SYSTEMS DEVELOPMENT PLAN
FOR
STATE IDENTIFICATION BUREAUS

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FOREWORD

This report has been prepared by the International Association for Identification (IAI) under an LEAA grant intended to promote the "Improvement of the State-Level Identification Function."

The goal of this study is to provide information for the identification, definition and prioritization of the needs and operational requirements of state identification bureaus. This document is one of a series of three documents produced in this project effort. These three documents are as follows:

- **Executive Summary** — *This document presents the highlights and major findings, conclusions and recommendations of the overall study primarily for the general reader.*

- **Functional Requirements Analysis** — *The detailed findings, conclusions and recommendations of the study are presented here, which are designed to be of greatest interest to bureau managers and their technical staff.*

- **Systems Development Plan** — *This work builds upon the findings, conclusions and recommendations of the Requirements Analysis and presents the general framework and priorities for implementation of improvement opportunities.*

ACKNOWLEDGMENTS

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INTRODUCTION

Reference to this document as a "systems" development plan is meant to be inclusive of the issues, needs and problems facing the nation's state level identification bureaus as a whole. While this generic view is inherent in a nation-wide assessment of any type, it does present some difficulties when regarding state identification functions due to the broad differences between their capabilities, operations and requirements.

In the conduct of the study, through on-site visits and mailed questionnaires, no two bureaus were found to be identical. And, across the full range of bureaus there are substantial differences in the scale of operations as well as the nature and magnitude of functional difficulties. As a result, it is difficult to establish common denominators for the presentation of problems which are applicable across the board. Many states vary in terms of the nature of functional difficulties or deficiencies as well as in regard to the relative seriousness of common problems.

In similar fashion, the approaches to system improvement, which are presented as the primary focus of this document, may be applicable to some state operations and not to others. In short, while general solutions to problems are suggested, only some will be applicable in most states. In the final analysis, these and other improvement efforts must be implemented in the unique context of the state bureaus and not as prescriptions for all states to follow.

In order to systematically present bureau requirements and recommended system development approaches, this document

is organized into three sections.

The first section begins with a discussion of needs and requirements which are generally evident in the administration and management of the identification function.

The second section then addresses operational and functional requirements as they would sequentially follow the work flow process of a state bureau. While there is no "typical" state bureau, as has been stated, there are common functions which are shared by bureaus in the fulfillment of their typical responsibilities.

The third section of this document presents a prioritized summary list of needs and improvement approaches which are based on the preceding discussion. This listing is designed primarily for the focus which it provides on state bureau improvement opportunities collectively.

SECTION I

MANAGEMENT AND ADMINISTRATION

The management and administration of an identification bureau, as in most other agencies, is a critical and indispensable element relating to its efficiency and general effectiveness. Surprisingly however, a majority of state bureaus do not now have complete policy and procedures which are required in this regard.

Bureau operations are nearly machine-like in their production oriented work revolving around fingerprint processing and its related clerical functions. Commercial businesses and analogous industrial production enterprises have adopted productive monitoring and improvement systems which are highly transferable to the bureau environment.

The technology and mechanisms for improvement in this area of concern are both available and proven. Of most utility in the areas to be noted therefore are means to bring these practices and procedures to state bureaus and integrate them effectively into the management and supervisory routines.

BUDGETING

In 1980, the nation's state identification bureaus are slated to spend approximately $60 million. With individual state budgets ranging as high as $15 million it is evident that procedures for ensuring bureau efficiency and effectiveness are extremely important. Requests for additional

expenditure of funds can in effect only be fully justified
if bureaus are capable of demonstrating the judicious expendi-
ture and maximum use of available resources.

In far too many cases, this is not presently possible.
This is not to say that widespread waste exists but that
without an adequate budget-production monitoring system the
present level of efficiency cannot be adequately determined.
It should be clearly recognized that bureaus can only expect
to receive requested operating capital if they can clearly
demonstrate the expected impact which that funding will have,
or the effect of reduced funding.

Improvement Approaches

First, more responsive budgeting methods are generally
needed among state bureaus.

State bureaus typically follow line-item budgeting formats.
These do not generally demand the type of costs-to-production
accounting which are necessary in other budgeting systems.
Approaches referred to variously as zero-based budgeting
(ZBB), program planning budgeting systems (PPBS), or, manage-
ment by objective (MBO) are based on the achievement of
specific objectives whether related to a production output,
a goal or an activity.

The parent organization of state bureaus frequently
requires the bureau to adhere to specific budgeting approaches.
If they are not of the type mentioned above, bureau managers
should become familiar with the principles of those budgeting
alternatives which will allow them to incorporate the inde-
pendent costs of functional aspects of the bureau with production
accountability.

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For example, a simple mechanism for monitoring the chang-
ing costs of production relates to "cost centers" within the
bureau, that is, cost breakdowns by functional unit. An
example of a chart which might be used in this regard appears
below.

Functional Unit	Total Staff	Total Production	Cost Per Item Produced
Data Input Filing Unit Name Search Classifica- tion (etc.)			

This partial and simple chart can produce some extremely
enlightening and useful data for bureau managers. Difficulties
may exist in dividing staff time to independent functions
where duties are shared, but this is not an insurmountable
problem. Costs in unit of production can be used for
innumerable purposes to include planning for personnel needs,
budget requirements as well as performance and production
monitoring. They can and should also be used in development
of personnel productivity requirements and the establishment
of unit production objectives.

Where possible, bureau administrators should take
advantage of training seminars or workshops which provide
education on such budgeting methods or encourage the develop-
ment of such training projects where they do not exist.

PERSONNEL AND STAFFING

The problem of personnel and staffing is the most

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significant of all problems of immediate and on-going concern to state bureaus.

