Fall 2003

SYSTEMSTATS

North Carolina Criminal Justice Analysis Center — Governor's Crime Commission

Technology on Patrol: An Evaluation of Mobile Data Computers in Law Enforcement Vehicles

Introduction/Study Rationale

The 1995 Criminal Justice Information Network (CJIN) Study Report, conducted by Price Waterhouse, noted an inability of law enforcement and other public safety agencies to communicate on a statewide basis. The study asserted that there was a growing need for law enforcement agencies to be able to more quickly access simple driver's license and vehicle registration information to the more complete criminal history data and photo images such as driver's license photos. The study also noted a need for automating an officer's incident, accident and citation report writing capabilities.

One of the recommended solutions was to equip patrol vehicles with mobile data computers (MDCs) which would allow officers to run their own criminal and vehicle queries, without requiring dispatcher assistance, and to enable officers to electronically complete and submit much of their required paperwork. Benefits of placing these MDCs in law enforcement vehicles were said to include: the reduction of data entry errors and redundant data entry, a rapid return of Division of Criminal Information (DCI) data immediately back to the officer, thus reducing the number of criminal and vehicle queries which at that time went through the agency's dispatchers, as well as allowing officers to be able to allocate more time on patrol versus report writing. Other benefits included: improving officer safety, the possibility of recovering more stolen property and vehicles and the immediate sharing of information between officers in the same agency, as well as across divergent law enforcement agencies.

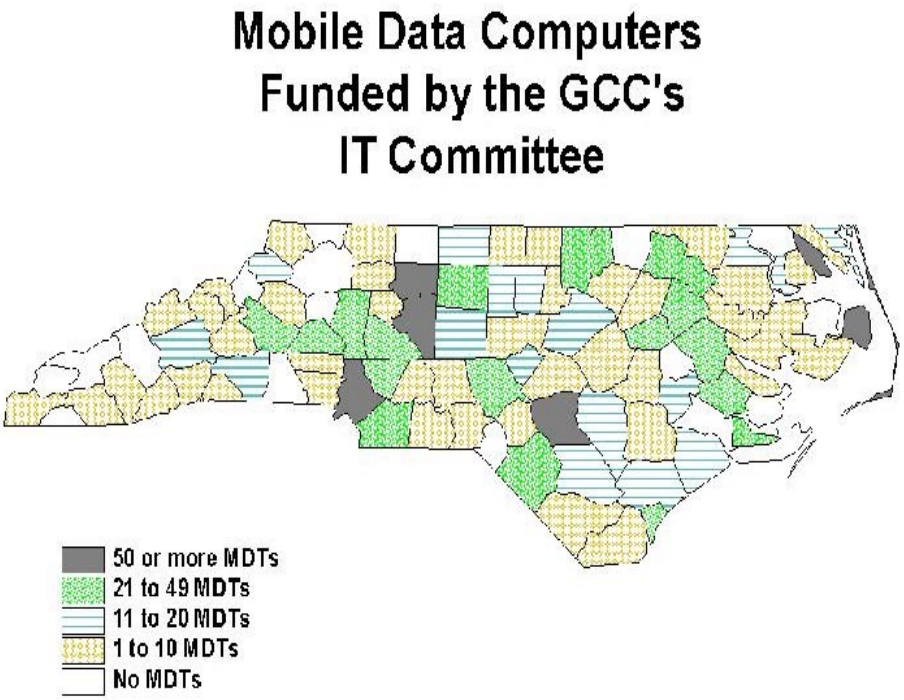
The authors of the CJIN Study Report further noted that there was a lack of statewide standards and definitions in this area with considerable funds being expended in an uncoordinated fashion. These deficiencies contributed to a situation in which multiple communication pockets were springing up across North Carolina; pockets which were not technologically suited for statewide communications and could not be interconnected in a simple and straightforward manner.

Shortly thereafter the North Carolina State Highway Patrol began developing a statewide 800 MegaHertz mobile data network infrastructure which would enable all participating law enforcement agencies to truly communicate with each other. This CJIN mobile data network (CJIN-MDN) would alleviate the uncoordinated, and incompatible, communications systems that were springing up across the state.

