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United States General Accounting Office

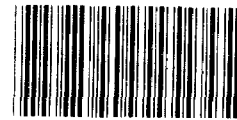
GAO

Report to Congressional Committees

April 1988

ADP ARCHITECTURE

Study Made for Immigration and Naturalization Service Needs Validation



135881

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541986/135881



United States
General Accounting Office
Washington, D.C. 20548

Information Management and
Technology Division

B-220280

April 25, 1988

The Honorable Jack Brooks
Chairman, Committee on Government
Operations
House of Representatives

The Honorable Neal Smith
Chairman, Subcommittee on Commerce,
Justice, State, the Judiciary and
Related Agencies
Committee on Appropriations
House of Representatives

The Honorable Ernest F. Hollings
Chairman, Subcommittee on Commerce,
Justice, State, the Judiciary, and
Related Agencies
Committee on Appropriations
United States Senate

In March 1986, we issued a report on a \$61.3 million contract that the Immigration and Naturalization Service (INS) had entered into to acquire automated data processing (ADP) hardware.¹ This acquisition was part of the agency's overall efforts to improve operations through the use of automated technology. We reported that INS (1) violated federal procurement regulations, (2) paid excessive prices for the equipment, and (3) acquired the equipment without a clear statement of the agency's ADP requirements. Accordingly, we recommended that INS reassess and document its ADP requirements and translate those requirements into a long-range, documented strategy.

Prior to that report's issuance, we met with your offices and presented our facts and concerns. Subsequent to those meetings, the Congress in a December 4, 1985, Conference Report (H.R. 2965, the bill containing INS' fiscal year 1986 appropriations) directed INS to review its ADP modernization program and to share the results of its review with the Congress and us. The Congress also directed the agency not to use any funds for ADP procurements, beyond the equipment it had already ordered under the \$61.3 million contract.

¹ADP Acquisitions: Immigration and Naturalization Service Should Terminate Its Contract and Recompete (GAO/IMTEC-86-5, March 20, 1986).

As a result of these actions, INS agreed to perform a formal evaluation of its ADP requirements and entered into an agreement with the Federal Computer Performance Evaluation and Simulation Center (FEDSIM), an organization within the General Services Administration specializing in performing technical evaluations. FEDSIM agreed to analyze and evaluate a number of possible system architectures² for INS in terms of cost, performance, and other characteristics, and to determine which architecture best satisfies INS' current and projected information processing needs.

To clarify the role intended for us in the December 1985 Conference Report, we met with a representative of the Subcommittee on Commerce, Justice, State, the Judiciary and Related Agencies, House Committee on Appropriations, as our coordination point, and agreed to review the team's study as it evolved. It was further agreed that we would assess and report to the requesters whether the study provided INS a basis for determining which architecture best satisfied its current and projected information processing needs. The objectives, scope, and methodology used during this assessment are contained in appendix I. Detailed information on the study and our evaluation are contained in appendix II.

Background

The overall mission of INS, an agency of the Department of Justice, is to administer federal immigration policies and enforce the nation's immigration laws. To accomplish this mission, the agency collects and maintains significant amounts of data through its headquarters office, 4 regional offices, 33 district offices, 20 border patrol sector headquarters, and numerous other facilities. INS has identified 33 ADP software systems needed to carry out its mission. (These systems are described in appendix III.) Thirteen of these are operational, 4 are under development, and 16 are planned. Of those systems that are operational, 10 are run centrally on the Department's computers in Washington, D.C., or Dallas, Texas; 2 are run centrally on an INS computer in San Diego, California; and 1 is run locally at selected district offices.

²INS and FEDSIM define a system architecture as the amount and type of hardware needed, its location, and the software that will be operational on that hardware.

Results of the FEDSIM Study

In June 1987, the FEDSIM project team issued its final report to INS, concluding that a three-tiered architecture comprised of central, regional, and local components would best serve INS' ADP requirements. The central component, which involves the largest amount of the agency's data processing, including automated records of aliens and administrative systems, would be implemented on Department of Justice computers.

The regional component would consist of four processors implementing seven systems known as the "casework" systems.³ These systems are used for such purposes as monitoring the processing of applications, tracking the status of deportable aliens, and monitoring the collection of alien application fees. According to the project team, computing at the regional level would help reduce the work load on the Department's central computers and provide INS with some flexibility in processing that should boost overall system performance by reducing computer response times.

The local level would consist of minicomputers placed in local offices to support two systems known as the Alien File Accountability and Control System and the Computer Assisted Detection and Reports Enhancement System; at high-volume ports of entry, super minicomputers would implement the National Automated Immigration Lookout System more economically than the Department's central computers. These systems are used for tracking the physical location of alien records, monitoring border patrol sensing devices, and providing information on undesirable aliens attempting to enter the country.

