Los Angeles County

Registrar-Recorder/County Clerk

New Voting System Assessment Project

Analysis of Critical Implementation Factors

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1. INTRODUCTION

The Registrar-Recorder/County Clerk (RR/CC) is conducting an assessment of its options for implementing a new voting system for the County of Los Angeles. The main purpose of this document is to analyze the critical factors that impact that assessment and to consider the different options available for structuring a project to implement the new voting system.

The document begins with a background review of the department's current voting system environment and its past attempts at modernizing the voting system. It then proceeds to look in detail at each critical factor that has been identified, followed by a comparison of the different ways an implementation project might be structured and how effective each one is in relation to the critical implementation factors. The document concludes with a recommendation on what, given the considerations, the best path forward is to successfully implement a new voting system.

For the purposes of this document, the term *voting system* refers collectively to the mechanical and computer technology needed by the department to develop the layout of the ballot for an election (including the output necessary for creating sample ballot booklets), to test the voting system's logic and accuracy, to vote and cast a ballot, to validate a ballot, to tally voted ballots, and to report tally results. Other election information systems supporting voter registration, pollworker management, candidate filing, and campaign finance reporting, are not addressed in this document.

2. BACKGROUND

The automated ballot layout, tally, and tally reporting systems currently used by RR/CC were developed by the Information Technology Systems branch of the County's Internal Services Department (ISD). The original systems, the Automated Ballot Layout (ABL) system, the Election Tally System (ETS), and the Election Results Inquiry System (ERIS), were developed four decades ago using IBM mainframe computing technology. While RR/CC still uses the mainframe ABL and ERIS system hosted at ISD's Downey Data Center, the ballot tabulation component of the ETS system was migrated in the mid 1990's to a DOS-based PC platform called the Microcomputer Tally System (MTS), which resides on an isolated token ring network at RR/CC's Norwalk headquarters. Several ISD staff, none of whom were the original developers of the systems, continue to maintain the ABL, ETS, MTS, and ERIS systems. Ongoing attrition of ISD staff due to retirement, and the increasing difficulty of finding replacement staff with requisite skills in obsolete mainframe technologies, make the replacement of these systems an urgent priority for the department. Continuing to use these systems going forward poses increasing risks to the successful conduct of future elections.

In the late 1990's, the department began to consider a major modernization of the County's voting system. The strategic plan that was developed favored a cautious, gradual approach to modernization, as opposed to a wholesale replacement of the system. In an effort to pilot the emerging direct recording electronic (DRE) voting systems – whose solid state and touchscreen technology made them light-weight, portable and paperless – the department implemented in 2000 a Touchscreen Early Voting (TEV) program at 16 sites around the County. In 2001, the department also embarked on a project to replace the ABL and MTS systems with a new vendor-

developed turnkey system called GEMS2 that would utilize Microsoft Windows and other commercial-off-the-shelf (COTS) technology while retaining the basic architecture of the County's voting system, which relied on a centrally-tallied, small-format IBM paper ballot card. These projects were funded through the County's Information Technology Fund and the Quality and Productivity Commission.

In the 2000 Presidential General Election, America witnessed voting irregularities centered in Florida that demonized the punch card voting systems in use in the majority of voting jurisdictions in the country, including Los Angeles County. In 2002, Congress responded with the Help America Vote Act (HAVA) which, along with several new voting system requirements, distributed large funds to the states to help finance the modernization of the nation's voting systems. Unfortunately, the HAVA legislation stipulated a relatively aggressive timeframe for spending the funds, which in turn spurred a rush to decertify punch card systems (the California Secretary of State did this in 2003) and to replace them with new ones based on optical mark reading (OMR) technology, or the newer direct recording electronic (DRE) technology.

The County's response to these dramatic changes taking place was to reaffirm its cautious, gradual approach to voting system modernization. Instead of scrapping the County's punch card-based Votomatic Optical Scan Voting system and purchasing a completely new system, the County chose to adapt the Votomatic system to OMR technology. Votomatic ballots were pre-scored IBM punch cards that were voted by punching the ballot at the desired candidate's vote position. Voted ballots were tabulated by MTS using LRC 1000 card readers whose optics counted a vote by detecting a hole in a specific ballot position. The new voting system, called InkaVote, changed the pre-scored vote positions to bubbles on the IBM card, and changed the punch stylus to a felt-tipped ink stylus that marked an ink dot when pressed on the ballot using the vote recorder. The LRC 1000 readers were then equipped with new read optical read heads and firmware that counted a vote by detecting an ink mark in a specific ballot position.

By 2003, the GEMS 2 project the County had begun in 2001 to modernize the ABL, ETS, MTS, and ERIS components of the central tally system was preparing to roll out the new system for the November Gubernatorial Recall Election. However, the Help America Vote Act's establishment of the Election Assistance Commission, which was to replace the National Association of State Election Directors (NASED) as the official organization for nationally testing and certifying election systems, caused hesitation among many Secretaries of State as to how to proceed with voting systems certifications. In this environment, which persists to this day, state certification testing of GEMS 2 was delayed numerous times. By the summer of 2007, when Secretary of State Bowen finally agreed to test GEMS 2 as part of a "Top To Bottom" Review (TTBR) of voting systems in use in California, technology and security platforms and standards had changed so much the system could not meet Secretary of State's expanded certification requirements. Today, the GEMS 2 project is effectively dead, and the vendor and the County are taking the necessary steps to mutually terminate the contract for convenience.

