

A Plan to Modernize Voter Registration: Implementation of the Recommendations of the Carter- Baker Commission on Federal Election Reform

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In its report entitled *Building Confidence in U.S. Elections*, the Commission on Federal Election Reform, co-chaired by former U.S. President Jimmy Carter and former U.S. Secretary of State James A. Baker, III, presents a bipartisan plan to improve U.S. election systems.¹ Central to this plan is a set of proposals to modernize voter registration. These proposals are designed both to facilitate participation by eligible voters and to prevent election fraud.

Voter registration systems are being upgraded under the Help America Vote Act of 2002 (HAVA; Public Law 107-252), which requires states to consolidate local voter registration lists into statewide voter databases. However, further improvements are needed. HAVA makes no provision to improve the way voter registration is updated for the approximately 9 million Americans who move to another state or abroad each year. HAVA also does little to expand voter registration or to assess the quality of voter registration lists. Improvements are needed beyond HAVA to ensure that the largest possible number of eligible voters is registered, the voter lists are accurate, and the ineligible voters are taken off the voter lists.

The Carter-Baker Commission recommends several major improvements in voter registration systems beyond HAVA:

- All states should establish “top-down” voter registration systems whereby the state has clear authority to register voters and to maintain the voter registration list (Commission recommendation 2.1.1).
- Voter registration databases should be made interoperable between states (recommendations 2.2.1 to 2.2.4). Interoperable voter databases should require citizens to register only once and should facilitate updates in voter registration when citizens move (recommendation 2.2.6).
- Citizens should be able to verify and correct their voter registration file (2.2.5).
- States should audit their voter lists for quality (2.6.1).
- States should automatically register to vote all citizens who are issued a REAL ID driver’s license and should provide non-drivers with a free photo ID for voting (Section 2.5 of Commission’s report). States should also make voter registration and ID accessible to all eligible citizens by taking the initiative to reach out to non-drivers through social service agencies and voter registration and ID drives with mobile offices (Section 4.1).

¹ For the report of the Commission on Federal Election Reform and information on its membership and funding see <www.american.edu/ia/cfer/>.

The rationale for each of these recommendations is presented in the Carter-Baker Commission report. This paper focuses instead on the steps needed to implement the Carter-Baker Commission recommendations. It assesses the policies, procedures, and costs of putting the recommendations into effect. It draws a roadmap to carry out the Carter-Baker Commission's proposals to make state voter databases interoperable, to assure high quality in voter databases, and to connect voter registration to voter identification.

The roadmap begins with modifications to existing federal legislation, specifically to the Help America Vote Act and to the REAL ID Act (Public Law 109-13). HAVA mandates the creation of statewide voter registration systems, but voter registration in some states remains largely under local control. A clear requirement for states to build "top-down" voter registration systems is needed to ensure that every state's election office is in charge of voter registration and thus is able to share voter data effectively with other states. The REAL ID Act requires states to verify the name, date of birth, Social Security number, and proof of citizenship of every U.S. citizen who is issued a driver's license. The process of issuing REAL ID cards is tantamount to checking a citizen's eligibility to vote. REAL ID cards therefore can be adapted for voting purposes and supplemented with free photo IDs for non-drivers to expand the portion of eligible voters who are registered while strengthening safeguards against electoral fraud.

The next stage in the roadmap is the introduction of new federal mandates to make state voter registration systems interoperable. Under these mandates, a "unique identifier" would be established to distinguish each voter from every other American, and a national voter database would be created to connect all of the state voter databases with each other. The national database would allow states to share voter data and to make real-time updates to voter registration records. States would operate the national database, but it would be created and supervised by the U.S. Election Assistance Commission.

International experience shows what effective voter registration systems can achieve. Democratic countries around the world have extended voter registration to nearly all of their adult citizens and have required voter ID without limiting voter participation. International experience also shows how to audit voter registration lists. Such audits measure the degree to which voter lists contain accurate records, include eligible voters, and exclude individuals who are ineligible.

Implementation of the Carter-Baker Commission's proposals on voter registration would require federal funds to build top-down voter registration systems in 11 states, to register the estimated 23 million Americans who do not have a driver's license, to create a national database for sharing voter data, and to provide voter ID cards to non-drivers. The total cost of these proposals is estimated at \$287 million.² The appendix summarizes the main steps of the roadmap presented in this paper.

² *Building Confidence in U.S. Elections: Report of the Commission on Federal Election Reform*, September 2005, p. 71.

Top-Down Registration Systems

HAVA required states to establish a “uniform” and “centralized” statewide voter registration system “administered at the State level.” States have interpreted and implemented this requirement in different ways. Some states have created a “top-down” system, in which local election authorities supply information to a unified database maintained by the state. Others rely on a “bottom-up” system, whereby counties and municipalities retain their own registration lists and submit information to a state compilation of local databases at regular intervals.³

Top-down systems put the state election office in control of voter registration, while bottom-up systems allow local jurisdictions to decide who is on and who is off the voter registration list. Moreover, top-down systems tend to deliver information in real time—they provide all users with updated information the moment it is entered into the system—while bottom-up systems typically have a lag between the time an update is made by a local jurisdiction and the time that update is sent to the state voter database.⁴ Under current guidance from the U.S. Election Assistance Commission (EAC), a local jurisdiction in a bottom-up system may take up to 24 hours to provide an update of information to the state election office.⁵ States must therefore establish top-down voter registration systems before they can make their voter registration systems effective in sharing voter data with other states.

As of June 2005, 38 states were building or had built top-down voter registration systems, while 11 states were creating a bottom-up system, establishing a hybrid of a top-down and a bottom-up system, or still deciding on their voter registration system’s design.⁶ The Carter-Baker Commission recommended that these 11 states should be required to develop top-down voter registration systems.⁷

To implement this recommendation, these 11 states will need to purchase appropriate software and hardware, to incorporate local voter registration lists into the statewide voter database, and to lease data lines for secure transmission of voter data. A commercially available Database Management System (DBMS) can provide the software needed to build and maintain a statewide voter registration database. A DBMS is designed to handle the kinds of functions required for voter registration systems. It can collect and manage images,

³ Electionline.org, *Assorted Rolls: Statewide Voter Registration Databases Under HAVA*, June 2005, <<http://electionline.org/Portals/1/Assorted%20Rolls.pdf>>.

⁴ Ibid.

⁵ U.S. Election Assistance Commission, *Voluntary Guidance on Implementation of Statewide Voter Registration Lists*, July 2005.

⁶ Electionline.org, *Assorted Rolls: Statewide Voter Registration Databases Under HAVA*, June 2005, <<http://electionline.org/Portals/1/Assorted%20Rolls.pdf>>. Of the states without top-down voter registration systems, Arizona, California, South Dakota, Tennessee, and Washington have bottom-up systems, Oklahoma and Texas have hybrid systems, and final decision on the design of voter registration systems for Alabama, Illinois, New York, and Ohio was still pending. North Dakota does not have voter registration.

⁷ These 11 states may have concerns about the requirement to develop top-down voter registration systems soon after they have completed their new statewide voter databases, but the need for this requirement outweighs those concerns, as explained in *Building Confidence in U.S. Elections: Report of the Commission on Federal Election Reform*, September 2005, pp. 10-11.

such as photographs and signature images, can import and export data, and can exchange data with other commercial database systems.⁸

The software and hardware that states purchase for their voter registration system will depend on the capacity they need. States will need to select software and hardware for their voter database that can process an appropriate number of data transactions per minute. The number of transactions will depend on the number of eligible voters in the state.

The database software must be supported by hardware—by a computer “platform”—that has sufficient capacity to handle the software and the amount of data traffic. There are several combinations of Database Management Systems and computer platforms currently on the market, including Oracle, DB2, and FoxPro servers with Dell or IBM platforms.⁹ Many states have opted to purchase Oracle9i Database software with an IBM eServer or a similar system. The Oracle9i can process as many as 57,346 transactions per minute, according to the audited benchmark published by the Transaction Processing Performance Council.¹⁰ The capacity to process just under 60,000 transactions per minute far exceeds the needs of any particular state. A cheaper alternative is the Dell PowerEdge platform with a Microsoft SQL Server, which is reported by the Transaction Processing Performance Council to perform 12,579 transactions per minute at one-fourth of the cost of the IBM/Oracle system.

States have used two different approaches to create new voter registration systems. Some states have used “in-house” arrangements, such as services of the state’s office of information technology, to build their top-down voter registration system, while others have contracted with a private company.¹¹ In-house services usually cost less for initial installation but tend to have higher maintenance costs. Private contractors are usually used by larger states, which need a voter registration system with greater capacity.

When the software and hardware for the voter registration system are purchased and installed, a definitive, official state voter registration list is compiled. This is done by importing the voter lists of each local jurisdiction, one list at a time. After the first local list is imported into the state list, the second local list is imported, and apparent duplicates in voter registration records are identified. If the match of apparent duplicate registrations is certain, the older registration record is removed from the state list. If not, the apparent duplicate registration is investigated further to determine whether or not it is in fact a match. Then the third local list is imported to the state list, and apparent duplicates are identified, investigated, and removed. The import of local lists continues until they are all incorporated

⁸ Raghu Ramakrishnan and Jonannes Gehrke (2003), *Database Management Systems, (3rd Edition)*, New York: McGraw Hill.

⁹ Tobias Kretschmer, “Competing Technologies in the Database Management Systems Market,” NET Institute Working Paper #05-17, <<http://www.netinst.org/Kretschmer.pdf>>.

¹⁰ The Transaction Processing Performance Council publishes audited benchmarks at <www.tpc.org>. Benchmarks are computer applications that are written by a disinterested party (in this case by the Transaction Processing Performance Council) and run by vendors on multiple platforms. The results are audited and published by the disinterested party as a way for customers to compare vendors. The benchmark cited here is TPC-C, which is similar but not identical to a voter registration application. This and other benchmark numbers cited in this report are only approximations.

¹¹ Electionline.org, *Assorted Rolls: Statewide Voter Registration Databases Under HAVA*, June 2005, <<http://electionline.org/Portals/1/Assorted%20Rolls.pdf>>.

into the state list and duplicate registrations are eliminated. The official state list is then ready for use.

Once the state voter list is fully compiled, it must be made available to all local jurisdictions. The most secure way to make the state voter list available to local jurisdictions is to provide them with “read-only” access, whereby they can read but not alter the state list. In addition, a secure physical connection must be established between the computer server with the state voter list and the local jurisdictions.¹² A connection over the internet is vulnerable to hackers. Rather than rely on the internet, a secure connection can be established with leased data lines. These are lines operated by long-distance telephone carriers that deliver data on fiber optic transmission networks and are leased by the user—by the state election office—to send data over a “private reserved pathway.” Through leased lines, the state election office can provide secure connections for each local jurisdiction to the state voter list. Alternatively, states may consider the option of using virtual private networks (VPNs) to transmit voter data. VPNs provide a secure way to transmit data through public telecommunications infrastructure. Because they rely on shared lines of communication, they can transmit data at much lower cost than private leased lines.¹³

Top-down voter registration systems are expected to substantially improve the accuracy of voter lists, yet states will still need to update their voter lists on an ongoing basis to keep their voter lists current and accurate.¹⁴ As more than 40 million Americans move residence each year,¹⁵ usually within the same state, voter lists will quickly become out-of-date unless they incorporate the changes in address of citizens who have moved and take note of the citizens who have died or have otherwise become ineligible to vote. Unless each state’s voter database is kept up-to-date, transfers of voter data among states may suffer from the problem of “garbage in, garbage out.” Transfers of voter data may pass on inaccurate or outdated information from certain states to the rest of the country.¹⁶ The overall quality of a system to share voter data among states will only be as strong as the quality of the worst state voter database.

