L-1 IDENTITY SOLUTIONS™

BIOMETRICS DIVISION

Pilot Description

North Texas Fusion Center

Face Examiner Workstation & Multi-Modal ABIS

1 Introduction

This document discusses the Face Examiner Workstation (FEW) pilot system being presented to your agency for live trials in your production environment.

The goals of the system to be installed for your pilot are as follows:

- Provide a comprehensive demonstration of the benefits of the system and how it will solve heretofore difficult or unsolvable identification issues
- Have sufficient capacity to load the entire identity database
- Provide a simple vehicle to cleanse and load identity records
- Be as minimally invasive to your IT environment as possible
- Be effective with as little agency training as possible

These goals will be supported by regular contact from L-1 Identity Solutions to your agency to:

- Ensure that the pilot is progressing well
- Assist you with any questions or difficulties
- Share any victories arising from the pilot system in your live environment
- Begin working with the principles engaged with the pilot program to develop the approach to tightly integrate and customize FEW for your long term operations

2 System Function

As cited in the Introduction, the design criteria and subsequent execution of the FEW Pilot is a blend of simplicity coupled with extensive functionality.

At a high level, the pilot system to be put in place at your agency has the following functional characteristics:

- As a simple statement of capacity, the system will support up to 4 million identity records with enough matching performance to support 20 search transactions per hour. As a corollary to this simple performance statement, the pilot system will also support smaller databases at higher throughput and somewhat larger databases with lower throughput.
- Typical face matching use cases are supported including:
  - Mugshot image search probe
  - Forensic face image search probe including:
    - Previously acquired still image
    - Capture of frame from video clip containing face image
  - Fully technical searches (no demographic filters)
  - Filtered searches using:
    - Race
    - Sex

- Hair color
- Eye color

- Probe submission parameters including technical search parameters and number of return candidates
- Candidate list response directly returned to workstation

Figure 1 shows the physical manifestation of the pilot to be installed in your agency. The ABIS/FEW pair to be installed is a fully self-contained solution and may be fully isolated from your agency network. In fact, should your pilot have only one workstation, a network hub is not even required as it will operate with full functionality utilizing only a network crossover cable if both the server and the workstation are in close physical proximity.

Should the installation locations for these components require physical separation (for example having the server in datacenter and workstation on a desk), only these two components required network connectivity and may be physically or logically isolated from the rest of your agency's network.

NOTE: While the FEW Pilot System may be fully isolated from the agency network, it may be beneficial to have the system on the network to ease transmission of load files to the server without requiring an intermediary step of data moving on physical media.

For greatest flexibility of installation, all components of the FEW Pilot System are capable of operation in a typical climate-controlled office environment.

Figure 1 Diagram depicting system connectivity

3 Installation

The FEW Pilot System server and workstation pair will be delivered to the customer site ready to run. To install, L-1 will ask the customer to have a location with power defined for both the server and the workstation (which may be the same location). If the system is to be fully isolated from the agency network, arbitrary IP addresses will be assigned. If the system is to be on the agency network, your agency must either define for L-1 to configure with DHCP or specific static IP addresses.

4 Data Cleansing and Loading

To support loading data to your pilot system, included is a standards-based tool to support loading and data cleansing (as depicted in Figure 2).

Initially a single step process from the user POV, the bulk enroll tool performs the following steps for each record in the enroller input file:

1. Image Quality Check where a broad range of quality parameters are evaluated and the image is assessed for whether it is good enough for consistently good results if enrolled
2. Input records meeting enrollment quality requirements are enrolled in matcher while those that do not are skipped
3. For all processed records, whether enrolled or skipped in the load, detailed information is gathered regarding quality of the image among other statistical information which may be reported on by a variety of means

NOTE: While it is the customer's discretion as to which and how many records to load to ABIS for the FEW pilot program, it is L-1 Identity Solutions' recommendation that the entire identity database be loaded. In this way, given that this is a production-level pilot, you do not run the risk of a scenario where there is a gallery match for a given probe but the candidate was not loaded in the database subset.