The project team recommended that INS develop a prototype of a regional component of the proposed architecture before full implementation, and that this prototype be located at the Department of Justice's Dallas, Texas, data center. The team also recommended that INS implement local processing of the lookout system at two airports of entry, New York and Miami, and one land port of entry, Nogales, Arizona. Nogales was chosen because there are plans to test the feasibility of using machine readable documents to collect data from temporary workers entering the country at this port. According to the team's project manager, local processing of the lookout system was considered a relatively simple task and hence developing a prototype was not recommended. The project team made no specific recommendation on the alien

³The seven casework systems are: Adjudications Casework System, Naturalization Casework System, Fees and Applications Receipt Entry System, Alien Entrant Control System, Deportable Alien Control System, Investigations Casework System, and Legal Case Tracking System.

file and computer assisted detection systems, because these systems were already being implemented at the local level.

Our Evaluation of the FEDSIM Study

On the basis of our evaluation of the FEDSIM study, we believe additional analysis is needed before INS implements the proposed three-tiered architecture. We found that the credibility of the analyses, conclusions, and recommendations contained in the report depended on the accuracy and reliability of two key data elements—work load and cost. In making its projections of work load and costs for architectural alternatives, the study team did not use actual work load and cost data as the basis for these projections because INS was not consistently collecting the data at a sufficiently detailed level. Thus, the study team relied on subjective judgments of INS officials as the basis for the team's projections.

As part of our evaluation, we made some limited tests of the methodology used by the FEDSIM study team, and noted instances where the team's projections differed significantly from projections based on actual work load and cost data where available. We found, for example, that for a 5-month period starting in May 1986, the actual number of user-generated transactions for one of INS' systems averaged 48,000 per day, for an annual projected work load of about 12 million transactions. This figure compares with 8.7 million transactions per year estimated by the project team. We also noted that the team's projection of costs to centrally process casework systems assumed that none of these costs were fixed. This projection showed that regional processing of these systems would be more cost effective than central processing. We determined, however, that fixed-costs could account for as much as 70 percent of central processing costs. Our analysis showed that if the fixed-cost portion were more than 65 percent of total costs, then central processing costs would be about equal to or below the team's projected costs for regional processing.

The study team acknowledged the "softness" of the data it used to project work load and costs and noted that it was largely due to this "softness" that the team recommended developing a prototype of the regional component of the proposed architecture. The team explained that a prototype would allow work load and cost data to be captured at levels of detail sufficient to support a more thorough comparison of alternatives.

INS' Thinking on How to Proceed

INS has accepted the FEDSIM study and its proposed three-tiered architecture. According to INS' Deputy Commissioner, however, INS will move cautiously towards implementing the study's recommendations, and has not requested any funding in the fiscal year 1989 budget for the proposed architecture. He added that INS will rigorously test the major components of the proposed architecture and thoroughly evaluate test results prior to proceeding with any widespread implementation. The Assistant Commissioner for Project Integration within INS' information systems area stated that prior to incorporating a new architecture into its long-range ADP strategy, INS needs to evaluate and analyze data that have been collected since the study. Regarding the regional component, he stated that INS plans to perform extensive front-end analysis to determine whether or not it will proceed with a prototype as recommended by FEDSIM. In addition, he said that if the decision is made to pursue the regional prototype, INS will use currently existing facilities and limit the investment of resources in this area.

With respect to local processing capabilities, although the project team recommended implementation, INS believes there is a need to develop prototypes of the lookout system in both locally and centrally accessed configurations at airports prior to making any changes to current implementation. According to the INS Assistant Commissioner for Project Integration, any local implementation of this system will be aimed at improving coordination with other federal automated law enforcement systems, and therefore, the team's comparison of costs for central and local processing may no longer be appropriate. INS, however, would like to implement local processing of the lookout system at the Nogales land port of entry.

According to the Deputy Commissioner, any plans for implementing the proposed three-tiered architecture must first be approved at the Department of Justice level. INS has not presented plans for proceeding further.

Conclusions

While we recognize there are risks associated with proceeding on the basis of insufficient data, we believe the study provides information that can be used by INS to cautiously move forward in the evaluation process. We believe that proper implementation of prototypes that provide evaluative data and further define processing requirements could help the agency proceed with its ADP modernization program. At the same time, prototypes can provide greater assurance that the course of action ultimately chosen is appropriate.

FEDSIM's recommendation that INS develop a prototype of the regional component of the three-tiered architecture is, we believe, reasonable because (1) additional data need to be collected and analyzed before INS can make informed acquisition decisions, and (2) a prototype offers a good opportunity to collect and analyze necessary data specifically relating to work load, cost, and performance.

We disagree, however, with the team's recommendation to implement local processing capabilities of the lookout system at two airports of entry. INS similarly disagrees with this recommendation. More data pertaining to work load and cost need to be collected and analyzed before this system's cost effectiveness at major airports can be determined. INS' development of a lookout system prototype would be useful in collecting these additional data. We see the team's recommendation to implement a local version of the lookout system at the Nogales land port of entry as a somewhat separate issue. Such localization would be part of a test to provide data on the feasibility of using machine readable technology to improve the efficiency of the inspection process. We have no basis to question INS' wishes to proceed with such implementation.