In an effort to support this statewide initiative, and enable local law enforcement agencies to tap into the CJIN-MDN, the Information Systems and Technology Committee of the Governor's Crime Commission (GCC), began providing federal grant funds for purchasing MDCs. Original funding for these devices began in 1996 and by 1998 mobile data computers were one of the committee's top policy and program development priorities. The committee sought to provide funding for these devices to as many law enforcement agencies as possible and to place the devices in as many counties as possible. Given this goal, and the limited amount of federal funds which were available, the committee imposed funding caps which specified the maximum dollar amount to be awarded per device and established a funding ratio of no more than one device for every ten sworn officers. The committee's intent was to enable agencies to obtain a number of MDCs, versus outfitting the entire department, and then demonstrate their utility to local governmental officials who would hopefully provide the necessary remaining funds to equip each patrol vehicle with an MDC. The committee also endorsed the Highway Patrol's effort, to develop a statewide and integrated mobile data network, by strongly encouraging, and often requiring via grant special conditions, that the MDC grant recipients establish connectivity to the CJIN-MDN.

Since 1996 the Information Systems and Technology Committee has awarded 315 separate MDC grants, to 217 distinct law enforcement and public safety agencies, with a total Federal Byrne fund allocation of $9,646,150. These 217 recipient agencies represent roughly one-half of the state's law enforcement and public safety agencies. These grant awards have placed at least 1,473 MDCs in 82 of the state's 100 counties and, as of April 2003, represent 25.6 percent of the total 5,758 mobile data computers which are connected to the CJIN-MDN 800 MegaHertz infrastructure.

This report presents the findings of a process and impact evaluation which was conducted in an effort to evaluate the efficacy of mobile data computers in law enforcement patrol vehicles. The study sought to ascertain evaluative information on the process of acquiring and installing these devices in patrol vehicles; as well as to obtain both qualitative and quantitative data on the reported benefits of these devices for the law enforcement professional. Questions were designed to identify both strengths and weaknesses surrounding the process of acquiring these devices and to elicit the impact of MDCs on the proported benefits of these devices as outlined in the 1995 CJIN study.



Methods

Study Survey

A two-part 27-item survey instrument was designed which included both process and impact related questions. Part one included items which sought to determine the number of MDCs in the agency, where they are located and how they were obtained. Questions also inquired about the acquisition and installation process and any difficulties that were encountered during this early period of program operation. Several questions were also included to determine the level of satisfaction with the Highway Patrol's customer service representatives and its overall CJIN-MDN service provision.

Part two sought to determine what impact MDCs have had on a variety of measures including: officer safety, report writing, intradepartmental and interagency communications, identifying suspects and recovering stolen property. Questions were also included which sought to ascertain how the use of MDCs has affected agency dispatchers; specifically to determine if MDCs have reduced the number of dispatcher transmissions related to running criminal history and vehicle checks.

Study Sample

All 217 law enforcement agencies that received Federal Byrne funds, for MDC grants, during the years 1996-2002 comprised the study universe. 2003 MDC grantees were excluded since their grant awards would not become active until July 1, 2003 and consequently would not be able to adequately respond to the questionnaire. A list of the applicable MDC grantees was generated from the Crime Commission's Grants Management System (GMS) and used to select the study sample. A 15 percent random sample was drawn producing a list of 34 agencies that had received MDC funding during the 1996-2002 study period. A combination of phone calls and faxes were used to administer the survey to the selected 34 agencies with a 100 percent response rate being obtained.

Results

The Governor's Crime Commission (GCC) funded approximately 40% of the total MDCs of the agencies surveyed. This percentage is consistent with the Information Systems and Technology Committee's intentions because a preset goal was to fund a small percentage of MDCs and let each particular agency build support and fund the remaining MDCs to meet its needs. This 40% is higher than the 25.6% mentioned in the introduction because that smaller percentage represents the percentage of MDCs actually connected to the CJIN Mobile Data Network. The discrepancy comes in the fact that not all of the MDCs and its components are connected to the CJIN Mobile Data Network. Some are connected to a private network (i.e. Greensboro PD) and some are used as stand alone devices for writing reports and performing other functions unique to the department.

The GCC's allocation of grant money for MDCs has been widespread and wisely spent. Based on the survey results, the average agency received funds for eight MDCs from the GCC and the number of MDCs funded by the GCC ranged from two to twenty-three. These numbers reflect the GCC's efforts to spread the funding among small and large agencies alike.

Since the Governor's Crime Commission did not fund all of the MDCs for each agency, a question on the survey inquired about the funding sources that were used to purchase additional MDCs. As Figure 1 demonstrates seventy-nine percent of the respondents answered that local funds were used. The remaining funding sources are as follows: 6%-State Funding, 12%-Additional Federal Funding, 3%-not sure of the fund source. On page 4 is a pie chart (Figure 1) that illustrates the breakdown of funding by source.

