General Challenges of e-Voting

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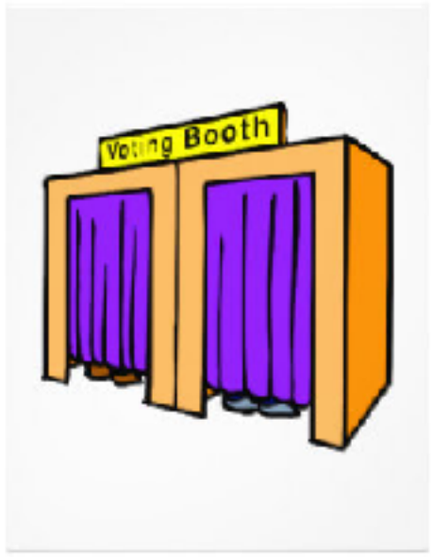
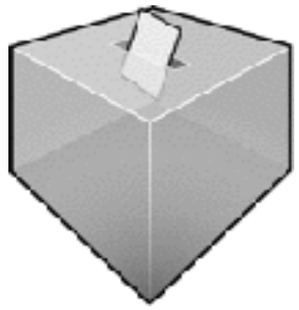
“Traditional” Voting



casting



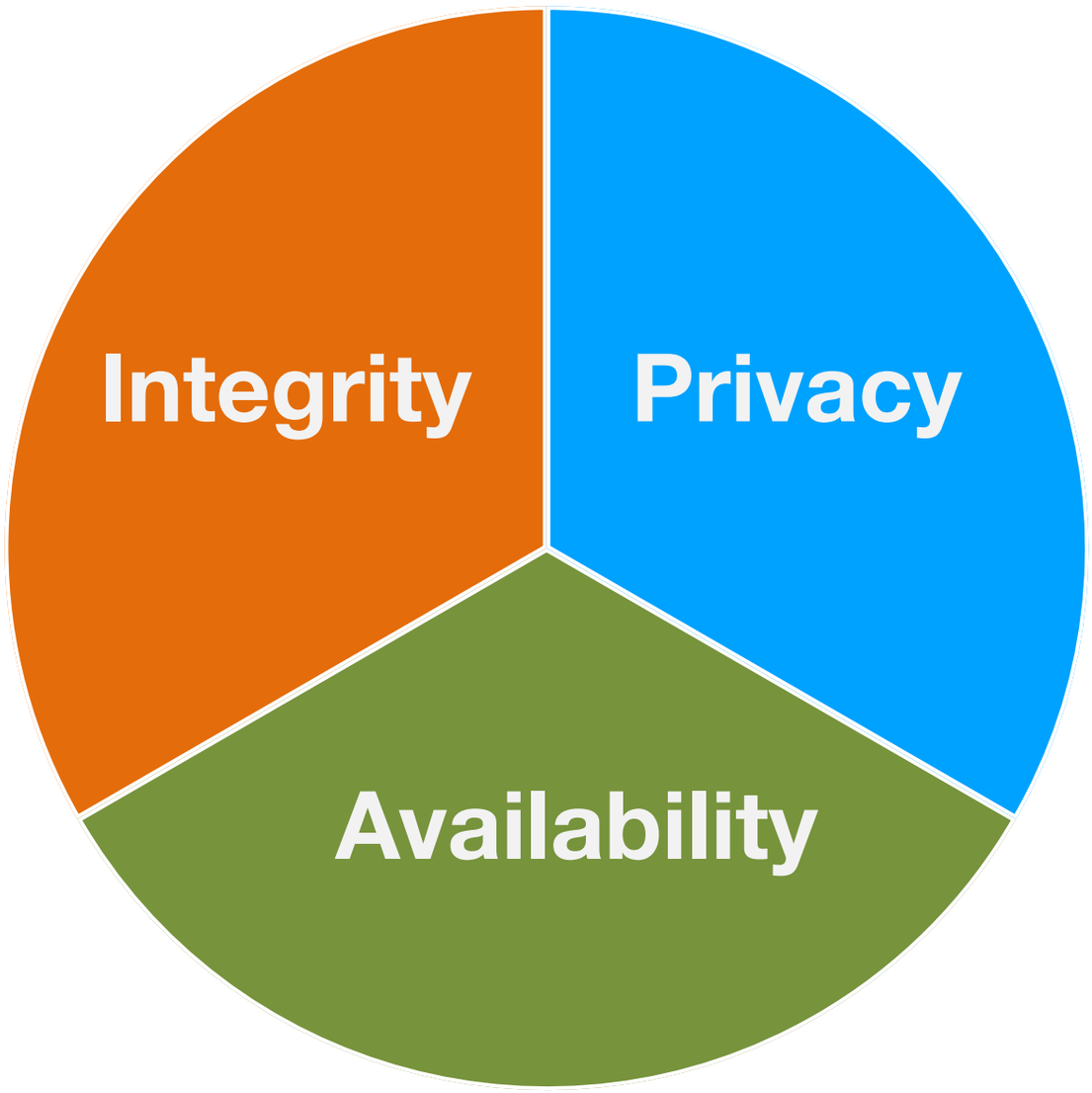
announcement

counting

auditing

identification

Fundamental Requirements of Voting



Traditional Voting & Requirements

- **Privacy** is guaranteed via physical means: (e.g., private booth, ballot box, opaque envelopes).

- **Integrity** is guaranteed via reliance on continuous oversight, (e.g., presence of accredited observers).

