

# State of Michigan

## *Department of Human Services*



Department of  
**Human Services**

### *Using Decision Support and Advanced Analytics for Innovative Fraud Detection*

**NASCIO 2005 Recognition Awards**  
**Category:**  
**“Innovative Use of Technology”**

## Executive Summary

Michigan's Department of Human Services (DHS) is one of the State's largest and most important organizations, managing approximately \$5 billion in funds for many of Michigan's critical programs, including food and cash assistance, and child support services. More than 1.2 million Michigan people depend on DHS programs for life's necessities. More than 5,000 retail stores participate in DHS's Food Assistance (Food Stamp) program.

To deliver these services to the State's neediest citizens – in a tightly controlled fiscal environment – DHS must get the greatest value possible from each and every dollar spent. Neither the agency or its clients, nor Michigan taxpayers, can afford the misuse of funds through fraud, waste, or abuse.

As part of its efforts to deliver value, DHS's Office of Inspector General (OIG) has implemented some of the most innovative fraud detection methods in the country. Using a sophisticated data warehouse/decision support system as an informational backbone, DHS's OIG has utilized advanced analytics in an unprecedented way to combat fraud activities in the Child Development and Care program [Day Care], and fraud and trafficking in food and cash assistance areas. In so doing, the OIG links data about providers and recipients with Wages data, Unemployment data, national food assistance data, and other sources, to undertake the comparative analysis necessary to achieve breakthrough results.

Thus far, in just over 12 months, the DHS OIG efforts – unprecedented nationwide – have yielded more than **\$2 million** in documented fraud to be recovered, with the potential to exceed **\$10 million** in the next year, and far more significant savings beyond that. In addition, cost efficiencies are projected to generate an annual savings of more than **\$13 million**. Moreover, OIG investigators are now much more targeted in their efforts to fight fraud and abuse, and when they confront alleged abusers, they are most often armed with irrefutable statistics and information – meaning their “hit rates” are substantially higher, and the potential for fraud recoveries much greater.

In addition to the monetary savings the agency has realized, and will realize in the future, other major benefits include:

- Savings of future program dollars when fraud is stopped through the “sentinel” effect that puts both clients and retailers on notice that the State has advanced fraud-fighting capability.
- Saving investigation time since analysts and investigators are pulling data from one central source.
- Saving time and money for partnering agencies (for example, the Michigan State Police) by filtering out “bad” trafficking referrals in the food and cash assistance programs.

The benefits of the DHS OIG fraud-fighting efforts do not stop at the state border. Because OIG activities serve as a national model, other states contact DHS to seek the agency's advice. Further, federal enforcement authorities – particularly, the United States Department of Agriculture's OIG – rely on the quality of DHS OIG data and analytics to support their documentation for trafficking search warrants they execute in Michigan, and for evidence in cases that they prosecute.

By utilizing the rapid analytical capabilities of the data warehouse and integrating records from disparate databases, Michigan DHS has established a national model in innovative techniques to battle Child Day Care, Food Assistance, and Cash Assistance fraud. In so doing, the agency has also embodied principles championed by Governor Jennifer Granholm and the State's Department of Information Technology (DIT), who view the “enterprise approach” to data sharing as critical to Michigan's success. As the Governor stated recently: “Information-sharing...is absolutely critical to have units of government deliver the best to assist taxpayers. If you cannot share data, then you are not delivering the biggest bang for your buck...”

## **A. Description of Project**

### **New Business Model + New Vision = New Approach to Fighting Fraud**

Two major factors converged to change and enhance the fraud-fighting approach undertaken by the Office of Inspector General (OIG) in the Michigan Department of Human Services (DHS) over the past 12-18 months.

First, DHS itself changed its “business model” by reducing the amount of direct cash assistance it provided to Michigan’s needy citizens, and instead offering more third-party services – Child Development and Care (CDC) services and Electronic Benefits Transfer (EBT) for food assistance, as examples – as a way of conveying benefits. The OIG needed to change its own business model to take third-parties into account as it conducted fraud investigations – to “follow the money” in a different direction, so to speak.

Secondly, Michigan Governor Jennifer Granholm had several major priorities when she took office. One was to deliver the greatest possible value to Michigan taxpayers for the billions they spend on State government services. She believed that technology and data sharing – the ability to break down silos between agencies – was one critical component in making that happen. Recently, she added that tight budgets presented an “opportunity for technology to emerge in a way that might not have occurred if people were allowed to just do as they always had done. So they are jumping on to share services now.”

