# US Electoral Reform: The Obvious Obligation

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The recent US presidential election has already resulted in pressure to reform the systems that handled the voting process and vote counting. Given that the data technologies used to conduct the election have also drawn fire, US computing professionals have a duty to be informed and to inform their community about this problem's technical aspects and implications. But their professional responsibilities reach beyond this one election.

The US commercial and technological empire exerts a worldwide influence less formal but otherwise comparable to that exerted by the British Empire a century ago. As a democracy committed to the spread of democracy, the US sets a particularly important example for electoral processes to the many countries around the globe struggling to develop their own democracies.

Popular elections usually provide a democracy's foundation. Thus, if observers perceive a US popular election as an imbroglio—if not an outright fiasco—then fiascoes and fraud elsewhere become excusable. The consequent US reform of its election processes would therefore encourage and justify similar reforms elsewhere.

The worldwide significance of last November's election thus justifies international comment and places a responsibility on computing professionals throughout the world to inform themselves about the technological aspects of any US electoral reform. Reforming an electoral system is above all else a political process, to be decided democratically. In principle, though, a democracy must be fully informed about the matter to be decided. In this case, the decision rests on re-engineering a system, so the source of technical advice for the reform must be system engineers. Since the use of digital technology is highly relevant to the reform, many such engineers will belong to the computing profession.

## THE TECHNOLOGY THAT WAS

Early last December, a colleague on study leave in the US e-mailed season's greetings to the School of Computing staff here in Tasmania, concluding with the observation: "Signing off from the technological forefront, where even people less than half Neville's age spend hours discussing punched-card technology!"

Somehow those Floridian ballot chads—variously dimpled, pregnant, swinging, or hanging—came misleadingly to epitomize the problems encountered in the US presidential election. By all reports, many electoral problems had nothing to do with chads, but I found the focus on them disturbing for two reasons.

The *trivial* reason for my concern arises from my recollection that the little pieces of cardstock created when a punch card is holed were—in my experience from the 1950s and 1960s—never called chads. We always called them chips, and they had to be emptied periodically from bins called "chip boxes" housed deep within the machines that punched holes in the cards.

On the other hand, we did associate chads with punched paper tape. As I recall, before photoelectric readers became popular for paper tape, two different tape types saw wide use. *Chadless tape* had the data holes entirely punched out of it, while *chad tape* had the data recorded with sesquisemicircular flaps for one bits. Those who preferred chad tape cited its greater strength, lack of confetti to be dealt with, and its chads showing the direction of its feed.



**Flaws in the US electoral system, if left uncorrected, could imperil democracy worldwide.**

With chad tape, the flaps popped up when they went over the sprocket and guide wheels and, because they looked like the popular graffito of half a century ago called Mr. Chad, the flaps were called "chads." Figure 1 shows an example of Mr. Chad, whose name is—according to *The Oxford English Dictionary*—of unknown origin. US servicemen adopted the graffito in association with the motto "Kilroy was here" (http://www.kilroywashere.org/).

The *significant* reason for my disturbed state of mind stems from the impression that the technology US voting machines used to produce the incomplete chips was based on what I knew in the 1960s as Portapunch, an impression confirmed by a news story posted to the Web (http://

www.foxnews.com/election_night/111600/inventor.sml). In this technology, users placed a card, scored with the potential chips, on a tablet so that any desired hole could be made with a stylus that pushed the chip into a channel in the tablet behind the card. Such a channel spanned the plastic backing plate for each row of the punched card, and these channels very effectively gripped the chips *provided the accumulation of chips was emptied out from time to time.*

Because the US election's Votomatic technology functions like that of the Portapunch, the kind of defects reported in Florida—dimples and so on—could only have occurred if the chips hadn't been cleaned out of the tablet. As all too often happens, then, human error and not technological malfunction caused the problem. Technology is the scapegoat here, not the culprit.

### THE TECHNOLOGY THAT MIGHT BE

Two classes of technological fix have been proposed so far—one intended to improve the voting, the other to assist in vote collection.

Typical measures for improving the voting process involve interactive technologies based on, for example, touch screens. A strong argument has yet to be made, however, that these measures would actually improve the voting process under the hectic conditions that
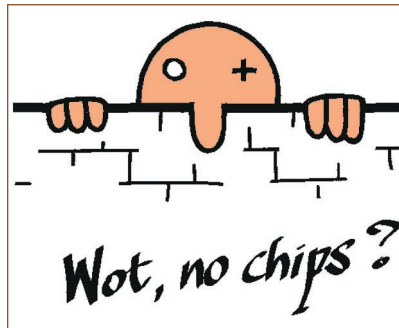


*Figure 1. A portrait of Mr. Chad, also adopted by US servicemen to depict the enigmatic Kilroy.*

prevail on election day. Such efforts would surely make matters worse and would certainly cost more.