Another consequence of the TTBR was a decertification and conditional recertification of the DRE technology used by the County for its TEV program. The conditional recertification called for a 100% manual recount of all ballots cast on the machines, effectively killing the program. With 2% of voters opting to cast their ballots at TEV centers, it was logistically and financially

infeasible to manually recount the approximately 50,000 to 60,000 ballots within the official Canvass period. The popular Countywide TEV program was terminated following the November 2007 UDEL election. The California Secretary of State has since maintained a strong policy bias against DRE voting technology and in favor of paper ballot voting solutions.

To comply with HAVA requirements that all voting systems support second-chance voting and provide voters with disabilities the opportunity to vote privately and independently, the County contracted with a vendor in 2005 to develop the InkaVote Plus Optical Scan Voting System, which was first used Countywide in the 2006 Gubernatorial General Election. InkaVote Plus places a Precinct Ballot Reader (PBR) with a peripheral Audio Ballot Booth (ABB) in each polling place. The PBR reads the ballot and checks for over votes and blank ballots, and supplies the ABB with ballot information and sound files that allow the ballot to be voted using an audio headset and keypad. In addition to English, audio is also made available in six foreign languages, in compliance with Federal Justice Department requirements.

The InkaVote Plus project was structured in two phases. In the first phase, the PBR and ABB units were manufactured and delivered, providing the County with required HAVA compliance. The second phase of the project involved the development of software components called the Vote Manager and Vote Converter that would allow precinct-level tally results from InkaVote Plus to be integrated into the County's central tally of vote-by-mail (VBM) and provisional ballots using MTS or GEMS 2.

The second phase of the project has been delayed for several reasons. First, although the County envisioned the implementation of a precinct-level tally when it developed the contract, the County has come to doubt its feasibility, especially since the Secretary of State has only certified the system for use as a HAVA-compliance device. Secondly, the confusion and resulting slowdown in the EAC's testing and certification process has cast doubt on the federal certification of the new software components. Lastly, since the EAC was established in 2002, it has issued a series of Voluntary Voting System Guidelines – in 2003, in 2005, and a new draft version in 2007 – that have rapidly expanded and hardened the requirements new voting systems must meet in order to qualify for federal certification. Given these difficulties in obtaining federal certification, and the fact that the County has always viewed the InkaVote Plus system as an interim solution while it charts a path for a wholesale modernization of its voting system, there was diminishing incentive to complete the second phase of the project. Recently, the County and the vendor have agreed to eliminate the second phase requirements and consummate the contract.

It is in this context of an aging voting system with dwindling technical support, a challenging and bureaucratic testing and certification environment, and rapidly changing technology standards and system requirements, that the County now must address with some urgency the goal of modernizing its voting system.

3. CRITICAL IMPLEMENTATION FACTORS

Before engaging in a project to implement a new voting system for Los Angeles County, it is useful, indeed obligatory, to review the many critical factors that will affect key decisions about what kind of system to implement and how. These factors are addressed in the section below.

3.1. STAKEHOLDERS

The successful implementation of a new voting system in the County of Los Angeles will not be successful without the participation, support, and consent of the project's many stakeholders. These stakeholders may be broadly categorized into the following groups:

3.1.1. Voters

The voters of Los Angeles County are the single most important beneficiary of the new voting system, so it is necessary for the implementation project to reach out to the community in a realistic and productive capacity to ensure as much as possible that their voice is heard and their needs are met. RR/CC already has a Community and Voter Outreach Committee that meets regularly to communicate issues, share ideas, and receive feedback from various community interest groups, and this body will continue to function as the primary venue for community stakeholder participation in the implementation project.

3.1.2. Voting Systems Interest Groups

Voting systems interest groups include advocates for one or more specific causes with respect to the design, development, implementation, and use of voting systems. These causes might be transparency (i.e., "open source voting"), security, disability access, instant runoff voting, paper-based voting systems, etc. Many of these interest groups are comprised of Los Angeles County voters who actively participate in the County's Community and Voter Outreach Committee. Others are based outside the County but are actively engaged with government and industry both nationally and in the State of California. While voting system interest groups are not necessarily the immediate beneficiaries of a new voting system the way voters are, the County still considers them key stakeholders in the implementation of a new voting system, because of the crucial input they provide in the County's decision-making process.

3.1.3. County Executive Management

In their capacity to make executive policy, budgetary, and contractual decisions on behalf of the County, and in their responsibility to taxpayers and constituents, the Chief Executive Office and Board of Supervisors play an important role in supporting and validating the department's decisions and plans for a new voting system. The CEO and the Board are also in positions to convene executive managers from other departments in the County in an advisory and/or support capacity.

3.1.4. RR/CC Election Administrators

After voters, those with the largest stake in the new voting system are the election managers and staff of the Registrar-Recorder/County Clerk, who must use, deploy, and maintain the system on a regular basis to successfully administer elections. Although a new voting system may be well-liked by voters or voting systems interest groups, if it is difficult or impractical to operate and support, or is incompatible with departmental requirements and limitations, it runs the risk of failure. Since no one knows more than RR/CC election administrators about what works and what does not in the successful conduct of elections in Los Angeles County, it is imperative that managers from all election-related areas of the department have a voice in determining the requirements of any new voting system and in evaluating the practicality and feasibility of any proposed solution.