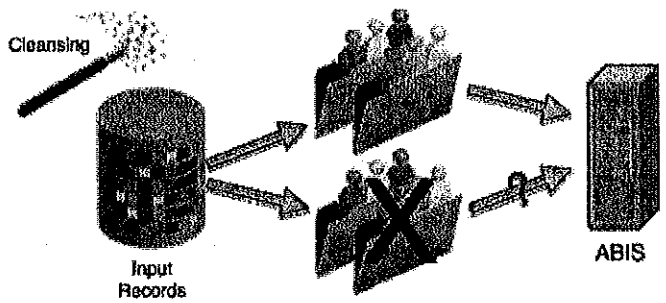

Figure 2 Data cleansing and loading

Creation of the input load files may be managed by your agency by:

- Using in-house IT staff to create the load file
- Working with your image store vendor to create the load file
- Working with L-1 Identity Solutions to scope, price, and create load files

NOTE: The load tools have been created such that, with appropriate IT skills on agency staff, where an agency has strict security guidelines, the data load and subsequent data loads may be managed entirely without L-1 Identity Solutions direct assistance and obviates the need for external staff requiring security clearances.

4.1 Enroller Functionality

The BulkEnroller is used to enroll face images into ABIS and employs the following files:

- Bulkenroll.csv listing each record to be enrolled into ABIS, one per line. Each line contains: datasource(ds), datasourcenumber (dsn), and an xml filename that has the full demographics information.
    - Typically datasource is a value assigned to a contributing entity while datasourcenumber is the unique ID for the record
- All xml files listed in Bulkenroll. Each individual xml file contains the demographics field and image filename of the subject. The following demographics fields are supported:
    - First Name
    - Middle Name
    - Last Name
    - Eye Color
    - Hair Color
    - Race
    - Gender
    - Height
    - Weight
    - Place of Birth
    - Date of Birth
    - State Id
    - Original Case Number
    - Original Agency ID
    - Source File
    - Social Security Number
    - FBI Number
    - AFIS Number
    - Juvenile Indicator
    - Occupation
    - Employer
    - Employer Address
    - Residence
    - Identification Comment
    - Citizenship Code
    - All image files listed in each one of the xml files

The bulk enroller creates a results folder that contains information for each individual record we attempt to enroll into ABIS. If a record fails to enroll, a text file that contains the exception information from ABIS is created. The bulk enroller also creates a

submissions.csv file and timing.csv file that provides us with success/failure info per record and enrollment time, respectively.

4.2 Input record format

The bulk enroller is executed with the following command on the ABIS server:

BulkEnroll <csvFilename> <ipAddress> ENROLL

where:

- csvFilename is a comma separated file with the following format:
  - ds,dsn,xmlfilename
- ipAddress is the IP address of the ABIS Search Engine

The demographics information for each record is listed in individual xml files. The bulk enroller records the timing and ABIS responses in an outputDirectory log files.

4.2.1 Example csv File

The format of the csv file is as follows:

```
#ds, dsn, xmlfilename
001,001,001.xml
```

4.2.2 XML File Format

The format of the XML file is as follows:

```
<?xml version='1.0'?>
      <person dataSource="001" dataSourceNbr="001">
            <active>Y</active>
            <demogs>
                  <firstName>John</firstName>
                  <middleName>Sampson</middleName>
                  <lastName>Doe</lastName>
                  <eyeColor>BLU</eyeColor>
                  <hairColor>BLK</hairColor>
                  <race>W</race>
                  <gender>M</gender>
                  <height>508</height>
                  <weight>200</weight>
                  <placeOfBirth>US</placeOfBirth>
                  <dateOfBirth>1945-05-05</dateOfBirth>
                  <stateId>02</stateId>
                  <origCaseNbr>12345</origCaseNbr>
                  <origAgencyId>003</origAgencyId>
                  <sourceFile>2356</sourceFile>
                  <socialSecNbr>0000000</socialSecNbr>
                  <fbiNumber>0000000</fbiNumber>
                  <afisNumber>0000000</afisNumber>
                  <juvenileInd>02</juvenileInd>
                  <occupation>contractor</occupation>
```

```
                <employer>self</employer>
                <employerAddress>100 main
st.,city,state</employerAddress>
                <residence>100 main st.,city,state</residence>
                <identificationCmt>missing index
finger</identificationCmt>
                <citizenCode>02</citizenCode>
          </demogs>
          <faces>
                <face>
                      <missing>N</missing>
                      <sample>IX00120001.jpg</sample>
                </face>
          </faces>
    </person>
```

