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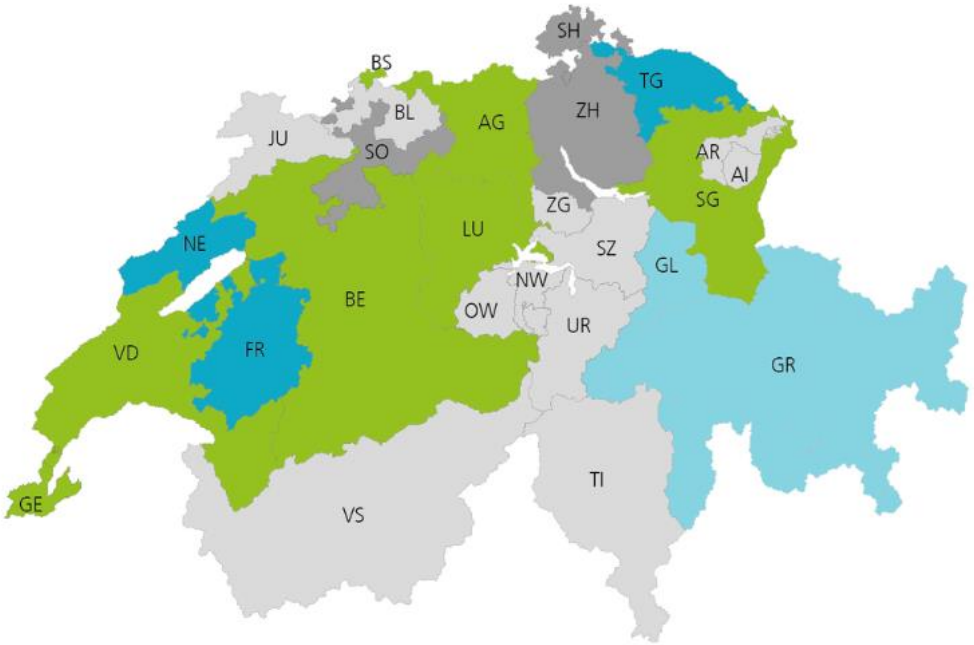
Trust in E-Voting

Oliver Spycher at Swiss Cyber Storm

Bern, 30th October 2018

E-Voting introduced by Cantons



- CHvote system: developed by GE; AG, BE, BS*, LU, SG and VD have joined.
- Swiss Post solution: FR, NE, TG. GL and GR are planning reintroduction in 2019 respectively 2020.
- These cantons carried out electronic voting trials up to the end of 2015.
- These cantons have not yet carried out any electronic voting trials.

*BS will change over to the Swiss Post system (probably in 2019).

Moving ahead step by step

- Trials since 15 years
- Open to 3.8% of the overall electorate (September 2018)
- Security first

Eckdaten zum Einsatz der elektronischen Stimmabgabe am 23. September 2018

Bedingungen / Kantone	Zugelassenes Elektorat Anzahl Stimmberechtigte (A)			Stimmbeteiligung zugelassenes Elektorat alle Kanäle (B)		Anteil elektronischer Stimmkanal (C)		
	Inland	Ausland	Total	Anzahl Stimmende	in %	Anzahl Stimmende	in % am zugelassenen Elektorat (A)	in % an allen eingegangenen Stimmen (B)
Bern	-	17 742	**17 742**	k.A.*	k.A.*	3 380	19.05	k.A.*
Luzern	-	4 944	4 944	1 461	29.55	919	18.59	62.90
Freiburg	1 025	6 040	**7 065**	2 198	31.11	1 047	14.82	47.63
Basel-Stadt	37	8 384	**8 421**	2 304	27.36	1 469	17.44	63.76
St. Gallen	37 778	8 096	**45 874**	18 038	39.32	4 377	9.54	24.27
Aargau	-	9 720	**9 720**	2 292	23.58	1 448	14.90	63.18
Thurgau	-	3 649	**3 649**	1 017	27.87	527	14.44	51.82
Neuenburg	29 059	566	**29 625**	k.A.*	k.A.*	4 643	15.67	k.A.*
Genf	48 171	26 406	**74 577**	***	***	19 461	26.10	***
Total	**116 070**	**85 547**	**201 617**	**27 310**	***	**37 271**	**18.49**	***