¹² A recent GAO report found that some states benefited by incrementally, rather than simultaneously, linking the counties online into the statewide system; GAO, “Election Reform: Nine States’ Experiences Implementing Federal Requirements for Computerized Statewide Voter Registration Lists,” U.S. Government Accountability Office, p. 27, <<http://www.gao.gov/new.items/d06247.pdf>>.

¹³ See <www.vpnc.org/vpn-technologies.html>.

¹⁴ Officials in Minnesota and West Virginia, among other states, reported that the introduction of a top-down system of voter registration “improved the accuracy of their voter lists somewhat or to a great extent”; GAO, “Election Reform: Nine States’ Experiences Implementing Federal Requirements for Computerized Statewide Voter Registration Lists,” U.S. Government Accountability Office, p. 21, <<http://www.gao.gov/new.items/d06247.pdf>>.

¹⁵ U.S. Census Bureau, *Geographic Mobility: 2002 to 2003*, Current Population Reports P20-549, March 2004, <www.census.gov/prod/2004pubs/p20-549.pdf>.

¹⁶ GAO, “Election Reform: Nine States’ Experiences Implementing Federal Requirements for Computerized Statewide Voter Registration Lists,” U.S. Government Accountability Office, p. 26, <<http://www.gao.gov/new.items/d06247.pdf>>.

REAL ID

The Carter-Baker Commission recommends the use of REAL ID for both voter identification and voter registration. The Real ID Act of 2005 (Public Law 109-13) sets strict federal standards for states to issue driver's licenses and personal identification cards. These standards require states to verify the documents presented by applicants, including proof that applicants are lawfully present in the United States, and to participate in the inter-state compact on sharing driver's license data to qualify for federal funds under the REAL ID Act. States must meet the federal standards set by the REAL ID Act for the driver's licenses and ID cards they issue to be accepted by federal agencies, for example by the Transportation Security Administration for passengers going through airport security. States that fail to comply with the federal standards must clearly mark, with a "unique design or color indicator," that the driver's licenses and ID cards are unacceptable to federal agencies.

The main provisions of the Real ID Act are as follows:¹⁷

- *Issuance standards:* Before states issue a driver's license or ID card, they must verify the documents attesting to the applicant's full legal name and date of birth, proof of the applicant's Social Security number, and address of the applicant's principal residence.
- *Evidence of legal status:* States are required to verify each applicant's legal status in the United States before issuing a driver's license or ID card.
- *Temporary licenses:* States may issue only a temporary driver's license or ID card to individuals who are authorized to stay in the United States temporarily. The expiration date of the driver's license or ID card must coincide with the end of the applicant's period of authorized stay in the United States. If the period of authorized stay is indefinite, the license or card must expire in one year.
- *Security:* States are required to:
 - make digital images and retain paper copies of documents submitted by applicants
 - confirm the numbers of applicants with the Social Security Administration
 - replace a driver's license or ID card issued by another state only upon confirmation that the applicant is terminating the old driver's license or ID card
 - train employees to recognize fraudulent documents
 - conduct security clearance checks on all employees who manufacture or produce driver's licenses and ID cards
 - ensure the physical security of locations where cards are produced

¹⁷ REAL ID Act (2005), 109th Congress, <<http://www.govtrack.us/data/us/bills.text/109/h418.pdf>>.

- *Database links:* States will be eligible for federal funds under the Real ID Act only if they participate in the Interstate Drivers' License Compact and provide electronic access by other states to their motor vehicle databases.¹⁸

The Carter-Baker Commission proposes the use of REAL ID for voting purposes because the process of issuing a REAL ID card is tantamount to voter registration. To issue a REAL ID card, the state must verify the applicant's full legal name, address, date of birth, and Social Security number, check the proof of citizenship if the applicant is a U.S. citizen, and retain a digital image of the application, which includes the applicant's signature. A U.S. citizen who is issued a REAL ID card has thus proven that he or she is eligible to vote and provided the state with all of the information needed to register him or her as a voter.¹⁹ The REAL ID card can be adapted for voting purposes with only a small notation on the card itself to show whether the card-holder is a U.S. citizen and thus is eligible to vote.²⁰

Under the National Voter Registration Act of 1993 (known as the "NVRA" or "Motor Voter" Act), many state departments of motor vehicles collect applications for voter registration when they issue driver's licenses.²¹ This is typically done by asking citizens, at the bottom of their application for a driver's license, if they wish to register to vote. The Carter-Baker Commission recommends that states automatically register to vote all U.S. citizens who are issued a REAL ID card. States can do so by making only two changes to their current procedures: (1) by asking citizens for their party affiliation if they wish to vote in primary elections (in states with closed primaries); and (2) by sending a copy of each citizen's application for a driver's license from the department of motor vehicles (DMV) to the bureau of elections.²²

¹⁸ The REAL ID Act did not authorize any specific amount of federal funds for states to fulfill the Act's mandates, but Sec. 538 of the Department of Homeland Security Appropriations Act of 2006 (PL 109-90), which was signed into law in October 2005, appropriates \$40 million in FY 2006 for states to implement the REAL ID Act.

¹⁹ Further study is needed on the implementation of the proof of citizenship requirement. On the one hand, this requirement raises concerns about the obstacles some citizens may face in obtaining a certified copy of their birth certificate, particularly citizens who were born in another state or who changed their name when they got married, see testimony by Barbara Arnwine, Executive Director of the Lawyers' Committee for Civil Rights, to the Commission on Federal Election Reform, April 18, 2005. Such concerns are, however, based entirely on anecdotal evidence. Further research therefore is needed to assess how great these obstacles are and what can be done to mitigate them. On the other hand, the requirement to verify proof of citizenship is new for states, and the U.S. Department of Homeland Security is still in the process of developing regulations (which are expected by May 2006) to guide the implementation and to ensure compliance by states of the REAL ID Act, including the requirement to verify proof of citizenship.

²⁰ The U.S. Department of Homeland Security regulations on the implementation of the REAL ID Act are unlikely to require a notation of U.S. citizenship on driver's licenses and state ID cards, but states can decide to include such a notation on the REAL ID cards that they issue.

²¹ National Voter Registration Act (1993), 103rd Congress, < <http://www.fvap.gov/laws/nvralaw.html>>.

²² Under the Motor Voter Act, the DMV transfers to the election bureau the voter registration applications that are submitted when citizens receive a driver's license. These transfers typically are done in batch, often with paper records, rather than by automatic and instantaneous data transmission. In Michigan, when citizens change the address on their driver's license, the Department of State updates the address of their voter registration. Michigan is, however, one of the very few states where the Department of State is responsible both for driver's licenses and for elections, and Michigan law requires the address on a citizen's driver's license to match the address on his or her voter registration.

There are two alternatives for transferring data from the DMV to the elections bureau. The first alternative is to enter the data from driver's license applications into the DMV's database and then to send files periodically from the DMV to the elections bureau to update the voter registration list. The advantage of this alternative is to leave the elections bureau in control of all updates made to the voter database. The disadvantage is the lag between the time new data is entered into the DMV's database and the time that data is added to the voter list.

The second alternative is to modify the DMV's database to automatically transfer all new data entries to the voter registration database. When data from a citizen's REAL ID application is entered into the DMV database, a command is given to forward a copy of the data to the voter database. This is done by inserting this command into the DMV's data entry program. With advanced, well-designed DMV and voter databases, the code for this command can be written and checked in a few days. With less versatile databases, weeks of work will be needed to write the required code. The DMV databases in many states are rather old and cumbersome, but they probably will be updated to manage the requirements of the REAL ID Act.

A system to automatically transfer data from REAL ID applications to the state voter database greatly reduces the risks that voter data will get delayed or lost in transmission between the DMV and the elections bureau. Moreover, this system imposes little if any additional burden on DMV staff, who may resist new responsibilities for voter registration, which lies outside of their core mission to issue driver's licenses.²³

Interoperable State Databases

As they work to comply with HAVA, states are building diverse systems of voter registration. They are using different database designs, different software and hardware, and different vendors.²⁴ The diversity of state voter registration systems precludes the possibility of a nation-wide attack on or malfunction of voter registration databases. A single attack cannot harm all state voter registration systems; all state systems are unlikely to suffer from the same bugs; and different state systems can function independently at times when they are in heavy use, for instance when there is a spike in voter registrations shortly before the voter registration deadline. However, the diversity of state voter registration systems also poses a challenge for making them interoperable.

The Carter-Baker Commission calls on states to make their voter databases interoperable so that they can detect and remove duplicate registrations and can facilitate updates in the voter registration list when citizens move to another state. The purpose of detecting duplicate registrations is to identify citizens who are registered to vote in two or more states, to eliminate all but one of their voter registrations, and thus to prevent them from voting in

²³ Once the DMV database is programmed to transfer automatically a copy of REAL ID applications to the voter database, the only additional step required for voter registration is to check whether citizens who are issued REAL ID cards are registered to vote in another state. That can be checked either by DMV staff while they process the REAL ID application or by elections bureau staff after a copy of the REAL ID application is sent from the DMV to the voter database.

²⁴ Electionline.org, *Assorted Rolls*.

different states for the same election. The aim of facilitating updates in voter registration is to ensure that when citizens move residence to another state, they are removed from the voter registration list of the state where they previously resided.²⁵

To make their voter databases interoperable, states need to acquire modern database software, to collect data that uniquely identifies every voter, to create a system for sharing voter data among states, and to develop procedures for removing duplicate registrations.²⁶ In addition, the federal government needs to ensure that the system for making state voter databases interoperable is effective.

Database software

Most, if not all, of the statewide voter registration systems under development for compliance with HAVA are built on top of modern, commercial Database Management Systems. Many states are using Oracle or IBM's DB2 as their underlying database. Voter registration systems probably will function more effectively and cost less if they are built on a commercial, off-the-shelf DBMS than if they are developed without one.²⁷

In computer science research, the type of system used to connect the diverse collections of state voter databases is called a "loosely coupled federated heterogeneous database system."²⁸ This is a loosely coupled system because it is composed of separate, independent databases. It is heterogeneous because the state databases are different. Research on how to make a loosely coupled federated heterogeneous database system interoperable first began more than 30 years ago and is, for the most part, a solved problem.

The modern, commercial DBMSs at the core of state voter registration systems ease the process of making state voter databases interoperable. A focus of a modern, commercial DBMS is to support a "query" interface, so that programmers can easily add applications to analyze the data in the database. Many DBMSs also provide interactive tools to link them to other DBMSs, including to DBMSs of other vendors. All modern DBMSs provide "export" tools that easily allow data to be written to a file, for transfer to another DBMS, and "import" tools that allow data to be added to the database. They also allow inclusion of images, such as the images of voter signatures.