Figure 1-Additional Funding Sources

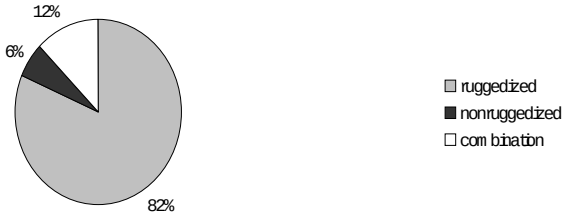
The grants were activated on July 1 of each grant year. At that time, each agency was ready to place procurement bids and decide which vendor would supply their equipment and software. After accepting bids from different vendors, the agency would decide with which vendor to sign a contract and make arrangements for installation. The range of time for the entire process, from grant activation to installation, was from one month to one year; however, the average time frame was about five months. When the respondents were asked to rank the difficulty they had in procuring their MDCs on a scale of 1-10, with 1 being "not difficult" and 10 being "very difficult", the average rating was three.

One goal of the GCC was to have grant recipients use the CJIN Mobile Data Network. The survey results supported this goal. The results showed that 97% of the respondents are connected to and use the CJIN Mobile Data Network. The only exception was the Greensboro Police Department, which is connected to a private network because of its large size, using 190 MDCs. Regarding the CJIN/SHP MDN, everyone has been pleased with the mobile data service and the help desk support service. Although everyone who answered was satisfied overall, some respondents complained of temporary dead time or patchy dead signal areas.

Usage of the mobile data computers is an important point. Based on the survey results, 97% of the officers that are using the computers are certified to use them by the Division of Criminal Information. Study findings indicate that only 13% of all MDC users needed any general computer or Windows training. As low as that number is, 13% does not accurately illustrate the actual need for this training. One agency put all officers through a standard computer-training program, forcing that agency to answer that 100% of its officers required training. A few small agencies had just a few officers to undergo training, but because their total agency is small in number, that agency's percentage answer for this question was higher.

The location of the MDCs as well as the type of computers that are needed and are being bought is another point of interest. The survey reflected that 93% of MDCs in use are located in line officer patrol vehicles. This statistic shows that the overwhelming number of MDCs are being used everyday, on every shift, and by the officers who need them the most. The other 7% of MDCs are located in the vehicles of investigators, narcotics officers, mobile response units, or in department command centers. The two types of computers that are being bought for mobile data law enforcement are ruggedized or nonruggedized. The nonruggedized computers are basic laptops similar to what other business professionals and personal users carry. Ruggedized computers are heavy-duty computers that are designed to withstand extreme contact, vibration, and heat. The percentage breakdown of types of computers bought by the respondents is as follows: 82%-ruggedized, 6%-nonruggedized, 12%-combination of both types within agency. The pie chart (Figure 2) on page 5 gives a visual representation of the responses.

Figure 2-Types of Computers



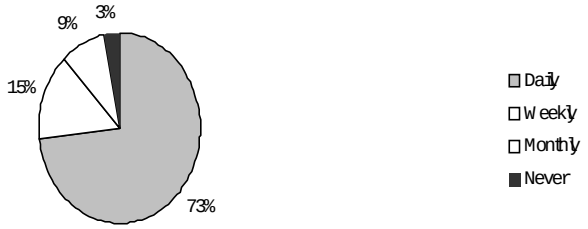
Impact of Mobile Data Computers

A major benefit of mobile data computers is the time saved in the report-writing process. Currently in North Carolina, approximately half of the agencies surveyed have the appropriate software and are capable of using MDCs to write reports. The minimum amount of time saved by the MDCs in the survey was fifteen minutes per report. The largest amount of time saved was reported to be one hundred hours per month for the entire department. The minutes and hours that are saved because of the report-writing capabilities of mobile data computers are now being spent on patrol instead of in the office. As a result, there is more police visibility in the community, quicker response to calls, and more officers available to backup other officers. All of these results lead to more effective and efficient local law enforcement.

Communication is one of the most important features of mobile data computers and their wireless capabilities. An item on the survey asked respondents about the frequency with which their agency communicates with officers of other agencies.

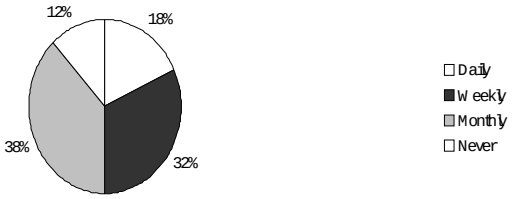
The first part of this question asked: "How often do your officers use MDCs to communicate with officers from other agencies in your county?" The responses were as follows: 73%-daily, 15%-weekly, 9% monthly, 3%-never. The responses support the idea that MDCs are vitally important for communications and data sharing within a county. Figure 3 below presents a visual representation of the responses.