By far the greatest problem relates to a <u>lack of quali-fied staff</u> in both fingerprint classification positions and as general support personnel for such functions as data entry and file maintenance. One third of all states now have back-logs of fingerprint cards waiting to be classified and/or verified and in at least half of these cases the bottlenecks are growing.

The basis for the personnel shortages are found in an interrelated set of problems. These are principally, diffi-culties in attracting and recruiting staff, inappropriate or unavailable candidate screening methods, low salaries, inade-quate or inaccurate job classifications, a lack of systematic personnel performance evaluations from established criteria, and unsystematized training and personnel advancement procedures.

Improvement Approaches

Solutions to personnel and staffing problems noted above are difficult to attack on an individual basis. Each is tied in very substantial ways with the others. For example, salaries and job classifications must be reviewed together, and per-formance evaluation and personnel advancement procedures should be closely coordinated with recruitment and in-service training. In any event, it is apparent that the primary problem of per-sonnel shortages is closely related to the combined negative effects of personnel policy deficiencies in these other areas.

As a first step in correcting these problems, state bureaus should make themselves aware of those state bureaus which cur-rently have established personnel policy and programs that may

be beneficial to their own situation. This may be done simply by telephone or letter survey.

The IAI annual conferences offer another means of sharing information of this and other types. Efforts should be made at these and/or on regional bases to discuss common personnel problems and share possible solutions.

A clearinghouse operated through the IAI or other state or national interest may also be used to provide leads on information that would help in this or other matters. The clearinghouse may also be established to operate as a pool for reference to technical assistance that may be provided on a free or fee basis.

Finally, a national effort to develop prototype "packages" to confront common personnel problems would prove helpful. This is particularly true in regard to guidelines for product-ivity, performance evaluation procedures and techniques, training guidelines, aptitute tests, and model job classifi-cations that may be adaptable to individual states.

SYSTEM EVALUATION

Overall questions of bureau efficiency and effectiveness and its implications for bureau management, planning and evaluation can only be answered through the compilation of performance and work flow data.

Study findings reveal however, that at least half of state bureaus do not address this need in any meaningful manner. Many others fall short of complete analysis and utilization of the data which they do compile.

Improvement Approaches

Procedures for the compilation of work flow data are not unusually difficult for the individual state bureaus to define. Bureaus which are computer-based may easily compile requisite data as a by-product of the system. This may be combined with an existing document control system or developed in conjunction with such a system.

Even in fully manual systems, adequate data can be generated if the process of data collection is properly integrated as part of the work regimen.

It would be extremely helpful to states which must develop both system monitoring and document control procedures if prototype systems were available. Such prototypes are needed to document the nature of data requirements, how that data may be collected as well as the ways in which such data may be interpreted, utilized and applied to evaluation and improvement efforts.

For example, bureau managers and line supervisors need to stay abreast of the volume as well as changes in the volume and composition of fingerprint submittals, the "hit" rate and accuracy of the name search and technical search, the volume and nature of missed identifications, changes in the flow of documentation through the various work stations of the bureau and other data related to production and efficiency.

SECTION II

FUNCTIONAL REQUIREMENTS

INTRODUCTION

The foregoing section of this document has underscored the primary needs of state bureaus from a management and administrative context. The following section will discuss needs and improvement approaches from the standpoint of document processing functions and operations.

To assist in this discussion, the narrative will follow the general work flow of a state identification bureau. The work flow that will be utilized in this discussion appears in Figure 1. This workflow diagram is meant only to facilitate this discussion and is not intended to represent the complete processing procedures or requirements of state bureaus. It does however contain the basic elements of bureau operations which are typically evident in state bureaus.

FINGERPRINT TRANSMISSION

By far, the greatest volume of fingerprint cards received by state bureaus are transmitted through the U.S. Mail. The mail, however, may frequently be slow and inconsistent in its delivery time or even subject to lost documents on occasion. Particularly considering the vast increases in civil and applicant fingerprint submissions, mail transmission both to and from state bureaus substantially increases overall turn-around time.