To improve vote collection, many observers have touted online voting via the Internet. Rebecca Mercuri recently outlined some of this highly inequitable proposal's dangers in "Voting Automation Early and Often?" (*Comm. ACM*, Nov. 2000, p.176). The inequity should be obvious when we consider the Digital Divide, which, despite official government hand-wringing (http://www.digitaldivide.gov/), will likely widen over the next several decades. Incidentally, neither the divide nor the hand-wringing is peculiar to the US.

A technological fix should only be proposed after studying the voting system as a whole, and then only as an aid to an effective electoral system. If, as seems strongly indicated, the present electoral system is severely broken, the purely technological fix should be forgotten for now. A saying popular among data processing professionals in the 1950s and 1960s warned "don't mechanize a mess." Why not? Because you just get a bigger, faster, more expensive mess.

The electoral-system mess has two human dimensions: the voters who provide the input to an election and the counters who determine the outcome. Technology could well be used to underpin an improved voting process and to support improved election administration.

### IMPROVED VOTING

Ideally, for each election as many eligible people as possible should cast a well-considered vote. All reports suggest that in the recent US presidential election roughly half those eligible to vote did so and that all too many of them didn't understand the process.

Two factors caused this outcome. First, the voting process varied from place to place and, in many cases, suffered from poor design and implementation. Second and far more important, the current system makes the basic mistake of forcing everyone to vote on the same day. This short a time period simply doesn't allow enough time to vote properly.

Suppose instead the system provided a two-month voting period, with perhaps the last week reserved for people who wish to change their vote. Then interaction with a screen could be used to ensure that everyone submitted a valid and intentional vote. Using this approach, more people would vote because they could choose to vote on the day they found most convenient.

### IMPROVED ADMINISTRATION

If voters are to choose their day to vote, voting locations must be established and kept open for the length of the election period. As Mercuri writes, "The tried-and-true method of showing up to vote where your neighbors can verify your existence is still best used until biometric identification is reliable and commonplace."

Currently, only one other government process requires that people at large be identified: the census. Why not then have the US Census Bureau assume responsibility for conducting elections? The Bureau could provide the independent electoral authority so many commentators have declared necessary to conduct scrupulously fair US elections.

This idea springs from the associated idea that, with modern technology, a continuous census, with at least decennial declarations for electoral purposes, would be more effective than conducting a frantic one every 10 years. Permanent census offices could then be set up to collect census data, register voters, and collect votes. This idea's charm lies in how modern digital technology has, in its administrative uses, developed from the machinery Herman Hollerith designed for the 1890 US Census.

The procedures and machinery used for census data collection could be adapted equally well to electoral administration. In each case, the two applications share similar identification and confidentiality requirements. Vote collection could be done online as well, but votes need not be counted as they are collected. An election night could still be held, however, during which the Bureau's computer would count all votes in the sequence they were cast, say in daily stages, and so provide a traditionally exciting performance by releasing the results progressively.

### WEIGHTY RESPONSIBILITY

The reforms I've suggested here, in sketch form, only illustrate possible solutions. However, the assertions that

- technology is an aid, not an end in itself;
- systems must be designed to help and protect people equitably, not to divide and conquer them; and
- electoral systems must be designed to promote democracy, not to provide profit for the equipment manufacturers

form sound principles applicable to the US and the world as a whole.

The US computing profession has a particular responsibility to involve itself professionally in public and private discussion of any proposed electoral reforms. To work toward the best possible decisions in this matter is a professional responsibility not just to the US community, but to computing professionals outside the US, so that the profession's entire membership may be seen to set a worthy example.

Yet the computing industry and its venture capitalists may endanger these goals by pressing for the utmost application of digital technology simply to generate profits for their shareholders and CEOs. Although this motivation is understandable, computing professionals who see contrary practical arguments must proclaim them loudly and often.

D esigning a good system for electing candidates to office is relatively easy. Although achieving such a system will be difficult, the great benefits of doing so make the effort worthwhile. Such an achievement is only the first stage, however. The second stage—achieving a good system for representative democracy—offers even greater potential benefits. This stage will be much more difficult to implement, however, because it poses significantly greater challenges, such as overcoming the present, deeply entrenched, and highly defective electoral systems. ☀

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