Without a modern, commercial DBMS, states can still develop the needed computer applications (to analyze data, to export, to import, etc.) but will incur additional costs. The task of programming these applications will be significantly greater for these states.

Unique identifiers

²⁵ For citizens with residences in two different states, the aim of interoperable state voter databases is to ensure that these citizens register and vote only in the state of their primary residence.

²⁶ Justin Levitt, Wendy Wiser, and Ana Munoz, "Making the List: Database Matching and Verification Processes for Voter Registration," Brennan Center for Justice, <<http://www.brennancenter.org/programs/downloads/HAVA/svrd/SVRD%20matching%20report.pdf>>.

²⁷ Raghu Ramakrishnan and Jonannes Gehrke (2003), *Database Management Systems, (3rd Edition)*, New York: McGraw Hill.

²⁸ Ibid.

Under HAVA, state voter databases use a number, known as a “unique identifier,” to distinguish each individual from all others, particularly to tell apart individuals with the same name or similar names. Some states use the driver’s license number as the unique identifier for voter registration. In other states, the unique identifier is the last four digits of the Social Security number together with the individual’s name and date of birth. Efforts to match voter registration records of different states are complicated and may fail. Take, for example, the problem of determining whether John Smith in Michigan is the same person as John Smith in Kentucky. Since the unique identifier for voter registration is the driver’s license number in Michigan but the last four digits of the Social Security number in Kentucky, an accurate match of the two registered John Smiths is unlikely. Any match will need to rely on John Smith’s date of birth to estimate, based on some level of probability, whether the John Smith in each state is the same person or not.

To make different state voter databases interoperable, they must use the same unique identifier, which must distinguish each citizen from every other citizen in the country.²⁹ The state voter databases will need to use a nation-wide unique identifier. Since different states might use the same driver’s license number, the most practical option for a federal unique identifier is the full Social Security number.

The Carter-Baker Commission recommended a template to define a common set of voter data that all states will collect in their voter databases and will share with each other. This set of data will consist of each person’s full legal name, date and place of birth, signature captured as a digital image, and Social Security number. The signature is needed to confirm the identity of voters who vote by mail.

The recommended template coincides with the set of data collected for REAL ID cards. As states collect and verify the names, birthdates, signatures, and Social Security numbers of citizens who are issued a REAL ID card, they will compile the data on voters that will be shared with other states. Moreover, 49 states already collect Social Security numbers for driver’s licenses.³⁰

Although HAVA allows states to use only the last four digits of the Social Security number as their unique identifier, the full Social Security number is needed for the federal unique identifier in a system where state voter databases interoperate effectively. The last four digits of the Social Security number are inadequate for the federal unique identifier because there are many Americans across the country with the same name. There is, for example, a 17% chance that at least two of the registered voters named James Smith will have the same date of birth and the same last four digits of the Social Security number.³¹ The Carter-Baker

²⁹ Ibid.

³⁰ ‘Overview of States Driver’s License Requirements’, National Immigration Law Center, July 12, 2005, <www.nilc.org/immspbs/DLs/state_dl_rqrmts_ovrvw_071205.pdf>. Alabama also collects Social Security numbers for driver’s licenses, according to Commission staff conversation with Alabama’s Motor Vehicle Division in August 2005. Vermont is the only state that does not collect Social Security numbers for driver’s licenses.

³¹ Estimate provided by Paula Hawthorn. Levitt, Wisner, and Munoz (2006) argue that the last four digits of the SSN are sufficient to match data within a state, but do not speculate on whether the four digits are sufficient to match data across all of the states. Given that there are only 10,000 combinations possible with four digits, and over 197 million registered voters, the full number is necessary; Justin Levitt, Wendy Wisner, and Ana Munoz,

Commission therefore recommends the use of the full Social Security number as the federal unique identifier.

The use of the full Social Security number in sharing voter data poses two challenges, which are significant but can be overcome. First, some records in the Social Security Administration's database are inaccurate and may lead to inaccuracies in voter registration lists. Inaccurate records in the Social Security Administration's database, however, probably will be identified as citizens apply for a REAL ID card and, in the process, have their Social Security number verified. That process will provide the opportunity to correct any mistakes in the Social Security Administration's records. Moreover, the ombudsman institutions recommended by the Carter-Baker Commission can help citizens to correct any inaccuracies in their records with the Social Security Administration.

Second, the use and transfer of Social Security numbers among state voter databases may require amendments to the Privacy Act of 1974 (Public Law 93-579) and other federal legislation and to state laws on data privacy.³² The new legislation proposed by the Carter-Baker Commission to make state voter databases interoperable therefore will need to amend the Privacy Act and other relevant legislation accordingly and to supercede any state laws that restrict the ability of election bureaus to share voter data and Social Security numbers with other states. As a matter of policy, Social Security numbers already are commonly used to compare records on individuals between different government agencies, including state agencies. Social Security numbers also serve as tax ID numbers for the Internal Revenue Service and are used to determine the eligibility of individuals for various government services and benefits.³³

The risks to privacy arise mainly from the misuse of Social Security numbers by private companies, particularly by financial services companies, and from the inclusion of Social Security numbers in publicly available state and county records. To avoid such risks, voter registration systems should use Social Security numbers only for internal purposes. There is no need to make Social Security numbers in voter registration lists publicly available. The publicly available voter lists should contain only the names and addresses of voters. The proposed legislation to make state voter databases interoperable should specify that Social Security numbers are only for internal use by authorized election officials.

System for sharing data

Once states adopt the common template for voter data, including the full Social Security number as the federal unique identifier, they will have taken the first step toward making

"Making the List: Database Matching and Verification Processes for Voter Registration," Brennan Center for Justice, <<http://www.brennancenter.org/programs/downloads/HAVA/svrd/SVRD%20matching%20report.pdf>>.

³² For instance, under the Privacy Act (1974), 93rd Congress, <<http://www.usdoj.gov/foia/privstat.htm>>, state and federal governments may not deny services to individuals who refuse to disclose their Social Security Number.

³³ U.S. General Accounting Office, "Social Security Numbers: Use Is Widespread and Protections Vary," Testimony of Barbara D. Bovbjerg, Director for Education, Workforce, and Income Security Issues to Subcommittee on Social Security, Committee on Ways and Means, U.S. House of Representatives, GAO-04-768T, June 15, 2004, pp. 10-12.

their voter databases interoperable. The next step is to build a system for sharing voter data among states. This system must link state voter databases together so that duplicate voter registrations can be identified efficiently and voter registration can be easily updated when voters move residence to another state.

Control over the system for sharing voter data can be either centralized under federal authority or distributed among the states. In a centralized system, the federal authority would send commands through a national voter registration database to direct the states to perform certain tasks, such as the tasks of removing a duplicate voter registration or updating the registration record of a voter who has moved to another state. In a distributed system, each state makes its own decisions on changes to its voter registration list.³⁴

A national voter registration database could only function effectively if the federal government were in charge of registering voters and deciding who is qualified to vote, and where. However, since voter registration will remain the responsibility of states, rather than become a responsibility of the federal government, states need to retain control over voter databases.

Current procedures for identifying voters who are registered in more than one state are clearly inadequate. Election officials detect outdated voter registrations by comparing their voter files with the U.S. Postal Service's National Change of Address List or by taking note of when materials sent to voters marked "do not forward" are returned. States sometimes are notified by election officials in another state that a voter has moved residence to the other state when the voter provides his or her previous address in a new voter registration application.³⁵ However, there are no systematic procedures in place to identify voters registered in two states or more. States rarely, if ever, check for duplicate voter registrations in other states.³⁶ Moreover, none of the state voter registration systems is currently able to communicate with the others.³⁷ As a result, citizens remain on the voter list of states they have left or are allowed to register in two different states where they own homes, and tens if not thousands of citizens are estimated to be registered as voters in more than one state.³⁸

The system envisioned by the Carter-Baker Commission for sharing voter data between states is modeled on the Commercial Driver's License Information System (CDLIS),³⁹ which is designed to make sure that commercial drivers have only one license. CDLIS shares data among states through a "distributed database," which links together the 50 state databases of commercial driver's licenses. It is a central site, or repository, connected to each of the state databases. CDLIS's central site contains the "pointer" for every commercial driver in the

³⁴ Raghu Ramakrishnan and Jonannes Gehrke (2003), *Database Management Systems, (3rd Edition)*, New York: McGraw Hill.

³⁵ U.S. Government Accountability Office, *Elections: Additional Data Could Help State and Local Elections Officials Maintain Accurate, Voter Registration Lists*, GAO-05-478, June 2005, pp. 21-22 and 26-27.

³⁶ U.S. Government Accountability Office, *Elections: Additional Data Could Help State and Local Elections Officials Maintain Accurate, Voter Registration Lists*, GAO-05-478, June 2005, pp. 26-27.

³⁷ Electionline.org, *Assorted Rolls*.

³⁸ Estimates presented in *Building Confidence in U.S. Elections: Report of the Commission on Federal Election Reform*, September 2005, p. 12.

³⁹ A description of the Commercial Driver's License Information System is available at <www.aamva.org/drivers/drv_AutomatedSystemsCDLIS.asp>.

country. The pointer is the basic information—name, date of birth, Social Security number, and state driver’s license number—that uniquely identifies each commercial driver.

When state officials want to check whether a particular driver has a commercial license from another state, they go to the CDLIS central site and enter that driver’s “pointer” information. The CDLIS central site then points them to any state that has issued the driver a commercial license, and they can then connect to that state’s database to get the driver’s full record.

All of the state databases of commercial driver’s licenses are inter-connected, so that an update in one state database is made available to all other states. CDLIS was mandated by federal law and is operated by the American Association of Motor Vehicle Administrators under U.S. Department of Transportation supervision.

The Carter-Baker Commission envisions a similar system, a National Voter Registration Information System (NVRIS), to share voter data among states. NVRIS would consist of a central repository with the full legal name, address, date of birth, full Social Security number, and signature (captured as a digital image) of every American voter registered in the country. When election officials process a voter registration application, they would check NVRIS to see if the applicant is registered to vote in another state. If so, NVRIS would notify the state where the applicant was previously registered of the applicant’s new voter registration.

Voter data can be transferred between states in either a “batch” or a “real-time” system. A batch system would collect updates in a batch and then send them as a batch to NVRIS, which in turn would share the updates with all other states. New voter registrations in Wyoming, for example, would be collected in a file every day or twice a week and sent to NVRIS as an encrypted file over the internet or on disk by postal mail or courier. NVRIS would then compile a national file of voter registration updates and distribute that file to all 50 states.

A real-time system would make updates in voter registration available to all states instantaneously and continuously. When updates are entered into Wyoming’s or Oregon’s voter database, they automatically enter NVRIS at the same time.