www.bk.admin.ch

People need to trust that…

- Result reflects the voters' intentions
- Secrecy of the vote is respected

→ …**even if they're not an observer**

Trust in Will and Ability

Trust One Trustee

…out of many

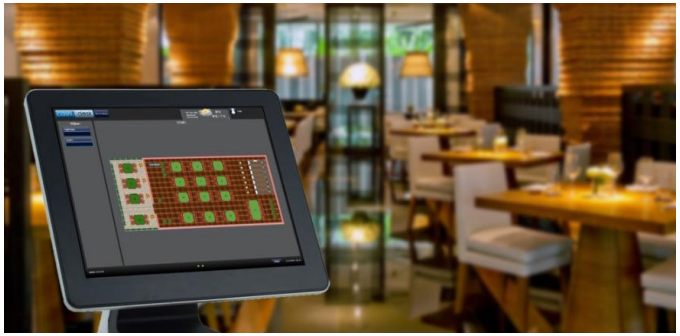
Trust in Will and Ability

E-Voting cannot be trusted…

- Transparency…
  - …inherently impossible
  - …only towards experts
  - …eats secrecy
- No meaningful recounts
- And anyhow, administrations will fail

Sure about that?

Trust through verification



[redacted]

RECHNUNG 9125
Tisch 27

1 2,5dl Lager	5,20	0201
2 geb.Crevetten	58,80	0004
2 Rindsf.Madagask	95,60	0024
2 Beilage Mais Kr	19,60	0042
1 Fl.Poggio	52,00	0461
1 5dl Min.mit	7,00	0223
1 Flan Caramel	10,50	0083
1 Coupe Waldbeere	12,50	0085
2 Kaffee Träsch	12,20	0278