Figure 1
Typical Basic Work Flow of State Identification Bureaus
In Processing Criminal Fingerprints
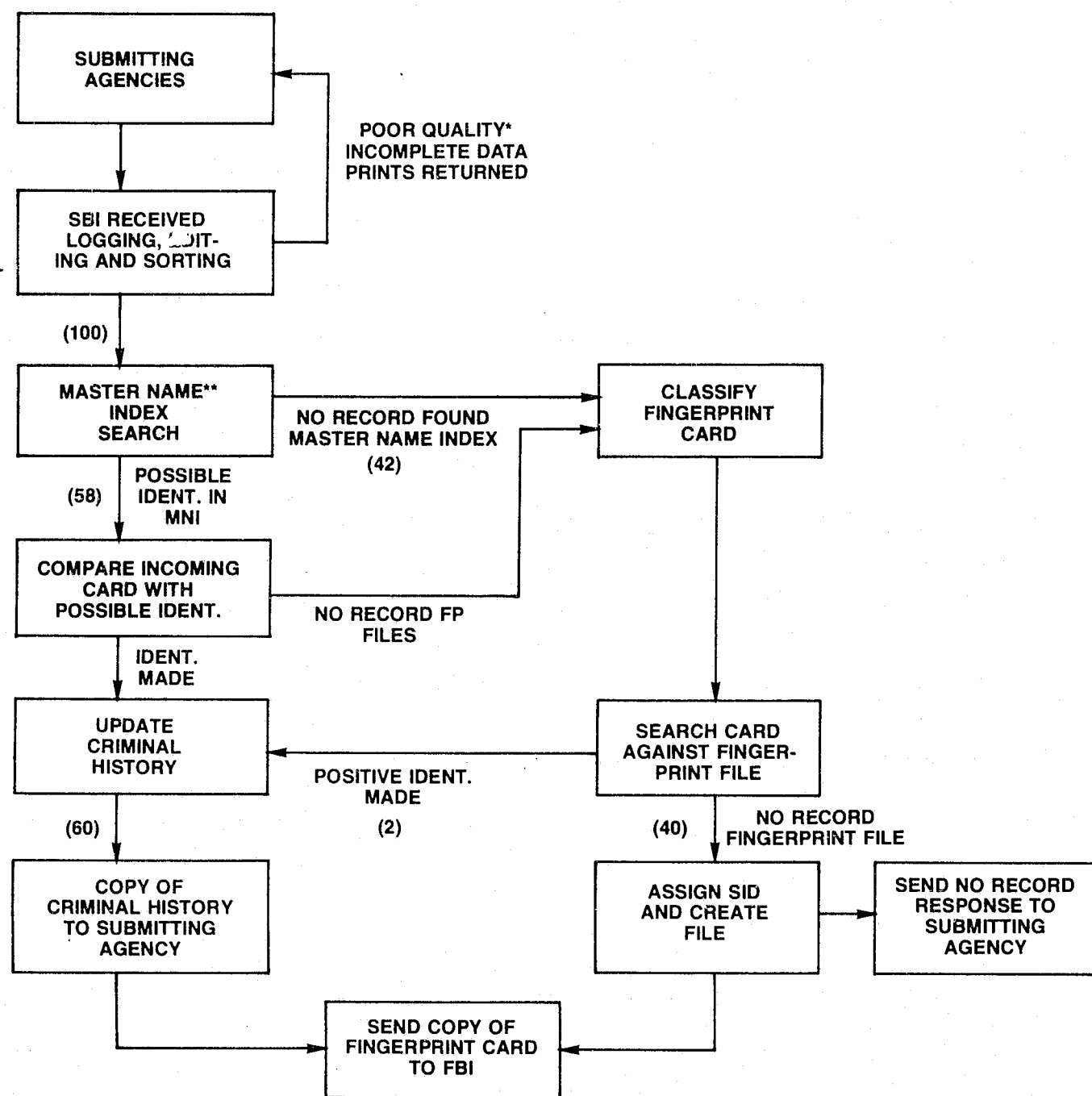
* Returns average 2% to 25% of total receipts
** Numbers of parentheses indicate typical volume of cards processed by function from a batch of 100 cards beginning at name search

Where quick arraignment of defendants is being practiced or is being developed there is a need to increase the speed of document turnaround.

Placed in perspective however, study reveals that at present there is not a priority need for an accelerated delivery method in most states, particularly lower volume states. In fact, in some current cases improved transmission time would add to existing processing difficulties and compound present problems. But, as these internal operational problems are resolved, the capacity for high speed turnaround will increase.

Improvement Approaches

The use of facsimile transmission for fingerprint images is one approach to speeding transmission that has received considerable attention. The unit cost associated with this technology has however remained relatively high.

While few states currently utilize any special methods for transmission of fingerprint images, some states are experimenting with facsimile transmission where an identified need for speed exists. More extensive use of facsimile in New York and Illinois has shown that technology is available.

New York has demonstrated that a facsimile setup, in conjunction with a computerized name and fingerprint search can achieve a response time of about three hours. Although New York is a high volume state, lower volume states could achieve similar timing upgrades, on a reduced economic scale, by limiting the facsimile network to their highest volume cities and integrating the use of the system with their current operation.

Overall however, there is a need to develop more cost effective facsimile fingerprint transmission systems. This need can be met in part by the development of multi-purpose hardware that can perform both the transmit and receive functions (transceiver). This will reduce the number of components required by the system. Lower cost digitally oriented systems, if available, would reduce transmission time and result in lower communication costs where dial-up telephone service is used. Current high speed facsimile technology, that reduces the transmission time of a fingerprint card to less than one minute, makes time sharing of public or private broadband (microwave, video) telecommunication facilities a potentially viable alternative for reducing communication costs.

RECEIPT, LOGGING, EDITING AND SORTING

The major issue or problem evident at this juncture of fingerprint processing involves the quality of fingerprint images received. States have been identified in this study, for example, which on average return 25% of cards received because they are not classifiable.

Under such circumstances, the fingerprint file is generally incomplete since most local agencies are not able to retake and forward a second set of prints. In cases where cards are not returned to the submitting agency, the state bureau incurs a problem related to their filing and use, and local agencies do not receive necessary feedback on their fingerprint taking performances.

Improvement Approaches

The major problem related to the quality of fingerprints

involves the way in which prints are taken. In spite of several years of costly experimentation with automated and semi-automated methods and the appearance of several commercial products, the vast majority of agencies still take fingerprints in the traditional manual method.

The first priority for improvement in this regard is the continuation of training for local agency personnel who take fingerprints. Substantial personnel turnover necessitates that basic and in-service training be continuously provided. Unfortunately, when funds become more limited this is one area that is the first to be reduced or eliminated. On-going training however can be highly cost effective in comparison to other potential solutions.

Efforts to improve training to local agencies could also be enhanced by the development of basic training packages. These may include basic presentation components, slide or film presentations and hand-outs for instruction.

A secondary effort should be directed toward the technical aspects of the fingerprint recording process. Cost effective innovations for recording fingerprint images which reduce smudging and distortions of the rolled impression should be encouraged and evaluated. An additional area for study should be the recording mediums. Inks and papers should be re-examined in the context of providing higher contrast fingerprint impressions, of sharper clarity. In the past, efforts to achieve improvements in this problem area have focused on the mechanical aspects of recording to the exculsion of these other potential areas for improvement

Another area for development involves the classification, filing and retrieval of poor quality prints. Those state bureaus which now retain poor quality or unclassifiable prints do so in order that they may be matched if a second

print is received in the future on the same individual.

In order to make such files more useful however, procedures are needed for filing and retrieval of these low quality prints through partial classification. Alternative search procedures and routines for automated systems would be most helpful in this regard. Flexible search systems that allow for searches on less than ten fingers would be most helpful in this regard.