A batch system offers greater reliability. The managers of NVRIS’s central repository direct the process of adding data to the system and thus can prevent situations where the system is overloaded. They can rely on a moderately-sized system because they have greater control over the amount of data traffic. The design of batch systems is more straightforward, and batch systems are simpler to implement. Batch system design began about 30 years ago and has developed over the past decades.⁴⁰

A batch system nevertheless would have serious drawbacks. It would be cumbersome, because updates are sent by file from states to NVRIS’s central repository and then from NVRIS’s central repository to other states, and it must rely on individuals to send updates on time. Moreover, significant time lags are inherent in the system. There would be a

⁴⁰ Raghu Ramakrishnan and Jonannes Gehrke (2003), *Database Management Systems, (3rd Edition)*, New York: McGraw Hill.

significant delay between the time updates are entered into a state's voter database and the time they are shared with other states. The process of sharing updates is delayed by the need to batch data updates together, transferring them to a file, sending the file to NVRIS's central repository, entering them in NVRIS's central repository, compiling a national file of updates, distributing that national file to every state, and adding the updates from NVRIS's central repository to each state's voter database.

A real-time system would eliminate the time lag in processing updates and therefore would be better suited to the needs of interoperable state voter databases. It would provide the advantage of instantaneous updates. As election officials are processing voter registration applications, they can find out right away whether the applicant is registered elsewhere, and any state with a duplicate registration is notified the moment a new voter registration is processed.

Development of a real-time system to share voter data among states presents significant challenges.⁴¹ A powerful system is required to process a large volume of updates at critical times. The volume is likely to reach many thousands of updates each day in the period before the voter registration deadline and on Election Day in states that permit Election Day registration, as election officials enter new voter registrations into their voter databases. Because the workload of the system is highly variable, with surges at peak times of voter registration, and is difficult to predict, the system requires a high level of sophistication to avoid bottlenecks or breakdowns. In addition, the system needs to operate on secure lines between NVRIS's central repository and state voter databases.

With powerful software and hardware and reliance on secure lines, a real-time system would best meet the requirements for NVRIS set by the Carter-Baker Commission. The NVRIS central repository should be capable of managing the pointer records of up to 250 million Americans. Although the estimated number of voting aged citizens currently is less than 200 million,⁴² the design of NVRIS's central repository should take into account the future growth in U.S. population and the Carter-Baker Commission's goal of substantially increasing the portion of eligible citizens who are registered to vote.

Over 14 million voters were added to the registration lists between 2002 and 2004.⁴³ If a similar increase in voter registrations were to take place in future years, and if most of those registrations were processed in the few days before the voter registration deadline, NVRIS might need to process up to 1 million updates per day during periods of peak use. High-performance database management systems on the market today have the capacity needed for NVRIS. Oracle9i database software with an IBM eServer, for example, can process up

⁴¹ Sang H. Son, "Real-time Database Systems: Present and Future," <<http://csdl.computer.org/dl/proceedings/rtsa/1995/7106/00/71060050.pdf>>.

⁴² Election Data Services, *Final Report of the 2004 Election Day Survey*, submitted to the U.S. Election Assistance Commission, September 27, 2005, Section 2, p. 5. According to the Census Bureau, there were 142 million registered voters and 55 million eligible but not registered in November 2004, see <www.census.gov/population/socdemo/voting/cps2004/tab01.xls>.

⁴³ Election Data Services, *Final Report of the 2004 Election Day Survey*, submitted to the U.S. Election Assistance Commission, September 27, 2005, Section 2, p. 5.

to 57,346 transactions per minute.⁴⁴ Such software and hardware are more powerful than NVRIS needs for average use but provide added capacity to handle high volumes of data transactions when use of the NVRIS system surges.

The NVRIS central repository will need to store digital images of signatures, which are used to verify the identity of voters who cast their ballots by mail. Such images are obtained by scanning the signature on a voter registration application with a document scanner. Tagged Image File Format (TIFF) is among the most widely supported file formats for digital images (it is supported by Oracle and DB2), but future advances in image representation may provide better technology for storing images in the years ahead.

NVRIS needs secure lines to transmit data between states. Data transmissions over the internet are subject to hackers and to denial-of-service attacks, which are often difficult to distinguish from genuine increases in data traffic. Databases connected to the internet are routinely attacked by hackers for no apparent reason. A national repository of voter registration records would provide a prime target for hackers. To stay secure, NVRIS therefore needs to operate on leased lines, which provide digital connections to transmit data in a secure network among databases. Leased lines provide permanent connections among databases in the network. They are only available for network users and are not shared with anyone outside of the network.⁴⁵ While reliance on leased lines adds to the expense of NVRIS, they are critical for keeping NVRIS secure.

Procedures for removing duplicates

The initial load of the NVRIS central repository can be made one state at a time. Each state would send an electronic file to NVRIS's central repository with the pointer information for all of the state's voters, and as each state's voter file is loaded into the central repository, the duplicate registrations would be removed. The initial load of NVRIS's central repository might, for example, begin with Alabama's voter file. Then Alaska's voter file would be added, and duplicates would be removed from the central repository and returned to the states that sent them. After that, Arizona's voter file would be loaded into the central repository, duplicates would be removed and sent back to the states, and then Arkansas's file would be added, and so forth. As all of the state voter files are loaded into the central repository, it would always be kept free of duplicates.

Since voter registration remains the responsibility of the states, they must decide what to do with duplicates. At the same time, however, NVRIS must avoid situations where neither state with a duplicate registration wants to deal with it. NVRIS might therefore adopt a policy that the most recent registration of a voter who is registered in more than one state is considered that voter's current registration, and the less recent registration of that voter is considered out of date. All out-of-date registrations would be sent back to the state that provided them to NVRIS's central repository, and each state would make its own decision whether to keep outdated registrations in its voter list marked as "inactive" or to remove

⁴⁴ According to the benchmark published by the Transaction Processing Performance Council at <www.tpc.org>.

⁴⁵ Further details on leased lines are available at <www.t1-t3-dsl-line.com>.

them from its voter list entirely. To avoid mistakes, the state would notify voters and give them time to respond before they are removed from the voter list.⁴⁶

Once NVRIS's central repository is operational, states will need to check it as they process each new voter registration. When they find a voter who was previously registered in another state, they would notify NVRIS that they are updating that voter's registration, and NVRIS would, in turn, inform the state where that voter was previously registered to vote. That state would then decide whether to keep the voter on its voter registration list marked as "inactive" or, after giving sufficient notice, to remove the voter from the list. So long as states consistently follow the procedure of notifying NVRIS's central repository of every update they make to the registration of voters who have moved from another state, the central repository will be kept free of duplicates. To ensure that states follow this procedure, officials responsible for NVRIS might periodically check the central repository for duplicates across states.

The need to keep voter databases free of duplicates must be balanced with the need to prevent any removal of eligible voters from the voter lists. As NVRIS will rely on the legal name, date of birth, and full Social Security number of citizens to compare voter data between states, it probably will minimize the possibility of near matches, where two voter records are almost identical but slightly different. The possibility of near matches, however, may still remain. Since a near match indicates that a correct match is likely but uncertain, election officials will need to investigate the near match to determine whether the two voter records belong to the same person or contain similar data on different individuals.

Moreover, rigorous procedures are needed within each state to prevent mistakes in removing eligible voters from the voter lists.⁴⁷ Such mistakes may arise when the voter lists are compared to records in other state databases, for example when the name of a registered voter appears to match the name on a list of deceased persons or a list of convicted felons which is missing Social Security numbers. States therefore have to check the accuracy of information on a person's ineligibility, particularly to verify any match of that person's voter record with data from another state agency, and to give that person the opportunity to correct any error before the person is taken off the voter registration list.⁴⁸

⁴⁶ Levitt, Wiser, and Munoz (2006) similarly recommend that state officials, in dealing with duplicates, "notify the applicants—not only by mail to all valid addresses on file, but also by phone...(to) allow applicants to resolve errors...without submitting a new form"; See Justin Levitt, Wendy Wiser, and Ana Munoz, "Making the List: Database Matching and Verification Processes for Voter Registration," Brennan Center for Justice, <<http://www.brennancenter.org/programs/downloads/HAVA/svrd/SVRD%20matching%20report.pdf>>.

⁴⁷ Recent reports by the Brennan Center, for instance, show that casual attempts to identify and remove duplicates in state voter registration databases are liable to result in the removal of eligible voters from the rolls; see Michael McDonald (2005), "Analysis of the September 15, 2005 Voter Fraud Report Submitted to the New Jersey Attorney General," Brennan Center for Justice, <<http://www.brennancenter.org/programs/downloads/NJ%20Fraud%20Final%20response.pdf>> and Justin Levitt, Wendy Wiser, and Ana Munoz, "Making the List: Database Matching and Verification Processes for Voter Registration," Brennan Center for Justice, <<http://www.brennancenter.org/programs/downloads/HAVA/svrd/SVRD%20matching%20report.pdf>>.

⁴⁸ Procedures on list maintenance are suggested in U.S. Election Assistance Commission, *Voluntary Guidance on Implementation of Statewide Voter Registration Lists*, July 2005. Further suggestions are offered in *Balancing Access and Integrity: The Report of the Century Foundation Working Group on State Implementation of Election Reform*, July 2005, pp. 45-46 and 48-49.

As a further safeguard against mistaken removals of eligible voters from the voter lists, the Carter-Baker Commission recommends a feature on each state's elections bureau website that allows citizens to verify their voter registration record. The websites of some jurisdictions, for instance of the District of Columbia's Board of Elections, already contain such a feature. It gives voters the opportunity to check online if they are in fact registered and if their registration record is correct. If their voter registration record is incorrect, they can download a form which they fill out and send to the elections bureau to correct their voter registration record.

In addition to removing duplicates, the system of interoperable state voter databases is designed to facilitate updates when voters move to another state. This system can facilitate updates of voters with or without REAL ID cards. Voters with a REAL ID card will need to apply for a new REAL ID card when they move residence to another state. In the process of applying for a new REAL ID card, they will be automatically registered to vote in the state where they currently reside, and NVRIS will update their voter registration records, under the system proposed by the Carter-Baker Commission. The only action required of citizens with a REAL ID card to update their voter registration when they move to another state is to apply for a new REAL ID card and to document the address of their new residence.

Voters who move from New York to Florida, for example, would apply for a REAL ID card in Florida. As they apply for a new REAL ID card, they would be added automatically to the voter registration list in Florida, and as that happens, Florida would notify NVRIS's central repository, which in turn would notify New York that their voter registrations in New York are now out of date. Provided that Florida recognizes the REAL ID card issued by New York, and accepts the New York REAL ID card as proof of full legal name, date of birth, U.S. citizenship, and Social Security number, the only additional information required for voters to obtain a new REAL ID card, and thus to update their voter registration, would be proof of their new address in Florida. When voters with a REAL ID card moved to another state, they would become registered to vote in that state simply by obtaining a new REAL ID card.

Registered voters without a REAL ID card would be issued a photo voter ID, called in the Carter-Baker Commission report an "EAC-template ID card," which would be a REAL ID card without reference to a driver's license. If they moved to another state, they could register to vote in that state simply by going to a designated elections office with their photo voter ID card from the state where they previously resided and with proof of their new address. The elections office would verify and update their voter registration through NVRIS and then issue them a new ID card.

