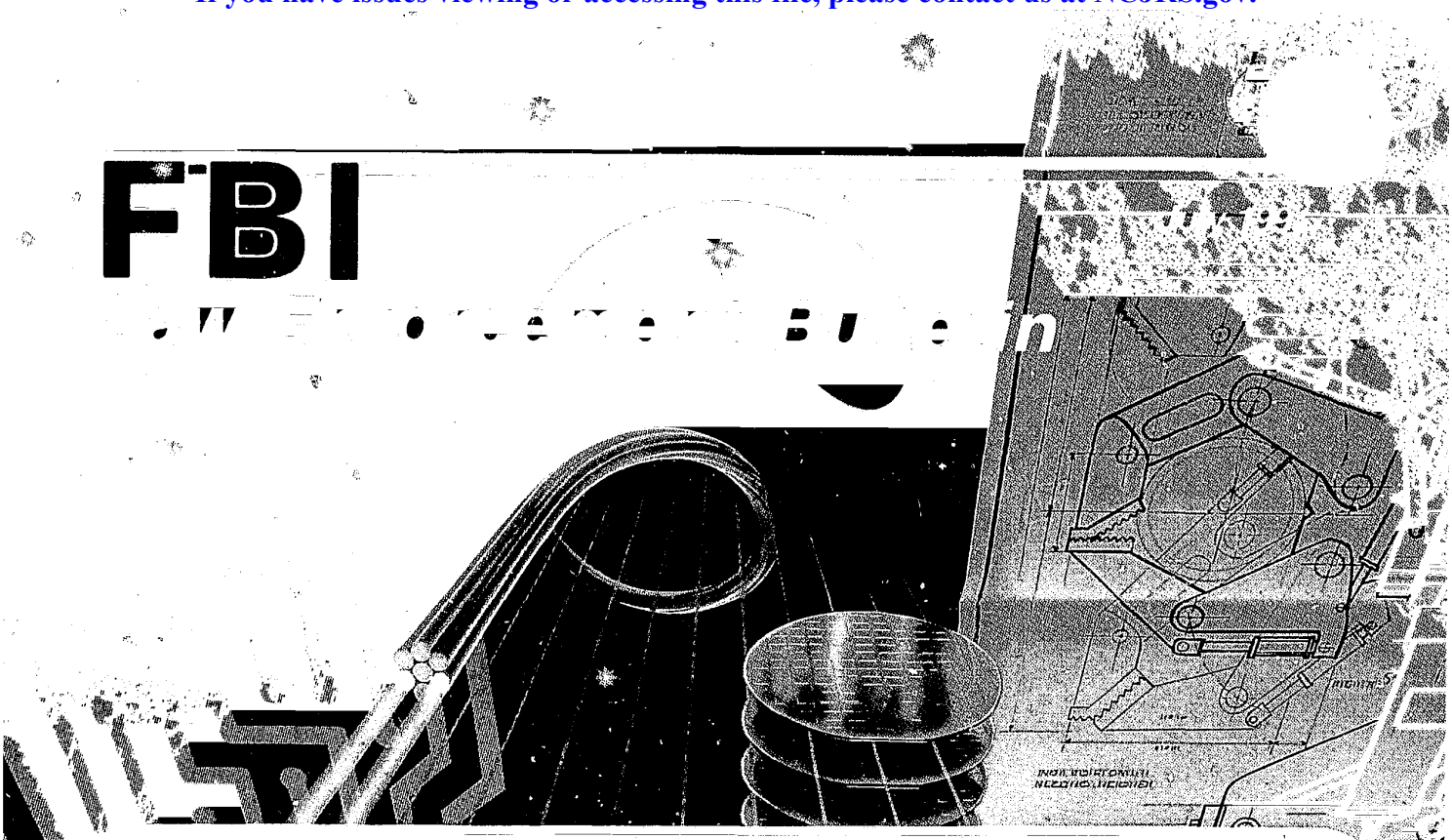

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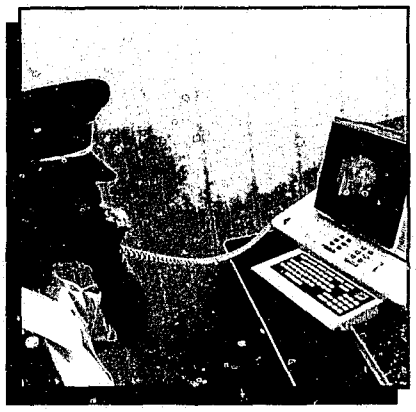