A combination of this new business model and a desire to advance Governor Granholm’s vision prompted DHS’s OIG to dramatically alter and enhance its efforts to detect and combat fraud. In addition, like most state agencies – due to adverse economic conditions and early retirements – DHS underwent budget cuts and also experienced a reduction in the number of fraud investigators. That meant its fraud-fighting efforts needed to be as targeted and focused as possible, no simple task when one considers the sheer scope of DHS’s reach.

DHS is one of Michigan’s largest and most important organizations, managing approximately \$5 billion in funds for many of the State’s critical programs (including food and cash assistance and child support services). More than 1.2 million Michigan people – among the State’s most vulnerable and many of them children – depend on DHS programs for life necessities. More than 473,000 families “cases” receive and spend their assistance benefits via their EBT debit card, resulting in 3.6 million EBT transactions per month. More than 5,000 retail stores participate in DHS’s Food Assistance (Food Stamp) program. A *monthly* total of \$121 million in transactions (purchases and cash withdrawals), including \$90 million in food assistance purchases, need to be tracked. Moreover, DHS is a highly visible agency – administration officials, the Legislature, the media, and taxpayers track its performance and any errors or misdeeds tend to be highly publicized and often emotional.

To help deal with all of these issues, OIG developed the most innovative fraud-fighting program in the nation – one lauded inside Michigan, and by other states and the federal government.

### **Linking Data + Advanced Analytics = Breakthrough Results**

Using a sophisticated data warehouse/decision support system as an informational backbone, OIG has utilized advanced analytics in an unprecedented way to fight fraud. In so doing, OIG accesses not only DHS provider and recipient data, but also Unemployment data, Wages data, national food assistance data – and other sources – to undertake the comparative analyses necessary to achieve breakthrough fraud detection results.

These fraud detection efforts include the following:

- **Child Development and Care (CDC) [Day Care] Fraud:** First and foremost, OIG implemented a CDC Reverse Wage Match, linking day care benefits with wages, and establishing parameters to detect potential fraud. The majority of DHS Day Care benefits are provided to clients who are working. OIG now uses the data warehouse to correlate those clients who are receiving a high level of CDC care due to “employment” but have low or no income being reported (for example, one analysis looked at those earning less than \$500 per quarter – Wages data – but receiving more than \$4,000 per quarter – DHS data – in day care benefits). The match has been so successful, that since implementing this project in FY04, **DHS-OIG has identified over \$10 million in fraud and, through the judicial system, has established restitution orders for over \$2 million.**

A couple of examples:

- An OIG agent conducted a CDC Reverse wage investigation which was prosecuted in September 2004. The agent determined that a DHS client was employed at three different places for **less than 30 days** over a four-year period, **while receiving Child Day Care and Food Assistance Benefits for seven children between October of 2000 and September of 2004.** A total of \$94,000 was referred for prosecution in this case.
- An Ingham County CDC provider pled guilty to charges of False Pretenses for over billing CDC hours. An OIG specialist compiled over issuance figures of more than \$100,000 from the data warehouse showing excessive hours billed for school-age children (who would not be at home and not require day care services during school hours). **As a result of plea negotiations, the provider agreed to make full restitution within 24 months.**

These types of examples show that advanced data analytics are translating into dollars for the State of Michigan. OIG is now adding Unemployment benefits, wage history, and worker’s compensation information to its calculations and expects its hit rate to increase.

- **Anti-Trafficking Efforts:** The DHS OIG is using the data warehouse as part of a sophisticated anti-trafficking effort in the Food Assistance Program (FAP or Food Stamps). These complex analyses involve multiple “data universes” including the DHS electronic benefits transfer (EBT) and food and nutrition databases. Analysts produce retailer matrix reports, individual recipient reports, and individual retailer reports.

Using these techniques, DHS OIG analysts can quickly determine if a particular store has reported unusually high levels of activity (for example, a small convenience store at a gas station repeatedly requesting reimbursement for large purchases from clients exceeding \$200). In one case that OIG analysts turned over to law enforcement officials, investigators ultimately found almost \$50,000 in a paper bag under the counter of one convenience store, whose manager was paying cash, at a 30% discount, to DHS clients in exchange for their food assistance benefits. The store was then reimbursed for the food assistance benefit at the 100% rate. Food Assistance trafficking at this store is estimated to have exceeded \$300,000.