Finally, accurate statistics on the volume of poor quality or unclassifiable prints should be compiled by submitting agency. Local agencies should receive copies of these reports which also compare the performance of their agency with the average return rate for all submitting agencies in the state. This is important information for local agencies if they are to understand and hopefully try to correct problem areas. It is also essential input to training programs so that trainers may identify and concentrate on particular agencies for improvement.

SORTING AND GROUPING

At a minimum, most state bureaus sort their incoming fingerprint work load by priority -- criminal prints receiving first priority and civil or applicant prints a secondary priority.

In some cases local agencies are submitting fingerprint cards which they have processed and affixed SID numbers previously assigned by the state bureau. Some local agencies routinely affix SID numbers while others do not. In either event state bureaus may or may not routinely utilize their own SID number for initial processing.

Improvement Approaches

In cases where state bureaus maintain SID or FBI indexes, cards received which have this number affixed should be sorted separately for "exception" processing. Using these numbers the bureau can proceed directly to the fingerprint file for verification.

In most cases, use of these numbers will lead to a positive identification and avoid the necessity of a name search and possibly a technical search. In those few cases where no identification is made the card may be re-entered into the processing queue for routine processing. Such a procedure could save some bureaus substantial time and resources.

DOCUMENT CONTROL PROCEDURES

Due to the volume of fingerprint cards handled by state identification agencies, a method of controlling and monitoring the flow of those documents is essential. This is particularly important considering the different priorities and processing methods discussed earlier. Few states, however, have embarked full-fledged document control systems, and most states have limited monitoring capabilities. Under such circumstances documents can and do get misplaced or lost without any capability for tracking their location.

Improvement Approaches

Because of increasing demands placed on the state identification bureaus, their need to manage the work load and to maintain statistics on that load, it is necessary to develop a document control system. There are many examples and models available in private industry and these should be

developed to fit the needs of the bureaus.

As a minimum, the control system should identify which
documents are in which batches being processed by the bureau
and identify where those batches are. The most extensive
system noted by the project team was capable of identifying
the exact location of each document at any point in the pro-
cessing flow. Not only is this system necessary to effectively
manage any backlog that might develop, it provides as a pro-
cessing by-product the statistics needed to manage monitor
and evaluate the work flow, personnel performance and guard
against lost documents.

PRE-NAME SEARCH PROCESSING

A problem of any identification bureau is duplicate finger-
print cards in the master fingerprint file. This may occur
through missed identifications jointly in the name search
and technical search routines. A more common cause of this,
and one that is more readily correctable, is that two or more
fingerprint cards on the same individual may be in the work
in process at the same time. If there is no prior record on
the individual, the cards may likely be filed as separate
identifications (persons).

This situation is likely when an individual is finger-
printed by a local agency, then released and rearrested
shortly thereafter by another local agency. It may also
happen when the arresting agency, a jail and/or the depart-
ment of corrections fingerprint the same individual in a short
time frame and submit the fingerprints to the state bureau.

Improvement Approaches

A number of states have solved this problem by the use
of a temporary identification record. This approach is
particularly applicable to automated systems. The temporary
identification entry is made whenever there is a negative
response to a name search. This temporary record will then
match if a second identical record should be searched, and,
the two records may thereafter be consolidated.

If after the technical search there is still no positive
identification, the temporary I.D. record can become the
permanent record with a simple modification. Since the
permanent record has to be created anyway, the effort of
creating a temporary record is not wasted.

This method of assuring that duplicate records will not
occur because of missed records in process should be adopted
by the state bureaus in the manner fitting their particular
operations. Many, if not most, consolidations have their
beginning in the creation of two simultaneous records, and this
procedure would eliminate that possibility.

NAME SEARCH RELIABILITY AND SELECTIVITY

During the course of documenting the work flow and
processing routines of state bureaus, a number of problems
and potential areas for improvement became evident in regard
to name search procedures. Most of these revolve around
approaches which can be utilized to increase the reliability
and selectivity of the name search particularly with regard
to automated name search systems. Prior to discussion of these
issues it should be noted that automated name search routines

present the greatest relatively recent benefit to the
identification process in terms of both speed and accuracy.
Additionally, an adequately constructed name search routine
can conservatively demonstrate a reliability rate of no less
than 90%.

That is, if a subject name is in the file, a search of
that file should produce the right name no less than 90 times
out of 100 attempts. The remaining 10% will or should be
identified by technical search. A well constructed name search
routine therefore, holds the greatest single promise of
effectively processing the vast majority of all incoming prints.
Attempts to maximize the effectiveness of name search routines
is therefore highly beneficial.

The following discussion on improvement approaches there-
fore, will highlight ways in which the reliability and selectiv-
ity of many name searches may be improved. While reliability
has to do with the system's accuracy in retrieving the right
record, selectivity involves the number of records that are
retrieved with the record in question. A good name search
of course should return only a few records while still main-
taining a reliability of at least 90%.

Improvement Approaches

One important yet basic approach to improvement of the
name search routine in automated systems is the inclusion of
the Henry primary/secondary classification in the search to
allow for a more precise differentiation on common names.
This is particularly important in larger files.

This process requires that the Henry primary/secondary
be determined prior to the name search thus placing a small

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additional work load on the fingerprint technicians. In one
state, non-technicians have been taught to perform this function.
Some states have begun a "screening" process whereby after a
name search, the subject names are eliminated visually by
fingerprint classification prior to attempting the identification
verification.

For large files this seemingly simple operation has a
great beneficial effect and should be implemented as time/funds
allow in all bureaus where files are large enough to justify
this routine.

Another approach is the increased use of numeric identifiers
in the name search routine.