- **Availability** is guaranteed via procedural means: (e.g., announcing the election day ahead of time and allowing sufficient time to vote, ability of presiding officer to call the police).

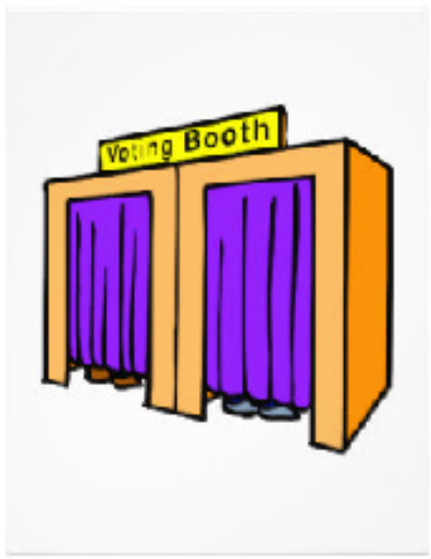
E-Voting

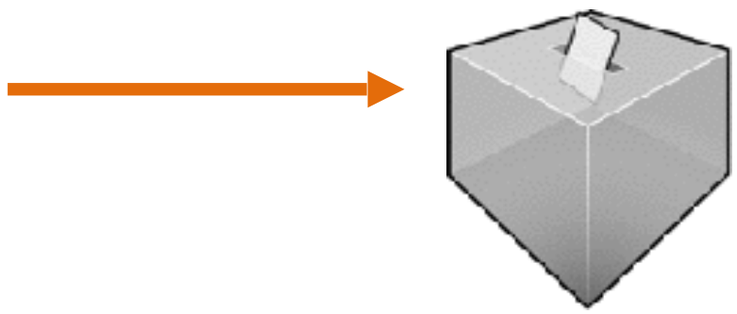
E-voting : using computers in at least one of the following three voting processes:

- Identification of voters
- Casting the vote
- Counting the vote
  - ~~(announcing / auditing)~~