In addition to statistical analyses, OIG analysts are implementing geocoding to gain a graphical depiction of where specific stores are located. In many cases, a recipient who travels a long distance to patronize a store – particularly if there are several stores between their home and the store in question – there is a strong possibility, even likelihood, that fraud is taking place.

- **Out-of-State Food Assistance Program Transactions:** OIG is using the data warehouse to analyze out-of-state food purchases for FAP recipients. While purchasing food outside Michigan is permitted for short periods of time (when a recipient might be visiting a family member, for example), OIG analysts match those recipients who have been out-of-state exclusively for extended periods. This may indicate fraudulent activities across state lines, especially the possibility that a recipient is “double dipping” and collecting FAP benefits from Michigan and another state. Or it may indicate that the person has moved out of Michigan, thereby disqualifying him or her from receiving DHS benefits. Upon case closure, the savings to FAP, TANF (cash), and Medical Assistance programs are immediate.

Michigan’s innovative fraud-fighting efforts in these areas lead the nation by conducting these kinds of advanced analytics in the CDC, cash and food assistance areas.

### **Flexible Architecture + Software Tools = Enormous Capabilities**

The technical foundation of the DHS OIG solution is a massively parallel processing (MPP) data warehouse platform, utilizing a relational database management system, designed to incorporate multiple symmetric multi-processing (SMP) nodes that are inter-connected with a high-speed communication link. Each MPP node has its own operating system and memory, enabling the system to process large volumes of data and complex queries. **The system has the power and scalability to address OIG’s needs, and the scalability to accommodate unlimited future growth.**

In addition, the system incorporates a series of software applications that allow easy access to the data and provide many avenues for analytical assessment and problem-solving. These include Business Intelligence/Query tools for querying data directly; a library of pre-defined reports that contains several executive-level and subject-specific detailed reports that may be refreshed easily as new data is added to the warehouse; and analytical software to allow users to compute advanced statistical algorithms to determine trends and build models.

The overall architecture incorporates file servers, desktop computers, printers, and LAN servers strategically distributed across offices throughout the state.

By utilizing the rapid analytical capabilities of the data warehouse and integrating records from disparate databases, Michigan DHS has established a national model in innovative techniques to battle Child Day Care, Food Assistance and Cash Assistance fraud.

## **B. Significance to the Improvement of the Operation of Government**

By utilizing the data warehouse/decision support system, OIG has dramatically increased the efficiency of its staff (through expedited data and evidence collection), used data analysis to balance workload and make policy recommendations, and enhanced program accuracy and integrity – both of which are DHS strategic plan values – through more intense fraud-fighting measures.

**OIG investigators are now armed with irrefutable statistics and information when they confront alleged abusers – meaning their “hit rates” are substantially higher, and the potential for fraud recoveries much greater.** Further, OIG is able to deliver information to its 68 investigators in the field faster and more efficiently, by relying on the data warehouse to provide information. For example:

- **Electronic Benefits Transfer (EBT):** Prior to OIG’s utilization of the data warehouse, it was nearly impossible for agents to obtain EBT Food Assistance purchase history, since the EBT vendor’s

system was cumbersome to use and only contains data for the last 180 days. Now, agents can query data at their desktop and have it in a format that is easier to use.

- **Case Management Application:** Under the old system (DHS calls it ARSIG), an investigator's case logs were only available via the screen or by screen prints. No output capabilities existed, and the contractor no longer supports the application. The data warehouse provides total flexibility; OIG staff can pull up a case log and support it by any criteria needed.
- **Child Development and Care, [or Day Care] (CDC) Payment History:** The data warehouse is the primary way of identifying CDC payment history. Without the data warehouse, the system's records only date back 12 months.

In addition, OIG can also monitor the status and outcomes of investigations that have been assigned as a result of these matches and queries. A copy of OIG's case management applications (ARSIG) is stored on the data warehouse and can be queried to identify project cases (e.g., the CDC-Reverse Wage match). Access to this data also allows OIG to determine if a query is successful, or if changes need to be made to the filtering criteria in the report.

In short, the OIG fraud-fighting system enables agents to have rapid and easy access to more timely information than ever before, and provides the knowledge to staff members – through evidence collection and data analysis – to direct investigators to the most promising cases. This increases productivity and makes it far more likely that future prosecutorial efforts will be successful.

