Section 1: Cover

Title: Electronic Rounds Tracking System
Category: Data, Information and Knowledge Management
State: North Carolina

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Hardware selection completed:	04/30/2012
Requirements/design sessions completed:	05/31/2012
Software development completed:	10/01/2012
Pilot prisons selection and training completed:	11/30/2012
Evaluation and adjustment of software at pilot prisons completed:	09/29/2013
Software/hardware distribution; training for all prisons completed:	11/22/2013

Section 2. Executive Summary

In the North Carolina Prison system, when an inmate's serious misconduct presents an immediate threat to the safety of the inmate or others, endangers institution security or jeopardizes the integrity of an investigation of alleged serious criminal activity, the inmate is removed from general population and placed in a segregated housing unit. Segregation units provide single occupancy, secure cells for these inmates. Not surprisingly, segregation units are one of the most dangerous areas for both staff and inmates. Many inmates are agitated and violent; others are distressed. A national study concluded that inmates in isolation are seven times more likely to commit suicide than those in general population. The best method to mitigate these risks is to ensure that the inmates are observed regularly according to policy. Historically, North Carolina has relied on paper logs maintained by correctional officers to record these observations and document the inmates' behaviors and demeanor. The problems with this process are manifold:

- Paper logs do not offer any means to externally verify the actual time and location the observations were made
- Paper logs require the officer to remember observations for numerous inmates and later accurately recall this information when completing the log sheets
- Paper logs must be retained for many years and require significant physical storage space
- Paper log sheets can be misfiled, damaged or illegible
- Analog observation data cannot be reviewed remotely or easily analyzed to identify problems, patterns or trends

These shortfalls become particularly important in the event of an inmate complaint or lawsuit where the data is placed under intense scrutiny. In many cases the logs may be the only documentation available for events that occurred months or years in the past.

North Carolina prison administrators had struggled for years with these issues and had pursued commercially available solutions to no avail. The North Carolina Department of Public Safety Electronic Rounds Tracking System was developed by a partnership between the Management Information Systems group and the Division of Prisons, Security Services. The project had to meet these criteria:

- Enhance the care and safety provided to segregated inmates
- Ensure the accuracy and timeliness of segregation observations while not significantly impacting the speed of the process
- Enhance the safety of prison staff when dealing with segregated inmates
- Put technology in the hands of front line correction officers for the first time
- Use durable, affordable hardware in the implementation
- Make the system easy to use for even the most computer challenged staff
- Organize the large volume of recorded data in an easily accessible central database

Section 3.1 Business Problem

Inmates in segregation normally must be directly observed at least every thirty minutes. The observations are intended to ensure that all inmates are safe, fed appropriately, showered, given exercise, and administered required medication. Traditionally, observations were hand written on paper forms which could be damaged, destroyed, lost, or falsified. The information recorded on the forms was often recalled from memory by an officer at the completion of rounds rather than at the time of the observation thus introducing the risk of error. The Department depends upon these forms to monitor its own performance and defend itself during legal proceedings.

Segregated inmates may often have a history of violence against staff or other inmates, unpredictable behavior, previous escape attempts, or an ability to escape restraints. An officer might approach the cell of a dangerous felon with no knowledge of the offender's past history thus exposing staff to elevated risk of injury.

North Carolina has the capacity to house over 3000 inmates in segregation concurrently. With observations documented at least every 30 minutes, significant storage space is required to store a voluminous number of generated observation logs. Moreover, many man hours are required to file the forms appropriately. The process of retrieving a specific log for a specific date can be difficult and time consuming.

Section 3.2 Solution

The implementation of the Electronic Rounds Tracking System was a two part solution consisting of both new hardware and new software.

Section 3.2 Solution - Hardware

Several commercial solutions had been considered previously but they lacked the durability, flexibility, or functionality required by the Department. Tablet hardware appeared to be a possible answer to the issues that had hindered a solution in the past. After investigating hardware from several manufacturers, the Samsung Android Galaxy Tab2 10.1 tablet was chosen for the following reasons:

- Durable construction can withstand the rigors of a prison environment
- Light weight for easy portability and no hindrance to officers
- Large screen is very readable and provides sufficient space to display information to an officer
- Pricing is reasonable considering that over 500 tablets would be required to implement a statewide system
- Android blended well with existing development skill set and existing Windows PC based infrastructure

Prisons can be hostile environments and tablets may be subjected to an array of unforeseen stresses. To further protect the tablets, each one is inserted inside a rubber protective cover manufactured by **Gumdrop**. The covers provide reinforcement at each corner of the device, an additional transparent cover over the screen glass, and seals for the openings on the tablet.

