



# ELECTRONIC

★ VOTING ★

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≡ ETHICS ≡

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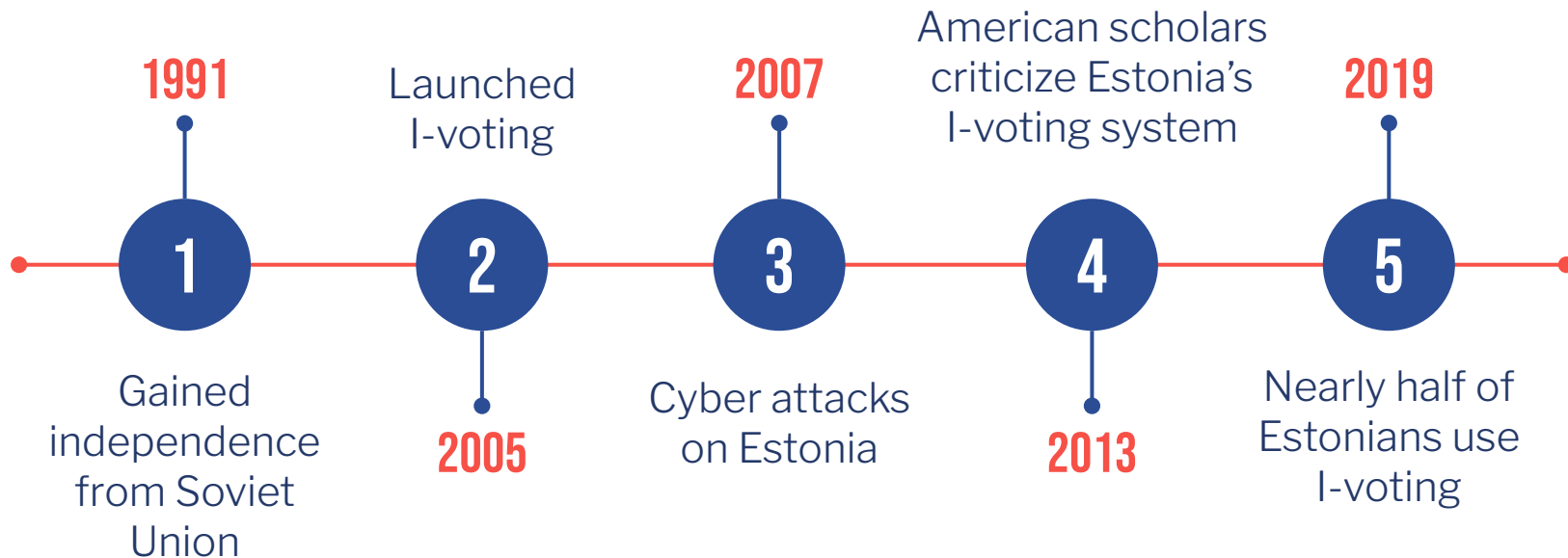


# **IF ESTONIA FIGURED OUT ONLINE VOTING 15 YEARS AGO, WHY CAN'T THE U.S.?**

The President of Estonia, Kersti Kaljulaid, at the World Energy Congress in Abu Dhabi, United Arab Emirates, Tuesday, Sept. 10, 2019.



# ONLINE VOTING IN ESTONIA





“Estonia’s system is based on the ideology that **people trust their government** to take care of their data ...”

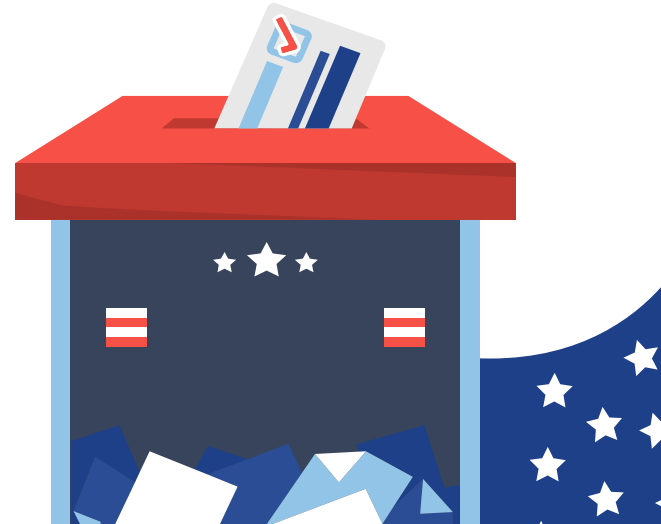
—MARTEN KAEVATS,  
ESTONIA’S NATIONAL DIGITAL ADVISOR

# ONLINE VOTING IN THE US

Voting over the internet is not available widespread throughout the US.