3.2. BALLOT FORMAT

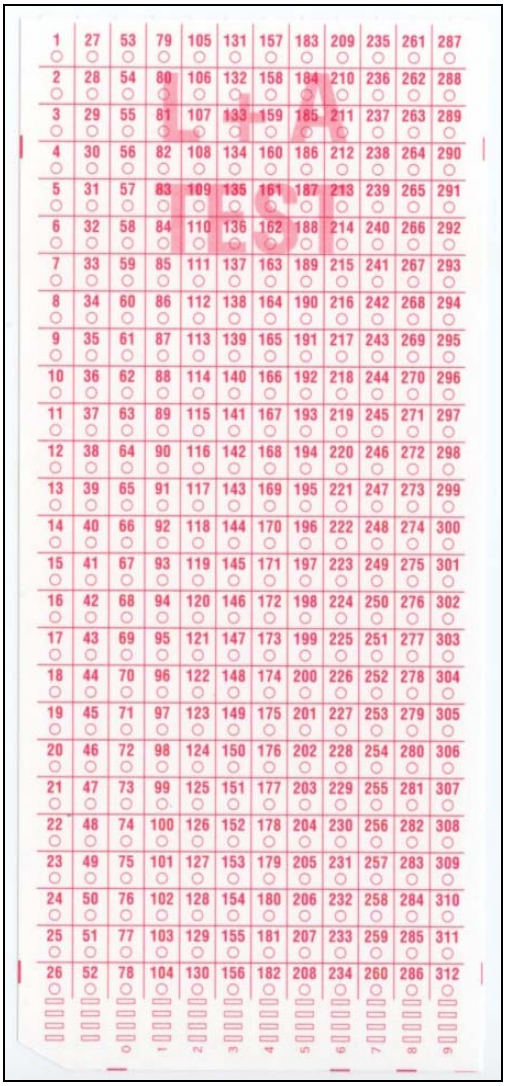
The ballot is the voter's interface with the voting system and, as such, is the crux of any new voting system implementation. As the singular point at which democracy actually happens, determining what ballot format will best serve the voters is paramount in the implementation. However, it would be a mistake to focus solely on the voter's relationship to the ballot. The ballot is also the fulcrum in the machinery of elections, around which all other election administration activities revolve. Each activity before and after the act of voting depends on the nature and structure of the ballot. Therefore, decisions about the ballot format must take into consideration the impact it will have on pre-election activities, such as candidate filing, ballot layout, and vote-by-mail (VBM) programs, and post-election activities, such as ballot remakes, tally audits, recounts, and ballot storage. Elections using full-faced paper ballots with candidate names on the ballot must be administered very differently than an election using a small-format ballot card, or an electronic ballot with a digital voting interface. Choosing a ballot format that meets voters needs yet is difficult to administer could pose unintended risks to the conduct of elections. Success in implementing a new voting system requires that a balance be struck between the ideal and the practical. In terms of selecting the appropriate ballot format, the discussion must be framed in the context of the end-to-end election process.

The impact of the ballot format on elections administration is particularly consequential in the County of Los Angeles. As the most populous, most geographically extensive, and most demographically diverse election jurisdiction in the country, Los Angeles County is subject to a host of constraints, preferences, and requirements that measure the effectiveness of one type of ballot over another. With over 4.5 million registered voters casting ballots in over 5,000 precincts distributed over more than 4,000 square miles of varying urban and natural topography, the challenges of storing, handling, and distributing the ballots and related equipment and materials are numerous and complex. Add to this the fact that the County is federally required to support six foreign languages, that it administers elections for over 4,000 districts, and that the number of voters casting ballots by mail during major elections is approaching 25% (in sheer numbers often exceeding total ballots cast for most counties in the nation), it becomes quickly evident that choosing a ballot format for Los Angeles County is a daunting task. This will explain to some extent why the basic ballot format used in Los Angeles County elections has not

changed in almost four decades, even as the voting system itself has evolved with changing technology and regulations.

3.2.1. Current Ballot Format

The IBM-format ballot used originally by the mainframe Votomatic voting system, and still in use today with the InkaVote voting system, has 312 vote positions, as shown in the figure below.



3.2.1.1. Advantages of the IBM-312 Format

In Los Angeles County, it is not uncommon during major elections to have ballot groups with 20 to 30 different contests appearing on the ballot, so the compact nature of the IBM-312 format, as well as its large quantity of available vote positions, gives flexibility to the ballot layout process

and allows all of the contests to appear on one single-sided ballot. The key benefit of this feature is that only one ballot is required for each voter.

The structure of the ballot has other benefits as well. The 3¼ inch by 7¼ inch dimensions of the ballot make handling the ballots quick and efficient. When packaged into boxes for delivery to and from the polls, or when loaded into trays for tabulation and storage, the cumulative weight of the ballots is low, making lifting and carrying relatively easy. The lower volume afforded by the compact format permits the storage of millions of ballots in fewer than 80 small cabinets situated alongside tally system equipment in the department's 500 sq. ft. secure MTS Tally Room. The dimensions and weight of the ballots also lend themselves to more economical mailing for VBM operations. By the same token, they allow the ballot to be constructed from thick, durable card stock without unduly impacting logistical operations and costs.