Because a federal grant was obtained to purchase the 527 tablets required to implement the project, there was no initial hardware cost to the Department.

For the implementation, a key function of tablet hardware is the ability to scan optical codes through its cameras. QR (Quick Response) codes were chosen for their compact size, data capacity, and rapid scanning. QR codes are fastened permanently to every segregation cell in every prison facility within the state. Each encrypted QR cell code is unique to the facility, the prison area, and the cell. When an officer scans a cell code, the tablet recognizes the location inside the prison and the onboard clock provides a timestamp.

Section 3.2 Solution – Software

With the exception of the Barcode Scanner (open source from **ZXing** ("zebra crossing")) all Android and PC software was developed by the MIS group. The software consists of two major components:

- a suite of tools written in Java on a PC for synchronization and reporting
- a Java Android application running on the tablets

It is critical to note that due to security concerns inside prison facilities, **no WIFI** services are available for the transmission of information to and from the tablets. All communication is done over a USB connection. This was a prime consideration in the development of the software for Electronic Rounds Tracking.

Section 3.2 Solution – PC Software

Since WIFI was not an option, the software uses the Android ADB (Android Debug Bridge) to communicate with tablets. The ADB works via a USB port on a PC connected to a tablet. ADB allows for the reading and writing of application data on a tablet.

The PC tools create and store SQLITE databases containing information about staff, inmates, security alerts, gang associations, health data, lost privileges, and inmate photos. Once populated with these databases via the ADB interface, a tablet can go into service performing rounds. At the completion of a prison shift, the tablets are reconnected to a PC and the observation data that was collected is recorded on the mainframe. The SQLITE databases on the tablets are refreshed at that time as well.

There is an extensive set of reporting and analysis tools provided on the PC. An Alerts report is generated automatically when a tablet's observations are recorded in the mainframe database. The Alerts report automatically notifies prison administrators of potential hunger strikes, refusals of exercise, and refusals to shower. In addition to optionally displaying observations for specific prisons, inmates

and time periods, prison administrators can, for example, generate reports for each prison showing:

- the average interval between observations
- observations per month
- observations per month by day of week
- tablet usage
- out of cell counts

Only users with proper security profiles can access the PC report information.

Section 3.2 Solution – Tablet Software

The tablet software was developed on Android 4.1.1. It uses a clear, intuitive interface that presents information and options relevant to the current situation. Most observations can be recorded with a touch of a few buttons but a virtual keyboard is available to record exceptions.

As part of the project, staff badges were reformatted to include a QR code to identify the staff to the tablet. Before any officer can use a tablet to perform rounds, they must scan their badge QR code. This allows the tablet to verify they are an active employee of the prison and that they have the proper user security profile to be using the system.


An officer making rounds with a tablet approaches a cell and scans the unique QR code. The tablet searches for the inmate assigned to that cell in the SQLITE inmate database. If the inmate is found, the officer is shown a picture of the inmate and asked to confirm that the picture matches the inmate in the cell. If the tablet cannot

match an inmate to the cell because of movements in the segregation area, the officer is provided a search facility to look up the inmate.

If the inmate has a security alert or a gang affiliation (STG), red buttons are displayed to allow the officer to see more detailed information as shown above.