32 states and the District of Columbia have an option available in very limited circumstances

In 2020, there was a push for entertaining the idea of an online election due to COVID-19.



# WHY CAN'T THE US HAVE ONLINE ELECTIONS

## SECURITY CONCERNS

In February 2020, MIT found **security flaws** in online election system

- company that ran West Virginia's first mobile election
- allowed the hacker to **alter**, **stop** or **expose** a user's vote

In July 2020, MIT and University of Michigan published a paper regarding **security concerns** with Omniballot

- Delaware, West Virginia, and New Jersey allowed certain voters to cast a ballot using Omniballot
- vulnerable to vote manipulation by malware on the voter's device and/or compromised cloud systems

# WHY CAN'T THE US HAVE ONLINE ELECTIONS

## ANONYMITY

Voters have no way to verify that their ballots were correctly counted or challenge the results.

Recount requires all elections to have a hack-proof record of every voter's choices - typically a piece of paper with the vote

**“All the same mechanisms that you might use to detect that something went wrong are all the mechanisms that we’re not allowed to give you because of the requirement for anonymity.”**

*Dan Wallach (CS Professor at Rice University)*



# POINTS OF FAILURE



## ATTACKING THE BALLOT

Malware could alter the ballot after the voter hits submit or saves it



## ATTACKING ELECTION WEBSITE

Hackers could attack website and alter multiple ballots at once



## ATTACK BALLOTS IN TRANSIT

Hackers can set up intermediate server to receive ballots, tamper with them, and then send them to real server



## OVERWHELM WITH BAD DATA

DoS attack which would interfere with voters access to election websites

# STAKEHOLDERS

## ELECTION AUTHORITY

- National Election Commission/Government Agency (Administer Elections)
- Legislative Institutions, Security Organizations, Local Governments

## THE ELECTORATE (VOTERS)

- From young to older voters

## CONTESTANTS

- Candidates, Political Parties, Public Organizations, Groups of Voters

# MAJOR IMPACTS

## POSITIVE

- Increased Efficiency
  - Faster
  - Less In-Person Employees
- Improved Accuracy
  - Less Human Error
- Accessibility
  - Young Voters
  - Disabled

## NEGATIVE

- Security
  - Not as secure as paper
- Lack of Transparency
  - Cannot see how votes are tallied
- More distrust of the government

# ETHICAL DILEMMAS

## PRIVACY

- Separating verification and anonymity
- Insecure storage of votes
- Bad-actor developers

## TRANSPARENCY

- Confidence in digital systems
- Understanding of technologies

## FRAUD

- Identity theft
- No physical accountability

## DISCRIMINATION

- Low income areas
- Geographic concentration of votes

# CODE OF ETHICS

## **1.4 Be fair and take action not to discriminate.**

- “Computing professionals should foster fair participation of all people, including those of underrepresented groups.”
- Need a way to provide access to those without devices or Internet

## **1.7 Honor confidentiality.**

- “Computing professionals should protect confidentiality except in cases where it is evidence of the violation of law. In these cases, the contents of that information should not be disclosed except to appropriate authorities.”
- Votes must be kept private, but voter fraud must also be investigatable

## **2.7 Foster public awareness and understanding of computing, related technologies, and their consequences.**

- System must be fully transparent and subject to criticism
- Simple enough for the average person to understand

# SOLUTIONS

## UNRESTRICTED VOTING - ESTONIA

- Anyone can cast a remote vote
- Uses smart nation ID card
- Uses “mobile ID” - authentication channel using specific SIM cards