3.2.1.2. Disadvantages of the IBM-312 Format

There are also some disadvantages to the IBM-312 ballot format. Apart from small, usually single-contest elections with few candidates, it is not possible to place the names of contests and candidates on the ballot. Therefore a peripheral device called the vote recorder must be used to display the contests and candidates and to assist the voter in marking the desired vote position. Voter recorders require maintenance, and the ballot pages must be assembled for each election. Ensuring that each recorder is assembled correctly for each ballot group, and ensuring that the assembled vote recorders are delivered to the correct polling place are additional requirements of this ballot format.

Since VBM voters do not have the benefit of the voter recorder device that is provided at the polls, they must use a sample ballot booklet to identify the number of the vote position for the desired candidate and manually mark the vote position. Some have argued that the mechanics of using a separate booklet to correctly mark the ballot is prone to error, and that requiring the voter to vote in this manner, as opposed to voting on a larger format ballot that supports a "name on ballot" layout, is disenfranchising.

3.2.2. Consequences of Changing the Ballot Format

In addition to the arguments for and against the use of the IBM-312 ballot format, due diligence also requires an evaluation of the consequences in Los Angeles County of changing to a different ballot format. Essentially, there are only two other general types of ballot formats, the large format, full-faced paper ballot, and the electronic ballot. These will be discussed in order below.

3.2.2.1. Large Format, Full-Faced Paper Ballot

The compelling advantage of the large format, full-face paper ballot is its intuitiveness and simplicity of use. Visually, voters are accustomed to similar documents, such as surveys, applications, medical forms and so forth, in which all of the information needed to complete them are presented together on a single page. This "name on ballot" format requires no other devices or extra voting materials in order for the voter to connect the vote position with the desired candidate. By eliminating the need for vote recording devices, the operational costs of

maintaining, preparing and delivering polling place materials would be greatly reduced. VBM voting instructions could also be minimized or eliminated, potentially reducing printing and mailing costs.

A large format, full-faced ballot, however, would present major operational challenges for the department due to the dimensions, volume and weight of the ballots. Given the large number of contests that can appear in a Los Angeles County ballot group, it would be mandatory to support the largest dimensions available, usually 11 x 17 inches. Even then, some ballot groups might exceed the double-sided capacity of these ballots, especially when judicial offices come into play. Such a large ballot tends to be unwieldy to handle individually, and requires more individual workspace. In terms of processing through machines, such as inserters, sorters or readers, they behave more like sheets of paper than stiff cards, especially when they have been folded for mailing purposes. Some machines would need to be modified or replaced to handle the new dimensions of the ballot stock.

The volume of ballots packaged for delivery would increase dramatically, as would the weight. Assuming a constant paper thickness and density, the volume and weight of an 11 x 17 inch ballot would be over six times greater than the IBM-312 ballot format. This would have a major impact on the storage and staging capacity of the Election Operations Center (EOC) during supply tub assembly prior to the election. Storage of voted ballots in the central tally room, which is the current practice, would be impossible even temporarily without major remodeling, and perhaps structural reengineering, of the RR/CC headquarters building. It may be possible to convert part of the EOC facility to a tally center and long-term ballot storage area, or to rent or purchase another facility, but those options would undoubtedly involve large capital investments, increased operating costs, as well as radical changes to ballot transport and handling processes.

To some extent, these negative consequences could be mitigated by selecting a large format ballot that uses thinner or less dense paper stock. While this would help to reduce the increase in volume and weight of the ballots, it raises other issues with durability and structural integrity during handling and machine processing.

Poll workers and voters would also be negatively impacted by a ballot format change. The County currently uses a supply pick-up model for election materials distribution, as opposed to a supply drop-off model. The pick-up model requires the poll inspector to drive to an Inspector Supply Pick-up location, and to load the election supplies into his or her private vehicle. With a large format ballot, the current 8 lb. box of IBM-312 ballots would become 48 lbs. – adding 40 lbs. more to the existing weight of polling place supplies and machinery the inspector must transport to and from the polls. Voters, too, would need to be extra diligent when voting by mail. With the ballot's large dimensions, the voters are more apt to bend or crumple them, spill on them, or otherwise stain or spoil them.

3.2.2.2. Electronic Ballots

Although the current regulatory climate, especially in California, has been decidedly against the electronic ballot format in the form of DRE voting technology, they nevertheless offer several benefits over paper-based ballots. Electronic ballots do not have the financial and logistical

overhead of procuring paper ballots ahead of logic and accuracy testing and other pre-election processes. They do not have the physical space limitations of paper ballots, since electronic ballots can have an unlimited number of pages. They offer flexible ballot presentation capabilities, such as adjustable font sizes and color contrasts for voters will visual impairments or ballot translation for voters with special foreign language needs. DRE technology more readily supports audio voting and disability access for voters with disabilities, as well as over vote protection in compliance with HAVA second chance voting requirements. DRE technology would also simplify Los Angeles County's setup of polling place voting booths for primary elections. Whereas our current system requires a different booth for the political parties, DRE technology can present the electronic ballot for any political party.