Figure 3-Communication Within County



The second part of the question asked: "How often do your officers use MDCs to communicate with officers from other agencies in other counties?" The responses were as follows: 18%-daily, 32%-weekly, 38%-monthly, 12%-never. Intercounty communication doesn't occur as frequently as intracounty communication because intracounty communication involves daily functional communications. Adversely, intercounty communication usually occurs in times of special need such as finding an escaped inmate, a wanted criminal, or other emergency situations. Although the MDCs are not used as frequently for intercounty communication, the responses to this question show that the wireless communication capabilities are still needed (Refer to Figure 4 below).

Figure 4-Communication With Other Counties

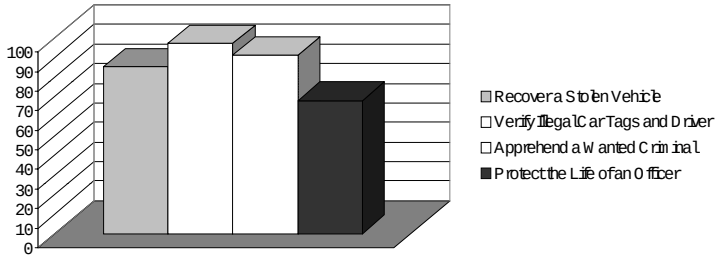


All of the respondents agreed that the MDCs have helped to improve officer safety and that their officers feel safer and more prepared now than in the past without MDCs. When asked the ways that the MDCs have helped to improve officer safety, the responses clustered into three groups: 68%- the officer has immediate access to important information, 38%-the officer has better knowledge of a situation and can call for backup if needed, 15%-officer location and actions are not broadcast over the radio, thus preventing citizens who use commercial scanners from receiving this information.[1]

Agencies across the state of different sizes and with different needs have benefitted from using mobile data computers. A question in the survey targeted those benefits and grouped them into several distinct response choices. The major benefits and the number of agencies who have received these benefits are as follows: 85%-recover a stolen vehicle, 97%-verify illegal car tags and driver, 91%-apprehend a wanted criminal, 68%-protect the life of an officer (Refer to Figure 5). Other ways that agencies have benefited from the MDCs are to help crack an unsolved case, to help recover guns and stolen property, and to locate missing persons.

[1] The percentages for this question exceed 100% when added because multiple responses were allowed.

Figure 5-MDC Benefits



Below are a few quotes that exemplify the usefulness of and the necessity for MDCs:

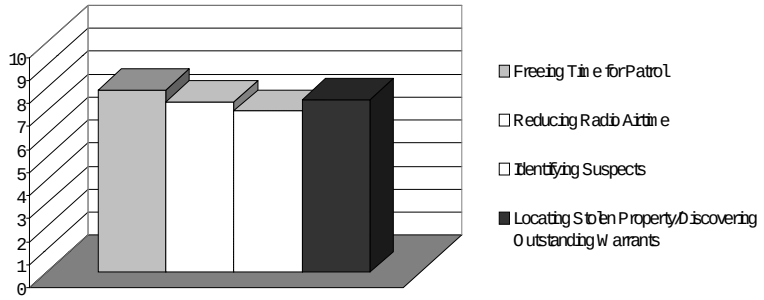
> "An officer was running car tags at a hotel on his MDC and discovered one particular car to be stolen. The car thief was caught and later convicted of murder in Virginia."
>
> "An MDC helped to apprehend a criminal with a federal warrant."
>
> "An officer using an MDC apprehended a wanted man from New Jersey using an MDC. He was later convicted of murder."
>
> "Using MDCs, we were able to communicate with another police department to apprehend a criminal wanted in another county."

No one has seen any unintended negative consequences of having MDCs in patrol vehicles. However, some have reported the possible danger that exists if the airbags were to deploy with the laptop open, although none of the responding agencies' officers actually experienced this during a collision.

Effectiveness of mobile data computers is a critical point of focus in the consideration of GCC funding. The last four questions of the survey specifically targeted the effectiveness of MDCs by asking the respondents to rate how effective the MDCs have been in certain areas of law enforcement such as freeing time for patrol versus handwriting reports, reducing radio airtime for dispatchers, identifying suspects, and locating stolen property and discovering outstanding warrants. When asked to rate the effectiveness of MDCs in these particular areas on a scale of one to ten, with ten being the most effective, the mean answer for each item was 7 or higher. The responses to these questions validate the positive effect MDCs have had on local law enforcement as well as the constantly growing need for them. The bar chart (Figure 6) on page 8 illustrates the figures and data just described.