By utilizing the various identification numbers, either
alone or in conjunction with a name search, the identification
process could be simplified. Such numbers as Social Security
Number, Driver's License Number, and local arrest numbers are
not always available nor are they always accurate but they are
nonetheless useful. If available, they allow for a greater
flexibility in search routines and thus discriminate more
accurately between candidates.

Their value is that normally the search of the file would
yield only one subject. If the probable identification is not
the same as the subject then processing can continue in the
normal name check fashion.

Another benefit in the use of identifying numbers is the
ability to compare the same unique number on records that
have different names (as probable aliases) and to locate pos-
sible mis-raps. This procedure has been successfully utilized
in several states using Social Security and/or Driver's License
numbers.

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The main problem associated with the use of these numbers is their reliability. That is, the offender may or may not give a number upon request, and if he does, there is no guarantee of its accuracy any more than any other data. There is a value to the consistent attempt to record these numbers however, as the identification bureau can use them as a precursor to a name check. In a system in Canada for example, (Ottawa Police Force) it was found that the collection and recording of these numbers over a period of time reduced the required name search by 30%. It is felt that this is significant enough to warrant the addition of numeric indices to all computerized systems that currently do not have them.

Another improvement approach to name search routines is to limit the number of name search returns and arrange them in "best fit" order.

In many systems, there is virtually no limit on the number of responses to a name search query. In these and other cases, responses may also not be in best fit order but are returned simply in the order retrieved in the file. This is a cumbersome and wasteful practice and one that increases the potential for error.

A better approach is to set a limit on the number of subjects in the response (generally no more than five) and have the returns sorted into best first order. In this fashion the inquirer sees the most likely match first, followed by the next most likely and so forth. This saves considerable time in manually evaluating the best match.

Another method of increasing system selectivity is to include soft data on the name query.

"Hard" data could be thought of as data that is not subjective such as identifying numbers. "Soft" data is data that could change and is therefore subjective such as eye/hair color, height, weight, address, etc. The inclusion of this data in queries serves to order the responses and not to eliminate any subjects. The ordering is extremely important in larger files where some method must be used to restrict the output associated with common names.

In other name search procedures reviewed in this study there is a need to add or change scoring techniques which have not been upgraded for some time, particularly through the addition of variable scoring methods.

Variable scoring methods are based on the recognition that not all name searches can be handled uniformly. Queries should be tailored to the availability of certain data elements and in regard to the size of the file by fingerprint classification or the prevalence of the common name.

For example, a query on a Spanish name in Texas should be treated differently than the same query in Michigan. The same concept would apply to a query on a common name or an uncommon name in the same state. Not only should the query itself be processed differently but the scoring should change to reflect the uniqueness of the input. This can be accomplished by using dictionaries or by allowing the operator to change the score as part of the inquiry.

Another area in which many name search systems could be improved is in the policy used to enter aliases.

That is, in manual files the practice has been to enter variations of spelling on a name to insure that if the misspelling reoccurred in the future the record could be found.

This practice has been unnecessarily carried over to many computerized systems.

The space for names in computerized files is normally allocated based on a sample of the population that it is to accommodate. Most name search systems use a "sound alike" system so that variations in spelling need not be entered. If they are entered, the allocated space for that name over-flows into other file areas causing searches to take a much longer period of time.

Name search systems that are properly constructed on a sound-alike basis should be adjusted if necessary so that only true aliases need to be entered and not misspellings.

In another area of concern, among name search systems which utilize a shared computer facility, there is a tendency to experience frequent system overloads. Partially because of this, some states have designed their systems to function in an off-line mode. In other words, the names that are to be searched are entered into the computer, but the search is not conducted until evening or night hours, when demand on the system is lowest, and responses are printed-out for verification the next day.

A second major reason for this procedure is to provide more consistent control of the processing of batches through the bureau. By entering all of a batch in the system and having all responses printed together, the reuniting of the subject fingerprint cards and the responses is simplified.

Finally in regard to improving name search procedures and automation in general, there is a general need among bureaus with computerized systems to have a staff position as EDP Coordinator.

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Of thirty state bureaus which report that they have computerized systems, only eight indicate that they have an EDP Coordinator. The term EDP Coordinator was left up to the survey respondent to define, but results of the survey substantiate the supposition that identification bureaus generally have to deal with the computer system staff without the luxury of a knowledgeable, in-house coordinator. This situation leads to problems when the bureau has need of either a change to an existing procedure, as in a modification in reporting requirements, or an enhancement based on a need to improve system response.

Many such enhancements or improvements are presently required in state systems as the foregoing discussion indicates. The availability of a qualified staff member to supervise such improvements and perform on-going system monitoring is highly desirable in many state bureaus.

TECHNICAL SEARCH AND VERIFICATION

The process of verification of probable name identifications, and the classification and searching of non-identifications by name continues to be the major processing bottleneck in most state bureaus. A large part of this difficulty relates to a lack of adequate staff and staff training as well as the need to develop performance standards and use performance monitoring systems. These were discussed in Section I of this report and are mentioned here only to emphasize their importance as areas for improvement.

One of the major common problems facing bureaus in the area of technical identifications is the quality of the fingerprint discussed in Section I. The other side of this problem relates to the quality of images as stored

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on microfilm or microfiche within the bureau. The clarity
of microfilm is often below that which would ideally be
required to make precise identifications or facilitate
this function. Once recorded on microfilm there is also
the general problem of making the film available to the
technicians as needed, as well as updating and purging
records that are on film.

Improvement Approaches

Much of the problem of microfilm clarity can be attrib-
uted to outdated equipment used to copy and read. In some
cases as well, personnel are not adequately trained and do
not fully follow manufacturer's microfilming procedures.
The use of improved equipment, adherence to quality repro-
duction and thorough maintenance of equipment would sub-
stantially improve many microfilming operations.

There is however a continuing need to improve the
recording, storage and retrieval process of fingerprint
images. Several approaches to this end have been attempted
with success that should be mentioned here.