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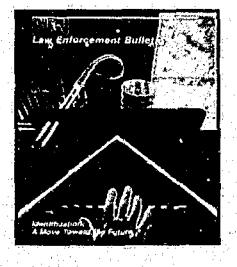

The Cover: *The "technology explosion" witnessed in recent years will have a dramatic impact on law enforcement in the years to come.*

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Identification
A Move Toward the Future

By
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and
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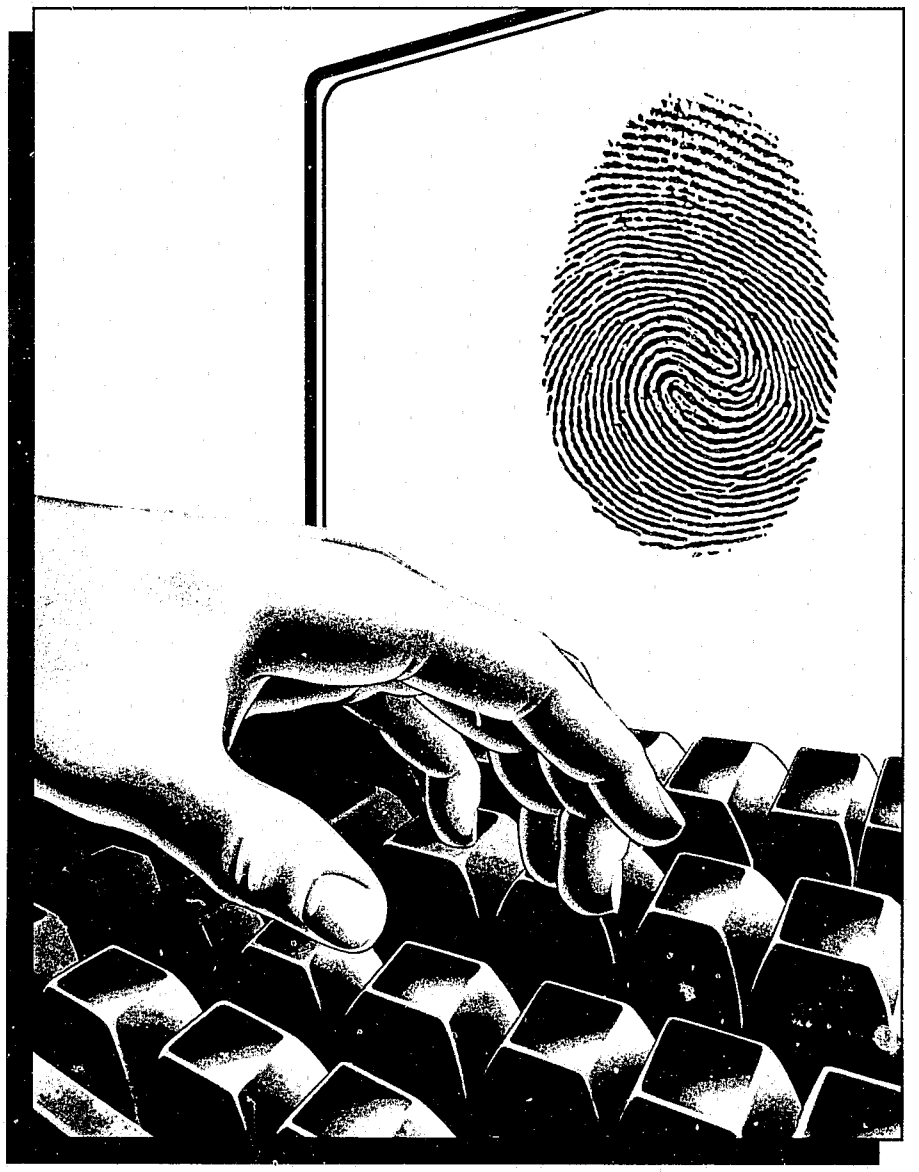