### **C. Benefits Realized by Service Recipients, Taxpayers, Agency, or State**

DHS and Michigan taxpayers have received enormous benefits thus far from the innovative fraud-fighting efforts undertaken by OIG. In addition to the hard-dollar ROI discussed in the next section (over \$2 million in fraud to be recovered, with \$10 million more projected this year, plus \$13 million in cost efficiencies), other major benefits include:

- Savings of **future program dollars when fraud is stopped through the “sentinel” effect** that puts clients and retailers on notice that the State has advanced fraud-fighting capability and will use it.
- Saving investigation time since **analysts and investigators are pulling data from one centralized source.**
- **Saving time and money for partnering agencies** (for example, the Michigan State Police) by filtering out “bad” trafficking referrals in the food and cash assistance programs.

DHS OIG also uses the data warehouse to target cases for attention and target cases pending with prosecutors or the court system, using the following process:

- OIG identifies addresses for *active* cash and food assistance recipients who have a **pending welfare fraud felony arrest warrant resulting from an OIG investigation.**
- Prosecutors and law enforcement personnel are notified of these recipients' addresses to **facilitate arrest and prosecution.**
- This process helps to fulfill state and federal regulations that say a **person with an outstanding felony warrant is not entitled to certain public assistance benefits.**

In addition, the benefits of the DHS OIG fraud-fighting efforts do not stop at the Michigan state line. Because OIG activities serve as a national model, other states contact DHS to seek the agency's advice. Further, **federal enforcement authorities – particularly, the United States Department of**

**Agriculture's OIG – rely on the quality of DHS OIG data and analytics to support their documentation for trafficking search warrants they may execute in Michigan, and for evidence in cases that they prosecute.**

## **D. Return on Investment**

While OIG's innovative fraud-fighting activities have been aggressively under way for only about 12 months, officials have already documented substantial Return on Investment (ROI).

- Thus far, OIG's use of the data warehouse has yielded more than **\$2 million** in documented fraud to be recovered. This consists of court orders and voluntary repayments. The CDC Reverse Wage Match alone has identified over **\$10 million** in potential fraud to be addressed in the next year, with a potential for far more significant savings beyond that.
- Further, to strengthen CDC program integrity, OIG promoted the idea of requiring providers to use a unique Personal ID number for billing purposes. This change required some evidence of cost-effectiveness. Because CDC billing information was contained in the data warehouse, OIG examined the "before and after" billing periods to calculate cost savings. The results showed that there was a 3% drop in the number of providers that billed and the cost reduction was also more than 3%, for a projected annual savings of more than **\$13 million**. (Avg. CDC biweekly payroll before PIN change: \$18.4M; avg. biweekly payroll after PIN change: \$17.8M; avg. payroll savings: \$511K; projected annual savings: \$13M).
- Further, the ability to access multiple databases to cross reference certain elements has led OIG to a means of identifying cases that have a greater potential for mis-payment. **Cost avoidance has improved more than 200%** in the CDC program over FY2004, due in part to more efficient use of data that is more precise and complete. (First half FY2005 CDC "fraud found" was \$4.2M, as compared to \$1.4M for the same time – previous FY.)
- Finally, all of these savings have been achieved with a total analyst population of 1-2 full-time staff members supporting investigators. As these analysts become even more familiar with the data, they are expected to identify and generate even greater savings, without a need for additional staffing – **which means ROI will increase dramatically.**

## **Summary**

The Office of Inspector General in Michigan's Department of Human Services leads the nation in using decision support and advanced analytics to combat fraud in the cash and food assistance arena. In so doing, DHS OIG is:

- Increasing the confidence and the **"hit rate" percentage of its investigators**, and providing them with tools and evidence to strengthen prosecutions.
- Tightening its controls over the expenditure of **\$121 million per month**, more than **\$1 billion per year**
- Generating **millions in ROI** with a potential for much more
- Improving its ability to provide **precise, accurate reports on fraud-fighting activities** to the Administration and the Legislature
- Strengthening its **partnerships with other state agencies** (e.g., Michigan State Police) and federal enforcement agencies (USDA OIG)
- **Bolstering the efficiency** of its staff and processes

Combined, all of these advancements are ultimately benefiting Michigan taxpayers and enhancing Michigan's reputation as a national leader in using technology to break down silos between agencies and departments, share disparate data, and solve business problems.