For example, Washington State has been utilizing
a system known by the manufacturer's name of "Trans-A-File."
The system uses a laser scanner to record data concerning
each fingerprint card on high-density magnetic tape. The
image can then be reconstructed on a visual display with
high accuracy, thus eliminating the need for either micro-
film or hard copy cards. The system is highly regarded by
its users but suffers from the onset of age. The manufacturer
is also no longer in business and the system is approaching
maximum capacity. However, the operation of the system is
impressive and boasts a very good history of name-based

and fingerprint based identifications. If this technology
could be developed on a cost-effective basis it should be
inviting to many state bureaus.

A second approach is now being explored by New York
State with substantial success. Like Trans-A-File the
system reduces fingerprint images to data bits and stores them
in high density fashion, but, in this case on microfiche.
Continued development of this technology appears promising
and should have major transfer potential to other state
systems.

The "Washington Experience" has operationally demonstrated
that digitally encoded fingerprint images are of sufficient
quality to be used for fingerprint verification purposes.

The New York project has demonstrated a novel concept
of digitally recording fingerprint images on microfiche.
This has significant potential advantages over standard
photographic microfilm technology for identification purposes,
to include a uniformly superior image quality, higher informa-
tion storage per unit of area, and ease of file maintenance
to include recording and updating.

AUTOMATED FINGERPRINT SEARCH

Most states that follow-up name searches with technical
searches do so in a manual file sequenced by the Henry
classification system. However, in an attempt to speed up
processing some states have developed computer assisted
fingerprint search systems. The effectiveness of these
systems has been mixed but is generally satisfactory.

Unlike the filing systems of manual operations, most

automated systems maintain their files in SID order. In
cases where SID file ordering is used, the computer returns
the SID number along with the name so that access to the
file is simplified. The filing of first time offenders is
also simplified as SID numbers are usually sequentially
generated. The only drawback to this is that searches
by partial fingerprint, such as latents, are complicated by
the lack of use of fingerprint pattern types for filing
purposes. Most computerized fingerprint search systems
have relieved this problem by allowing cross indices for
fingerprint classifications, a flexibility in search pro-
cedures that will allow searches on less than ten fingers,
and accommodating searches during off-peak hours.

By in large, the two major issues facing automated
fingerprint search systems involve the type of classification
system employed and the cost-benefits of such systems.

The question of which classification system to use and
the precise nature of the automated search routine is of
critical importance. The issue arises in consideration of
the reliability and selectivity of a search routine. Reli-
ability is the measure of the ability of a particular
classification scheme to consistently retrieve the matching
record to a particular subject while selectively is the
measure of how many records in addition to the subject are
returned.

Fingerprint classifications have particular problems
in simultaneously achieving both high selectivity (few
extra hits) and high reliability (few misses). For example,
consider the 1/1 A/A classification group. How does an
automated system differentiate between candidates? Or,
consider all whorls with ridge counts of 7 to 10? What

criteria does the system use to make sure it does not omit
a good possibility based on a minor ridge count difference?
These questions must be considered by the designer of any
computerized fingerprint search.

The cost-benefits problems related to automated finger-
print search systems is also a major consideration of state
bureaus, particularly where funds are restricted and expendi-
tures closely justified.

That is, a bureau can develop by the use of current
technology, an automated name search that conservatively
is about 90% effective as was previously mentioned. Under
such a system, if a record is in the file, that individual's
record will be selected about 90% of the time. As such,
one can expect to recover only about 10% of the records in
the file through technical search. In a batch of 100 finger-
print cards this would amount to about six records based on
a recidivist population of 60%. As a result, the expenditure
of time and money involved in the technical search has been
judged unjustifiable by some states.

Improvement Approaches

As indicated, when an agency embarks upon an automated
fingerprint search system, the question of the organization
and use of the hard copy fingerprint file for verification
should be addressed cautiously. The decision as to which
approach to use is of some importance as it is very difficult
to return to manual operations if the automated system
proves inadequate.

There are several fingerprint classification schemes
currently in use in automated systems. Of particular interest

are those used in the states of Georgia, New York, Utah and Washington.

New York's system was developed as part of the NYSIIS system and consists of five pattern types and ridge counts.

Washington's system was developed as part of the conversion to the Trans-A-File system and is called the Alpha-Numeric Coded Fingerprint System (ANCF). The system assigns numeric identifiers to pattern types and alphabetics to ridge counts. The system offers more detail than the NCIC Classification yet can be translated to both the NCIC and Henry Classification systems.

Utah's system was developed by personnel in their identification bureau in conjunction with the development of the computerized system that supports the bureau operation. The classification scheme consists of an alphabetic identification of the pattern type, followed by a three digit code. The three digits consist of a score indicator and a two digit ridge count. The classification scheme is also convertible to NCIC and to Henry.

Georgia (and a few other states) use the NCIC Classification system as the fingerprint search index scheme. The development of the scheme was based on work done by an outside consultant to GCIC. The system has worked well, but due to the file size increase, which is currently over 440,000, it will soon be necessary to adjust the scoring criteria. The Georgia experience has shown that with the proper file access techniques, the NCIC Classification can be used by many states.

In regard to the problem of cost-benefits of automated

fingerprint search systems, experience indicates that there are strongly divided opinions in this regard whether the system for technical search is automated or manual. A reconciliation of these positions cannot be offered in this document since, in the final analysis it is a policy decision which must be considered in the context of each state.

However, considering that technical classification and verification is the most costly of most bureau functions and is the source for most work backlogs, improvements in this area are highly desirable. The development of software packages and improved systems for handling these functions on an automated basis should receive a priority attention.

The cost-benefit argument does however, point out once again that bureau managers need to have an accurate assessment of the costs and outputs associated with all elements of their operation; and, to utilize this information in the development of operational practices which best serve bureau goals and objectives.

