Remote Voting: What Can We Do?

David Wagner
voting technology is in a period of stasis
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...now's the perfect time to innovate!
I hope to inspire you, by sharing exciting research opportunities.
let's talk about remote voting
vote-by-mail
40-50% of voters vote by mail, in several Western states
What can we do to improve vote-by-mail?
not-quite-remote voting
it might be time to re-consider
the precinct model
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imagine if you were only allowed to drop
off outbound mail at your home post office
Can we enable voters to vote at any polling place of their choice?
voters would like to be able to research candidates and make their choices, at a time and place of their convenience
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... but voting over the Internet is risky.
Can we establish a technology foundation for pre-voting?
accessibility
15% of US voting-age have disabilities
($\geq$ 30 million eligible voters)
45-72% of polling places have impediments to access

Source: GAO 2009.
poll workers often have difficulty setting up accessible voting machine
Can we help disabled voters vote from home?
overseas voting
there are 6 million eligible US voters abroad
(civilian + military)
for ≈ 25% of overseas voters who wanted and tried to vote, their vote didn't count.

Source: OVF 2013.
15% of overseas voters returned their ballot electronically (email, fax, or web – no paper).

Source: OVF 2013.
Can we help overseas and military voters?
it is time to study how to make Internet voting work.
In 2004
Internet voting is not safe!

In 2004
Today

Tuesday, August 13, 13
Let's try to make Internet voting safe enough for overseas voters
is it even possible?
“if only voting weren't anonymous, it would be easy”
“if only voting weren't anonymous, it would be easy”

just publish everyone's vote
"if only voting weren't anonymous, it would be easy"

just publish everyone's vote

Anne: vanilla
Grace: chocolate
Charlie: vanilla
....
overseas ballots *already* aren't 100% anonymous
publish everyone's vote

10923: vanilla
92301: chocolate
46388: vanilla

....
publish everyone's vote

10923: vanilla
92301: chocolate
46388: vanilla

tracking number
publish everyone's vote

10923: vanilla
92301: chocolate
46388: vanilla

tracking number

vote
problem solved
problem solved?
wait a minute:
does this provide privacy?
wait a minute: 
does this provide privacy?

No!
10923: President: Obama, Mayor: Brown, ...
92301: President: Romney, Water District 3: ...
46388: President: Romney, School District 7: ...
if Alice is the only overseas voter with a particular ballot style, she has no privacy.

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in one county:
4% of voters would be uniquely identified
28% of voters would have anonymity set < 20
one tracking number isn't safe
one tracking number isn't safe

so give 'em two!
10923: President: Obama
92301: Water District 3: Jones
46388: School District 7: Smith
75190: Mayor: Brown
23209: President: Romney
44852: President: Romney
Anne's tracking numbers

10923: President: Obama
92301: Water District 3: Jones
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23209: President: Romney
44852: President: Romney

Tuesday, August 13, 13
another approach:
end-to-end (open-audit) cryptographic schemes
another approach:
remotely-supervised remote voting

See: Juan Gilbert's research.
there might be hope for making Internet voting auditable
caveat:
caveat:

usability
caveat:

usability > auditability
caveat:

usability > auditability > security
caveat:

we don't know how to build a secure bulletin board.
suppose 20% of voters verify their vote against the public website (BB), right after voting.
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if website is hacked,
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if website is hacked, it can change everyone's votes
suppose 20% of voters verify their vote against the public website (BB), right after voting.

if website is hacked,
it can change everyone's votes after voters verify them but before they're counted.
ok, so some crypto geeks need verify their votes didn't change.
ok, so some crypto geeks need verify their votes didn't change.

```python
if (voter == "Josh Benaloh")
    do_not_cheat = True
```
public website (BB) knows who you are, and can show something different to each person
Can we build a public bulletin board that is worthy of our trust?
Can we make Internet voting safe enough for overseas, military, and/or disabled voters?
Internet voting that's both auditable and usable?
Will voters be able to audit their vote? And, will they actually do it?
do I know how to make Internet voting safe today?

No.

should we deploy Internet voting today?

No.

should we research it?

Yes!
Can we make Internet voting safe enough for overseas, military, and/or disabled voters?

We have to try!