Recommendations

We agree with INS' cautious approach in implementing the study's recommendations. Because of the "softness" of the data used by the project team, we believe any plans INS develops for proceeding further should, at a minimum, provide a method for validating FEDSIM's conclusions and recommendations. Accordingly, we recommend that the Attorney General, in approving INS' plans, ensure that such plans include steps to:

- analyze all pertinent work load and cost data, including data acquired since the FEDSIM study, for the various INS mission-oriented systems, particularly for the seven casework and lookout systems; and,
- use the resulting analyses to evaluate alternative architectures, including those considered in the study.

Our analysis of the FEDSIM study, contained in appendix II, highlights areas where we believe INS needs to obtain more accurate and complete data to support its ADP decision making. Views of responsible INS and FEDSIM project team officials were obtained during the course of our work and are incorporated where appropriate. We performed our work in accordance with generally accepted government auditing standards from July 1986, to January 1988.

We plan no further distribution of the report until 30 days from its issue date. We will then send copies to other appropriate House and Senate Committees; the Attorney General; the INS Commissioner; the Administrator of General Services; the Director, Office of Management and Budget; and other interested parties.

Daniel C. White
for Ralph V. Carlone
Director

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Abbreviations

ADP	Automated Data Processing
AFACS	Alien File Accountability and Control System
CADRE	Computer-Assisted Detection and Report Enhancement System
FEDSIM	Federal Computer Performance Evaluation and Simulation Center
GAO	General Accounting Office
IMTEC	Information Management and Technology Division
INS	Immigration and Naturalization Service
NAIS	National Automated Immigration Lookout System

Objectives, Scope, and Methodology

As agreed with a representative of the Subcommittee on Commerce, Justice, State, the Judiciary and Related Agencies, House Committee on Appropriations, the objective of our review was to assess whether the Federal Computer Performance Evaluation and Simulation Center (FEDSIM) study provided the Immigration and Naturalization Service (INS) a basis for determining which architecture best satisfies its current and projected information processing needs. Our review focused on the reasonableness of the work load estimates and cost data used in the study, including the underlying assumptions and methodology.

It was further agreed that we would review the FEDSIM study as it evolved. We conducted our work between July 1986 and January 1988, at INS' headquarters office in Washington, D.C.; Southern Regional Office in Dallas, Texas; and Western Regional Office in San Pedro, California. In addition, we performed work at INS' district offices in Washington, D.C.; Dallas, Texas; Los Angeles, California; New York, New York; and selected INS locations under the Miami, Baltimore, and Newark district offices. To understand INS' activities and current and proposed uses for automation, we interviewed INS' program managers and senior officers responsible for the areas of Examinations, Detention and Deportation, General Counsel, Border Patrol, Investigations, and Records Management at INS headquarters and various field locations. We also observed selected INS' operations at several district offices, ports of entry, and border patrol locations. We obtained and analyzed documentation on central and field operations, and current and projected automated data processing (ADP) system requirements. In addition, we interviewed ADP information system and project managers at INS to obtain their views on existing and proposed ADP systems. We also met with the Department of Justice's ADP officials in Washington, D.C., and Dallas, Texas, to discuss INS' current use of its data centers, and we obtained and reviewed documentation on their billing system.

To understand and assess the appropriateness of the FEDSIM project team's methodology, we met with team representatives and performed a review of the work load estimates and cost data used in the study, including the underlying assumptions and methodology. We also reviewed the project team's interim and final reports to assess their support for recommendations.

Views of responsible INS and FEDSIM project team officials were obtained during the course of our work and are incorporated where appropriate. Our work was performed in accordance with generally accepted government auditing standards.

Summary of the FEDSIM Study and Our Evaluation

In January 1986, INS entered into an agreement with FEDSIM for a study that would analyze and evaluate a number of possible system architectures, and determine which architecture best satisfies INS' processing requirements. INS initiated this action because of concerns raised by the Congress and GAO that INS had not determined its ADP requirements prior to acquiring equipment.

As a result of the study, the FEDSIM project team proposed that an appropriate architecture for INS should include a regional processing level consisting of four processors in addition to the central and local processing levels already being used. Below is a summary of events that preceded the study, a description of the project team's methodology, and our evaluation of the study.

Background

INS, an agency of the Department of Justice, administers federal immigration policies and enforces the nation's immigration laws. Specifically, INS (1) facilitates entry of persons legally admissible as visitors or immigrants; (2) grants benefits under the Immigration and Nationality Act, as amended, including assistance to those seeking permanent resident status or naturalization; (3) prevents improper entry and provision of benefits to those who are not legally entitled to them; (4) apprehends and removes those aliens who enter illegally and/or whose stay is not in the public interest; and (5) enforces sanctions against those who act or conspire to subvert the requirements for controlled entry and stay in the United States.¹ To accomplish this mission, INS collects and maintains significant amounts of data through its headquarters office, 4 regional offices, 33 district offices, 20 border patrol sector headquarters, and numerous other facilities.

In 1980, INS began an intensive effort to improve its operations through the use of information technology by implementing an ADP modernization program. This program included the contracting for and development of computer software, acquisition and operation of a large data communications network, and the acquisition, installation, and operation of ADP hardware.