LOCAL-STATE AND FEDERAL INTERFACE

Responsibility for fingerprint identification functions in this country is duplicated on the local, state and Federal levels. Many millions of dollars could undoubtedly be saved and an immense improvement in efficiency could result through the coordination of these efforts. In addition, with state bureaus facing greatly expanded work loads on the one hand and pressures to decrease or hold costs on the other, bureaus are facing the prospect of reducing services unless alternatives can be implemented.

Traditionally, the FBI has allowed city, county and state law enforcement agencies to send fingerprint cards directly to the Bureau for processing and either bypass, or include their state bureaus. In a few instances, state bureaus have sole source agreements with the FBI in which all local fingerprints are sent through the state bureau first.

In the majority of cases however, both the FBI and the state bureau respond to the submitting agency. Not only does this result in a substantial overlap of service but it also creates a problem in synchronizing Federal and state files. This is particularly the case where the state may not receive a fingerprint card that is sent to the FBI, or vice-versa, or, where either the state bureau or the FBI returns an unclassifiable card to the submitting agency and does not receive another copy. When one includes the reporting of dispositions, which are based on name search, and file purging to this work flow, the system becomes even more complex and wasteful.

Improvement Approaches

Solutions to this problem must take on several dimensions. First, to the degree possible state bureaus should institute single source submission to the FBI so that the duplication of effort and its related problems will be corrected.

It should be recognized however, that with the current manpower and operational capabilities this would create a substantial and even unmanageable work load burden for many state bureaus. Therefore, the implementation of this procedure must be made in tandem with state bureau upgrade highlighting additional staff, and technical assistance for operational improvement.

Ultimately, under sole source reporting, the state bureau would process all fingerprint cards submitted from their state agencies and submit to the FBI only duplicates of those cards that were not identified. For the present, however, all idents and non-idents would continue to be submitted.

Second, the duplication of effort and lack of coordination between local identification functions and state bureaus needs to be reduced as much as possible. That is, most larger city and county law enforcement agencies maintain their own fingerprint identification operations. And as such, many state bureaus are redoing or at least rechecking identifications performed locally.

To avoid duplicate processing, local agencies should uniformly submit, when available, the discrete state identification number (SID) to their state bureau. And, when submitted with the fingerprint card, state bureaus should not reclassify local identifications but should only verify them against the fingerprint file.

As well, state bureaus should begin to supply SID numbers to submitting agencies where this is not now being done.

In reciprocal fashion, state bureaus as well as local agencies should always provide the FBI number on fingerprint card submissions to the FBI. Possibly more than any other action, systematic adherence to the use of SID and FBI numbers on state and Federal submissions would yield substantial savings in time and manpower.

Finally, in state bureaus which maintain the entire state Master Name Index (MNI) in computer files, the state local interface could be additionally enhanced by increasing

local agency access to those files. Current access to the
MNI by local agencies is generally limited to short form
criminal history checks where a specific name is available.

If local agencies with fingerprint files could access
the MNI on a namesearch query basis much as the state bureau
does, a substantial amount of the namesearch routine could
be eliminated at the state level with proper verification
against the fingerprint file. In addition to assisting the
state bureau, local agencies would also reap substantial bene-
fits of both efficiency and effectiveness, but the local user
must assume follow-up record update responsibility.

FILE PURGING

For many agencies, particularly totally manual operations,
file purging creates substantial workload problems. In
larger files the onus of conducting purges can be so signifi-
cant that they are generally not conducted. Yet, there
are some purges which must be conducted in order to satisfy
legal requirements or court orders.

For example, many states now have first offender or
limitation laws requiring that an offender's record be sup-
pressed or removed if no repeat criminal activity occurs in
a given timeframe. Some jurisdictions also require the
purging of an arrest record where the judgment is not guilty
or the charges are dropped.

In these and other types of purges, such as age purging,
automated files are at a distinct advantage over manual sys-
tems. Automated systems can be programmed to perform the basic
identification aspects of purges which are so time consuming.
Manual systems must rely on basic manpower for these functions,
and are often seriously incumbered by these requirements.

Improvement Approaches

There is a clear need to develop systems and practices
which will assist state bureaus in reducing the burden
associated with file purging.

Approaches to meeting these needs in automated systems
presently exist although not all states are fully utilizing
programming routines that will assist them in this activity.

Fully manual systems however, require assistance in
meeting these requirements in a more cost effective fashion
than generally now exists.

RECORDS ACCESS

Records access in terms of security and privacy does
not seem to be the issue that it was five to ten years ago.
This is principally due to the advent of security and privacy
legislation in most states and bureau policy and procedures
on dissemination.

However, the accessability of criminal histories by
non-criminal justice agencies has become a major burden on
state bureaus. More than any other area, this has been
responsible for increased work loads.

Legislatures, concerned with protection of the public
have allowed/required licensing agencies to check the criminal
records of applicants for security guard, gun permits, gambling
licenses, life insurance salesmen, auto salesmen, and
physicians among others. The scope of agencies sending
applicant prints to the state bureau is becoming broader.
This increase has caused several operational problems in

many bureaus, such as reduction in response time and relative priority assessment.

Improvement Approaches

Short of changing laws related to the submission of civil and applicant fingerprints, state bureaus will continue to require across-the-board improvement of their operations in order to handle the work load. Recommendations contained in this report focus on that end.

In the short run, there must be a policy determination in each bureau as to the extent that applicant cards are to be searched. The question is whether they should be completely processed through the name and technical searches. The answer most bureaus have arrived at depends on two considerations, the type of applicant and the bureau's relative work load. For criminal justice applicants, a full search is generally conducted, while for most others, a name search only is conducted.