No one in law enforcement today could deny that the years ahead will bring many changes and challenges to the profession. Witness the transformation that has already taken place with regard to economics, demographics, politics, and technology. Each of these factors has already had major implications for law enforcement. And there is every reason to believe their impact will continue to have a profound effect.

Current trends and developments indicate that in the years to come, fingerprint identification will play a much wider role in law enforcement. This is why the FBI's Identification Division is pursuing a strategic plan to rebuild and improve essential services for its criminal justice users. By 1995, the FBI will have in operation a new system providing greatly expanded fingerprint identification services that will provide immeasurable benefits to law enforcement and other users nationwide.

AUTOMATED FINGERPRINT IDENTIFICATION—AN EVOLVING TECHNOLOGY

In the early 1960s, the FBI realized that the future of its Identification Division would be closely tied to its ability to incorporate automated technology into fingerprint processing operations. The subsequent research and development (R&D) initiatives of the Identification Division produced some of the first steps toward fingerprint automation.

During the ensuing years, commercial companies ventured into the field of fingerprint auto-

mation. Fingerprint identification technology flourished and grew more sophisticated. Several manufacturers developed automated fingerprint identification systems (AFIS) integrating automated 10-print and latent processing capabilities into one system. By the 1990s, these and other companies introduced the concept of "live-scan technology," a revolutionary new process requiring neither inked cards nor chemicals.

Many of the Identification Division's contributors capitalized on these emerging technologies to initiate their own automation projects and acquired their own AFISs. However, the simple expansion of automated capabilities did not provide a cure-all for the problems that have traditionally plagued criminal identification efforts.

While these technological improvements afford law enforcement with newer, more advanced tools for performing their jobs, the ability to execute fast and efficient nationwide criminal searches remains deficient. Primarily, there are no guiding standards to ensure compatibility among dissimilar AFISs manufactured by competing commercial vendors. And although many States have automated systems, their inability to communicate with incompatible AFISs severely limits their effectiveness.

Factors Precipitating Improvements

The Identification Division realized the need for a more-cohesive system to link local, State, and Federal law enforcement agencies. Subsequently, division personnel began to examine their own operations to identify those areas that needed to be upgraded.

When first implemented, the technological developments pioneered by the Identification Division were state-of-the-art. However, in the intervening years, the industry made great strides toward producing equipment that was even more responsive to the specialized needs of the law enforcement community. But, unfortunately, the division was not able to obtain these latest technological innovations. Therefore, the acquisition of new hardware with improved capabilities emerged as a major factor in the division's strategic planning.

In addition, enacted legislation also influenced the division's long-range planning efforts. Pursuant to the Anti-Drug Abuse Act of 1988, the Attorney General mandated the FBI to ensure that the data in its automated systems were complete, accurate, and immediately available in order to identify felons who attempt to purchase firearms. Also, the Airports Security Act and recently enacted banking laws required screening of applicants for criminal histories. Implementation of these capabilities impacted considerably on the FBI's already overburdened automated system.

Methodology for Achieving Improvements

In June 1989, the FBI took steps to improve its essential identification services to its users by enlisting the assistance of the NCIC Advisory Policy Board (APB) to review the Identification Division's strategies and plans for automation and to make recommendations. Together, the Identification Division and the Identification Services Subcommittee of the NCIC APB produced a conceptual road map for "revitalization" of the division.