In March 1986, we issued a report on INS' \$61.3 million ADP hardware acquisition. Our review² disclosed that INS had incurred excessive costs

¹See 8 U.S.C. 1101, (1982) et seq., as amended.

²ADP Acquisitions: Immigration and Naturalization Service Should Terminate Its Contract and Recompete (GAO/IMTEC-86-5, March 20, 1986).

in acquiring ADP hardware, had violated federal procurement regulations, and was procuring equipment without a clear definition of its computer processing requirements. We therefore recommended that the Attorney General direct the INS Commissioner to

- reassess, justify, and document INS' current and projected ADP requirements and translate those requirements into a long-range, documented strategy; and
- procure competitively the automation needs outlined by this strategy and terminate its hardware contract, including that equipment currently under lease.

Prior to our report's issuance, we met with your offices and presented our facts and concerns. In the December 4, 1985, Conference Report (H.R. 2965, the bill containing INS' fiscal year 1986 appropriation), House and Senate conferees directed INS to review its ADP modernization program and to share the results of its review with the Congress and GAO.³ INS was further directed not to use any funds for ADP procurements, beyond the equipment it had already ordered.

As a result of the above actions, INS agreed to conduct a formal evaluation of its ADP requirements and halted acquisition of any additional ADP equipment. INS did not terminate its lease of installed ADP equipment but recognized the possibility of replacing equipment after a new contract was in place.

The FEDSIM Study

The purpose of the FEDSIM project was to analyze and evaluate a number of possible system architectures for INS in terms of cost, performance, and other characteristics, and to determine which architecture best satisfies INS' current and projected information processing needs. The project team's assessment of INS' architectural needs depended largely on three key elements: 1) the estimated work load associated with each current and planned application system, 2) the ability to process the work load under different computer configurations, and 3) the cost to process the work load under each feasible alternative architecture. Once these elements were estimated, the team compared various architectural alternatives in terms of costs, and other considerations such as maintainability and risk, to select the most appropriate alternative for INS.

³H. Rept. 99-414, 99th Cong., 1st. Sess., p.25.

To estimate the processing work load, INS identified for the project team 50 proposed and operational software systems that it believes constitute its total information processing requirements; 33 that directly support INS' mission, 12 that are administrative, and 5 that provide specific management information. Statistical reports covering certain activities carried out by INS were used by the project team as a starting point for making work load projections. However, because these reports did not exist for various INS administrative and management activities, the project team considered only the 33 mission-oriented systems in performing their evaluation. Thirteen of these are operational, 4 are under development, and 16 are planned. Of those systems that are operational, 10 are run centrally on the Department's computers in Washington, D.C., or Dallas, Texas; 2 are run centrally on an INS computer in San Diego, California; and 1 is run locally at selected district offices. Using a combination consisting of the statistical reports and discussions with program managers, the team estimated the total work load for the mission-oriented systems to be about 100 million transactions annually if all applications are completely implemented.

The project team then analyzed and scored each of the software systems to determine which ones would be suitable for various levels of decentralized processing. They determined the flow of information through the systems, the degree of data sharing among INS users of the systems, and the physical location of the systems' users through discussions with appropriate INS officials. The project team scored each factor and calculated an average overall score. Using this analysis, they concluded that two systems, the Alien File Accountability and Control System (AFACS) and the Computer Assisted Detection and Reports Enhancement System (CADRE) could best be processed at the local level (that is, district offices and border patrol sector headquarters), and that seven "casework" systems¹ could be processed at either the central, regional, or local levels. The remaining systems would be processed centrally with the National Automated Immigration Lookout System (NAILS) being processed centrally for most users and locally for large ports of entry. Appendix III provides a list of the INS systems, their estimated work load, and their proposed level of processing.

The project team then developed a set of 20 architectural alternatives using different combinations of computers and locations. The team

¹The seven casework systems are: Adjudications Casework System, Naturalization Casework System, Fees and Applications Receipt Entry System, Alien Entrant Control System, Deportable Alien Control System, Investigations Casework System, and Legal Case Tracking System.

determined a preliminary cost estimate to process the work load for each of the alternatives, and used this estimate to reduce the number of alternatives that would be analyzed in further detail. They derived these preliminary figures by estimating the cost to process an INS transaction on the Department of Justice's computers, the costs to process the casework systems on the different regional and local computer configurations, and the costs to process CADRE and AFACS locally.

INS information system managers selected 9 of 20 alternatives with the lowest estimated costs for further evaluation. The project team then used computer modeling to determine specific computer sizes, anticipated performance, and communication needs for the 9 alternatives, and calculated each alternative's final estimated processing costs, including costs for computers, terminals, and communications equipment. After determining the most cost effective alternative, the project team ranked the alternatives on cost and other factors such as risk to implement, and ease of maintenance, to determine the most appropriate alternative overall.