To meet the Carter-Baker Commission's goals of requiring citizens to register only once and of facilitating updates when citizens move, the process for updating voter registrations would need to become further streamlined in the future. One option to further streamline this process might entail the use of "smart cards," which have microchips implanted in them. Smart card readers would be issued to every U.S. Post Office throughout the country and connected to state voter databases, so that citizens who move would only need to update their address at their local post office. As they update their address, the post office

would enter their new address on the smart card and, at the same time, would automatically update the address on their voter registration. This option, however, requires further research.

Federal policy

In developing its recommendations on interoperable state voter databases, the Carter-Baker Commission had to balance two competing objectives: (1) to leave states in control of their electoral system; and (2) to make the system for sharing voter data effective. Past experience of the U.S. Election Assistance Commission was instructive. Under the Help America Vote Act, the EAC disbursed federal funds to the states based on their own plans for building statewide voter databases. The EAC lacked the authority to withhold funds from states and issued guidance that was only voluntary. As a result, the EAC was unable to use federal funds to shape the decisions of states on voter registration systems.

The EAC even provided federal funds to states that disregarded its guidance. States that built bottom-up voter registration systems, for example, received federal funds to do so from the EAC, even though the EAC's guidance declared that a "top down" voter registration system is "most closely akin" to HAVA's requirements.⁴⁹ HAVA set detailed requirements for statewide voter databases,⁵⁰ yet the structure of voter databases varies widely from state to state, and some states may avoid the fundamental aim of HAVA to shift responsibility for voter registration from local jurisdictions to each state's chief elections officer.

The experience of HAVA on statewide voter databases, and on other issues, indicates that a system for making state voter databases interoperable would only be effective if the EAC is given greater authority. The EAC would need the authority to determine the format for sharing voter data among states and to distribute federal funds only to states that follow that format.

While states might offer useful advice in designing a system to share voter data, the system is unlikely to operate effectively unless a single federal agency is placed in charge of its development. Without sufficient federal authority over the system's development, states may never agree on a standard format for sharing voter data or may adopt diverse procedures, which would make the system ineffective. To develop an effective system, the EAC would need the authority to introduce the template for shared voter data, to define the format for cross-state data transfers, and to supervise the creation and the operation of NVRIS to ensure that state voter registration lists are kept up to date. This authority would be granted in the new legislation, recommended by the Carter-Baker Commission, to require states to make their voter registration systems interoperable. It would be similar to the authority of the U.S. Department of Treasury's Internal Revenue Service to determine the format that states must use to transfer data on tax returns.

⁴⁹ U.S. Election Assistance Commission, *Voluntary Guidance on Implementation of Statewide Voter Registration Lists*, July 2005.

⁵⁰ HAVA required the Chief Election Official in each State to implement a "single, uniform, official, centralized, interactive computerized statewide voter registration list," which is "defined, maintained, and administered at the State level" and must contain the "name and registration information of every legally registered voter in the State."

The appropriation of federal funds would encourage states to adopt the standard format for sharing voter data and to make their voter databases interoperable, provided that sufficient funds were made available, were provided only to states for compliance with the EAC's system for sharing voter data, and were combined with penalties on states that fail to comply. The Carter-Baker Commission recommends that Congress should appropriate funds for voter registration systems to the EAC, which in turn would distribute funds only to states that make their voter databases interoperable and would withhold funds from states that do not. The EAC would thus have the authority both to distribute and to withhold federal funds for voter registration systems, and that authority would give the EAC leverage in encouraging states to make their voter databases interoperable. Such authority would, however, carry with it the responsibility for the EAC to rigorously check whether states are adopting the standard format and following the procedures for sharing voter data, and when they are not, to stand firm in withholding federal funds.

To ensure that NVRIS operates effectively, the EAC would need to check on an ongoing basis that states remove out-of-date voter registrations. The EAC might select a sample of outdated registrations identified by NVRIS from each state and find out whether each state election office has in fact marked those outdated registrations as “inactive” or removed them from the state voter list. Ongoing checks by the EAC are critical to ensure that state voter lists—and voter data shared among states—is kept up to date.

While the federal funds would provide some incentive for states to take part in the system for sharing voter data, they may prove insufficient. States would be more likely to participate in the system if there were significant consequences for deciding to opt out. The Carter-Baker Commission therefore called for federal law to mandate participation by states in the system of interoperable voter databases and for enforcement of this mandate.⁵¹

After the system of interoperable voter databases is created, it could be managed by an interstate compact or an association of state officials under EAC supervision. Interstate compacts are used to address a wide range of issues and serve to facilitate cooperation among states.⁵² Alternatively, the system for sharing voter data could be managed by an association of state officials, just as the Commercial Driver's License Information System is managed.

International Experiences

A significantly smaller portion of eligible voters is registered to vote in the United States than in other advanced democracies. For the 2000 presidential election, 73% of the U.S. voting age population was registered to vote. In comparison, the percentage of the voting age population that is registered to vote is above 90% in other advanced democracies.⁵³

⁵¹ Unless sufficient federal funds are made available to states to comply with the EAC's system for sharing voter data, penalties for non-compliance will be the primary incentive for states to take part in this system.

⁵² See National Center for Interstate Compacts at www.csg.org/CSG/Programs/National+Center+for+Interstate+Compacts/statutes.htm.

⁵³ International Institute for Democracy and Electoral Assistance (International IDEA), *Voter Turnout Survey*, www.idea.int/vt/survey/index.cfm. For the 2004 presidential election in the United States, the Census

Registration systems

Other advanced democracies achieve significantly higher levels of voter registration than the United States (see Table 1) because they place the onus on the state to register eligible voters. In almost all of the advanced democracies surveyed for the Election Process Information Collection (which is compiled by the International Institute for Democracy and Electoral Assistance, United Nations Development Program, and International Foundation for Election Systems), it is compulsory to be on the voter register. In the few countries where it is not compulsory, the state still takes the initiative to register eligible voters.⁵⁴

Table 1: Registered Voters as a Percentage of the Voting Age Population for Select National Elections

Country (year)	Registered Voters (in millions)	Voting Age Population (in millions)	Percentage of Population Registered
Japan (2005)	103.4	103.5	99.8%
United Kingdom (2005)	44.1	45.4	97.2%
New Zealand (2005)	2.8	2.9	96.6%
Denmark (2005)	4.0	4.1	95.6%
Austria (2004)	6.0	6.3	94.3%
Germany (2005)	61.6	66.3	92.9%
France (2002)	41.1	45.0	91.3%
Canada (2004)	22.2	24.4	91.2%
United States (2004)	142.0	215.6	65.9%

Data on registered voters is from International Foundation for Election Systems, *Election Guide*, <www.electionguide.org>. Population statistics are from EuroStat and from the national statistics bureaus of individual countries. Estimate of U.S. voter registration is from U.S. Census Bureau, *Reported Voting and Registration, by Sex and Single Years of Age: November 2004*, <www.census.gov/population/socdemo/voting/cps2004/tab01.xls>. The U.S. Election Assistance Commission *Election Day Survey*, however, estimates that 79.5% of the voting age population was registered to vote in 2004, <www.eac.gov/election_survey_2004/toc.htm>.

Bureau estimated that 72% of the voting aged population was registered to vote, <www.census.gov/Press-Release/www/releases/archives/voting/004986.html>, while the U.S. Election Assistance Commission's Election Day Survey estimated the level of voter registration at 79.5% of the voting aged population or 86% of the population of voting aged citizens, <www.eac.gov/election_survey_2004/html/exec%20summary.htm>.

⁵⁴ International IDEA, United Nations Development Program, and International Foundation for Election Systems, *Election Process Information Collection*, <[http://epicproject.org/ace/compepic/en/topic\\$vr](http://epicproject.org/ace/compepic/en/topic$vr)>. Canada's national register of voters was based on the 1997 enumeration and is updated with information collected from government agencies responsible for revenue, citizenship, motor registration, and vital statistics, see Jerome H. Black, *From Enumeration to the National Register of Electors: An Account and an Evaluation*, Institute for Research on Public Policy, 2003, p. 5, <www.irpp.org/choices/archive/vol9no7.pdf>. France automatically adds citizens to the electoral rolls when they reach the age of 18, see <<http://vosdroits.service-public.fr/particuliers/F1961.html>>, although individuals who move residence are responsible for registering to vote at their new place of residence. In Iceland, which has a population of around 300,000, the national citizens register serves as the basis for voter registration, while Ireland uses a door-to-door registration campaign to compile and update the voter register, see Election Process Information Collection.

Most advanced democracies maintain a national list of registered voters. In countries with a centralized system of election administration, the national voter registration list is compiled by the national election commission (for example, in Australia, Canada, and Japan) or by a central government agency (in Finland, Iceland, Norway, etc.).⁵⁵ Elsewhere, as in France, voter registration lists are compiled by local government authorities and then aggregated into a national list.⁵⁶

The United Kingdom has a decentralized system of voter registration but is moving toward greater centralization. Electoral registers currently are compiled and managed locally, according to each local authority’s standards. There are no mandatory national standards for maintaining information on electoral registers. In January 2004, the British Government began to create a Coordinated Online Register of Electors, which aims to standardize local electronic electoral registers across the country and to make them fully interoperable, regardless of the local system in use. This Coordinated Online Register of Electors will also allow authorized users to access local voter registration data centrally. The UK Electoral Commission has recommended that electoral registers should continue to be compiled and managed locally but should in the future form part of a national electoral register, which the UK Electoral Commission would manage. The Commission also recommended the introduction of mandatory data standards for electoral registers.⁵⁷

Table 2: Examples of Countries That Require Voter Identification

The following are some of the nearly 100 democratic countries that require voter identification:			
Belgium	France	Kenya	Slovenia
Brazil	Germany	Lithuania	South Africa
Chile	Ghana	Malta	Spain
Costa Rica	Greece	Mexico	Sri Lanka
Cyprus	Hong Kong	Netherlands	Switzerland
Czech Republic	India	Nicaragua	Thailand
El Salvador	Indonesia	Panama	Turkey
Estonia	Israel	Portugal	
Finland	Italy	Slovakia	

Sources: *National ID Cards*, Privacy International, available at <www.privacyinternational.org>; Mike France and Heather Green, “Privacy in an age of terror,” *Business Week*, 2001, <www.businessweek.com/magazine/content/01_45/b3756001.htm>; Electoral Institute of Southern Africa, *Promoting Credible Elections and Democratic Governance in Africa*, <www.eisa.org.za>; Latin American Election Statistics, *Social Sciences and Humanities Library*, <<http://sshl.ucsd.edu/collections/las>>; Election Process Information Collection, *Voter Registration*, <<http://epicproject.org/>>. In addition, multiple government websites and electoral commissions were consulted in verifying the ID requirements.

⁵⁵ Election Process Information Collection.

⁵⁶ Rafael López-Pintor, *Electoral Management Bodies as Institutions of Governance*, draft paper prepared for United Nations Development Program, 1999, p. 41.

⁵⁷ Parliament and Constitution Center (2005), *Electoral Register*, <www.parliament.uk/commons/lib/research/notes/snpc-03031.pdf>.