The Division of Criminal Information currently charges law enforcement agencies $6 per terminal per month to use the CJIN/MDN. All respondents stated that their agency was functioning well at the current DCI fee schedule. When asked about a DCI fee increase, most respondents indicated that any increase would be a difficult budget adjustment, especially an increase of any significant amount. Survey respondents were asked to hypothetically give an approximate dollar amount at which their agency would be forced to discontinue using some or all of its MDCs if the DCI fee was increased. The median of the respondents' answers was $11 indicating the extent to which a hypothetical fee increase would impact their operational and budgetary capacities.

Figure 6-MDC Effectiveness



Recommendations

Based upon the study results, and respondent input, a series of policy implications and recommendations are offered below in an effort to benefit the GCC's Information Systems and Technology Committee.

After researching possible improvements for the software, communications, and network capabilities of mobile data computers, a list of recommendations was compiled. The final question of the survey directly asked the respondents if they agreed which of these features would make MDCs more helpful or more useful to them and their agency.

The recommendations and the percent agreement are listed below.

- **77%-involve officers and other users in the system design process**
  Many officers and administrators believed that involving the personnel who use the computers on a regular basis for input and design ideas is very sensible. This involvement would lead to efficient improvement in areas such as laptop mounting convenience, software that is user-friendly, and control panels that are easy to operate.
- **79%-voice-activated software**
  This software provides huge benefits with only one real drawback. Voice-activated software drastically improves an officer's ability to safely and quickly perform communication functions and write reports while driving. By speaking into a microphone instead of typing on a keyboard, an officer can drive and perform the needed functions without pulling to the side of the road. The only real drawback is the cost of voice-activated software. This high-priced software can be cost prohibitive given the fact that the agency has already purchased several laptops, hardware, and other software.
- **79%-back-lit keyboards**
  Many agencies already use backlit keyboards and are satisfied with them. A large majority of the respondents agreed that back-lit keyboards would be very helpful for officers who are patrolling on night shifts. With these keyboards, officers can see the keys to type without having to turn on the overhead light in the car.
- **100%-availability of Department of Motor Vehicles (DMV) photographs**
  Respondents unanimously agreed that being able to access DMV photographs would be helpful. Currently, most agencies can only access their respective agency's database of mugshots. The availability of DMV photographs, and consequently digital images of all licensed drivers in the state, would minimize cases of mistaken identity, deter suspects from providing fictitious names and expedite the process of offender verification on site.

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- **76%-text only email feature**
  An email feature is attractive because of its compatibility. Any officer with Internet access can email any other officer with Internet access. Types of connections, types of computers, and location are irrelevant.

Below are additional suggestions made by respondents:

- **Touch screens**
  Touch screens would be beneficial for two main reasons. One, the touch options on the screen would be larger than the keys on a keyboard making it easier for the officers to operate the computer. Two, the keyboard would be eliminated, thus creating more space in the car and less hardware to possibly malfunction.
- **Hand-held devices**
  Hand-held devices would enable the officer to use the same communications and report-writing capabilities on the scene rather than being confined to the patrol vehicle.
- **Messaging programs**
  Instant messaging programs would allow instant communication between officers. Instant communication can be beneficial in emergency situations and is wanted by the line patrol officers. However, administrators fear that the instant communication feature will be abused by officers who will engage in idle, non-work related chat while on patrol.
- **Digitized city maps for faster response routes**
- **More 800 MegaHertz towers for better reception**

Keeping in mind the relative youth of mobile data technology for the previously mentioned suggestions for improvement, the benefits of mobile data computers are immeasurable. Despite varied percentages and responses, all respondents expressed a tremendous need for mobile data computers, as well as their benefits for law enforcement. The Information Systems and Technology Committee should continue to list MDCs as one of its policy and program development priorities targeting those agencies that currently possess few or no MDCs. The Governor's Crime Commission should continue to act as a champion for interoperable communications enhancements for all public safety agencies across North Carolina.

References

Price Waterhouse (April 7, 1995). Criminal Justice Information Network Study: Final Report. Raleigh: N.C.

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The Governor's Crime Commission was established in 1977 by the North Carolina General Assembly under G.S. 143B-479. Its primary duty is "to be the chief advisory body to the Governor and the Secretary of the Department of Crime Control and Public Safety for the development and implementation of criminal justice policy." The Crime Commission is always open to comments and suggestions from the general public as well as criminal justice officials. Please contact us and let us know your thoughts and feelings on the information contained in this publication or on any other criminal justice issue of concern to you.

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