5 Training

The L-1 Identity Solutions Face Examiner Workstation is, as will have been presented to you, a powerful yet intuitive application. As such training will not be difficult for the agency pilot principles to assimilate. Training will have two components:

- FEW Application training (typically an ident or forensics officer)
  - Provides basic fundamentals of getting images into the system
  - Image enhancement
  - Search parameters
  - Results viewing
- ABIS Operation training (typically a system administrator but may be the same as the FEW operator)
  - System startup and shutdown
  - Data Loading
  - Log file viewing

6 Support

While this is a pilot system L-1 Identity Solutions understands the important of this pilot to your agency. As such, you will be given access to our existing support infrastructure to support your pilot program. This will ensure than any issues you may have arise will be dealt with, as they would be with a production system, as expeditiously as possible.

As always, if you have any additional need of contact with L-1 Identity Solutions, your Sales Executive stands ready to help.

7 Timing

The length of this proposed pilot will be six (6) months from the last day of installation and training. Should the agency decide to keep the system beyond the initial six month pilot, please see the attachment to this document that outlines our initial proposal. Should Collin County decide to return the pilot, an L-1 Representative will come on-site, uninstall the server and workstation, box it up in original packing materials, and send it to the L-1 corporate office at L-1's expense. The timing of this will correspond on or around the last day of the six (6) month end date.

8 Cost to Agency

There will be no cost incurred by Collin County other than usual costs associated with installation of a Server and Desktop hardware (i.e., network cables, additional power jacks if necessary, rack space, etc).

IN WITNESS WHEREOF, the Parties to this Agreement have signed and delivered this Agreement.

RECEIVING AGENCY	PERFORMING AGENCY
Collin County, Texas	**L-1 Biometrics Division**
By: Franklin Ybarbo	By: J.J. Solazzo
Frank Ybarbo	
Title: County Purchasing Agent	Title: Vice President
Date: 5/17/11	Date: 5-25-11

2011-294-05-09

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L-1 IDENTITY SOLUTIONS™

BIOMETRICS DIVISION

ROM Solution and Quotation

North Texas Fusion Center

Face Examiner Workstation & Multi-Modal ABIS

1 Introduction

This document discusses the Face Examiner Workstation (FEW) pilot system and ROM price quotation being presented to your agency.

The solution presented, at a high level, meets the following requirements:

- Initial Operating Capabilities (IOC):
  - Initially to support growth to 4 million records with a transaction volume of 20 transactions per hour.
  - Support multiple FEW stations
- Future Operating Capabilities (FOC):
  - Support seamless and non-intrusive growth to larger databases or transaction volumes.
  - Allow later custom workflows to be implemented
  - Allow later addition of other biometric modalities

2 Initial Operating Capabilities

At a high level, system being quoted has the following Initial Operating Capabilities:

- As a simple statement of capacity, the system will support up to 4 million identity records with enough matching performance to support 20 search transactions per hour. As a corollary to this simple performance statement, the start up system will also support smaller databases at higher throughput and somewhat larger databases with lower throughput.
- Typical face matching use cases are supported including:
  - Mugshot image search probe
  - Forensic face image search probe including:
    - Previously acquired still image
    - Capture of frame from video clip containing face image
  - Fully technical searches (no demographic filters)
  - Filtered searches using:
    - Race
    - Sex
    - Hair color
    - Eye color
  - Probe submission parameters including technical search parameters and number of return candidates
  - Candidate list response directly returned to workstation

Figure 1 shows the physical manifestation of the system to be installed in your agency. The IOC ABIS/FEW pair to be installed is a fully self-contained solution. While the diagram shows only a single FEW, as many FEW stations as required may be connected to ABIS with the only caveat that, for the IOC system, transaction volume remains not

significantly higher than the stated 20 transactions per hour as the database reaches the designed 4 million record capacity.