Identification cards are often used to facilitate voter registration. More than 100 countries, including most Western countries, issue national ID cards,⁵⁸ which are often used for voting purposes (see Table 2). Several other countries, notably the United Kingdom, are considering government proposals to establish a national identity card. Countries without a national ID often issue voter ID cards. Mexico, for example, issues voter ID cards with a range of safeguards, including a digitized photograph and thumbprint. These ID cards can be used to obtain a passport, driver's license, and marriage certificate. They also facilitate various daily transactions, such as opening bank accounts, cashing checks, and purchasing airline tickets.⁵⁹

Updates

A variety of methods are used in different countries to update voter registration lists. The most proactive methods are enumeration, which is a door-to-door canvass of eligible voters, or partial enumeration. Canada, for example, has conducted "targeted revision" of voter registration lists through door-to-door canvassing aimed at highly mobile populations, such as students.⁶⁰ Less proactive methods use links to national population records, records of residency, or applications for government services to update voter registration lists.⁶¹ The alternatives rely on the initiative of citizens to update their voter registration in person at a registration office, by mail, or on the internet.⁶² Voter registration lists often are updated through some combination of these various methods. Australia updates voter registration lists by conducting door-to-door voter registration, matching data with other government agencies, and allowing individuals to check their voter registration on the internet and to update their voter registration by mail or in person.⁶³

Implications for U.S. voter registration

Democratic countries around the world provide examples of three successful practices that are applicable to the United States. First, they show how participation in elections can be expanded through proactive state measures to register voters. While election authorities in the United States assume a passive role in voter registration and wait for voters to come to them, other countries achieve high rates of voter registration by placing the onus on the state to find and register all eligible voters. The highest rates of voter registration are achieved in countries where state authorities take the initiative to reach out to eligible voters, including to canvass for eligible voters door-to-door.

⁵⁸ George W. Grayson, "Registering and Identifying Voters: What the United States Can Learn from Mexico," in *Election Law Journal*, Vol. 3, No. 3, 2004, p. 518.

⁵⁹ Grayson, p. 516.

⁶⁰ Black p. 22.

⁶¹ Election Process Information Collection.

⁶² In Germany and France, where voter registration lists are compiled locally, individuals who move must take the initiative to register in their new place of residence, although the local authorities in that place assume responsibility for removing the individual from the voter registration list in his or her former place of residence, see <www.bundeswahlleiter.de/wahlen/rechtsgr/e/bwo2_e.htm#14> and <www.interieur.gouv.fr/rubriques/b/b3_elections/b34_voter/index_html/L_inscription_sur_les_listes_electorales>

⁶³ Election Process Information Collection and Australian Electoral Commission <www.aec.gov.au/>.

Second, the United Kingdom is setting the example for making local voter registration lists interoperable. Local authorities will continue to compile and manage voter registration lists, which will be inter-connected in a national online voter registration system.

Third, a voter ID card tied directly to voter registration can strengthen the integrity of elections without reducing access. In Mexico, for example, citizens are issued a voter ID card when they become registered to vote, and election authorities undertake extensive efforts to register eligible voters. These efforts include the use of more than 230 mobile offices nationwide. As a result of these efforts, over 94% of the voting age population in Mexico is registered to vote.⁶⁴

Mobile offices are likely to contribute to a significant increase in voter registration only if they are deployed as part of a broader strategy for states to reach out to eligible citizens and to register them to vote. Georgia has deployed a single mobile office to issue ID cards among its population of 8.8 million,⁶⁵ and even though it has 159 counties, there currently are only 56 offices where ID cards are issued. The commitment of Georgia to reach out to non-drivers therefore is open to question. Mexico, by contrast, has built an extensive network of mobile offices and deploys them regularly as part of voter registration drives which aim to register and to issue voter ID cards to the largest possible number of citizens.

A strategy to expand voter registration may include renewed efforts to register voters under the National Voter Registration Act (NVRA) at state offices that provide public assistance. In many states, such offices have never complied with NVRA's mandate for them to conduct voter registration, because NVRA neither provided funds to implement the mandate nor imposed penalties for non-compliance, and social service agencies often consider voter registration a significant burden that lies outside of their mission.⁶⁶ A fresh commitment—and new state funding—is needed to expand voter registration through social service agencies, particularly since some expertise is required to administer voter registration under the Carter-Baker Commission's proposals, such as the expertise to verify proof of citizenship and to issue photo ID cards.

The advantages of conducting voter registration at social service agency offices are that the offices already exist and many non-drivers go there. Mobile offices, in contrast, have the advantages of going closer to the places where non-drivers live and of focusing on their core mission of registering eligible voters and issuing voter ID cards.

Audits of Voter List Quality

In other countries, the accuracy of voter registration lists is checked through audits. Mexico audited its national voter registration list 36 times between 1994 and 2000.⁶⁷ The accuracy of

⁶⁴ Information provided by Carlos Navarro, Director of International Affairs, Mexico's Federal Election Institute (IFE).

⁶⁵ U.S. Census Bureau, <www.census.gov/popest/states/asrh/tables/SC-EST2004-03-13.xls>.

⁶⁶ Brian Kavanagh et al. (2005), "Ten Years Later, A Promise Unfulfilled: The National Voter Registration Act in Assistance Agencies, 1995-2005," <<http://www.demos.org/pubs/NVRA91305.pdf>>.

⁶⁷ Robert A. Pastor, "Improving the U.S. Electoral System: Lessons from Canada and Mexico," in *Election Law Journal*, Vol. 3, No. 3, 2004, p. 588.

Australia's electoral roll was assessed by the Australian National Audit Office in 2002 and again in 2004.⁶⁸ Elections Canada is launching a survey to measure the accuracy of its National Register of Electors.⁶⁹ In the United Kingdom, the Electoral Commission provides local authorities with detailed guidance on how they should assess the quality of voter registration lists, identify needed improvements in the voter registration process, and develop plans for improvement.⁷⁰

Audits of voter registration lists in the United States are extremely rare and are modest in scope. The U.S. Government Accountability Office assessed the procedures used in seven states to assure accuracy in voter registration lists,⁷¹ but this assessment was based only on interviews with election officials and provided no measurements of voter list accuracy. Perhaps the most extensive study of voter list quality was conducted by Michigan's Office of the Auditor General. This study focused on the procedures used by election officials to assure reliability and security of information in the state's voter database. The only measurement of the quality of voter information was a comparison of the 26,058 names of the registered voters without a driver's license number recorded in the database with the names of voters in the database who had their driver's license number listed. A random sample of these voters without a recorded driver's license number indicated that 92% were duplicates.⁷² This study was very limited in scope, as the Michigan Office of the Auditor General neither matched voter files with information in other state agency databases nor conducted any field surveys of Michigan voters to measure the accuracy of their information in the state voter database.⁷³

Data matching

The Australian National Audit Office (ANAO) has provided detailed explanation of the methods used to assess the quality of voter registration lists. The audits by ANAO were designed to assess the extent to which Australia's electoral rolls were accurate (with correct and up-to-date information on individuals), complete (including all eligible voters), valid (excluding ineligible voters), and secure (protected from unauthorized access). ANAO also assessed the management of the electoral rolls by the Australian Electoral Commission (AEC).

⁶⁸ Australian National Audit Office, *Integrity of the Electoral Roll*, Audit Report No. 42 2001–02, April 2002, <www.anao.gov.au/WebSite.nsf/Publications/4A256AE90015F69BCA256B9E007B5F52>, and Australian National Audit Office, *Integrity of the Electoral Roll—Follow-up Audit*, Audit Report No. 39 2003–04, April 2004, <www.anao.gov.au/WebSite.nsf/Publications/697180F87D32F97BCA256E6E0008AE40>.

⁶⁹ See <www.elections.ca/content.asp?section=ins&document=index&dir=int&lang=e&textonly=false>. In addition, the Province of British Columbia has conducted a thorough assessment of its voter registration list, see Elections BC, *Quality Audit: Coverage and Currency of Federal and Provincial Voters Lists in British Columbia*, 2003.

⁷⁰ The UK Electoral Commission, *Best Value and Electoral Services*, July 2002, <www.electoralcommission.org.uk/files/dms/best_11957-6171__E__N__S__W__.pdf>.

⁷¹ U.S. Government Accountability Office, *Elections: Additional Data Could Help State and Local Elections Officials Maintain Accurate, Voter Registration Lists*, GAO-05-478, June 2005.

⁷² Michigan Office of the Auditor General, *Performance Audit of the Bureau of Elections*, Report Number 23-235-01, February 2003.

⁷³ A more recent study of New Jersey's voter rolls by Michael McDonald reveals that data error and a lack of clear and effective procedures for removing duplicates when people move resulted in at least 4,397 double entries; see Michael McDonald (2005), "Analysis of the September 15, 2005 Voter Fraud Report Submitted to the New Jersey Attorney General," Brennan Center for Justice, <<http://www.brennancenter.org/programs/downloads/NJ%20Fraud%20Final%20response.pdf>>.

The 2002 audit by ANAO assessed the management of the electoral rolls through interviews and on-site observations of election officials in AEC's central office and in the head offices of every state and territory. Through its interviews and observations, ANAO identified instances of inefficiency in the administration of voter registration, for instance the expense of going door-to-door to verify registration information, and recommended alternatives, such as a computerized method to periodically update and verify voter registration records.⁷⁴

ANAO also matched voter data with records of other government databases to estimate the extent to which the national electoral roll was accurate, complete, and valid. All of the names and dates of birth in the national electoral roll were matched with names and dates of birth in the national Health Insurance Commission's Medicare database and in the state and territory licensing and motor vehicle databases. The Medicare database contains names and dates of birth for nearly every Australian resident.⁷⁵ The data matching was designed to measure the quality of the electoral roll. In addition, ANAO used motor vehicle and census data to catch additional matches and to get better estimates on the number of unregistered but eligible citizens and on the number of ineligible individuals found on the electoral roll.

ANAO compared the 12.6 million citizens on the electoral roll to the 18.4 million residents (including non-citizens) in the Medicare database and found perfect matches for 83.7% of registered voters. It then relaxed the criteria for data matches, to compensate for minor errors in data entry or spelling, and matched an additional 11.9%.⁷⁶ ANAO also compared the remaining unmatched registration records to state and territory licensing and motor vehicle data, which added 0.6% matches. Data matching of names and dates of birth indicated that the electoral roll was 96.2% accurate.

To measure how complete the electoral roll was, ANAO had to estimate the number of adult Australian citizens. This estimate was made by subtracting the number of non-citizens from the number of residents listed in the Medicare database. According to this estimate of the number of adult Australian citizens, the electoral roll was 95.1% complete.⁷⁷

To assess the electoral roll's validity, ANAO identified all of the non-residents who were listed in both the Medicare database and the electoral roll. ANAO ascertained how many of these non-residents were citizens by comparing the citizenship number provided with their voter registration to the citizenship number listed in the database of the Department of Immigrant and Multicultural and Indigenous Affairs. Of these non-residents, 99.7% were

⁷⁴ See Australian Electoral Commission, Roll Integrity Unit, *Measuring the Accuracy of the Electoral Rolls and Testing the Effectiveness of Continuous Roll Update*, April 19, 2005 and Australian National Audit Office, *Integrity of the Electoral Roll*. For further analysis see Australian National Audit Office, *Integrity of the Electoral Roll—Follow-up Audit* and Parliament of the Commonwealth of Australia, Joint Standing Committee on Electoral Matters, *The Integrity of the Electoral Roll: Review of ANAO Report No. 42 2001-02, Integrity of the Electoral Roll*, October 1, 2002.