## LOCAL LEVEL

- Canada: Ontario and Nova Scotia but only smaller local elections

## ONLY CERTAIN VOTERS

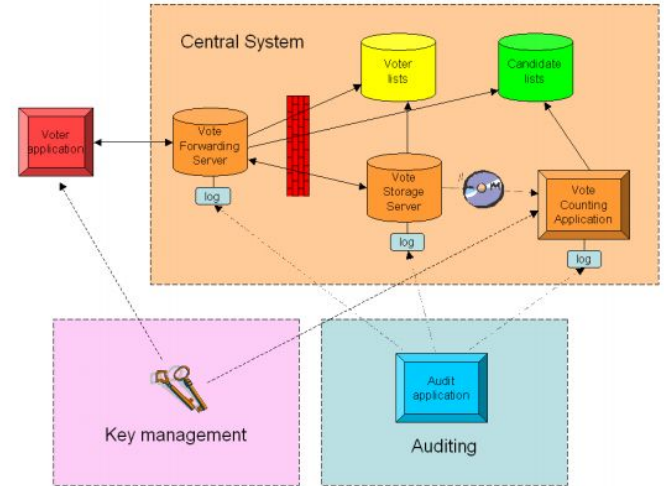
- France, Panama, Pakistan: Abroad
- Armenia: Abroad + diplomat/military
- Australia: disabled (literacy, visual, hearing)

## UNDER PARTICULAR REQUIREMENTS

- Switzerland: Certain number of people depending on security

# STANCE

- Start at the bottom with smaller scope and expand
- Improve the technology along each step of the way
- Ensures consistent progress without major gaps for security breaks
- Current testing isn't substantial enough



# ONLINE VOTING SETBACKS

## INTERNET VOTING IN THE USA: HOW NIST HAS MISLED CONGRESS AND THE AMERICAN PEOPLE ABOUT INTERNET VOTING INSECURITY (2013)

- Voting Technology Guidelines are Optional
- Most States won't do it alone
- "However, as long as strong-armed extremists enforce the irrational taboo on Internet voting, there is little chance that any state will go it alone. If only the election technology division of NIST fulfilled its duties as responsibly as the other departments of that distinguished agency, the prospects for Internet voting in the USA would be excellent." ~ Kelleher
- Lack of pursuit by the NIST also causes setbacks in addition (it's not just security limitations)



# USING ESTONIA AS MODEL

## AUTHENTICATED USER VOTES SENT TO CENTRAL DATABASE

### SIMILAR TO MULTI-FACTOR AUTH

- Virtually signed twice, once with signature, next with signature, identification, and session log

### ENSURING SECRECY

- Multiple Online Votes (only last counts)
- Online votes open only one week before election day
- Online voters removed from electoral register on election day

### PAPER BALLOT OPTIONS

- Early paper ballots
- Those abroad can send them via post or vote at an embassy
- Paper ballots cancel out online ballots

### SYSTEM MAXIMIZES SECRECY BY ALLOWING MULTIPLE VOTES AND PRIORITIZING PAPER VOTES

- Allows any voter otherwise influences to cast their vote and overwrite their tainted vote



# THANKS!

Any Questions?

# RESOURCES

<https://www.nbcnews.com/tech/security/voatz-smartphone-voting-app-has-significant-security-flaws-mit-researchers-n1136546>  
<https://www.cnbc.com/2020/09/23/why-us-cant-vote-online-in-2020-presidential-election-trump-biden.html>  
<https://internetpolicy.mit.edu/wp-content/uploads/2020/06/OmniBallot.pdf>  
<https://www.politico.com/news/2020/06/08/online-voting-304013>  
<https://aceproject.org/main/english/ve/veb03a.htm>  
<https://electionbuddy.com/blog/2022/04/20/the-advantages-and-disadvantages-of-online-voting-systems/>  
[https://www.eac.gov/sites/default/files/eac\\_assets/1/28/William-Kelleher-Internet-Voting-WPSA-Paper-July-9th.pdf](https://www.eac.gov/sites/default/files/eac_assets/1/28/William-Kelleher-Internet-Voting-WPSA-Paper-July-9th.pdf)  
<https://www.ndi.org/e-voting-guide/examples/internet-voting-in-estonia>