



RFID Technology in Election Management

2022 EAC Clearinghouse Award Submission
Category: Outstanding Innovation in Elections

Submitted by:
Douglas County Clerk
Kansas

Submitter:
Jamie Shew, Douglas County Clerk/County Election Officer
1100 Massachusetts St.
Lawrence, KS 66044
785-832-5181
ishew@douglascountyks.org
www.douglascountyelections.com

Background and Overview

There are 83,000 registered voters in Douglas County, Kansas. While it is the fifth largest county in Kansas, Douglas County is a small/medium size election jurisdiction in the United States. We are faced with typical challenges of election offices including: limited resources while expected to address a growing expectation of security, monitoring and documentation of election equipment. As legislatures and advocacy groups increase the requirements for election offices, there are rarely additional funds allocated for upgrades. While smaller jurisdictions may lack the internal resources available to larger jurisdictions, it does not mean creative innovation is impossible. In fact, we this requires our offices to be creative in our solutions. The RFID project is an example of collaboration with technology partners to create an economic, sustainable solution to a pressing need in election management and logistics chain-of-custody improvements.

Problem/Challenges

When election equipment is stored in a warehouse/secure room/office, it is under the direct supervision of the election officer and staff. During each election, however, that same equipment is distributed to polling places throughout the jurisdiction, either by staff or delivery companies. The need to establish chain-of-custody for equipment, especially precinct tabulators, electronic pollbooks and HAVA-compliant accessibility devices, has been and continues to be a priority for election operations. Deployment of equipment outside the central office/warehouse to remote locations exacerbates challenges with chain-of-custody monitoring.

Delivery of equipment demands a well-organized process which requires logistical coordination of schedules, monitoring delivery, and securely setting-up equipment at the polling place. Chain-of-custody systems need to track specific equipment deployed

while minimizing human error (i.e. recording the wrong piece of equipment on a paper form) and without delaying the delivery process. Additionally, at the central location when equipment is opened for maintenance, testing or at any other time it is handled, logging these events needs to be efficient and correct.

Any solution to chain-of-custody challenges must use technology that quickly and accurately tracks equipment, while maintaining current labor utilization and not slow-down delivery to each polling place. The system must be economically viable with limited on-going costs yet provide efficient tracking and reporting. The Douglas County election office does not have a dedicated IT department and needed to find a third-party to partner with in order to develop and implement a new equipment management system.

Program Objectives

1. Establish chain-of-custody for each piece of equipment both while in storage and when deployed at a location off-site, i.e., advance voting or election day polling locations.
2. System tracks specific pieces of equipment, allowing for the creation of historical data on each item including maintenance, testing, and deployment.
3. Develop a method where equipment can be tracked throughout deployment which includes correctly identifying what is loaded on each truck for delivery.
4. Create a method for polling place set-up technicians to record the equipment delivered to each polling place that is not manual, i.e., recorded on paper, that does not slow down the delivery process and accurately records the activity.
5. Allow the central office to monitor and verify equipment that is being delivered and returned.
6. Establish a system that will identify a specific piece of equipment in the storage location but has the capability of large scale recording of events and equipment.

7. Compensate for limited staffing resources and reduce logging and tracking procedures.
8. Enhance security of equipment by increasing the level of tracking and logging the use of specific equipment in the polling place.

Initial Concept

In 2019, during a planning meeting for an election worker management system implementation with the Modus Election Software team, Douglas County Clerk Jamie Shew proposed the idea of adding a barcode scanning system for equipment tracking and chain-of-custody in the polling place to the software. The challenges previously discovered by the election staff with barcode implementation were discussed. As the Douglas County team worked with the Modus team, the idea of utilizing radio frequency identification (RFID) tags and readers for this project was put forward. The technology partner had already been working on how to utilize RFID technology in an election environment. RFID tags allow for one-click scanning of entire locations and large groups of equipment, yet it is also capable of targeted scanning of singular pieces of equipment. RFID technology is used in retail/warehouse operations for inventory control and security and other operations which require correct tracking of equipment. Partnering with Modus allowed for integration into the asset management module of their system and leveraging the technological expertise of their programmers and staff.