⁷⁵ The electoral roll contains only adult Australian citizens, while the Medicare database contains residents of Australia, including non-citizens, and children.

⁷⁶ While ANAO's report does not specify the threshold used to distinguish these matches with minor errors from non-matched records, ANAO rejects the conclusion that these matches with minor errors are inaccuracies in the electoral roll.

⁷⁷ Australian National Audit Office, *Integrity of the Electoral Roll* and Department of Immigration and Multicultural and Indigenous Affairs, <www.immi.gov.au/>.

citizens. ANAO therefore concluded that the electoral roll was 99.7% valid, even though ANAO neglected to account for the validity of the 3.8% of inaccurate records.

The data matching conducted for the 2002 audit produced a useful but unreliable assessment of the quality of Australia's electoral roll. This audit had several significant limitations:

- The measure of the electoral roll's accuracy is based on the assumption that the Medicare database is perfectly accurate. If a voter's name or date of birth is inaccurate in both the electoral roll and the Medicare database, it will still be counted as accurate in ANAO's audit.
- Since individuals were matched solely on the basis of their name and date of birth, some of the matches could be false positives. The audit may claim a positive match when different individuals have the same name and date of birth.
- ANAO did not measure the accuracy of voters' addresses, which are subject to change and, as listed in the electoral roll, could be out of date.
- No explanation was provided for the 3.8% of voter records that had no match with the Medicare database or with the state and territory licensing and motor vehicle data. These records could be invalid rather than inaccurate.
- The measure of the electoral roll's validity could be inflated, because ANAO did not compare the electoral roll to death records or to records of criminal convictions, which might have indicated a larger number of invalid records than ANAO measured in the electoral roll.

Field study

In response to the limitations of ANAO's audit, the Australian Electoral Commission conducted a field study to assess the extent to which the electoral roll was accurate and complete.⁷⁸ AEC sent auditors to contact almost 80,000 individuals in more than 43,000 households. The auditors went door-to-door to verify each respondent's name, date of birth, and address, as compared to the name, date of birth, and address listed in the electoral roll. They also recorded the name of every individual listed in the electoral roll who was deceased or was otherwise ineligible to vote. Auditors made two attempts to contact respondents in person, and if they were unable to reach respondents at home, they left a form for the respondents to mail back to AEC.

To assess the electoral roll's accuracy, AEC measured the percentage of addresses that were correctly listed in the electoral roll, which was termed "address list accuracy," and estimated the percentage of voters who were registered at the address where they were actually living, or "list accuracy." The AEC also took two separate measurements of how complete the electoral roll was. The first measurements, of "national completeness," was based on AEC's

⁷⁸ Australian Electoral Commission, Roll Integrity Unit, *Measuring the Accuracy of the Electoral Rolls and Testing the Effectiveness of Continuous Roll Update*, April 19, 2005.

estimate of how many Australians were eligible to vote. AEC used that estimate to calculate the electoral roll's "national completeness" as the percentage of estimated eligible voters who were in fact registered. The second measurement, of "address list completeness," was based on AEC's Address Register, which lists all addresses in the country and their uses. The Address Register specifies the addresses that are residential and thus may contain eligible voters. AEC measured "address list completeness" as the percentage of residential addresses that contained registered voters.

AEC's field study indicated that the electoral roll was 92.9% address list accurate but was only 89.5% list accurate. More than one in ten Australians, according to this study, were not listed in the electoral roll at their current address. The electoral roll was 6.7% less accurate according to the AEC field study than to ANAO's audit. The field study thus was able to identify a significantly larger portion of inaccuracies in the electoral roll than was the data matching performed by ANAO.

The AEC study's findings on the electoral roll's completeness were similar to the results of ANAO's audit. AEC found that the electoral roll was 97.6% nationally complete and 96.4% address list complete. The field study thus appeared to confirm the results of ANAO's data matching on the completeness of the electoral roll.

Alternative methods for audits

Australia's experience shows the benefits and the limitations of three alternative methods for auditing voter registration lists. A process evaluation, based on interviews and on-site observation of election officials, serves to assess the process for managing voter registration lists. It can identify ways to make voter registration lists more reliable and less costly. It is the only audit method that can assess the risks of unauthorized access to voter data and identify procedures to enhance security of voter registration databases. A process evaluation cannot, however, gauge the accuracy, completeness, or validity of voter registration lists.

Data matching estimates the extent to which a voter list is accurate, complete, and valid by comparing voter data to records in the databases of motor vehicles, deaths, felony convictions, etc. Auditors can measure the quality of a voter list by cross referencing data on individuals in different state databases. The accuracy of that measurement depends on the amount of data available. If auditors compare only names and dates of birth, particularly for a large population, there is a risk that they may falsely identify a positive match between different individuals with the same, or a similar, name and date of birth. The more information that is available on individuals, the higher degree of confidence there will be in data matching. Auditors can match data with a high degree of accuracy if the data matches are based on social security, driver's license, or citizenship numbers that uniquely identify each individual.

Data matching can be used to quantify assessments of voter database accuracy, completeness, and validity and thus to measure improvements in voter database quality over time. Moreover, as a desk-top study, without the expense of field research, an assessment based on data matching usually is the least expensive method to audit a voter database.

There are, however, two significant limitations to data matching. First, every large database contains some margin of error, and if the errors in different databases are systemic or related, data matching is likely to overlook them. Data matching may, for example, inflate the estimate of voter database accuracy if the same outdated addresses for registered voters appear in the motor vehicle database as well. Second, data matching, by itself, cannot explain unmatched records. There are different reasons why auditors may find no match for an individual's voter registration record with the records of other state databases: the voter registration record could be inaccurate; the individual's records in other state databases could be inaccurate; the individual could be legitimately and accurately registered to vote but have no driver's license or other records that would appear in state databases; or the individual could be ineligible to vote but nonetheless registered and have no records in other state databases. The reason why records are unmatched can only be determined by further research, specifically by direct contact with the individuals with unmatched records.

A field study usually produces a more reliable assessment of voter database quality than data matching, because auditors contact registered voters directly to verify information contained in the voter database. Neither of the two main limitations with data matching applies to a field study. With a field study, auditors can identify inaccuracies, such as out-of-date addresses, that are found in both the voter database and other state databases. Auditors can also determine whether the voter registration record of each respondent is accurate or not.

Field research nevertheless has its limitations. While it provides a reliable way to measure the accuracy of voter registration lists, it is less reliable in measuring voter list completeness and validity, because respondents to survey research may provide inaccurate responses. To assess how complete a voter registration list is, auditors must either use census and other data to estimate the total number of eligible voters (and determine the percentage of registered voters from that estimated total) or take a sample of residents, drawn from a list of addresses or telephone numbers, and ask these residents whether they are registered to vote. The residents may respond that they are registered even if they are not. To assess the validity of voter lists, auditors need to ask about the eligibility of respondents, and if respondents are ineligible, they are unlikely to admit that to auditors.

Moreover, the cost of field research is higher than the cost of data matching, although AEC spent only \$340,854 for its field study.⁷⁹ The cost of AEC's field study averaged \$4.25 per interview and less than \$0.03 per registered voter. The cost of a similar field study in the United States probably would be substantially higher. A U.S. field study may cost about 20 times more than the AEC's, about \$85 per interview or \$0.60 per registered voter.

Each of the three methods for auditing voter registration lists thus has its strengths and limitations. Auditors may select any one or combination of these methods to assess the quality of a voter registration list. The most reliable and comprehensive audit would combine all three methods.

The purpose of audits is to assure quality in voter databases, which are dynamic. When significant problems are identified, a follow-on audit will be needed later to check whether those problems are corrected. When no significant problems are found, a follow-on audit is

⁷⁹ Australian Electoral Commission, *Measuring the Accuracy of the Electoral Rolls*, p. 46.

not urgent, but periodic audits are still needed to check that the voter databases are being updated to take into account citizens who move, die, or otherwise become ineligible to vote. As the process of keeping voter databases accurate and up-to-date is ongoing, so is the process of assessing and assuring quality in voter databases.

No state in the United States has undertaken a comprehensive audit of its voter registration list, as Australia and other countries have done. U.S. elections experts have focused on the procedures used to add and to remove names from voter lists.⁸⁰ While improvement in these procedures may lead to enhanced quality in voter lists, the actual quality of voter lists cannot be determined without a comprehensive audit.⁸¹

Cost Estimates

The Carter-Baker Commission recommends federal funds to pay the cost for making voter databases interoperable, which is estimated to total \$287 million.⁸² This cost breaks down as follows: \$74 million to build top-down statewide voter registration systems; \$21 million for states to adopt the recommended template for shared voter data; \$77 million to create a system for sharing voter data among states; and \$115 million to register and provide voter ID cards to non-drivers.

Top-down state databases

Funds are needed for 11 states to build top-down voter registration systems. Estimates are available on what 5 of these 11 states are currently spending to build bottom-up or hybrid voter registration systems.⁸³ We can assume that these 5 states will need to spend the same amount as they are currently spending on bottom-up or hybrid systems to create new systems that are top-down.

For the remaining 6 states, we estimate the cost of new top-down systems based on the average amount of funds being spent by states that have already built or are already building top-down systems. Among the states with top-down systems, the cost of building a new voter registration system varies according to the state's population. States with an average population of less than 4 million spend an average of \$1 million to build a top-down voter registration system, while states with a population between 4 and 8 million spend on average

⁸⁰ For example see The Century Foundation, *Balancing Access and Integrity: The Report of The Century Foundation Working Group on State Implementation of Election Reform*, 2005, at <www.tcf.org/list.asp?type=PB&pubid=542>.

⁸¹ Justin Levitt, Wendy Wiser, and Ana Munoz, "Making the List: Database Matching and Verification Processes for Voter Registration," Brennan Center for Justice, <<http://www.brennancenter.org/programs/downloads/HAVA/svrd/SVRD%20matching%20report.pdf>>.

⁸² The estimate of \$287 million covers the costs of making state voter databases interoperable. It excludes the costs for operation and maintenance.

⁸³ Estimated costs of voter registration systems are available for Alabama, Arizona, South Dakota, Texas, and Washington, see Electionline.org, *Assorted Rolls*, pp. 15-24. Alabama has yet to decide on the design of its voter registration system. For Arizona, which estimated the cost of its new voter database between \$10 million and \$20 million, the average—\$15 million—is used.

\$5 million, and states with more than 8 million people spend an average of \$8 million.⁸⁴ Based on these estimates, the amount needed to build top-down voter registration systems in all 11 states is expected to total \$73.6 million.