The project team had estimated that NAILS would account for about 44.8 million of the 100 million transactions performed annually. Because of this system's estimated work load volume, and concern that continued central processing could potentially slow response time as work load increased, a separate analysis was performed to determine how these transactions could best be processed. This analysis determined that local processing at high-volume ports of entry could be cost effective and still satisfy performance requirements that a transaction be processed within 3 seconds. The methodology used included estimating the work load and using computer modeling to determine the specific computer size needed to satisfy performance requirements at each port of entry. The cost to process these transactions locally at specific ports of entry and the cost to process them centrally on the Department's computers were then estimated. Estimates of local processing costs for specific ports of entry were compared to estimates of central processing costs to assess which ports of entry could process work loads more cost effectively at a local rather than central level.

When developing the detailed cost estimates, the project team initially concluded that transactions processed on the Department's central computers cost INS about 60 cents a transaction. These estimates were subsequently revised after additional analyses were performed in response to concerns raised by the Department that cost estimates were overstated. The project team concluded that on the average NAILS would cost 6 cents

per transaction, and casework and other systems would cost 40 cents a transaction for central processing. These estimates were then used to determine the central processing cost for each alternative.

Conclusions and Recommendations Presented in the Final Report

In June 1987, the FEDSIM project team issued its final report to INS. From its analysis, the project team concluded that a three-tiered architecture comprised of central, regional, and local components would best serve INS' current and future processing requirements. The central component would involve the largest amount of data processing and could be provided by the Department's computers. The regional component, according to the study, would help reduce the work load on the central computers and provide some flexibility in processing that should boost overall system performance by reducing computer response times. It was ultimately concluded that a four-hub configuration of mainframe computers located at one large district office in each of four regional areas would best meet the regional processing of the casework systems. At the local level, it was concluded, minicomputers placed in local offices should be used to process AFACS and CADRE. At high-volume ports of entry, super minicomputers could provide local processing of NAILS more economically than the Department's central computers.

The report contained two recommendations on how to implement the proposed architecture. First, it was recommended that INS implement a prototype regional processor at the Department's Dallas, Texas, data center to facilitate a proper test and evaluation of the regional processing concept. The Dallas center was chosen because a prototype there would be easier to connect to INS' data communications network, and those casework systems that are operational are already on its computers. It was further reported that the remaining three regional processors should be installed following successful completion of the prototype project.

Second, it was recommended that INS implement local processing of NAILS at the New York and Miami airports of entry, and the land port of entry in Nogales, Arizona. New York and Miami were chosen because, according to INS statistical reports, these ports have the highest volume of persons entering the country, and localization would, according to the FEDSIM study, be cost-effective at New York and "nearly so" at Miami. Nogales was chosen because there are plans to test the feasibility of using machine-readable documents to collect data from temporary workers entering the country at this port. It is believed that local processing

at Nogales would enhance this test to determine if transactions can be generated using machine-readable documents.

According to a project staff member, the localization of NAILS was not recommended as a prototype because it was believed that fully implementing NAILS was a relatively simple task. He further explained that local processing involved one system, whereas the regionalization of casework systems involved seven systems that would be integrated with each other and with other systems. The report did state, however, that central processing should be carefully monitored for cost and response times, and if central processing satisfies INS' response time requirements and costs are reasonable then INS should continue to deploy NAILS centrally. The report did not contain a recommendation with respect to AFACS and CADRE, because these systems were already being implemented at the local level.

INS has accepted the FEDSIM study and its proposed three-tiered architecture. According to INS' Deputy Commissioner, however, INS will move cautiously towards implementing the study's recommendations and has not requested any funding in the fiscal year 1989 budget for the proposed architecture. He added that INS will rigorously test the major components of the proposed architecture and thoroughly evaluate test results prior to proceeding with any widespread implementation. The Assistant Commissioner for Project Integration within INS' information systems area stated that prior to incorporating a new architecture into its long-range ADP strategy, INS needs to evaluate and analyze data that have been collected since the study. Regarding the regional component, he stated that INS plans to perform extensive front-end analysis to determine whether or not it will proceed with a prototype as recommended by FEDSIM. In addition, he said that if the decision is made to pursue the regional prototype, INS will use currently existing facilities and limit the investment of resources in this area.

With respect to local processing capabilities, although the project team recommended implementation, INS believes there is a need for prototypes of NAILS in both locally and centrally accessed configurations at airports prior to making any changes to current implementation. According to the INS Assistant Commissioner for Project Integration, any local implementation of NAILS will be aimed at improving coordination with other federal automated law enforcement systems, and therefore, the team's comparison of costs for central and local processing may no longer be appropriate. INS, however, would like to implement local processing of NAILS at the Nogales land port of entry.

According to the Deputy Commissioner, any plans for implementing the proposed three-tiered architecture must first be approved at the Department of Justice level. INS has not presented plans for proceeding further.

Study Results Need Additional Analysis

We evaluated the study as it was being performed in order to fully understand the methodology being used and the results being obtained. We found that the credibility of the analyses, conclusions, and recommendations contained in the report depended on the accuracy and reliability of two key data elements—work load and cost. INS could not provide specific transactional work load data because these data were not being routinely gathered at that time. In addition, cost data were not accounted for by individual systems, and neither INS nor the Department maintained transactional data to predict cost trends as work loads increase. Therefore, to perform its evaluation, the FEDSIM project team relied on subjective data.