The most commonly cited disadvantage of the electronic ballot format is the lack of a paper ballot for auditing and recount purposes. DRE technology has addressed this concern with the voter-verified paper audit trail (VVPAT) capability, but these paper records, which are implemented as thermal paper rolls, are very difficult to use for audits and recounts and to store for record retention. Another disadvantage is that electronic ballots can only be used at polling places where DRE devices are located, so a separate solution would be needed for VBM voters.

Other disadvantages are unique to Los Angeles County due to its size. With over 4,500 polling places in a major election, the need to have up to eight voting booths in a polling place (as we currently do for high-turnout elections) could require storing, maintaining, programming, securing and transporting well over 30,000 DRE devices. Retrieving, transporting, and processing the votes on 30,000 memory cards would be a very complex process that is difficult to control. Such a logistical challenge would require fundamental changes to current election preparation, materials distribution, and ballot collection and tabulation business processes, and as with the large-format paper ballot, could require major capital investments for facilities remodeling or procurement. Poll workers, too, would be challenged to transport so many DRE devices, unless they could be designed to be light-weight and compact. Otherwise, it is likely that the County would have to shift to a supply distribution model that involves additional costs for rental trucks and drivers.

One concept that has been proposed that might address the paper record issue is the hybridization of the paper and electronic ballots in the form of a "ballot-on-demand" system. Such a system would present an electronic ballot to the voter for making vote selections, but would print a paper ballot for tabulation, audit, and recount purposes. In addition to all of the advantages of a traditional DRE solution, a ballot-on-demand solution would require only a generic official ballot that would be easier to order and distribute. Unfortunately, even if such a system were to gain regulatory approval, it carries with it the disadvantages of both a paper-based solution, which requires paper ballot procurement, handling, and storage, and a DRE solution with its maintenance, storage and transport requirements.

3.3. TALLY LOCATION

There are two types of tally location models, the central tally model and the precinct tally model. In the central tally model, ballots are transported back to a central tally facility for tabulation and reporting. In the precinct tally model, ballots are tabulated at the precincts, and only the precinct

results are submitted to election headquarters for election night compilation and reporting. It is important to note that this choice of tally model only applies to traditional elections that use polling places for in-person voting. Ballots that are cast by mail, whether for an all vote-by-mail election, or as part of an absentee or early voting program of a traditional election, must be tallied at a central facility, where the voter's identity is verified prior to tabulating the mailed ballot.

Los Angeles County currently uses a central tally model in which all InkaVote ballots are transported to RR/CC headquarters in Norwalk on election night for ballot tabulation using the MTS system. There are two chief advantages of this system for Los Angeles County. The first is that a relatively small number of centrally-located high-speed card readers can be used to tabulate millions of ballots in one night. All of the card readers and the MTS client and server machines (as well as the ballot storage cabinets) can be stored and maintained in a roughly 500 sq. ft. room making it easy to test and maintain the hardware and to control and secure the environment. The contained environment also supports a tightly controlled ballot tabulation and snag process to ensure each ballot is accounted for and securely and accurately counted.

The second advantage is that the same system used to tabulate polling place ballots is also used to tabulate VBM ballots. This is an important point to keep in mind when considering the implementation of a new voting system. Should the County opt to change to a precinct tally system, it would not only require testing and maintaining the performance and accuracy of thousands of precinct tabulation devices, but also a separate set of high-speed VBM ballot tabulation devices operated at a central tally facility. Even if the County were to use one system for centrally tallying precinct ballots, and a different system for tabulating a different format VBM ballot, the need to maintain and integrate two different tally systems would present challenges in terms of facilities remodeling and election process changes.

To a certain extent, Los Angeles County already has some experience with a precinct tabulation system through its use of the ES&S InkaVote Plus optical scan voting system. Although the County is not permitted to use the system to tabulate ballots (it is used only to support compliance with federal HAVA and Voting Rights Act requirements at the polling place), it was designed as an end-to-end voting system, and much of the system maintenance, programming, testing, and preparation would be similar for any optical scan precinct tally voting system. However, what the County learned from implementing the system is that, without the ability to use networking or telecommunications technology to upload precinct tally results to a central server, which is prohibited by California Elections Code 19217, the additional costs associated with administering a precinct tally voting system outweigh the benefits.

The benefits of remote upload of precinct tally results include the time and manpower saved by not having to transport paper ballots back to a central facility running a late evening, fully-staffed tally operation. Under the statutory restriction of electronic uploads, physically transporting memory cards containing the precinct tally results from the polling place to a central facility, with all of the requisite logistics, staffing, and security controls, is little different from transporting a box of paper ballots. In either case, the speed with which election night tally operations can conclude is limited by the last precinct to report.

Perhaps the biggest disadvantage of the precinct tally model for Los Angeles County is the requirement that all ballots are successfully tallied at the polling site. With over 4,500 polling places for a major election, the task of training poll workers, educating voters, setting up the equipment, and keeping the tabulator operational at each polling place is an unfeasibly high operational hurdle not experienced by smaller scale jurisdictions. Based on our experience with the InkaVote Plus system, no amount of preparation or training can ensure operational integrity at 100% of the polling places. Consequently, the need to have contingency processes in place to ensure voting never stops and every ballot is accurately counted adds cost and complexity to the process without commensurate benefits.

