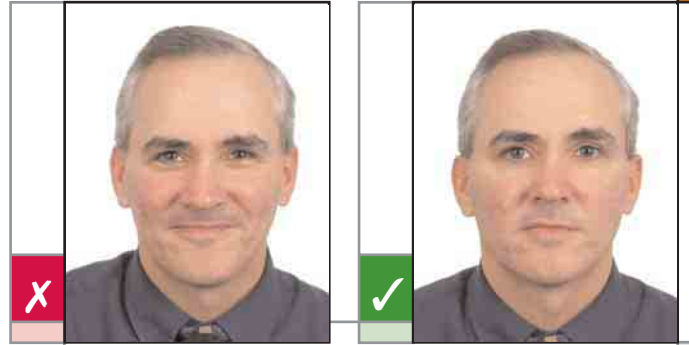
**Photograph and Head Size Specifications**

The face must be square to the camera with a neutral expression, neither frowning nor smiling, with the mouth closed.

**If the photographs do not meet the specifications, you will have to provide new photographs before your application can be processed.**



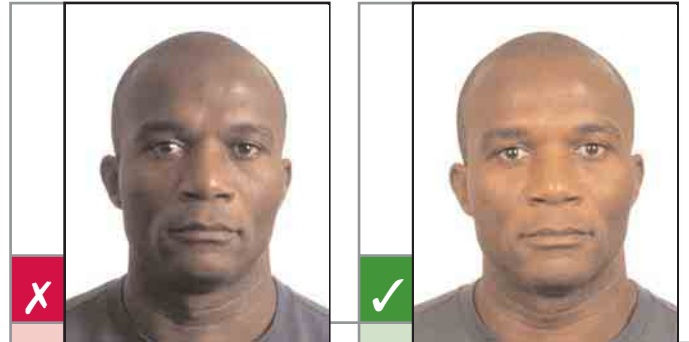
>> Blurred photograph



>> Non-neutral expression



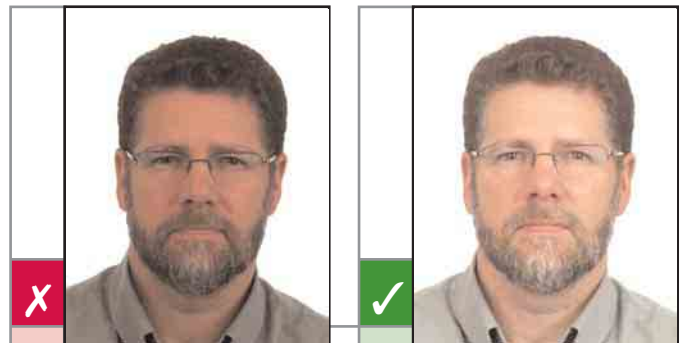
>> Tinted glasses



>> Shadow on face



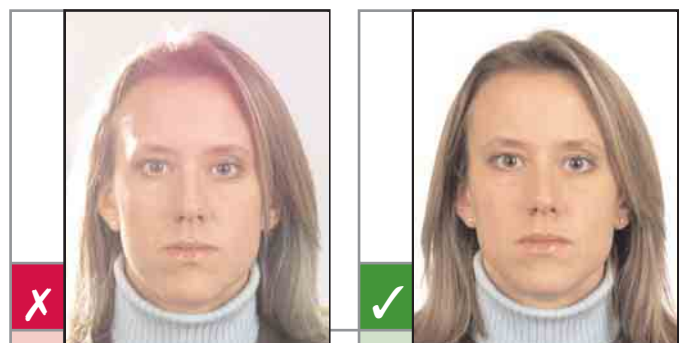
>> Shadow in background



>> Underlit



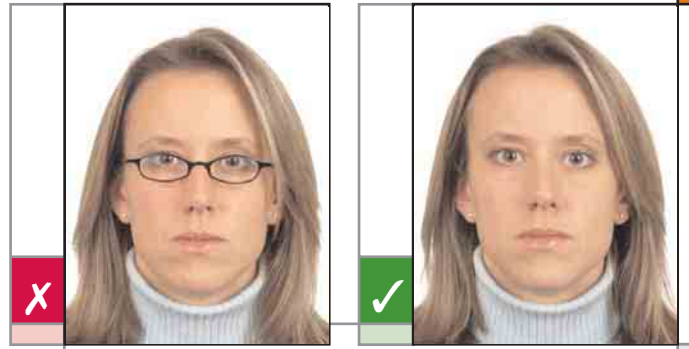
>> Disturbed background



>> Overlit



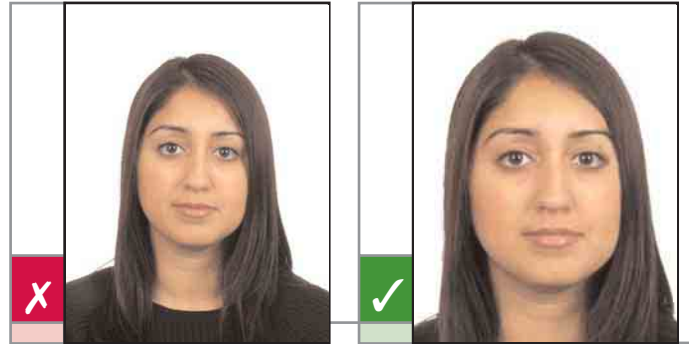
>> Reflection on glasses



>> Glasses frame covering eyes



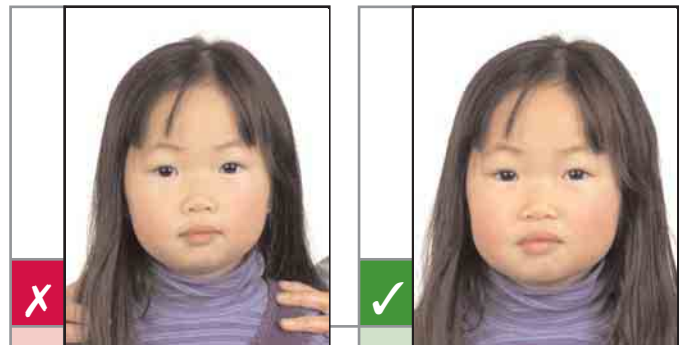
>> Unnatural colour



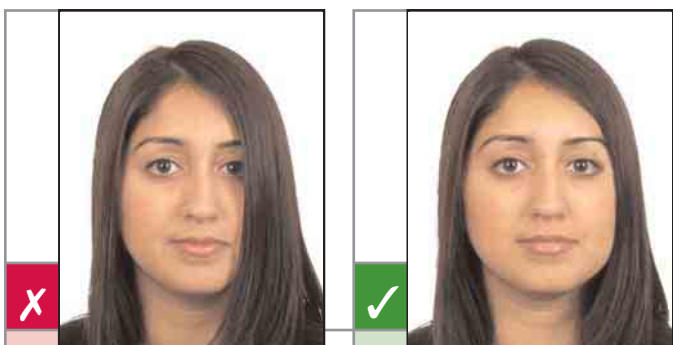
>> Face too small



>> Washed out



>> Hands in picture



>> Hair covering part of face



>> Face covered

# TAKE THIS SHEET WITH YOU TO THE PHOTOGRAPHER

## Requirements

Provide two photographs of yourself and each accompanying family member with your application.

Your photographs must comply with the specifications below. **If the photographs do not meet the specifications, you will have to provide new photographs before your application can be processed.**

Photographs must be printed on quality photographic paper.

## Specifications

The photographs must be identical and taken within the last six months. They may be either black and white or colour.

The photographs must be clear, well defined and taken against a plain white or light-coloured background.

If the photographs are digital, they must not be altered in any way.

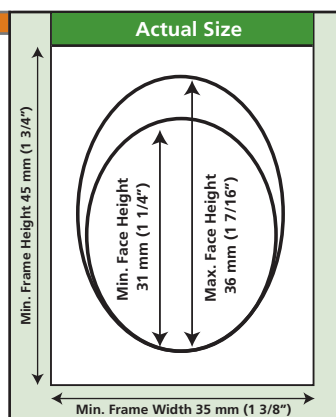
Your face must be square to the camera with a neutral expression, neither frowning nor smiling, and with your mouth closed.

You may wear non-tinted prescription glasses as long as your eyes are clearly visible. Make sure that the frame does not cover any part of your eyes. Sunglasses are not acceptable.

A hairpiece or other cosmetic accessory is acceptable if it does not disguise your normal appearance.

If you must wear a head covering for religious reasons, make sure your full facial features are not obscured.