Unavailability of Work Load Data Increases Risk of Proposed Architecture's Inappropriateness

We were unable to assess the validity of the project team's work load estimates because INS does not routinely collect transactional work load data at levels of detail sufficient to support such estimates. Because such data did not exist, the FEDSIM team developed a methodology for estimating work load by asking various INS program managers to estimate the number of times each system would be used during the performance of certain predefined functions. These functions included making an apprehension at a border station, receiving an application for citizenship, or inspecting the arrival of an individual at a port of entry. Once the team determined these functions, it used INS statistical reports to determine how often the agency's staff performed each predefined function and obtained from INS program managers estimates of the number of times each system would be accessed for each function. By multiplying the number of times each system would be accessed per function performed, by the number of times during the year the staff performed a given function, the project team developed an estimate of the expected work load for each system.

The reliability of the project team's estimates is highly dependent on the experience of agency program managers and their knowledge of how each system supports each predefined function. These work load estimates directly affect the team's conclusions and recommendations including the size and cost of the different computer configurations and their locations. Variations in work load estimates from actual work load

processing increase the risk that the project team's proposed architecture may be inappropriate. These work load estimates were used to help support the team's proposed architecture, to calculate cost estimates, and to assist the analytical modeling performed by the team.

Although we were unable to directly assess the validity of the project team's work load projections, we did determine that the methodology produced variations from actual work load where limited data were available. For the Central Index System, one of INS' mission-oriented systems, actual work load data were available on a daily basis from automated reports generated by that system. Similarly, we found that the AFACS system had been programmed to maintain transactional counts on a daily, monthly, and annual basis. The project team said they did not use any of these data because the data were not sufficiently detailed for their overall analysis.

For the Central Index System, we found that the actual number of user-generated transactions averaged 48,000 per day, for an annual projected work load of about 12 million transactions, based on a 5-month period starting in May 1986. These figures compare with 8.7 million transactions per year estimated by the project team. For AFACS, we reviewed transaction counts in two of the six district offices where AFACS is operational—New York, New York, and Washington, D.C. At New York, the transaction counts using data that had been obtained during the first and second quarters of 1987 showed a projected total of 1.6 million transactions annually, as compared to the project team's estimate of about 466,000 transactions annually. For Washington, our projection based on actual data was over 134,000 transactions annually as compared to the 76,000 annual transactions estimated by the team. INS' ADP system managers who had access to Central Index System and AFACS data stated that the time periods used to make our projections were representative of normal processing work loads.

We believe that the variances between our numbers and the project team's estimates can be attributed primarily to their using projections based on INS program managers' estimates. For example, the team assumed on the basis of program managers' estimates that when a file is requested, AFACS would be queried once. Our observations of these activities, although limited, show that for each file request AFACS was queried five times on the average. According to a project team staff member, the team generally did not observe the actual performance of processes to verify the reasonableness of the estimates made by INS program managers. Although we realize that our projections are based on limited

observations, and are also estimates of INS' data processing work load, these estimates are based on empirical data. The differences between our estimates and the project team's estimates highlight the risk that the architecture proposed by the project team may not be the appropriate one for meeting INS' requirements.

With respect to the team's work load projection for NAILS, the team estimated that at full implementation this system's work load would be 44.8 million transactions annually. Project officials stated that they based this estimate on established procedures that required all arriving airplane passengers to be checked against NAILS. We determined, however, that this estimate may be significantly overstated because of procedures INS uses at many of its ports of entry. For example, at 6 of the 25 busiest airports where INS performs inspections, including New York and Miami, INS relies on Customs inspectors to check U.S. citizens by using the Custom Service's Treasury Enforcement Communication System⁵ instead of NAILS. At 5 of the remaining 19 airports, INS inspectors use the Custom's system, not NAILS, to check all arriving passengers. Since the project team's projections assume that all arriving airplane passengers are checked against NAILS, we estimate that the team's overall work load figures may be overstated by about 30 percent and that annual work load estimates for New York (about 7.8 million transactions) and Miami (about 5.2 million transactions) would be overstated by as much as 68 and 58 percent respectively. Since the FEDSIM study indicates that transaction volumes must be at least 6.2 million annually before local processing becomes cost effective, an overstatement of this magnitude invalidates conclusions that locally processing NAILS at these high volume ports of entry would be cost effective or nearly so.

The INS Associate Commissioner for Information Systems told us that INS wants to do a lot more testing before it determines whether localization of NAILS is cost effective. The Associate Commissioner also said that local processing of NAILS might still be cost beneficial, even with reduced transaction volumes, because less-costly machines may be able to process the reduced work load more cheaply and quickly than the equipment selected by the project team.