Finally, considering that a precinct tally solution in California would also have to be a paper ballot optical scan solution that would require special handling of both paper ballots *and* memory cards, and considering the aforementioned limitations, complexities and costs associated with a precinct tally solution, it is difficult to justify the precinct tally model in Los Angeles County. The best argument in favor of a precinct tally solution are the federal Help America Vote Act and Voting Rights Act, whose requirements for second-chance voting and support for foreign-language voting and disability access encourage placing computer hardware in the polling place which may as well support precinct tabulation.

3.4. LOGISTICS, HANDLING, AND SECURITY

Up until 2002, the RR/CC used trucks and drivers to deliver election supplies approximately one month before the election. Official ballots, voter rosters, vote recorders, and other voting materials were delivered to the poll inspector, while voting booths, tables, chairs, and other heavier equipment were delivered to the polling place facility. This approach to election supply distribution required renting many trucks, hiring many drivers, and developing truck routing plans, and was ultimately complex and costly to administer, and prone to errors. In 2002, the department implemented the Inspector Supply Pick Up (ISPU) program, which has successfully reduced the cost and errors associated with election supply delivery. The ISPU program compensates the poll inspectors for coming to a Regional Distribution Center ten days prior to the election to sign for the election equipment and supplies and to transport them in their personal vehicles. The traditional wood ballot booths were replaced with disposable cardboard ballot booths, so the inspector could transport them, but special requests for tables and chairs are still delivered to polling place facilities on an as-needed basis. After the close of polls on election night, the poll inspector and one other poll worker transport the voted ballots along with all the other election equipment and supplies to a Check-In Center (CIC).

While the ISPU program has been an unqualified success for the department, it does present some constraints that must be considered when evaluating a new voting system implementation. Chief among these is the weight and dimension of the supplies the inspector is being asked to handle. Since ISPU takes place ten days before the election, inspectors are required to handle the supplies several times before and after Election Day. They take them home for secure storage, take them to the polling place on Election Day, set them up and break them down at the polling place, and transport them to the CIC after the close of polls. This involves quite a bit of lifting, carrying, and maneuvering that may physically challenge the poll inspectors (many of whom are elderly), damage poll inspectors' personal vehicles, or simply not fit into available passenger or

cargo space. Any equipment of a new voting system must be as compact and light weight as possible if it is to be a viable solution in the context of our ISPU program.

Other issues to be considered are equipment amenities that make handling the equipment easier and safer. Features such as hand grips, extending handles, shoulder straps, and wheels are very important, as is the ability to efficiently stack and secure the equipment during transport and storage. With respect to optical scan units, disability voting devices, or other computer equipment, the ability to maintain, program, test and prepare the equipment *in situ* in storage racks, as opposed to moving them around between storage and some other location, is a key requirement considering the limited workspace at the department's Elections Operation Center (EOC).

A final consideration of any new voting system is the quantity of computer equipment that must be provisioned to the polling place and monitored for chain of custody and security. The more pieces of equipment that require penetration prevention using serialized security locks and seals, the more work and supplies needed to prepare the equipment for the election, and the more work required by poll inspectors and others to monitor and audit the security. Less equipment means less complexity and greater probability of success in using the equipment successfully and without incident.

3.5. ELECTION AND REDISTRICTING SCHEDULE

Since the conduct of current elections always takes priority over other projects in the minds of elections administrators, the timing of a new voting system implementation project with respect to the current election cycle can make or break its progress and ultimate success. It is fair to say that, historically, the scope of any project to implement a new voting system in the County of Los Angeles was so monumental and time-consuming an undertaking, it appeared unworkable in the busy schedules of RR/CC election managers. It is no wonder the County has developed a measured and cautious approach to voting system modernization over the years, changing and enhancing its system in manageable increments according to the regulatory, administrative, political, and constituent needs of the day, while keeping the fundamental architecture of the system the same.

While there may not be much that can be done to mitigate the scale and impact a wholesale voting system replacement would have on the department's business processes and organizational structure, the probability of a successful implementation can be optimized by coordinating it around lulls in the election schedule. In the past, the best period to implement major election-related projects was the quiet ten-month period between the even-year General Election and the odd-year UDEL Election. Assuming the New Voting Systems Assessment Project concludes as planned in June 2010, it is not unreasonable to target the December 2010 to September 2011 timeframe for making major strides toward a new voting system implementation, whatever that may entail.

Unfortunately, there are a couple of reasons why this timeframe may be challenging as well. First, since the advent of term limits for state legislative offices, vacancies in federal or state offices have had the tendency to trigger a series of additional special elections caused by

politicians seeking to extend their careers before terming out of office. Consequently, we have seen election schedules in the so-called "off years" of 2005, 2007, and 2009 that have been as busy as their even-year counterparts. There is every reason to believe the trend will hold and 2011 will offer little respite for non-election activities, making it difficult for managers to focus on the new voting system implementation.

Secondly, 2011 is also the year redistricting is implemented for congressional, legislative, and local government districts. While there is no direct linkage between redistricting and the voting system, the workload created by redistricting will occupy the schedules of key managerial and technical staff for a good part of 2011, contending with the new voting system implementation for the time and attention of key personnel.