The solution proposed has a very small technical footprint requiring only a single server to support the stated 4 million record capacity at 20 transactions per hour. L-1 Identity Solutions will be pleased to deliver this server either as a rack mount or tower server to meet your needs.

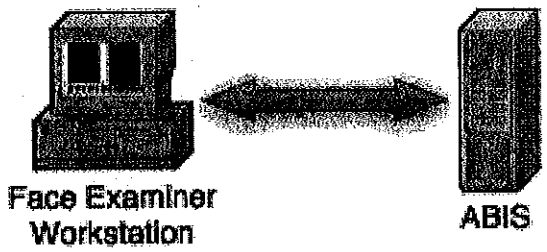

Figure 1 Diagram depicting system connectivity

2.1 Data Cleansing and Loading

One of the key elements to a successful implementation is a successful Back Record Conversion. Figure 2 shows, at a high level the approach to converting data. L-1 Identity Solutions recognizes that data contained within existing systems may, over time, come to include records of less than optimal quality if they have not always had strict capture control. Additionally, there can sometimes be images that are not frontal images in an image database.

To that end, to ease the conversion and enrollment process as well as having the cleanest possible resultant data load we will take a two step approach to the conversion.

- Data Cleansing
  - The first step will be to programmatically review all images from your image store. This process will provide two output lists; one of records that are ready to enroll and one of records that are questionable. This will reduce the number of records requiring review before determining ABIS suitability.
  - While records of poor quality may be "force" enrolled, unless the individual is of extreme interest, it is typically better to not do this to avoid skewing aggregate system accuracy and also considering that limited success with very poor images can be expected.
- Data Loading
  - Once the clean records are identified and questionable records are reviewed to determine suitability, a bulk load will be done to the ABIS. Once complete, the system is ready for use.

NOTE: While it is the customer's discretion which and how many records to load to ABIS, it is L-1 Identity Solutions' recommendation that the entire identity database be loaded. In this way, you do not run the risk of missing a match if the candidate in question for a given probe is not loaded in the database.

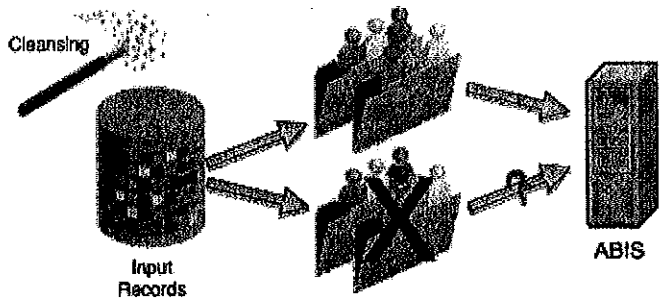

Figure 2 Data cleansing and loading

2.2 Installation

The ABIS and FEW(s) pair will be delivered to the site ready to run. To install, L-1 will require a location with power and network connectivity defined for both the server and the workstation. We will also require information as to whether to configure with DHCP or specific static IP addresses.

2.3 Training

The L-1 Identity Solutions Face Examiner Workstation is a powerful yet intuitive application. As such training will not be difficult for the agency principles to assimilate. Training will have two components:

- FEW Application training (typically an Ident or Forensics Investigator)
  - Getting probe images into the system from still images and video
  - Image enhancement
  - Search parameters and how to use them
  - Results viewing
- ABIS Operation training (typically a system administrator)
  - System startup and shutdown
  - Routine maintenance as defined by your installation
  - Backup procedures

2.4 IOC ROM Pricing

This section discusses ROM pricing for the IOC ABIS configuration described above and based on information present at the time of this writing and do not include recurring maintenance prices beyond the included 12 month warranty. Please be aware that these are ROM prices only and may change (up or down) as additional system requirements are presented and refined. Professional Services ROM prices are based on typical examples

of the element being quoted and may also change (up or down) based on the complexity of the quoted element.