Essentially, the plan reflects a partnership between Federal, State, and local law enforcement to ensure that the Identification Division will be in a position to meet the increasing needs of its users into the 21st century. It focuses on the development and implementation of a complete Integrated Automated Fingerprint Identification System (IAFIS). The basis of this new national concept is an on-line image transmis-

Special Agent Brotman

Special Agent Brotman is the Section Chief of the Automation, Research and Development Section, Identification Division. Ms. Pavel (who requested no photo) is a Computer Systems Analyst assigned to the Automation, Research and Development Section, Identification Division.

sion network that interfaces law enforcement agencies nationwide.

Besides updating processes and technology, the greatest benefit would be accrued by relocating the division. Primarily, it would not be possible to install new technology in the Identification Division's current facilities at FBI Headquarters, while simultaneously maintaining current operations. Therefore, the total plan for improvements has become one of revitalization **and** relocation.

To this end, the FBI conducted a relocation study, which led to the selection of a site in Clarksburg, West Virginia, as the location for a new facility to house IAFIS equipment and operations. The design for the planned, multilevel building allows for the entire division to be housed within one location. More importantly, however, it will provide for the required expandability and flexibility to accommodate the new IAFIS.

IAFIS: THE INTEGRATION OF NEW TECHNOLOGIES AND CAPABILITIES

The envisioned future system of the Identification Division is the IAFIS, which will be developed using as its main premise the electronic or "paperless" submission of fingerprint cards and related documents. Basically, the system allows a suspect to be fingerprinted at the booking station using live-scan technology, thereby eliminating fingerprint cards and documents at every step of the process. Then, the fingerprint images and personal data will be processed by a local AFIS and electronically transmitted to a State identification bureau for processing. If no identification is made, the data will be forwarded to the FBI's Identification Division. There, it will be processed by a highly advanced AFIS, allowing for an electronic response to the booking station within hours.

> ***"...the FBI's Identification Division is pursuing a strategic plan to rebuild and improve essential services for its criminal justice users."***

The IAFIS will be developed using integrated architecture, modular design, and integrated implementation. Primarily, implementation of IAFIS will involve the integration of three new automation efforts:

- An Image Transmission Network (ITN) for paperless fingerprint submission and processing,
- Acquisition of a new advanced AFIS, and
- An upgraded Interstate Identification Index (III).

The Image Transmission Network

The Image Transmission Network (ITN) will eliminate the submission of hard-copy fingerprint cards and other documents. To accomplish this, live-scan fingerprinting technology will be used at the local level to create and to transmit electronic fingerprint images for processing. The fingerprint images and related data may either be processed by a local AFIS, transmitted directly to the State identification bureau, or if no identification is made at the State level, transmitted electronically and processed through the FBI's AFIS.

Ultimately, the ITN system will process the equivalent of over 70,000 fingerprint card submissions per day and electronically return a response to a criminal inquiry within 2 hours of the division's receipt of the request. The ITN should be fully operational by June 1995. Full operation will be achieved through a three-phased integration of ITN functions.

Integrating the functions

The first phase involves designing and building a prototype system at FBI Headquarters to demonstrate and test a paperless environment for processing live-scan and hard-copy submissions and various document receipts. States participating in this effort will be identified by the Identification Services Subcommittee of the NCIC Advisory Policy Board. Using a prototype approach allows the FBI to develop the ITN while maintaining the flexibility necessary for

successful integration into the IAFIS. The prototype's final design will lead to detailed specifications for the ITN.

These specifications will form the basis for the second phase, in which pilot States will be selected to submit electronic 10-print transactions. The final phase involves expanding the pilot and installing it at the new facility in West Virginia.

Storing and retrieving automated fingerprint images

A successful paperless environment depends heavily on an Image Storage and Retrieval (ISR) system to capture, store, and retrieve electronic fingerprint images. The Image Transmission Network will incorporate an ISR system to store both rolled and plain impressions in digital form in an image data base.

Replacing the Identification Division's current manual filing system with the ISR system offers several advantages. Essentially, problems inherent in a file the size and complexity of the Identification Division's—out-of-file conditions, large numbers of misfiled prints, and heavy consumption of time and labor for manual filing and refiling—will be eliminated. In addition, these fingerprint images can be transmitted to remote users over the NCIC telecommunications network.