⁵The Treasury Enforcement Communication System is a multifaceted communication and enforcement system that is managed by the U.S. Custom Service, and provides support services to 10 agencies including INS. The system includes a border enforcement component which is predominantly a lookout system for wanted or suspicious vehicles, persons, vessels, and businesses. NAILS data are routinely added to the data in this Custom's system.

**Assumptions Used in
 Estimating Costs May Not
 Be Valid**

The project team concluded that regional processing of casework systems and local processing for a portion of the NAILS work load are more cost effective than centrally processing these systems. These conclusions are based on certain assumptions regarding central processing costs that our evaluation indicates may not be valid. These assumptions and the rationale for our questioning their validity are discussed below.

INS could not provide the team with actual cost data for central processing⁶¹ that was correlated specifically to the transaction work load of each major application system. Therefore, the project team made certain assumptions and developed various methodologies to allocate actual cost data to these applications so that it could compare the expected costs of processing certain applications regionally (casework) and locally (NAILS). In projecting casework systems' central processing costs, the project team assumed that there were no fixed costs associated with central processing and that the 40 cents per transaction, which it estimated the Department charged to INS, would remain constant as the work load increased. As a result of this assumption, the team projected an annual central processing cost of about \$6.3 million. When compared to the project team's annual estimated cost of \$3.4 million for regional processing, the latter was determined to be more cost effective. Table II.1 shows how the comparison of central and regional processing costs were assessed by the FEDSIM project team.

**Table II.1: FEDSIM's Cost Analysis for
 Casework Systems**

Dollars in million			
	Cost per Transaction	Annual Cost ^a	Life Cycle Costs ^b
Casework, central costs	40 cents	\$6.3	\$35.4
Four hubs, regional costs	22 cents (approx.)	\$3.4	\$18.8

^aAnnual cost represents the average cost per year, prior to discount, for processing 15.8 million transactions annually.

^bLife cycle costs are estimates of annual costs for 8 years discounted at 10 percent annually.

Our review of the project team's cost allocation for casework systems showed that using April 1986 cost data, the team estimated an average cost of 54 cents to process casework transactions centrally. In the final

⁶¹INS has been working with Justice analysts as part of overall departmental ADP capacity management and performance analysis efforts. Through these efforts INS is now able to better determine its volume and costs per transaction for some of its centrally run computer applications such as NAILS, which will in turn give INS a better basis to project its work load and costs. These efforts are continuing and INS hopes to be able to determine, in the near future, work load and cost data for its other applications, including the casework systems.

report, the project team estimated, by applying the same methodologies but using actual cost data for April 1987, that the average cost was 40 cents. In this report, the team explained that the decrease in cost per transaction was essentially attributable to an increase in work load, because work load had increased by about 50 percent while total actual billings remained relatively constant.

Using the project team's two estimates of costs per transaction at different work load levels, we determined that the fixed-cost portion could account for as much as 70 percent of central processing charges. Our analysis shows that if work load and cost relationships include fixed costs of more than 65 percent, then central costs at full implementation would be about equal to or below the team's estimates for regional processing. How close central and regional processing costs will be depends on the overall increase in the work load and the relationship between these increases and central processing costs. Project officials pointed out that such processing costs could be influenced by a number of factors independent of INS' processing work load, such as the Department's basis for billing its central computer users and the amount of processing done for users other than INS. Because of these factors, project officials agree that this relationship needs to be further studied by INS.

With respect to the NAILS processing cost estimates, data contained in the FEDSIM study indicated that local processing of this system at the New York airport of entry would cost approximately 5 cents a transaction and at the Miami airport of entry this cost would be approximately 7 cents a transaction. Comparing these costs to the team's estimated 6 cents a transaction for centrally processing this system, the team concluded that local processing would be cost effective in New York and nearly so in Miami. However, according to Department of Justice analysts, the central processing cost for this system would be two and one-half cents a transaction. These analysts believed that the project team did not properly consider the number of NAILS transactions being processed when it determined current processing costs. Therefore, the team's estimates of cost per transaction may be overstated. Although the project team has not accepted the Department's two and one-half cents cost estimate for central processing, the team did acknowledge this figure and included it in an analysis contained in the final report. This analysis compared several different levels of central processing costs to the estimated costs for local processing. At two and one-half cents for central processing this analysis showed that localization of NAILS would not be cost effective.

According to the Assistant Commissioner for Project Integration within INS' information systems area, local implementation of NAILS is expected to include efforts to improve the coordination of this system with other federal automated law enforcement systems, and therefore, the team's comparison of costs for central and local processing of NAILS may no longer be appropriate. Although we agree with this position, we also believe that INS needs to better understand NAILS central processing costs since these costs are likely to be a factor in deciding such issues as whether additional functions should be added to this system and whether it is more cost effective to combine this system with other applications. Variations in the project team's and the Department's estimates can make the difference in deciding whether a course of action is or is not cost effective.