Source: https://www.e-voting.cc/en/it-elections/definitions/

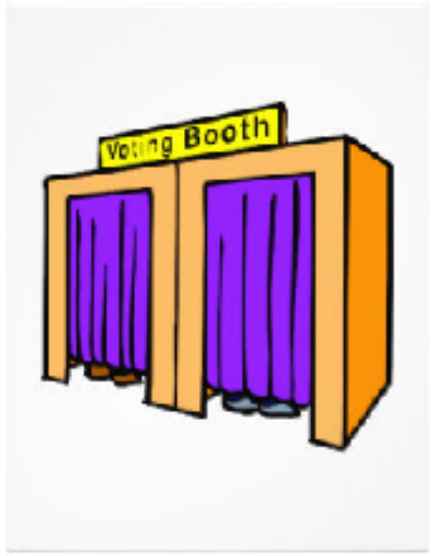
From Traditional Voting to E-voting

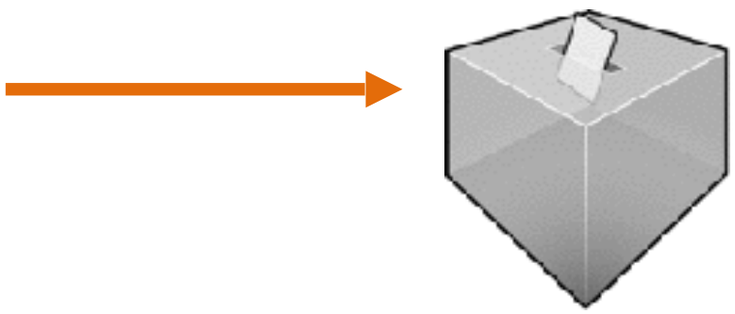




From Traditional Voting to E-voting

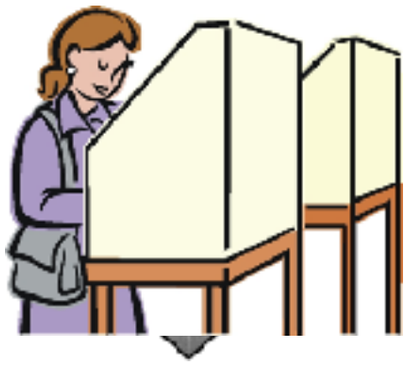
e-counting





From Traditional Voting to E-voting

ballot scanning / direct recording electronic



From Traditional Voting to E-voting

online voting

The benefits of e-voting

- Increase the participation of social groups that face considerable physical barriers.

- Increase the efficiency of the preparation of the election and the calculation of the final results.

- Reduce the financial cost of the elections (in long term).

The risks of e-voting

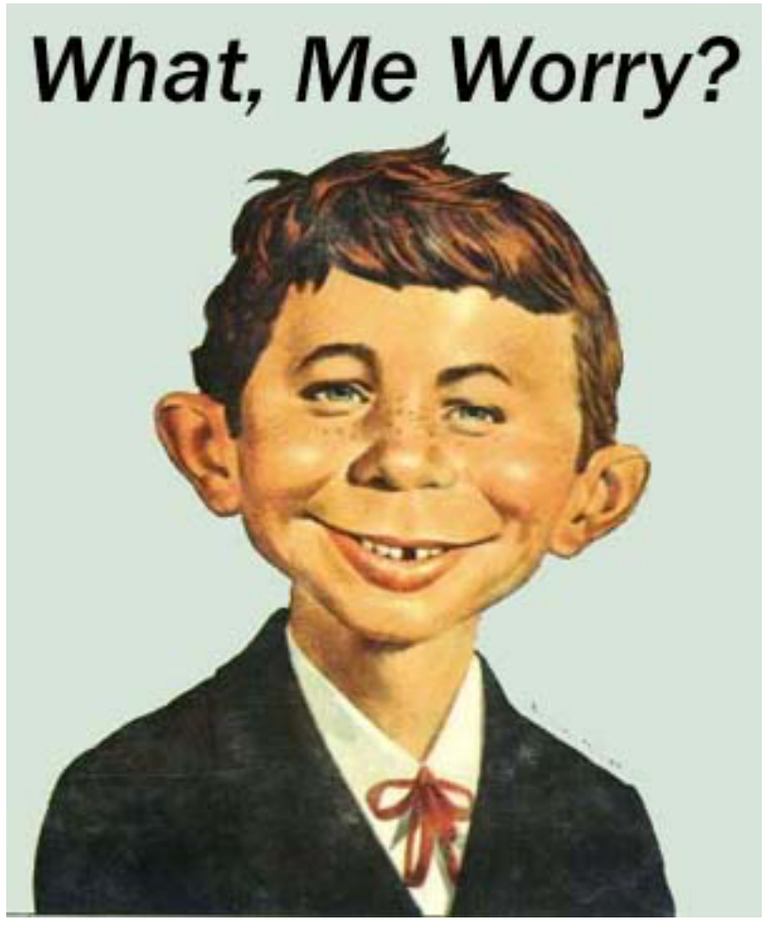
- Software vulnerabilities and/or the availability of digital transcripts may lead to privacy leaks. (~~privacy~~)

- Protocol and software vulnerabilities may lead to large-scale manipulation by a small group of insiders. (~~integrity~~)

- Interference (via electronic means) may cause denial of service & selective disenfranchisement. (~~availability~~)

- Auditing may require substantial technical expertise.

Is it really that bad?



we fly planes “by wire” so how come it’s hard to vote “by wire”?

Yes, it is!

- The adversary in voting can be **immensely more sophisticated** than in other settings.

- You may **never** know the system was hacked!

Is there a way forward?

…There is a way forward

- Modern cryptography provides a thorough methodology for designing and **formally establishing** the security of voting systems.

- Use it in order to extract and standardise the **proper specifications** of e-voting systems.

- Impose a **rigorous compliance regime** to the e-voting systems that are adopted.