Template for voter data

In the process of implementing the REAL ID Act, states will collect most of the data needed for the recommended template of shared voter data. The template consists of each citizen's full legal name, date of birth, signature captured as a digital image, and Social Security number. The name, date of birth, signature image, and Social Security number will be collected from every individual who is issued a REAL ID card. The REAL ID Act requires states to retain a digital copy of all documents submitted with applications for a REAL ID card, and these documents will contain the applicant's signature. States will thus capture a digital image of the signature of every citizen who is issued a REAL ID card. Most states already capture and store a digital image of the signature of every resident who is issued a driver's license.

Through the implementation of the REAL ID Act, states will also collect the Social Security number of every REAL ID card holder. Every state except Vermont currently requires applicants to provide their Social Security number to obtain a driver's license, and Vermont will need to collect Social Security numbers from its 354,000 drivers for it to comply with the REAL ID Act.

States will collect the entire template of voter data from every voter who is issued a REAL ID card. They will then need to transfer that data from their department of motor vehicles, which will issue REAL ID cards, to their voter database. Some states, such as Kentucky, already collect Social Security numbers for voter registration. Others could transfer Social Security numbers from their DMV database to their voter database. Under HAVA, states are supposed to coordinate their voter database with the databases of other state agencies, such as the database of the department of motor vehicles.

Moreover, the Carter-Baker Commission recommends a close connection between each state's voter database and DMV database so that every citizen who is issued a REAL ID card will be automatically registered to vote. This connection will function most effectively if the DMV database is set up to automatically transfer all new data on citizens with REAL ID cards to the voter registration database. Such a connection would be built into the DMV database and the voter database and thus would be incorporated into the cost of creating real-time connections among databases within and across states (see below).

States will still have to collect the voter data, including the signature image and the Social Security number, of U.S. citizens without a REAL ID card. To collect this data, states will need to register an estimated 23 million Americans who do not have a driver's licenses.⁸⁵

⁸⁴ Electionline.org, *Assorted Rolls*, pp. 15-24. Oklahoma has a population of under 4 million; Tennessee's population is between 4 and 8 million; and California, Illinois, New York, and Ohio have populations over 8 million.

⁸⁵ The U.S. voting age population is estimated at 215.7 million people in 2004, see U.S. Census Bureau, Voting and Registration Data, <www.census.gov/population/www/socdemo/voting/cps2004.html>. In 2003, the number of Americans aged 18 years or older with a driver's license was estimated at 192,686,927, see U.S.

The cost of voter registration is estimated on the basis of the cost incurred by Canada in 1997, when Canada conducted a door-to-door enumeration of almost the entire country to register voters. That enumeration cost \$18,026,055 (in U.S. Dollars) for 19,663,478 registered voters and thus averaged \$0.92 per voter.⁸⁶ At that average, the cost to register 23 million Americans to vote would total \$21.1 million.

System for data sharing

There are three main components to the proposed system for sharing voter data among states. First, each state's voter database must have the capacity to connect to other databases in real time. Second, a central repository of voter data must be set up. Three, leased lines must be used to provide secure connections among state voter databases.

The Congressional Budget Office estimates that states will need to spend \$80 million to participate in the Driver License Agreement on sharing driver's license information in compliance with the REAL ID Act.⁸⁷ Each state will spend \$1.6 million on average to make its driver's license database capable of participating in the Driver License Agreement. States can expect to spend the same amount to make their voter databases capable of sharing information with other states. The voter databases of 26 states currently lack real-time connections to other state agency databases and therefore will require upgrades, at the estimated cost of \$1.6 million per state voter database, to build such connections. The remaining 24 states have a voter database with real-time connections to other databases within the state but still require a small upgrade, estimated to cost \$340,000 per database, to establish real-time connections to the voter databases of other states.⁸⁸ The total cost to create real-time connections among the voter databases of all states comes to \$49.76 million.

The central repository of voter data is a database, such as the IBM eServer with Oracle9i software, with the capacity to process 57,346 transactions per minute. Such a database costs \$1,632,624.⁸⁹

The cost of leased lines for sharing voter data among states is estimated on the basis of the price Idaho paid to connect each local jurisdiction to the state's voter registration system. Since Idaho paid \$502,450 for its leased lines, a national network of leased lines to connect

Department of Transportation, *Highway Statistics 2003*,
<www.fhwa.dot.gov/policy/ohim/hs03/htm/dl22.htm>.

⁸⁶ Office of the Chief Electoral Officer of Canada, *Voting for Democracy: Notes on the Canadian Experience*, March 1998, <www.aceproject.org/main/samples/vr/vrx_w005.pdf>; and Electionguide.org, *Voter Turnout*, <www.electionguide.org/turnout.htm>. The door-to-door enumeration encompassed the entire country except for the provinces of Alberta and Prince Edward Island.

⁸⁷ Congressional Budget Office, *H.R. 418: REAL ID Act of 2005*,
<www.cbo.gov/showdoc.cfm?index=6072&sequence=0>.

⁸⁸ See Electionline.org, *Assorted Rolls*. On average, top-down voter registration systems with real-time connections to other state databases cost \$1.94 million more than top-down voter registration systems without such connections. The estimated cost to connect a state's voter database with the voter databases of other states is \$1.6 million. The difference in cost between in-state connections and cross-state connections—\$1.94 million minus \$1.6 million—provides the estimate of \$340,000 to upgrade a voter database with in-state connections to add cross-state connections.

⁸⁹ Price quotes on databases are available from the Transaction Processing Performance Council at <www.tpc.org/tpcc/results/tpcc_result_detail.asp?id=101042301>.

state voter databases is expected to cost 50 times that amount, or \$25.12 million.⁹⁰ The total cost to create a system for sharing voter data among states is thus estimated at \$76.5 million.

Voter ID for non-drivers

The Carter-Baker Commission calls on states to issue photo voter ID cards, or “EAC-template ID cards,” to non-drivers—to the 23 million Americans who will not have a REAL ID card. EAC-template ID cards are estimated to cost \$5 each.⁹¹ This is the cost of the card itself. The cost of registering the 23 million non-drivers is included above in the calculations of the cost of the template for voter data.

The estimated cost of ID cards varies. It can reach as high as \$10 or more per card. Yet even critics of national ID cards admit that a “smart card,” which contains an implanted microchip, can cost as little as \$5. The EAC-template ID card envisioned by the Carter-Baker Commission is not a smart card. Instead, it is a simple tamper-resistant ID card, similar to the driver’s license that most states currently issue. The estimate of \$5 per EAC-template ID card therefore is conservative. At \$5 per card, the total cost to issue voter ID cards to the 23 million non-drivers will be \$115 million.

Conclusion

Voter registration systems are improving under the Help America Vote Act but still require further improvement. Even after HAVA is implemented, they will remain inadequate to the tasks of ensuring the accuracy of voter registration records, removing voter registrations that are duplicated in different states, facilitating updates in voter registration when citizens move to another state, or expanding the number of eligible voters who are registered. The Carter-Baker Commission therefore put forward a package of proposals to modernize voter registration systems beyond HAVA. The main steps required to implement these proposals are as follows:

- States with bottom-up or hybrid voter registration systems build top-down voter registration systems.
- REAL ID cards are adapted for voting purposes. A small notation is added to REAL ID cards to show whether the card-holder is a U.S. citizen and thus is eligible to vote. All U.S. citizens who are issued a REAL ID card are registered to vote, and a copy of their REAL ID application is sent automatically from the department of motor vehicles to the state elections bureau.

⁹⁰ Price quotes on leased lines are available at <www.t1-t3-dsl-line.com>. The cost of Idaho’s leased lines is listed in Electionline.org, *Assorted Rolls*.

⁹¹ This cost includes approximate administrative, infrastructure, and issuance costs; Stephen Moore, Testimony before the U.S. House of Representatives Subcommittee on Immigration and Claims, Judiciary Committee, May 13, 1997, <www.cato.org/testimony/ct-sm051397.html>; The Century Foundation, Homeland Security Project, *The Debate Over a National Identification Card*, <www.tcf.org/Publications/HomelandSecurity/National_ID_Card.pdf>.

- New federal legislation requires states to make their voter registration systems interoperable. The U.S. Election Assistance Commission is given authority to implement this legislation.
- The EAC introduces a federal unique identifier, which consists of each voter's full legal name, date and place of birth, signature captured as a digital image, and full Social Security number. States collect the unique identifier information of every registered voter.
- A National Voter Registration Information System is created. It is a distributed database with real-time connections among all of the state voter databases. It allows state to share voter data across secure lines of communication.
- NVRIS is used to remove duplicates and to facilitate updates in voter registrations. States also facilitate voter registration updates by accepting REAL ID cards issued by other states as proof of the card-holder's name, date of birth, U.S. citizenship, and Social Security number.
- The EAC distributes federal funds for states to participate in NVRIS and withholds funds from states that do not make their voter databases interoperable. The EAC also checks on an ongoing basis that states remove duplicate registrations from their voter databases.
- States reach out through mobile offices to non-drivers to register them and to issue them free photo ID cards for voting.
- Voter registration lists are audited for quality. The audits assess the extent to which voter lists are accurate, complete, valid, and secure.

APPENDIX 1: Summary of Proposed Steps to Modernize Voter Registration Systems

A. Top-Down Registration Systems

Steps	Details
1. Eleven states (AL, AZ, CA, IL, NY, OH, OK, SD, TN, TX, and WA) need to build top-down systems	1. Obtain Database Management System (DBMS) hardware and software.
2. Determine whether to purchase a commercial database or build one “in-house.”	2. “In-house” arrangements are generally cheaper but have higher maintenance costs. Large states generally purchase commercial systems.
3. Produce the definitive statewide voter list.	3. Each state will import local voter lists, one list at a time, into the statewide list and will check for duplicates, which will be quarantined and reviewed.
4. Make the statewide list available to local jurisdictions.	4. Each state will establish a secure physical connection between its central registration data repository and local jurisdictions, either through leased lines or a virtual private network.

B. REAL ID

Steps	Details
1. Adapt REAL ID for voting purposes.	1. States will change current procedures to request party affiliation information from driver’s license applicants and to will send a copy of driver’s license applications from the DMV to election officials.
2. Determine whether to transfer data through a batch system or a real-time connection.	2. Batch systems ensure control by state election officials over voter registration, while automatic transfers reduce the risk of losing data in transmission.

C. Interoperability

Steps	Details
1. Develop a standard voter registration and identification template.	1. The template will include a person’s name, date and place of birth, signature, and Social Security Number.
2. Build a National Voter Registration Information System (NVRIS).	2. The federal government will set up a distributed database or sharing voter data and then turn it over to the states to run.
3. Link the states to NVRIS.	3. States establish secure, real-time connections to NVRIS.
4. Compile the national voter registration database.	4. The NVRIS repository will be compiled one state at a time. As each state adds its list to the repository, potential duplicates are identified. The states will decide how to handle duplicates.
5. Data in NVRIS is updated on an on-going basis.	5. As states register new voters and update registrations of voters who move, voter registration data is forwarded automatically to NVRIS.
6. Check apparent duplicates before any registration is removed from state voter databases.	6. States will implement rigorous procedures to prevent voters from being removed from the voter lists due to a false duplicate entry.