Eliminating paper with hardware

It is anticipated that not all contributors will be submitting data electronically by the beginning of ITN operations. Therefore, some hard-copy processing will still be required. To support this requirement, the paper cards and documents will be converted, upon receipt, to an electronic format identical to that of electronic submissions. This conversion process will use new technology, specifically fingerprint card and document scanners and an Intelligent Character Recognition (ICR) system to provide electronic imaging capabilities for ITN.

The ICR system will convert text into computer processable characters for direct entry into the data base, thereby reducing the amount of manual data entry. The resulting increase in productivity will decrease the turnaround time to contributors.

For the most part, these three subsystems (fingerprint card scanners, document scanners, and the ICR system) will constitute the hardware solution to the final step in eliminating paper from fingerprint processing. Their use will provide a more-efficient identification and criminal recordkeeping service to the law enforcement community.

> ***"...the plan reflects a partnership between Federal, State, and local law enforcement...to meet the increasing needs of its users into the 21st century."***

Providing communication among AFISs

In addition to the new hardware, the Image Transmission Network will use a standard to provide a common interface for all AFISs. This standard is being developed as an American National Standards Institute standard in conjunction with the National Institute of Standards and Technology, AFIS and live-scan users, and equipment vendors.

Several benefits will be realized from the use of this standard. First, an acceptable standard fulfilling all the information requirements of the current system will support the direct, on-line submission of fingerprint image and identification data. It will also specify image compression algorithms for storage and transmission that will reduce costs for all agencies. Finally, it will establish a universal means of communication among all AFISs, allowing for enormous gains in productivity.

An Advanced AFIS

The minutiae-based AFIS will include a 10-print system for searching incoming fingerprint requests, as well as a latent fingerprint subsystem. Its objectives are to accelerate the processing of 10-print search requests and to improve identification of latent fingerprints through the use of advanced technology.

The Identification Division's current method of searching fingerprint characteristics requires full

NCIC fingerprint classification (NCIC-FPC). This procedure, which necessitates extensive training, will be replaced by one that requires only pattern-level classification. In this regard, a set of hardware and software requirements to classify fingerprints at the pattern level (e.g., arch, tented arch, right loop, whorl, etc.) automatically will be researched. Since manual fingerprint classification is labor-intensive and time-consuming, its elimination will directly affect the Identification Division's responsiveness to its contributors.

New minutiae matchers will be required to efficiently satisfy the total projected processing requirements for fingerprint matching in the new AFIS. In addition, the AFIS will employ newer latent fingerprint processing technology and features not in the Identification Division's current system. Use of current technology will yield better quality data with which to work. This, in turn, will equate to higher accuracy rates. AFIS will also search new 10-print records against a file of previously unidentified latents, as well as searching latents against other latents.

The Interstate Identification Index

The current Interstate Identification Index (III) will be upgraded to expand its on-line services for its 62,000 users. These improvements include implementation of the National Fingerprint File (NFF) concept; access to more criminal history data; the capability to transmit, store, and retrieve on-line electronic images of mug shots; and an upgrade of the technology base of III for supporting the overall workload.

The National Fingerprint File

The National Fingerprint File (NFF) concept to decentralize the Nation's criminal history records system is being incorporated into the current system and interfaced with III. Participating States submit to the FBI only their first arrest fingerprint card for each subject. The Identification Division then establishes pointers identifying those States in which a person has an arrest record. When III receives an on-line request for a criminal history that contains such a pointer, it notifies the appropriate State to transmit the record to the requesting agency. As more States participate in this concept, it will reduce the criminal fingerprint processing workload of the Identification Division while increasing the balance of responsibilities at the State level.

On-line criminal history records

Presently, the Identification Division has 8.8 million individual criminal history records that are not available for immediate identification of felons because only their personal descriptor data are automated. The arrest data for those who are currently active will also be automated. III users now have direct access to arrest histories of 14 million individuals. This effort will greatly increase that number.