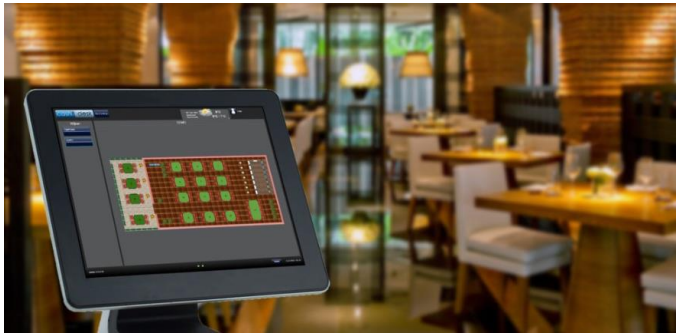
SUMME FR. 273.40

NETTO 08.0%	253,15
MWST 08.0%	20,25

Datum: 06.12.2016 Beat 2
MWST CHE-112.433.949

BESTEN DANK

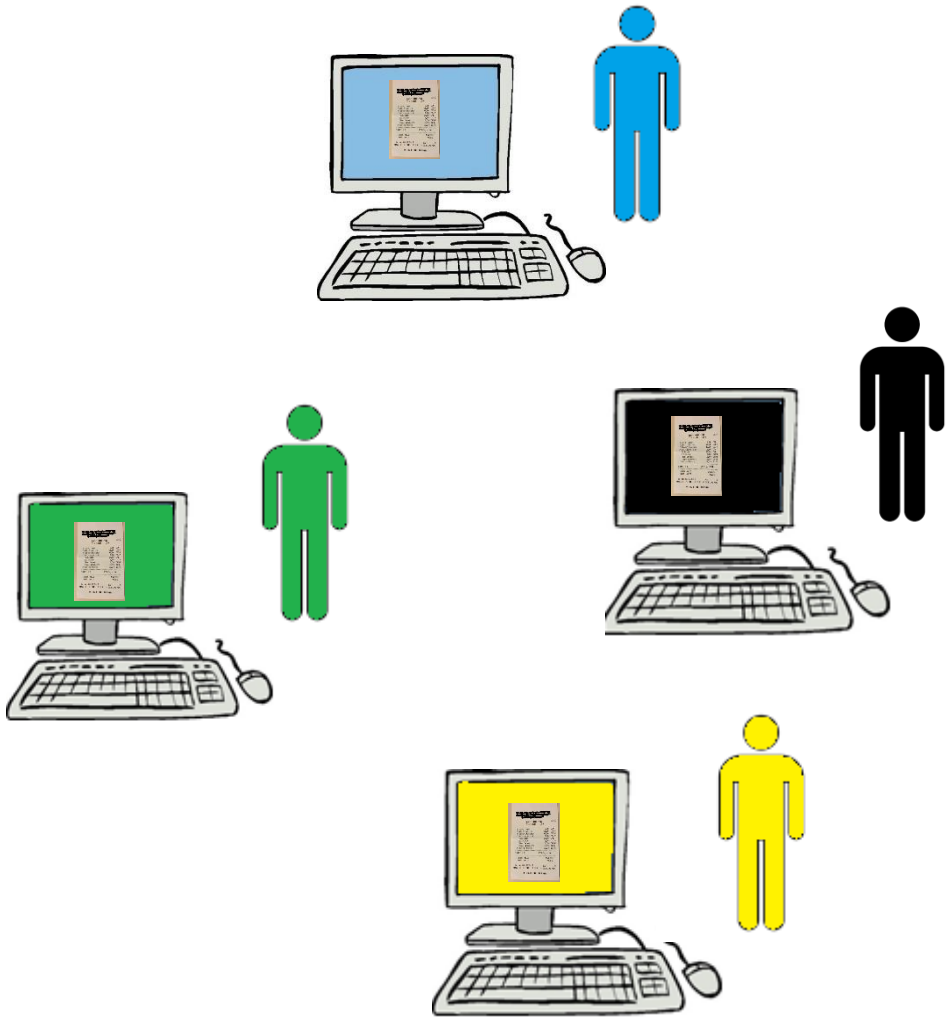
Trust through re-verification



Trust through verification

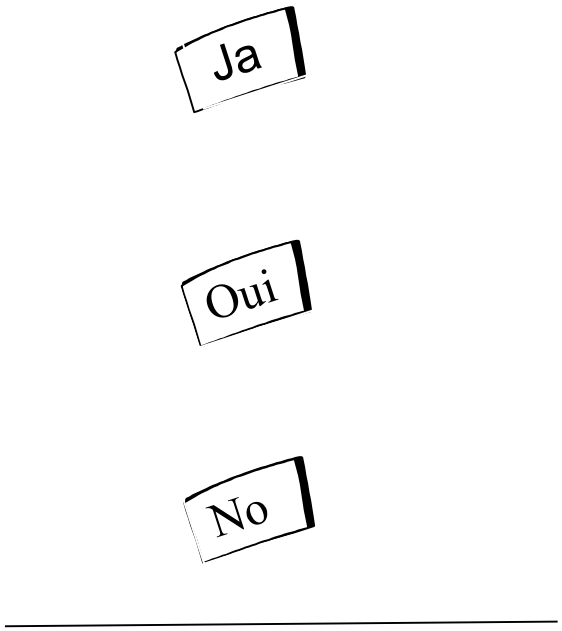
e-mail

Trust through re-verification



Summing up votes is verifiable…

…by checking equations



Ja : 2
Nein: 1

Full Verifiability

Voters or observers verify that votes have been

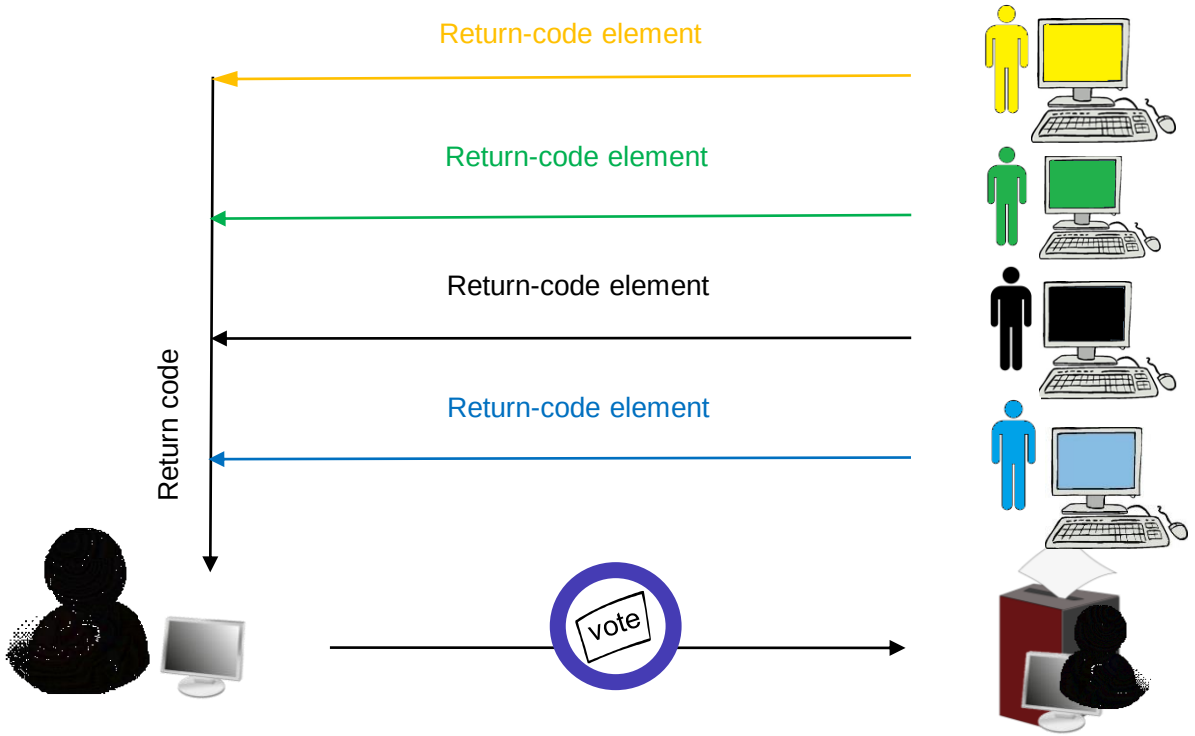
- cast as intended
- recorded as cast
- tallied as recorded