### Photograph and Head Size Specifications



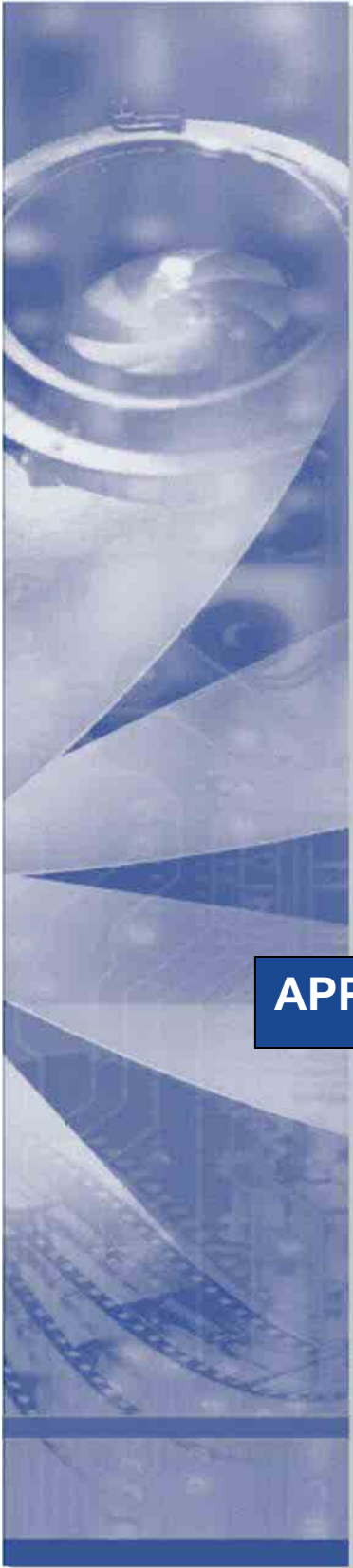
**The frame size must be at least 35 mm X 45 mm (1 3/8" X 1 3/4").**

The photographs must show the full front view of the head, with the face in the middle of the photograph, and include the top of the shoulders.

The size of the head, from chin to crown, must be between 31 mm (1 1/4") and 36 mm (1 7/16").

Crown means the top of the head or (if obscured by hair or a head covering) where the top of the head or skull would be if it could be seen.

**If the photographs do not meet the specifications, you will have to provide new photographs before your application can be processed.**



**APPENDIX F**



HONG KONG – SEATTLE

# VISITOR'S GUIDE for the Biometrics FIELD TRIAL

October 2006 – April 2007



Canada 

Citizenship and Immigration Canada (CIC) is conducting a six-month biometrics field trial from October 2006 to April 2007, affecting all temporary resident visa applicants (visitors, students and workers) in Hong Kong and Seattle.

### What is a biometric characteristic?

For the purpose of this field trial, a “biometric characteristic” is a physical feature that is unique to you, such as your fingerprints. In this trial, CIC will be testing facial recognition and fingerprint recognition.

### Who is affected by the trial?

The field trial affects only people applying for a visa in Hong Kong and Seattle during the six-month period. Those who receive field trial visas in Hong Kong or Seattle will also take part in biometric procedures when entering Canada at Vancouver International Airport (British Columbia) or when crossing the land border between the United States and Canada at Pacific Highway/Blaine, Washington, or Douglas/Peace Arch.

If you arrive at any other airport or land border crossing, you will not be subjected to any fingerprint scan as part of this field trial.

### What is the purpose of the field trial?

Your participation in this field trial is very valuable to us as it will help us test the impact of biometrics on CIC operations.



VISITOR'S GUIDE



## How will the field trial affect me?

### VISA APPLICATION

When following current temporary resident visa application procedures, you will submit two photographs that comply with the photo standards outlined in the application kit: Visa Application Photograph Specifications (C&I-767-01-06).

The visa officer will scan your fingerprints (all 10 fingers) when you drop off your application in person, when you pick up your passport in person or when you attend an interview.

**NOTE:** If your application was completed entirely by mail, your fingerprints (all 10 fingers) will be scanned upon your arrival in Canada.

Children 13 years old and under at the time of application will not be asked to provide fingerprints.

### ARRIVAL IN CANADA

#### VANCOUVER INTERNATIONAL AIRPORT

Follow “Customs and Immigration” signs and make your way to the Customs/Immigration area. There, you will speak with a Canada Border Services Agency (CBSA) officer who will verify your identification (valid passport) and visa. The officer will scan your fingerprints by asking you to position one or more fingers on a fingerprint reader.

### PACIFIC HIGHWAY AND DOUGLAS LAND BORDER

Present yourself to a CBSA officer who will verify your identification (valid passport) and visa. The officer will scan your fingerprints by asking you to position one or more fingers on a fingerprint reader.

#### IMPORTANT

If you have received your visa by mail, a CBSA officer will scan your fingerprints (all 10 fingers) once you arrive in Canada. It is important to note that the procedure may take some time and may slightly delay your onward travel.