Access to mug shots

The FBI is also exploring the integration of an Interstate Photo

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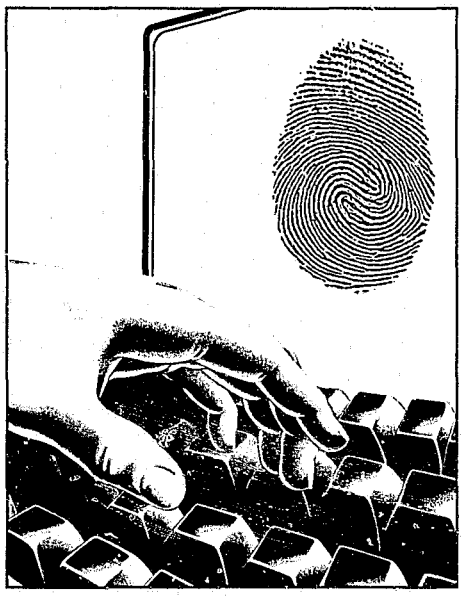

System (IPS) into III to provide users the capability to enter, maintain, and retrieve a subject's photograph. The intent is to allow an individual's mug shot to be sent to a police station or another designated location for visual confirmation of the person's identity by the officer on the scene.

Crosschecking between indices

Enhancements will be made to III to provide full interaction between the NCIC wanted persons index and the III name index. As a result, any inquiry into one index will initiate an automatic inquiry of the other. Such crosschecking will increase the number of III on-line inquiries from the current volume of 77,000 per day to 600,000 per day, over a sevenfold increase.

Expansion of hardware

New hardware employing upgraded technology will be acquired to expand or replace portions of the III system. This equipment upgrade will provide an adequate, but expandable, baseline of processing power to satisfy the projected requirements for users and for the integrated systems that are part of IAFIS. Users will have on-line access through the NCIC telecommunications system, and on-line operations will be maintained without interruption.

A COOPERATIVE SYSTEM

In addition to its coordination with State and local entities, the Identification Division is also working with other Federal agencies that have embarked on their own automated efforts. For example, the division is fully supportive of the U.S. Immigration and Naturalization Service's (INS) initiative to establish live-scan stations at U.S. ports of entry to communicate on-line with a central AFIS. One INS goal is to identify individuals with prior illegal entry arrests before they gain entry into the country. Design of IAFIS will include INS's specialized requirements.

> **"...IAFIS...will be developed using as its main premise the electronic or 'paperless' submission of fingerprint cards and related documents."**

The U.S. Secret Service and U.S. Postal Service also have specialized identification needs. The Identification Division is cooperating with these agencies to ensure that their ultimate systems are compatible with, and any particular requirements they have are incorporated into, IAFIS. This will eliminate duplication of effort and ultimately result in a savings to the Government.

The Identification Division has also undertaken a collaborative technical effort with the United Kingdom (U.K.) Home Office. The technical staffs of both organizations will pool their resources into a joint effort to achieve the development of a faster, more improved AFIS. The cooperative U.S. and U.K. scientific and technological programs leading to development of AFIS will support both organizations' efforts to further worldwide fingerprint searching and identification. The fruits of this labor will support all of law enforcement, from local police agencies to national and international organizations.

CONCLUSION

The goal of the FBI's Identification Division is to rebuild and to improve essential identification services to its criminal justice users. This includes meeting not only the needs of the users but also the challenge of technological advances that have created incompatible State automated fingerprint identification systems.

IAFIS will return enormous dividends to a society plagued by violent crimes committed by repeat offenders. It will become a valuable tool to law enforcement officers attempting to identify sophisticated criminals who prey upon society. The safety of the public will be served by the expeditious removal of these felons from the streets.

To achieve this, the Identification Division is cooperating with Federal, State, and local agencies to weave their requirements into the design of IAFIS. Doing so will ensure that the FBI is in a position to meet the law enforcement community's growing needs. In essence, IAFIS will provide the impetus required to propel the Identification Division and all of law enforcement into the 21st century. **LEB**