In terms of the dissemination of criminal records, state bureaus can best protect themselves against claims of illegal or inappropriate dissemination by maintenance of a log. Such a dissemination log documents the record released, the purpose of the dissemination, the agency and the date. Even if it is not required by law, all agencies should keep such a log. If criminal histories are generated by computer, the log could be produced at the same time, otherwise, a manual log could be established and maintained in the mail room.

SECTION III

PRIORITIES FOR IMPROVEMENT

The two preceding sections of this document have presented many of the most widespread and troublesome of problems facing state identification bureaus.

The question at this point is how to gauge these problems and issues against each other in order to determine where overall improvement efforts should begin. By viewing state problems and needs in a collective sense it is evident that priorities and strategies for improvement will not coincide with those perceived by a given state bureau. However, it is necessary for planning and developmental purposes to apply some relative measure of importance to the myriad issues previously highlighted.

In the prioritization of state bureau needs it has been necessary to answer three basic questions. These are:

- How common or widespread is the problem?
- How serious is the problem from the individual states' perspective?
- What is the net effect of the deficiency in the network of state bureaus and the achievement of their primary goals?

Means for improvement were examined from an analogous perspective. Here the major concerns are:

- What approach or activity will yield the broadest positive impacts?

- Which alternatives can be implemented under current technology and in a relatively short time period?

- Which alternatives are most cost beneficial?

In these combined perspectives, priorities and approaches to system development were organized. No attempt has been made to organize the full range of problems and improvement approaches discussed in the foregoing sections. The five priorities presented below are considered to present enough developmental requirements for the immediate future.

Since these problems have been discussed individually at some length in the foregoing sections they will only be summarized here.

PRIORITY 1. Improvement of State Bureau Management Systems

First, it should be emphasized that the greatest general problem facing state bureaus is their capability to process the volume of work they receive within the limitations of resources available. Short of the obvious need to acquire more funds for staffing and the like, attempts to improve the efficiency and effectiveness of available capabilities should be emphasized.

The improvement of operations must begin with an improved system for their management control and utilization. Efforts to be emphasized in this regard are improved budget-ing procedures; a comprehensive review and upgrade of personnel policy to include recruitment, training, job classification and pay rates, personnel evaluation procedures for the monitoring and evaluation of bureau operations. In total each state bureau needs to develop formal plans for

meeting these needs in the face of increasing work loads over the coming years.

Knowledge of these techniques must not be regarded as inherent to positions of management and supervision but learned abilities. In this regard, bureau administrators and supervisors should be encouraged if not rewarded for furtherance of their knowledge and skills in these areas. National and regional seminars and training laboratories conducted by identification practictioners and management specialists would help meet these needs. The publication and distribution of monograms of a topical nature may serve specific needs as well as the development of "packages" which could be adaptable to state needs in such regards as staffing norms, production and quality standards, and evaluation and monitoring systems.

PRIORITY 2. Improvement of Computer Capabilities

About two-thirds of all state bureaus utilize computers in their identification name and/or technical search. Both site visits and results of the survey questionnaire reveal that noticeable improvements could be made in current systems and that assistance is also needed among states which are planning for computerization in these areas.

Technical assistance to state bureaus would be most useful in meeting these needs and is a principal choice of most administrators. A clearinghouse capability designed to fill short-term technical needs in such areas as design validation, requirements analysis, software development and related areas would be highly useful.

Additionally, there is a need for improving the transfer

of technical solutions to common problems among state bureaus. Means to increase the communications between bureaus in these regards should be encouraged such as through newsletters, national seminars, informative conferences, and interstate visits or personnel "sharing" programs.

PRIORITY 3. Improvement of State and Local Interface

Reduction of duplication and increased efficiency between state and local identification operations is potentially one of the greatest areas for improvement of overall identification functions.

The essential elements of an improved interface include the transition of state bureaus to "sole source" contributors to the FBI, systematic use of SID numbers in submissions from local to state bureaus, and increased name search access of local fingerprint agencies to Master Name Index Files of the state bureau.

PRIORITY 4. Improvement of Fingerprint Image Quality

Improvement of fingerprint image quality is an old problem that has been difficult to overcome. The return of unclassifiable fingerprint cards in some states has reached unacceptable proportions. In some cases, the credibility of the state bureau files as operational tools becomes questionable.

The major cause of this problem involves frequent turnover of local agency personnel responsible for taking fingerprint impressions. As a result, an increase of training to local agencies in this regard is highly necessary. Training packages to include films, handouts and other

training aids would be helpful if suitable for individual state needs, as well as the addition of training staff to state bureaus.

From a developmental standpoint, there is a need to explore technical means of increasing fingerprint image quality. The use of fingerprint scanners as well as better papers and inks for fingerprint images have been explored. Continued study of these and other potential improvement approaches is desirable once improved training options have been explored.

PRIORITY 5. Improvement in Technical Search and Verification.

These functional areas have been identified as universally labor intensive, most costly in the identification process and the prime impact area for improving "backlog" situations.

Efforts to improve their efficiency and effectiveness should be initiated in several program areas.

For example, existing Computer Assisted Fingerprint Search Systems should be evaluated and operational experience documented and disseminated more widely.

Software packages reflecting improved reliability and selection should be developed and the means provided to enable interested potential users to derive technical assistance and consultant services in design and implementation. Flexibilities should be included in the software design to permit utilization by a broad range of mini and micro computer hardware configurations.

In the area of classification, emphasis should be placed on longer term developments. These areas should include the evaluation of low cost graphic data entry devices which permit direct entry of classification data into the computer automated search system.

In the context of low cost data entry devices, the use of extended descriptors should be examined such as the core/delta distance in loop and whorl patterns and a second ridge count in whorls. These descriptors provide a potential for increased selectivity in the denser sections of the average fingerprint file. New York's SAFE Project (Semi Automated Fingerprint Encoding System) is directed in part toward evaluating the efficacy of such descriptors and should be monitored for its potential application.

END