Component/Option	Price
ABIS Matching Engine configured for: • 4 million face records • ~20 transactions/hr	
Software	$180,040
Hardware	$6,500
Face Examiner Workstation (per station)	
Software	$16,000
Hardware	$1,200
Professional Services	
System Configuration and Installation	$21,000
Back Record Conversion	$35,000
Optional Interface to current face image store (implies some elements of workflow to integrate)	$65,000
Training	
ABIS	4 days – $4,200
FEW	2 days – $2,195

Total with interface to the Existing Face Image Store - **$331,135**

Total without Optional Interface to Existing Face Image Store - **$266,135**

Annual On-Going Maintenance Cost - $31,000

3 Future Operating Capabilities

As cited in the introduction, there are several FOC elements requested for the system after the IOC system is in production. These include:

- Support seamless and non-intrusive growth to larger databases or transaction volumes.

- Allow later custom workflows to be implemented
- Allow later addition of other biometric modalities

All ROM pricing for the FOC items described below are based on information present at the time of this writing and do not include recurring maintenance prices beyond 12 month warranty. Please be aware that these are ROM prices only and may change (up or down) as additional system requirements are presented and refined. Professional Services ROM prices are based on typical examples of the element being quoted and may also change (up or down) based on uncommon simplicity or complexity of the quoted element.

3.1 System Expansion

As stated above, the IOC system requires a single ABIS server to support up to 4 million records at ~20 transactions/hr. Expansion beyond this will require an additional server along with requisite incremental licensing. This breakpoint of database size and transaction volume requiring an additional server is dependent upon the combination of each variable along with the Fusion Center's required response time.

Upgrades are minimally invasive requiring minimal downtime with the procedure being:

- Install and configure new server discretely
- Halt production system, reconfigure to include new server in the core matching system
- Restart production system, which will now include the new server in the single logical ABIS match core.

Additional FEW workstations are fully non-invasive and require only licensed FEW software to be installed on a PC and the target IP address of the ABIS server configured.

Component/Option	Price
ABIS Expansion to support additional capacity or throughput	
Software	$20,000
Capacity Licenses (per 1,000 additional stored identities)	$365
Professional Services	$21,000
Hardware	$6500
Face Examiner Workstation (per station)	
Software	$16,000
Hardware	$1,200
Professional Services	2 Days - $2,195

3.2 Custom Workflows

The IOC system, for ease of implementation at the most reasonable cost, utilizes our FEW with a direct connection to the ABIS API. This implementation approach meets the needs of most agencies' forensic face search needs. However, as forensic face searching becomes more tightly integrated to an agency's crime resolution practices or more agencies are included, often custom workflows and interfaces to external systems may be required. Reasons for moving in this direction may include but are not limited to:

- Direct integration and/or data sharing with external systems
- Logically regionalizing databases in central database to provide logically discrete agency databases
- Transaction routing such as adding additional approval review to match/no match results
- Tighter integration to agency Enterprise IT environments
- Addition of more biometric modalities

With this, we add our Workflow Manager (WFM) and the structure of the solution seen in Figure 2 becomes that shown in Figure 3. While this seems like it is more complex by an order of magnitude it is, in fact, not.

If we assume that addition of custom workflows is the initial impetus for adding the WFM, the ABIS in place will not change at all and users will only see, and need incremental training on, additional transaction queue management on their FEW. All other elements remain utterly unchanged.

Even if we were to assume a more extensive integration involving external systems or data stores or even other agency systems, while remaining largely a forensic face searching system, the user would see only incrementally extra information presented. Core functions would remain unchanged.