3.6. CERTIFICATION

At both the federal and California State level, it has become increasing difficult to obtain voting system certification. The federal funding made available by the Help America Vote Act of 2002 (HAVA), which sought to modernize the nation's voting systems, spurred a rapid migration to DRE voting technology that outpaced the ability of regulators, voting integrity advocacy groups, and the general public to adjust to the technological changes. A grassroots backlash decrying supposed flaws and vulnerabilities of voting system digitization and networking prompted many states as well as the federal government, to rethink processes, standards and guidelines for voting system certification. Many states, including California, moved to harden voting system security and accuracy testing requirements, and also added federal certification as a regulatory or statutory prerequisite for state certification.

Prior to HAVA, the National Association of State Election Directors (NASED) was the organization responsible for setting federal standards and guidelines for voting system testing and certification, and for administering a voluntary testing program. HAVA shifted this responsibility to a newly created Election Assistance Commission (EAC). Unfortunately, the EAC was slow to establish its program for testing and certifying systems, and instead focused its energy and resources on the development of ever newer and more stringent voting system guidelines. As a consequence, new voting system certifications have ground to a halt and voting system manufacturers, as well as election jurisdictions, remain confused about the guidelines to which they should be building and implementing their systems. The threat of stagnating innovation and market failure posed by this certification regime is increasingly becoming a reality, as evidenced by the recent merger of the two largest voting system manufacturers.

As the County of Los Angeles looks forward to implementing a new voting system, it must factor in this challenging and complex issue of voting system certification. The approach the County takes, and the solution that it pursues, will likely be the one that also offers the most expedient path to certification. While that path is as yet unclear, there is a growing realization that the federal EAC voting system certification program as it is currently structured and operated is dysfunctional. Pressure on the states to provide an alternative path to certification is increasing.

In California, the only statutory requirement for federal certification is for DRE voting system solutions. Presumably, alternative optical scan solutions do not by law require federal certification, although the SOS has used its regulatory authority to establish a procedural requirement that all voting systems be federally tested before applying for California state certification. This deference to federal testing, combined with more stringent testing and security requirements, has had a similar effect of stifling voting system approvals in California. The traditional vendor-based approach to voting system implementation appears less viable, and perhaps that is by design. The SOS has signaled that it favors an "open source" approach to voting system implementation, even though that approach has yet to be successfully employed anywhere in the United States.

Los Angeles County is not opposed to exploring an open source voting system implementation, or something similar to it that would satisfy the concerns and requirements of the SOS (e.g., a County-developed solution that unlike proprietary software could be more transparent and subject to professional review). Indeed, of all the counties in the state (and even the country), Los Angeles County – with its technical and managerial strength and long history of home-grown and self-supported voting and election system solutions – is the one county that is capable of making an open source solution a reality. However, if it does not lead to a more expedient certification, preferably by avoiding the federal process all together, there is little incentive to bear the additional risk of this new and potentially revolutionary model of voting system implementation.

3.7. BUDGET

The global financial crisis of late 2008 and ensuing recession have placed a serious strain on the budgetary health of the County. The long-term prognosis of the County budget, which relies on funding from more severely battered state and federal budgets, is not rosy. As intertwined as they are, it is prudent to assume that the County will have to weather the same structural economic deficiencies faced by California and the nation, which are forecast far into the future due to an aging, retiring population with growing medical and socio-economic needs. Although some might argue that there should be no limit to the price paid for a new voting system, the new economic reality compels us to be rational in the pursuit of our ideals, and to accept the fact that no voting system can meet the special needs of every individual. Compromise, to the extent permitted by legal requirements, will be essential to controlling the costs of any new voting system.

Budget concerns can also drive implementation options. The shrinking voting system marketplace has the potential to place upward pressure on voting system costs. It would behoove the County to evaluate and compare the procurement cost, as well as the long-term operations and maintenance cost, of systems developed by the County, vendors, or other third-parties.

3.8. TECHNICAL SCOPE

Reflecting on previous discussions of the budget, and the extent to which business processes might change, or new facilities might be needed, it is worthwhile for the County to consider

limiting the technical scope of the project. There are three types of voting that shape the business processes and voting systems infrastructure of the department. These are:

1. Voting at the polling place on election day
2. Voting by mail
3. Early voting at designated early voting sites

While the County might want to take advantage of the opportunity this project presents to completely overhaul the processes and infrastructure that support each of these areas, it is by no means necessary to undertake it all at once. It is feasible to break these areas into three separate projects, and to implement them as means and priorities dictate. For example, it may be better to implement a new VBM voting system and integrate it with the existing MTS central tally system. Limiting the scope in this way contains the amount of business process change that would take place at one time and the new VBM system could better inform a later project to replace MTS. Likewise, implementing a new early voting technology would solve that immediate deficiency in our voting services while perhaps shedding new light on the directions that County might take in modernizing the systems that support the vote-at-poll and VBM voting services.

4. IMPLEMENTATION OPTIONS

The three basic options for implementing a new system are to purchase a pre-built system from a vendor (a.k.a. COTS); to contract with a vendor to build a new system, who then turns it over to the buyer for maintenance and operation (called turnkey projects); and building the system oneself with internal or contracted technical staff (called in-house projects). These three options are discussed further in the following section.