RFID Technology

While the initial idea for chain-of-custody tracking was to use barcodes, our office found them to be cumbersome, requiring that each piece of equipment was scanned while standing next to it. This slowed down delivery and was not efficient in implementation. The use of RFID tags offered the possibility of scanning large areas with accuracy and

speed while logging multiple pieces of equipment at the same time. While barcodes can be implemented with limited technology expertise and investment, these positives did not outweigh the negative impacts on our processes. Initially, there were concerns about the use of radio frequency tags on equipment, but research found they have no impact on electronic components as these are the same tags used at electronic equipment stores to discourage theft.

Our office contemplated potential concerns from stakeholders and was proactive in researching answers. For example, would the tags allow someone to have access to the election equipment if they hacked the tag? No, the tags are not tied to anything on the equipment they are on the outside, there is no way someone could access the tag and get access to equipment. Additionally, gaining access to the internal functions of the tag does not give a bad actor access to the internal secure structure of equipment. The RFID tag is basically an identification number which ties to a database of events. Changing something on the tag just creates a false reading which does not log the piece of equipment, but it does not compromise the integrity of the tabulator.

Implementation

In 2021 our partner, Modus Elections Software, coordinated a small consortium of counties and cities from three midwestern states to understand the business need and define a coordinated solution. The Modus team completed development before making new technologies available in a preview release. Our office participated in a pilot of the new system in a live election scenario. During deployment for the 2021 city/school election in November, a trial was set-up using RFID tags on the equipment on a single delivery route and tested scanning with cellular phones and RFID scanners along with beta testing the mobile application for scanning. The route was chosen to include urban and rural polling places with a variety of location sizes. At the time, the scope of the testing focused on tagging precinct tabulators and ADA ballot marking devices. The

Modus team was on-site to assist with the pilot and document on-site field usage while working with the Douglas County staff and equipment technicians. While in the delivery process, potential scenarios which could be problematic were tested and monitored by the staff at the election office. One of the challenges that emerged included how to compensate for areas of the county where limited cellular access restricted live monitoring. Additionally, how to flag if a technician accidentally logged equipment at the same location twice. We participated in a group debrief which allowed our technology partner to further improve and enhance RFID features before offering to a wider audience.

Full Deployment

After the success of the 2021 tests, Douglas County moved forward with full implementation and expanded use of the RFID tags beyond the precinct tabulator and ADA marking device. The test was so successful that the staff started mapping the ways to use the RFID tags on every piece of equipment deployed to the polling place. Staff set-up tags non-essential supply bags and each voting booth. Expanding implementation to every piece of equipment not only allowed the Douglas County staff to verify delivery and security of election tabulating equipment but to verify in real time that the correct number of voting booths was delivered to each polling place.

The Douglas County staff expanded use of the app to alert correct delivery mistakes, including tracking the quantity of items delivered. The staff assign the number of each item allocated to the polling place, for example 10 voting booths at the American Legion. If the technicians scan the room logging only 9 voting booths, they receive a real time message informing them of the discrepancy. They can fix the problem while still on site rather than finding out on election day. The election office also receives an alert message in case the crew misses the problem.

The RFID system was not only used for delivery but for equipment pick-up and return by Supervising Judges. Under Kansas law, there are secure items which must be picked up the afternoon before election day and returned on election night. The judge signs a form which is witnessed by a staff member. By tagging every bag and equipment being deployed, the election office can have one more level of monitoring that the equipment was picked-up and delivered correctly. After the form is signed, the staff member scans the stack of equipment which logs this chain-of-custody transfer in the Modus system, creating a chain-of-custody record in addition to the required paper forms which could potentially be destroyed or lost.

Scanning Devices

There are two methods for scanning equipment. The RFID scanner is versatile, using different power levels for scanning, depending on the need. When logging equipment on a truck or staged in the warehouse for delivery, the highest power setting can be used to quickly log everything in the truck or in a stack ready for deployment. This setting is also used in a polling place to scan an entire room after set-up. The quick scan of a room reduces the impact on time during delivery, which was a priority goal in setting up the RFID system. Our delivery schedules are extremely tight, adding a tracking system which did not require additional personnel or add significant time was important. The scanner can also be dialed to a lower setting which allows for identifying and scanning a specific piece of equipment. If staff is looking for a specific piece of equipment in the warehouse, they can walk along the rows scanning until that item is identified and singled out by the scanner.