Cast as intended

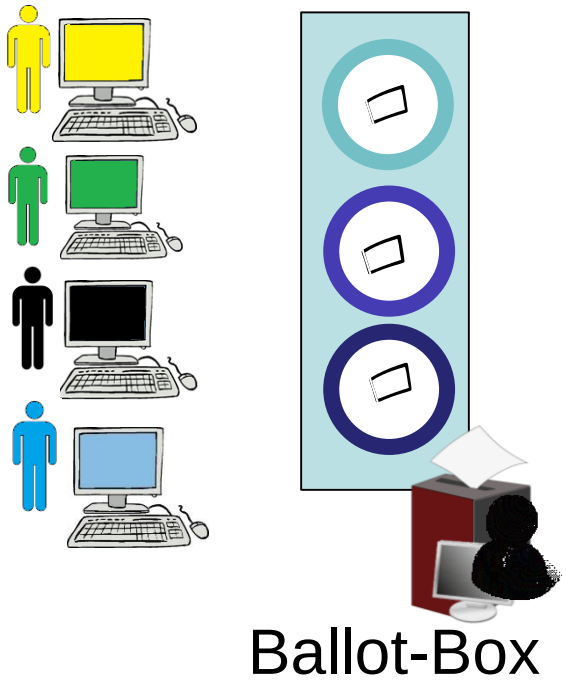
N°	Démo Votation populaire fédérale / Demo Eidgenössische Volksabstimmung	Codes de vérification / Prüfcodes				
		Oui / Ja	Non / Nein	Blanc / Leer	Initiative / Initiative	Contre-projet / Gegenentwurf
1a	Initiative populaire: Acceptez-vous «l'initiative populaire A»? *Volksinitiative: Wollen Sie die «Volksinitiative A» annehmen?*	1299	2023	1610		
1b	Contre-projet: Acceptez-vous le contreprojet de l'Assemblée fédérale «Contre-projet B»? *Gegenentwurf: Wollen Sie den Gegenentwurf der Bundesversammlung «Gegenentwurf B» annehmen?*	0027	4701	8186		
1c	Question subsidiaire: Si le peuple et les cantons acceptaient à la fois «l'initiative A» et «le contre-projet B»: Est-ce l'initiative populaire A ou le contre-projet B qui doit entrer en vigueur? *Stichfrage: Falls sowohl die «Volksinitiative A» als auch der «Gegenentwurf B» von Volk und Ständen angenommen werden: Soll die Volksinitiative A oder der Gegenentwurf B in Kraft treten?*			3009	9991	9194
2	Acceptez-vous l'arrêté fédéral «C» du 28 février 2017? *Wollen Sie den Bundesbeschluss «C» vom 28. Februar 2017 annehmen?*	5040	7313	0619		