4.1. PURCHASE COMMERCIAL OFF-THE-SHELF SYSTEM

History has shown that for large systems implementations, this option is usually unrealistic. This is because, in terms of user requirements, the County simply does not fall within the bell curve of the average customer, so systems manufactures have little market incentive to design and build COTS products to unique Los Angeles County specifications. Consequently, it is rare for a COTS system of any significant scope to be implemented without major customizations or enhancements that address the scale and complexity of the County. In terms of a new voting system, such changes to a COTS voting system are often difficult to force into the existing architecture, and inevitably entail a recertification of the system. In the current certification environment, this means additional managerial costs and delays, which vendors are reluctant to undertake for the sake of one customer.

Another disadvantage of the COTS option is that it does not easily support the needs and concerns of open source voting advocates who are seeking more transparency in voting system technology. With the need to earn profits, vendors have a vested interest in guarding their proprietary solutions, and it is no wonder that most vendors have invoked intellectual property rights to limit source code reviews to state and federal certification programs. All things considered, a better vendor-based approach may be a turnkey project, as discussed below.

4.2. CUSTOM DEVELOPMENT AS TURNKEY PROJECT WITH VENDOR

The advantage of a turnkey project is that the vendor is required to gather the unique requirements of the user and incorporate them into design specifications prior to building the solution. Such an approach would greatly benefit not only Los Angeles County elections administrators and poll workers, but also the many voting advocacy groups who regularly communicate their unique needs and concerns to the department through the Community and Voter Outreach Committee. If the project and contract are structured properly, a turnkey project would also better support the needs of the open source voting community. Since the vendor is building a custom voting solution for the County and relinquishing proprietary rights to the software, the County would have the ability to make the development process more transparent and to incorporate the needs of voting integrity advocates and the voting public in general. It may be possible under this approach to engage with a non-profit open source voting organization, who would act as the vendor.

It is also possible in a turnkey project to engage the support of County staff in the design and even development of the voting system, so that when the time comes to turn the developed system over to the County, the department will have knowledgeable staff capable of administering, maintaining, and enhancing the system. To some extent, the County already has experience with this type of turnkey voting system project in its implementation of the InkaVote Plus Voting System (ES&S). Although the InkaVote Plus system is certified and marketed as an end-to-end voting system of the company Election Systems & Software, its development came out of a Los Angeles County Request For Proposal that specified a HAVA-compliant precinct tally solution that was compatible with the County's IBM-312 format ballot card and other unique County requirements. Since no such solution existed on the market at the time, the project was similar to a turnkey project in terms of its incorporation of unique Los Angeles County requirements, although ultimate ownership and marketing of the solution remained with ES&S.

From a risk management perspective, a turnkey project is similar to a COTS solution in that performance risk is transferred to the vendor, thus limiting the cost exposure of the County should the project fail.

4.3. CUSTOM DEVELOPMENT BY INTERNAL SOFTWARE ENGINEERING TEAM

In this very dynamic time in the history of voting systems, the greatest opportunity for setting a new paradigm in voting systems implementation is the option of developing a voting system solution using an internal software engineering team. This approach gives the County maximum flexibility in terms of designing to the County's unique array of needs, as well as following an open source model of system development. If necessary, the County could consult with a non-profit open source voting organization for guidance in the open source model.

The uniqueness and transparency of this approach also has the potential to open up a new dialog with the SOS regarding the voting system certification process. The current certification process is geared toward verifying the security and accuracy of vendors' closed proprietary solutions. If

the security and accuracy verification were carried out as part of an open development process, it could justify a truncation or fast-tracking of the certification process.

Within Los Angeles County, the internal software engineering team could consist of software specialists from the Information Technology Services branch of the Internal Services Department, programmers and analysts from the RR/CC's Technical Services Bureau, third-party programmers contracted through the County's ITSSMA program, or some combination of the three. While smaller counties with fewer resources might scoff at such a proposal, it is not at all beyond the ability of the County to manage its own project to design and build its own voting system. Indeed, the County's current voting system was originally implemented almost forty years ago by County technical staff using existing IBM products. Recent experience with vendors has demonstrated that the County's current software engineering staff are as technically skilled in software and systems, and as knowledgeable of election requirements and processes, as any vendor's technical staff. In fact, not developing the solution in-house begs the question of what would happen to these staff if they could not continue to engage in the technical support of the County's voting system. Certainly, a great deal of talent and knowledge could be squandered and perhaps even lost if our existing County resources are not directly utilized.

The risk to avoid in developing a new voting system solution in-house lies in the hardware. As long as the hardware used by the system is of the COTS variety, the project will be relatively easy to manage and implement, and hardware costs would be lower. If that is not technically feasible, the County could contract with a vendor to manufacture custom hardware. This would increase the cost and complexity of the project, but would transfer hardware performance risk to a vendor with more expertise in development, testing, and quality control of computerized hardware.

5. CONCLUSION

The critical implementation factors and project implementation options considered in this document reflect in a general way the diverse perspectives and experiences of Los Angeles County election administrators. While the priority and merits of each are endlessly debatable, the analysis presented herein will, after time and careful consideration, reveal a general inertia toward an ideal voting system implementation for Los Angeles County. This document is intended not as a final judgment of these factors and options, but to serve as a basis for a continued focused discussion and analysis that will help the County and all other stakeholders in the voting system implementation process to realize a new voting system that is best for most, if not all.