Our technology partner developed a mobile app which allows staff to use a cellular phone to scan equipment and log events. The RFID scanners are expensive, therefore use can be restricted by the number purchased and available, but if the staff is somewhere without a scanner they can use their cell phone app to scan the RFID tag

and log an event. For example, if the staff are in the warehouse pulling equipment for maintenance, rather than go find a scanner, they can pull out a cell phone and log the event. While the scanner is more efficient, especially for larger scans, the development of the mobile app helps control costs for election offices with limited resources.

Lessons Learned

1. Communication with your equipment vendor is essential; placement of the RFID tag on equipment in an area which does not potentially impact operations is important.
2. There are different types of RFID tags which are better suited for a variety of equipment. RFID tags are designed for attachment to metal or non-metal surfaces to eliminate any potential interference to the signal transmission.
3. In the warehouse/storage environment, the knowledge and testing of the RFID scanners is important to avoid logging too many items with a higher setting or not enough items with a lower setting.
4. Using the RFID process during board worker return on election night, allows our staff to notice if something is missing or not scanned almost immediately. The larger setting on the RFID scanner also allows the staff to quickly scan a large room and find the missing piece of equipment. We are currently exploring RFID readers installed in tables, when the election board places the bags on the table it will automatically read and log the items as returned.
5. While the initial reason for this project was to document and track election equipment, additional benefits were identified. One of the problems which can occur during deployment is a delivery truck falls behind and impacts an already tight schedule. By monitoring the RFID scans at the central location in real time and utilizing a calendar system in Modus, election staff can not only see if a truck is behind schedule but also how far behind. The staff can start calling polling places on that route to communicate the altered schedule to the person waiting

to give the delivery team access to the building. In some areas of our county, a building is secured and a township officer is waiting for the delivery team. If the delivery schedule is falling behind, we can communicate and avoid frustration from the person meeting our staff.

Sustainability

As we found with this project, there is no limitation to expanding the utilization of this program other than running out of items to track. The scope of the project has expanded from the original goal of tracking tabulators and ballot marking devices to bags, voting booths, tables, and chairs deployed to a polling place. We are discussing new ways to leverage this technology. Are there items within the bags that we would also like to track? Do we stage the small items going into envelopes, do we use the tags to log when we stock those items? For example, we use color coded envelopes for opening documents (green), closing documents (red), signs (yellow) and forms (blue). In the months prior to the election, do we attach a tag to the envelope and when the forms are added, we scan the envelope, log the event and record the item has been added?

The database software is extremely flexible and can be configured to our needs, so events logged can be as granular as expected by the office. Currently, our most common events are logged, i.e., maintenance, testing, deployment. We have discussed creating events that log every time a piece of equipment is touched, even changing the paper before an election, and creating a complete record of equipment activity.

The next step for this project is identifying the cost and resources needed to set up stationary security scanners at each entrance/exit of the warehouse. These scanners would look like the security devices at retail stores which alert employees if someone is attempting to steal an item. By placing scanners at the points of entry/exit, the election

staff would have documentation and would be alerted if a piece of equipment is moved from the warehouse. This would not only improve documentation of movement but increase physical security measures for the equipment.

Recently, Kansas legislature passed a law which requires tracking ballots as they are moved within an election office or outside of the office. The Douglas County elections staff developed a spreadsheet to comply with the law, but it is cumbersome, not conducive to high traffic advance voting times when ballots are being moved to reload the stock at advance sites and relied on staff remembering to document each movement. The Douglas County staff is working on a system which would utilize an RFID scanning process for tracking ballot movement.

When ballots are received from the printer and unpacked, they could have a tag attached to each packet of 25, 50 or 100 and logged by ballot style. When a packet is moved, the staff member would log the even and scan the tag. Because of the phone app, this feature could be used in the field for satellite advance voting sites. We could also expand ballot tracking for use on election day, as each packet is opened by election board workers, it would be scanned and documented. This process does have some challenges still being addressed. While it is not expensive to use RFID tags on a single piece of equipment, assigning a new tag for each bundle of ballots could get cost prohibitive. Therefore, a system would have to be in place where ballots could be stored in a reusable box with an attached tag. The tags would be re-assigned each election. While RFID tags may not be the best option, the Douglas County staff has learned it is an efficient way to track items so we continue to see the applicability of this process. With every planning conversation, we ask, “can we put an RFID tag on that?”.