### What will happen upon my departure from Canada?

There are no special exit procedures. You will not be asked to provide any further biometric information when departing from Canada.

### What will CIC do with the information collected during the field trial?

It is of the utmost importance to CIC to protect the privacy of your personal information. CIC, its visa offices and the CBSA's participating border offices will strictly adhere to Canada's *Privacy Act*. The *Privacy Act* can be found at the following Web site: <http://laws.justice.gc.ca/en/P-21/95414.html>.



VISITOR'S GUIDE

FOR THE BIOMETRICS FIELD TRIAL



The photograph that you will be providing to the visa office will be used in establishing your identity. It will be scanned and saved on a chip that will be read by a CBSA officer, for examination purposes, upon your arrival in Canada. However, the scans of your fingerprints will not be used to make a decision on your visa application or your entry to Canada. The personal information will be strictly protected in a secure database stored in Ottawa, Canada, where it will be used only for statistical purposes.

All biometric information, including fingerprints, will be destroyed no later than three months after the closing of the field trial, which is expected to finish in April 2007.

#### Who do I contact for further information?

If you have any further questions, please contact your visa office by visiting the following Web sites:  
Seattle, U.S. – [www.seattle.gc.ca](http://www.seattle.gc.ca)  
Hong Kong, China – [www.dfait-maeci.gc.ca/asia/hongkong/](http://www.dfait-maeci.gc.ca/asia/hongkong/)

You may also send comments to the Minister of Citizenship and Immigration at [Minister@cic.gc.ca](mailto:Minister@cic.gc.ca).

Or you may write to:

**Minister of Citizenship and Immigration**  
**Citizenship and Immigration Canada**  
**Ottawa, Ontario Canada K1A 1L1**



VISITOR'S GUIDE



## QUICK REFERENCE

### BIOMETRICS FIELD TRIAL FOR HONG KONG – SEATTLE

ARRIVAL IN CANADA

#### VANCOUVER INTERNATIONAL AIRPORT

Follow “Customs and Immigration” signs and make your way to the Customs/Immigration area. There, you will speak with a Canada Border Services Agency (CBSA) officer who will verify your identification (valid passport) and visa. The officer will scan your fingerprints by asking you to position one or more fingers on a fingerprint reader.

#### PACIFIC HIGHWAY AND DOUGLAS LAND BORDER

Present yourself to a CBSA officer who will verify your identification (valid passport) and visa. The officer will scan your fingerprints by asking you to position one or more fingers on a fingerprint reader.

IMPORTANT

If you have received your visa by mail, a CBSA officer will scan your fingerprints (all 10 fingers) once you arrive in Canada. It is important to note that the procedure may take some time and may slightly delay your onward travel.



# 香港 — 西雅圖

## 生物圖像識別實地試驗 摘要

士  
抵  
達  
加  
拿  
大  
人  
士

### 溫哥華國際機場

請依循「海關與入境」標誌往海關/入境部門。加拿大邊境服務官員將會為閣下辦理手續：核閣下的身份證明(有效護照)和簽證。有關官員將會為閣下在指紋閱讀器上印上一隻或多隻手指，以掃描閣下的指紋。

### 一號公路或道格拉斯公路

請向加拿大邊境服務官員報到，有關官員將會核閣下的身份證明(有效護照)和簽證，要求閣下在指紋閱讀器上印上一隻或多隻手指，以掃描閣下的指紋。

士  
抵  
達

閣下若以郵遞方式收到簽證，加拿大邊境服務官員會在閣下抵埗時掃描閣下的指紋(全部十隻手指)。務請注意，手續辦理需時，閣下的緊接行程或會略受阻延。



# 香港 — 西雅圖

## 生物圖像識別實地試驗 摘要

士  
抵  
達  
加  
拿  
大  
人  
士

### 溫哥華國際機場

請依循「海關與入境」標誌往海關/入境部門。加拿大邊境服務官員將會為閣下辦理手續：查核閣下的身份證明(有效護照)和簽證。有關官員將會為閣下在指紋閱讀器上印上一只或多只手指，以掃描閣下的指紋。

### 一號公路或道格拉斯公路

請向加拿大邊境服務官員報到，有關官員將會查核閣下的身份證明(有效護照)和簽證，要求閣下在指紋閱讀器上印上一只或多只手指，以掃描閣下的指紋。

士  
抵  
達

閣下若以郵遞方式收到簽證，加拿大邊境服務官員會在閣下抵埗時掃描閣下的指紋(全部十隻手指)。務請注意，手續辦理需時，閣下的緊接行程或會略受阻延。

