E-vote with Blockchain and Municipal referenda
The case of a bottom-up proposal in Naples

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is this still the way?
VERSIL REFERENDUM
UNA SPIAGGIA PER TUTTI

il 2% dei napoletani possiede un’imbarcazione
il 98% possiede un costume da bagno

LA PRIMA GRANDE SPIAGGIA PUBBLICA A NAPOLI

Una spiaggia per tutti

some great experiments... but problems...
democracy needs a new way
E-voting?

1) Electronic voting on the Internet
2) Electronic voting in the polling station
E-voting?

1) Electronic voting on the Internet
2) Electronic voting in the polling station

Unsuitable when TRUE anonymity is at risk
• Authentication procedure to authorize the single vote
• Traceability of data packages
  (remediable with sophisticated protocols like TOR)

Facilitates coercion and vote trading:
• Voting could be non-private

What about Blockchain?
Blockchain e-vote on the Internet?

ID: OB78Y54WEUNP09
Vote: Yes

ID: W45SXBG78YMU8S
Vote: No

ID: UEEPRONIVW4Y8E
Vote: blank

ID: 4ZGIOSJ3WPMOR1
Vote: Yes
Blockchain e-vote on the Internet?

Some problems!
Blockchain e-vote on the Internet?

- Anonymity?

Some problems!
Blockchain e-vote on the Internet?

- Open ballot box results!
- Anonymity?

Some problems!
Blockchain e-vote on the Internet?

- Who is really voting?
- Open ballot box results!
- Anonymity?

Some problems!
Some solutions

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Some solutions

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- VOTE IN THE POLLING STATION
  - Voter identity check
  - Use of a preconfigured device
  - Open Source Software
Some solutions

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- Open ballot box results!
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- **VOTE IN THE POLLING STATION**
  - Voter identity check
  - Use of a preconfigured device
  - *Open Source Software*

- **VOTE ENCRYPTION**
Some solutions

- Who is really voting?
- Open ballot box results!
- Anonymity?

- **VOTE IN THE POLLING STATION**
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- **VOTE ENCRYPTION**

- **VIRTUAL BALLOT BOX**
  - Votes are aggregated
E-voting?

1) Electronic voting on the Internet
2) Electronic voting in the polling station

- Polling stations and places do not change much
- Costs for appliance and personnel do change
- New benefits
- New risks
Current setting

Polling station

- Set up of polling station
- Voters identification
- Authorization (giving ballot paper)
- Vote expression (in voting booth)
- Collection
- Counting votes
- Delivery of parcels

Municipal Electoral Office

- Managing of electoral rolls
- Managing right of voting certificates
- Division of municipality wrt polling stations
- Support of polling officers and staff
- Managing of the count staff list
- Managing of the polling officers list
- Organization of consultations
- Issuing of electoral certificates
Setting for blockchain e-vote

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Changed

Unchanged
What is your answer to the question which interests the local community?

YES
NO
Blank
Null

Polling Station n. 5
<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>blank</th>
<th>null</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>375</td>
<td>8</td>
<td>13</td>
</tr>
</tbody>
</table>
More opportunities

To limit vote trading

- The interface provides the possibility to change the vote before leaving the booth
- The use of the smartphone camera loses its value
- The vote is placed in the ballot box ONLY when the identity document is returned
ADVANTAGES

• Reducing paperwork and therefore sources of error
• Keeping a consolidated procedure as much as possible
• Making hourly turnout statistics possible
• Making mistakes in counting votes almost zero
• Hindering the vote trading

AND…

• The publication of partial results remains impossible
• The anonymity of the voter is guaranteed
Risks and mitigation

• Network attack to system and to SW → security by design

• Network fault → encrypted local record of partial results until the transaction is confirmed

• Decryption of partial results → implementation of standard key confidentiality procedures

• Anonymity of the voter → grouping of votes in blocks of N elements

FACILITATION FROM THE DISTRIBUTED SYSTEM
Open Points

• Trust in the supply chain  
  (we can be inspired by ATM solutions)

• Public verifiability:
  • Open Source code
  • Dynamic certification of the code in execution
  • Verifiability of the vote VS. anonymity
thank you!

e-voting voluntary group in napoli is:

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- Maria Francesca De Tullio
- Mauro Forte
- Davide Lo Pilato
- Diego Romano
- Rosario Scognamiglio
- Erica Vaccaro

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