INS' Mission-Oriented Systems

System	Status	Purpose	Proposed Level of Processing	Estimated Annual Work Load (millions of transactions)^a
Alien File Accountability and Control System (AFACS)	Operational	Tracks the physical location of alien records	Local	2.972
Adjudication Casework System (ACS)	Under development	Monitors the adjudications work load, tracks the status of benefit requests, and assists examiners in processing benefit applications.	Regional	6.370
Administrative Appeals System (AAS)	Planned	Supports the case processing work load of the Administrative Appeals Unit	Central	.073
Alien Entrant Control System (AECS)	Under development	Tracks processing of excludable aliens	Regional	.327
Application and Petitions History System (APH)	Planned	Maintains a historical summary of all cases that involve applications for benefits	Central	2.818
Apprehensions System (APP)	Planned	Provides the enforcement functions more rapid information on alien apprehensions	Central	3.044
Asylum System (ASY)	Planned	Records the existence of Department of State opinion letters regarding alien asylum applications	Central	b

(continued)

**Appendix III
INS' Mission-Oriented Systems**

System	Status	Purpose	Proposed Level of Processing	Estimated Annual Work Load (millions of transactions)^a
Central Index System (CIS)	Operational	Maintains automated records of all aliens of interest to INS and serves as a pointer to other automated systems	Central	8.698
Computer Assisted Detection and Reports Enhancement (CADRE)	Under development	Monitors the border patrol's intrusion sensing devices used to determine the presence of aliens who have entered the U.S. without being inspected or admitted	Local	1.010
Deportable Alien Control System (DACCS)	Operational	Automates deportation docket control function	Regional	3.164
Directives and Instructions Access System (DIAS)	Operational	Automates the INS' Administrative Manual	Central	.467
Employer System (EMP)	Planned	Contains information pertaining to known or suspected employers of undocumented aliens	Central	1.385
Exclusion System (EXC)	Planned	Provides on-line, historical records of aliens denied admission to the U.S. and the reason for denial	Central	1.615
Fees and Application Receipt Entry System (FARES)	Operational	Tracks and manages the collection of fees received with applications for benefits provided by INS	Regional	1.973

(continued)

**Appendix III
INS' Mission-Oriented Systems**

System	Status	Purpose	Proposed Level of Processing	Estimated Annual Work Load (millions of transactions)^a
Fines Tracking System (FINES)	Planned	Supports the processing of administrative fines imposed, and liquidated damages assessed by INS	Central	b
Fraud System (FRAUD)	Under development	Provides automated support to investigations in detecting and processing fraud cases	Central	.456
Investigation/ Privacy Act and Tracking System (FOIA/PA)	Operational	Tracks and controls the progress of request for information under the Freedom of Information and/ or Privacy Acts	Central	b
Investigations Casework System (IVC)	Planned	Assists the field office investigations staffs in managing and tracking the status of their case work load	Regional	1.346
Investigations Case History System (IVH)	Planned	Provides the Investigations function a permanent record of past casework activities	Central	.292
Legal Case Tracking System (LCTS)	Operational	Automates the tracking and processing of legal cases	Regional	.708
Legal Information System (LIS)	Planned	Provides the INS' field attorneys with a text retrieval system	Central	.100

(continued)

**Appendix III
INS' Mission-Oriented Systems**

System	Status	Purpose	Proposed Level of Processing	Estimated Annual Work Load (millions of transactions)^a
National Automated Immigration Lookout System (NAILS)	Operational	Provides information to INS and other federal law enforcement agencies on people entering the U.S. who are suspected of illegal activities	Central and local	44.794
Naturalization Casework System (NACS)	Operational	Automates the tracking and processing of naturalization cases	Regional	1.946
Non-Immigrant Information System (NIIS)	Operational	Tracks the arrival and departure status of nonimmigrant aliens	Central	5.274
Operational Activities Special Information System (OASIS)	Operational	Provides automated information about smugglers, smuggling activities, and deportable aliens	Central	.623
Profile System (PRO)	Planned	Assists field personnel by generating profiles of high risk categories of aliens, applications, etc.	Central	1.084
Refugee and Parole System (RAPS)	Planned	Provides and maintains information on aliens who enter the country as refugees, who are granted asylum, or who are paroled into the U.S.	Central	.346

(continued)

Appendix III
INS' Mission-Oriented Systems

System	Status	Purpose	Proposed Level of Processing	Estimated Annual Work Load (millions of transactions)^a
Seized Vehicle Information System (SEVIS)	Operational	Provides an automated tool for managing assets seized in connection with anti-smuggling activities	Central	.550
Student School System (STSC)	Operational	Tracks and monitors alien students and schools authorized to enroll alien students	Central	5.070
Temporary Residents System (TRS)	Planned	Maintains information on aliens granted temporary resident status under the terms of the Immigration Reform legislation	Central	.078
Temporary Worker System (TWS)	Planned	Maintains information on nonimmigrant aliens admitted to the U.S. as temporary workers	Central	.081
Violators System (VIO)	Planned	Contains historical information in summary form on violators of immigration law	Central	.612
Wanted Cards System (WTC)	Planned	Provides all INS units access to information concerning alien identification documents that are wanted by INS	Central	2.782

^aRounded to the nearest thousand.

^bFEDSIM reported that data were not available to estimate work load.



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