Cost-Effectiveness

The cost of implementing this system depends on the capability of an office to develop their own database or partner with a company which can provide that service. The app is not necessary, but it has become a critical tool for our operation. Most cell phones can now scan RFID tags, they could be used in place of the RFID scanners but it limits the ability to make large scans of rooms and trucks.

Hard costs include purchasing the RFID tags and scanners, if needed. While RFID tags are more expensive than barcodes, we have found the savings in time and accuracy outweigh the costs. Regular RFID tags cost about \$1.00/each and the metal-surface tags are approximately \$2.00/each. The larger RFID scanner that we use in our operation is about \$1750. As mentioned, a cell phone can also be used as a RFID scanner, but it limits the ability to scan large areas. As chain-of-custody best practices evolve to meet the expectations of both internal and external stakeholders, investing in technologies to meet those expectations while limiting increasing staffing capacity is important. This project has proven to be a cost-efficient way to make a large impact on our ability to meet those expectations as we will discuss later in this paper.

Replicability

Douglas County used a third-party to assist with building the platform for the RFID project because we did not have the internal staffing, or the knowledge skill set for implementation. While we understood how it would work, we needed expertise to make it happen. This does not mean every election office would need to work with a third-party vendor for this type of project. RFID technology is used in stores, warehouses and inventory control systems everywhere. The technology used, the tags and scanners are off the shelf products. The tags are relatively inexpensive without the need for replacement. There are different types of scanners and manufacturers, testing

by an office will find a scanner that works for their operation. Offices with larger operations could most likely set up databases that work with the scanning technology. But utilizing a third-party vendor is also not extremely expensive compared to the return on investment.

Outreach Efforts/Positive Results

Increasingly, election offices are being asked to account for questions on security, chain-of-custody, and accountability. Every system, process or procedure that we can improve, while also demonstrating the diligence taken by our office in implementing these changes, is a worthwhile investment. As we have hosted groups or individuals for information sessions, our office is able to show the RFID system as the way we are tracking, monitoring and accounting for equipment. The RFID system has received positive responses with citizens who have said it really impressed them the level to which we were tracking our equipment.

In 2022, the Kansas Legislature asked for an audit of election security in local election offices. The Legislative Post Audit office selected a handful of counties for investigation. Douglas County was one of those counties. The Legislative Post Audit staff submitted a random selection of equipment with questions about testing and deployment. Our office was able to go into our tracking system and print full historical records of testing, maintenance, deployment. The ability to not only produce these records, but to do it with minimal effort was worth everything we invested in this project, both in human and fiscal resources. Additional, producing these records easily without sorting through piles of paper exhibits the professionalism of our office to counter a misperception of election offices having no controls or interest in security, chain-of-custody. The ability to show this to our legislature was worth all of the investment in this project.

Conclusion

Recently, while researching for this submission, we have learned Alameda County, California (883,942 registered voters) first experimented with RFID technology in 2008. They were able to utilize their internal resources for implementation, at a time when the introduction of the technology was extremely cost prohibitive for most offices. Often, the largest counties with the most resources can harness the equipment and funds for a project like this one and smaller jurisdictions feel innovation is not possible. Technology has advanced to allow us to be creative without the limitations of excessive cost and staffing. This project shows how use of the technology advancements in RFID tags, cell phone applications and database management tools has allowed a small/medium size county to implement an innovative approach to a complex problem. Additionally, this RFID project exhibits the development of sustainable and replicable systems which can be scalable for any size jurisdiction. We are in a time where technology is now accessible for election offices in ways that are not only cost-effective but are also flexible to meet the imaginations and creativity which have always been part of how we face the challenges of managing a complex ever-changing environment. Douglas County submits this submission not only to celebrate the success of this project, but to also show that regardless of size innovation really is possible.