When the tablet has identified the inmate and it is confirmed by the officer, the screen changes to allow the recording of observations. A button is offered for each of the most common observations. As a button is pressed, the observation appears in a list of observations being recorded. If the Other button is pressed, a keyboard appears to allow free form text to be entered. The picture below displays the main tablet observation screen.
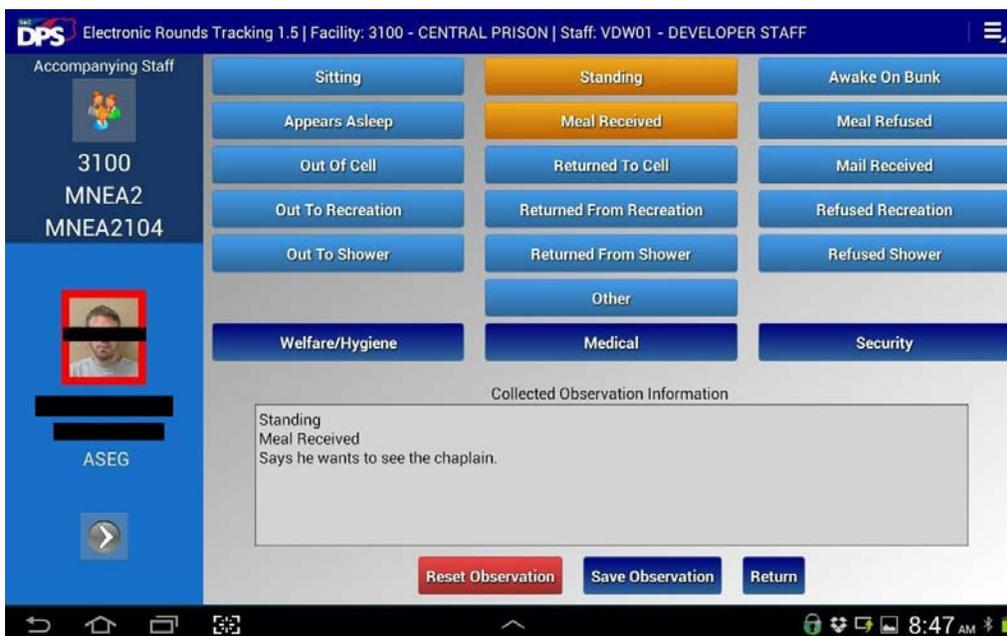
The Welfare/Hygiene button reveals buttons that supply observations related to cell cleanliness, hair cuts, exchange of clean clothing, receipt of correspondence supplies, and miscellaneous items for the inmates' well being. The Security button reveals buttons that primarily supply observations related to inmates' behavior. These include whether they have been put in restraints or placed on special observation or self injurious behavior observation. Whenever an inmate is put in restraints or is put on observation, the tablets activate a procedure that will sound an alarm on the tablet every fifteen minutes to remind the officer to return to the cell and check the inmate. The alarm identifies the specific inmate and the cell to be checked.

Prison policy prohibits an officer from recording any medical observations without the presence of a medical professional along with the officer. The tablet provides an Accompanying Staff button which allows a staff member to scan their badge and lets the tablet record their presence on rounds. If the accompanying staff happens to be a medical professional, the tablet will allow medical observations to be made. Medical

observations include Pre-Seg Screening, Segregation Check, Use Of Force Assessment, Medication Received, Medication Refused, Medication Education, Sick Call, Vitals/Readings Taken, and TB Screening.

Section 4. Significance

While the primary objectives of the project (enhance accuracy, reliability, and dependability of the segregation observations) were met, it was important that the system be efficient and endorsed by front line staff. During user feedback sessions, the majority of comments have centered on how easy it is to use the system and how there has been little impact to the time it takes to perform rounds. Every correctional officer received classroom instruction in the use of the tablet. The training curriculum was developed jointly by MIS and the Prison Security group. This initial successful introduction of technology into officers' daily routine has paved the way for the adoption of future applications.

North Carolina is not aware of other states that have addressed this problem with the novel use of technologies employed in this solution. Other law enforcement agencies have expressed interest to North Carolina in using this technology.

Section 5. Benefit of the Project

Through the innovative use of Android based tablets, the Electronic Rounds Tracking System has placed the Department in a much better position to monitor itself and provide proof of how inmates are treated while in segregation.

One prison administrator has credited the Electronic Rounds Tracking System with saving the life of an inmate who complained of not feeling well and was placed on observation. When the tablet alarm notified the officer on duty to return for a 15 minute check, the inmate was vomiting blood. Quick response by custody and medical staff sent the inmate to a local hospital where he was successfully treated and returned a few days later.

Since the tablets provide officers with ready access to specific inmate information, officers can answer the most common questions inmates have while they are standing at the cell. One officer remarked that since the introduction of the new system, the segregation unit is quieter and better behaved.

In summary, the Electronic Rounds Tracking System exceeded all the original design criteria set for it, was implemented in a quick, efficient, cost effective manner, and laid the foundation for future technological improvements within the North Carolina prison system. It ensures officers have physically seen each inmate, records the precise time they were at the cell, records exactly what they see at the moment, and provides access to information securely. It has had a beneficial impact on inmates, officers and administrators alike.