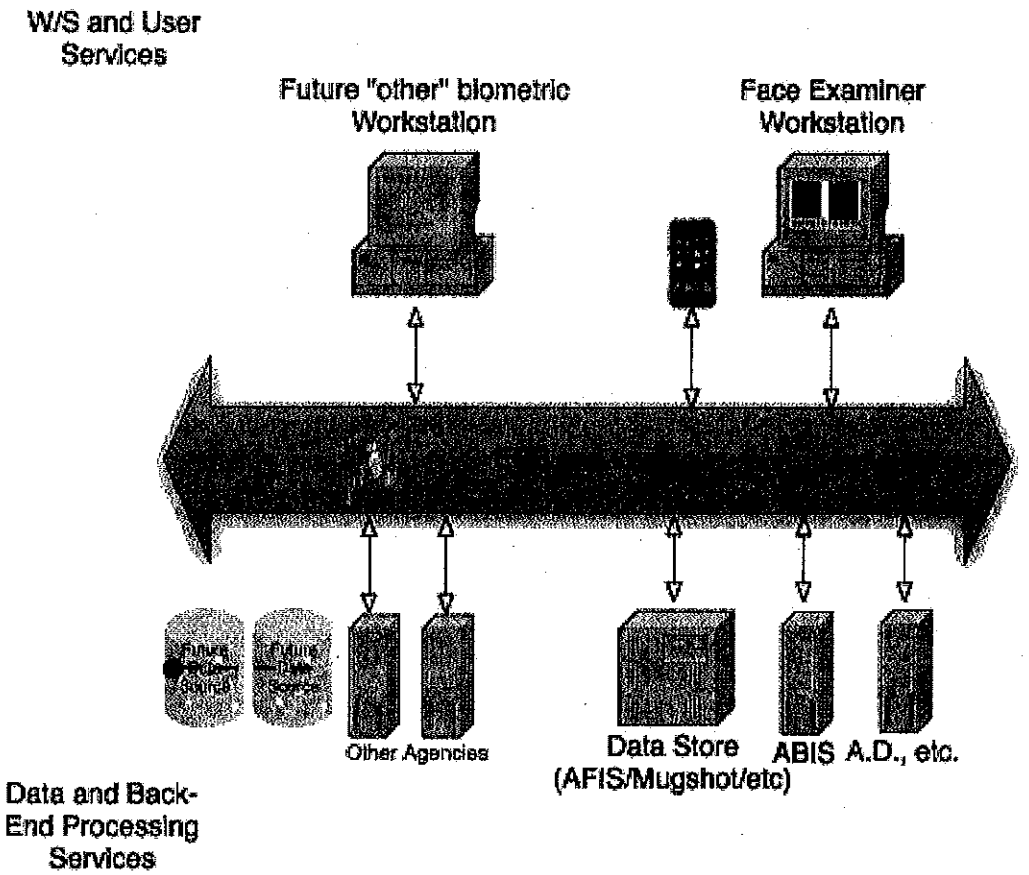

Figure 3 Diagram depicting ABIS in full ESB environment

Component/Option	Price
WFM Server	$,5000
Custom workflow – typical per use case	
Professional Services	$65,000
Custom external system interface – typical per interface (may also require custom workflow	
Professional Services	$21,000

3.3 Additional Biometric Modalities

Another direction for system expansion is to add the additional biometric modalities of finger and/or iris matching capabilities. As with expanding the system capacity, throughput, or customization, these are minimally-invasive extensions to system function.

All elements of the ABIS environment including ABIS itself and the WFM are fully multi-modal ready; multi-modal elements in these components are just not used until such time as the system is configured to include more biometrics. There is *never* a re-integration or, worse, a re-engineering of the production system to add a new biometric.

At a high level, what the Fusion Center would see when adding a new biometric to the ABIS core would be:

- The new server(s) for the biometric will be configured and tested by L-1 outside the production environment.
- The production ready biometric elements will be installed alongside the existing production environment.
- The production environment will be brought down, reconfigured to recognize the new biometric and restarted.

At this point, the previously running production biometric functionality returns unchanged and the new biometric functionality is active.

Unlike other FOC functions that have been given ROM pricing, L-1 will not present pricing for additional biometric modalities. We state this as a potential FOC function but without requirements such as the biometric, size, volume, and needed functionality it is simply not possible to scope this element.

L-1 will be happy to define, scope, and price these as/when the Fusion Center needs these functions added.

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