Taken from the online demo-system by Swiss Post at e-voting.ch

Cast as intended

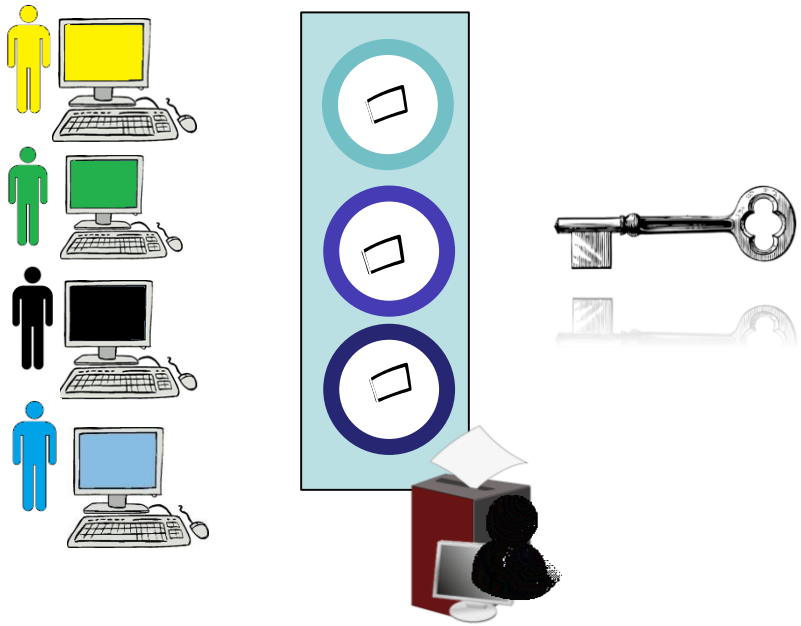


Recorded as cast



Ballot-Box

Tallying



Ballot-Box

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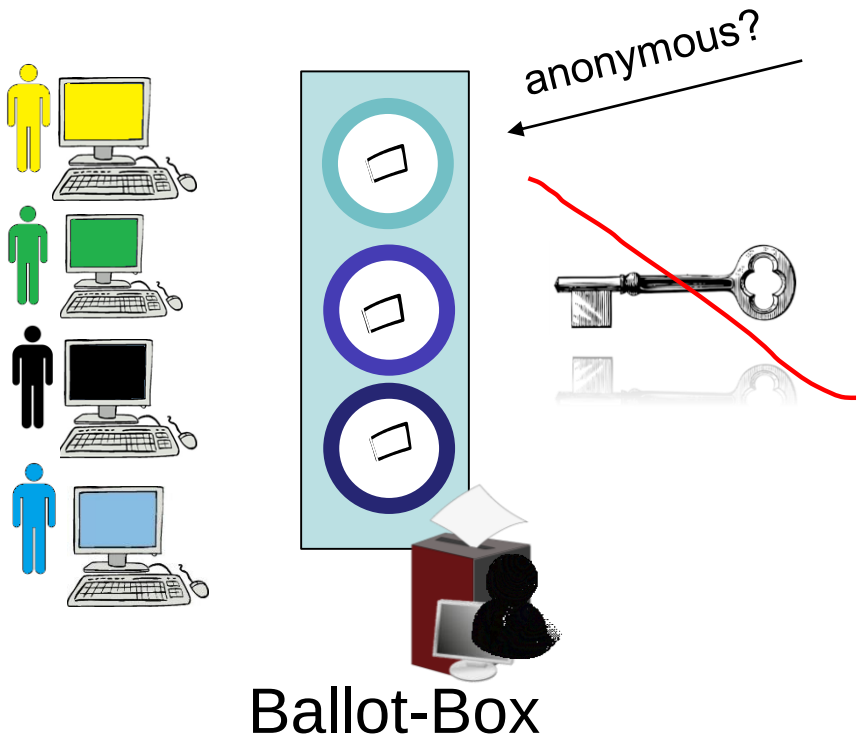
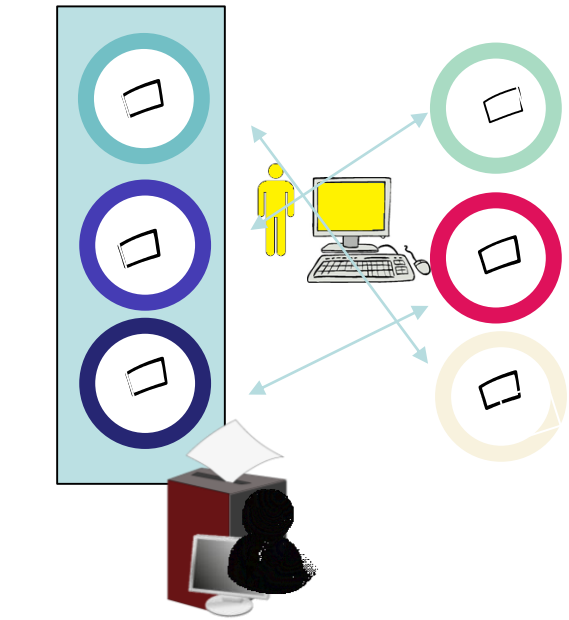


Secrecy



Ballot-Box

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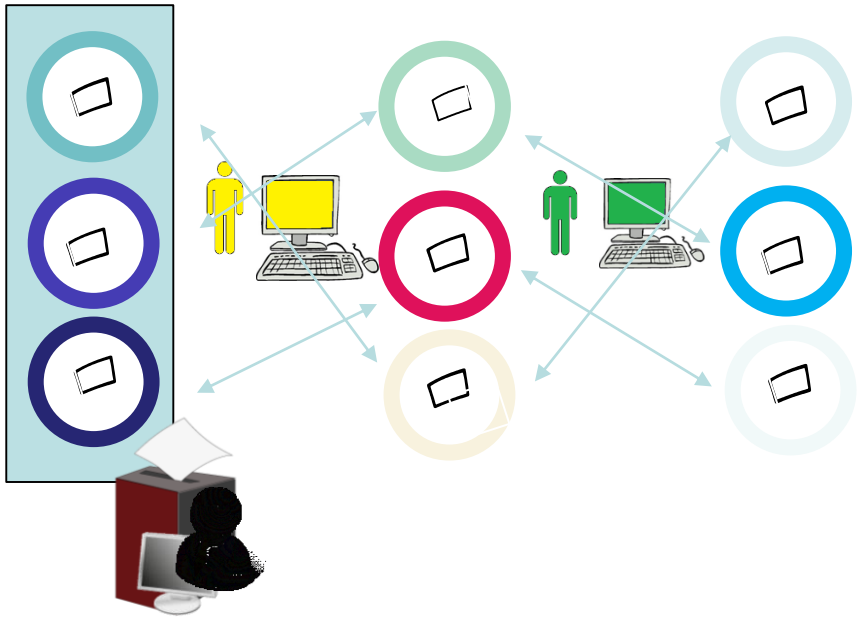
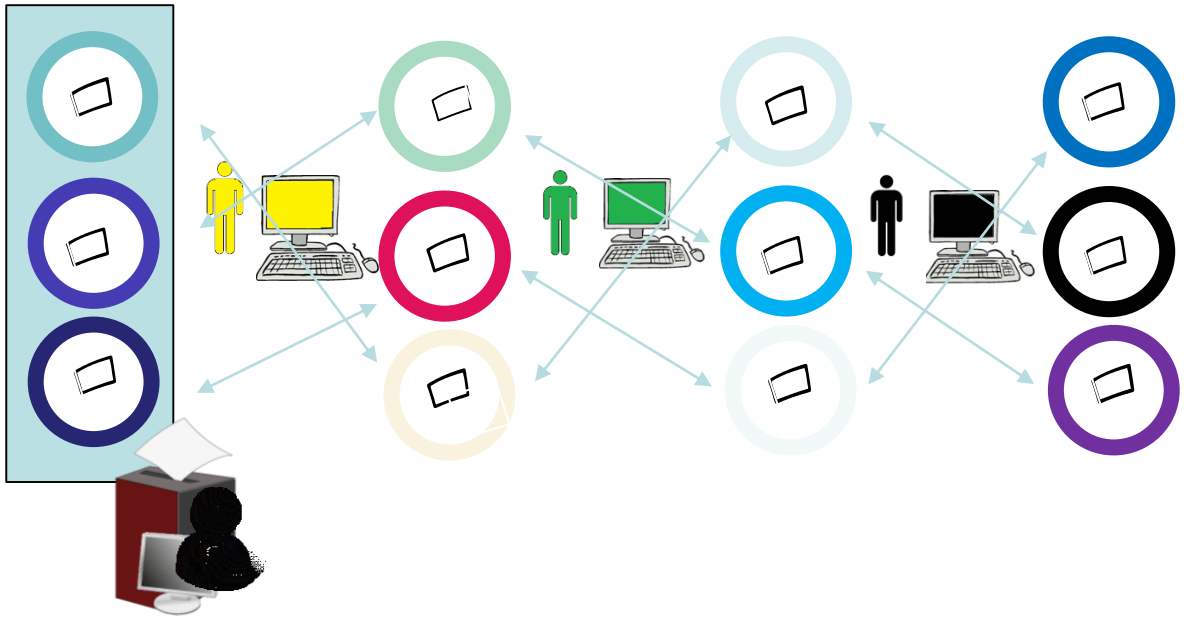


Ballot-Box

Secrecy



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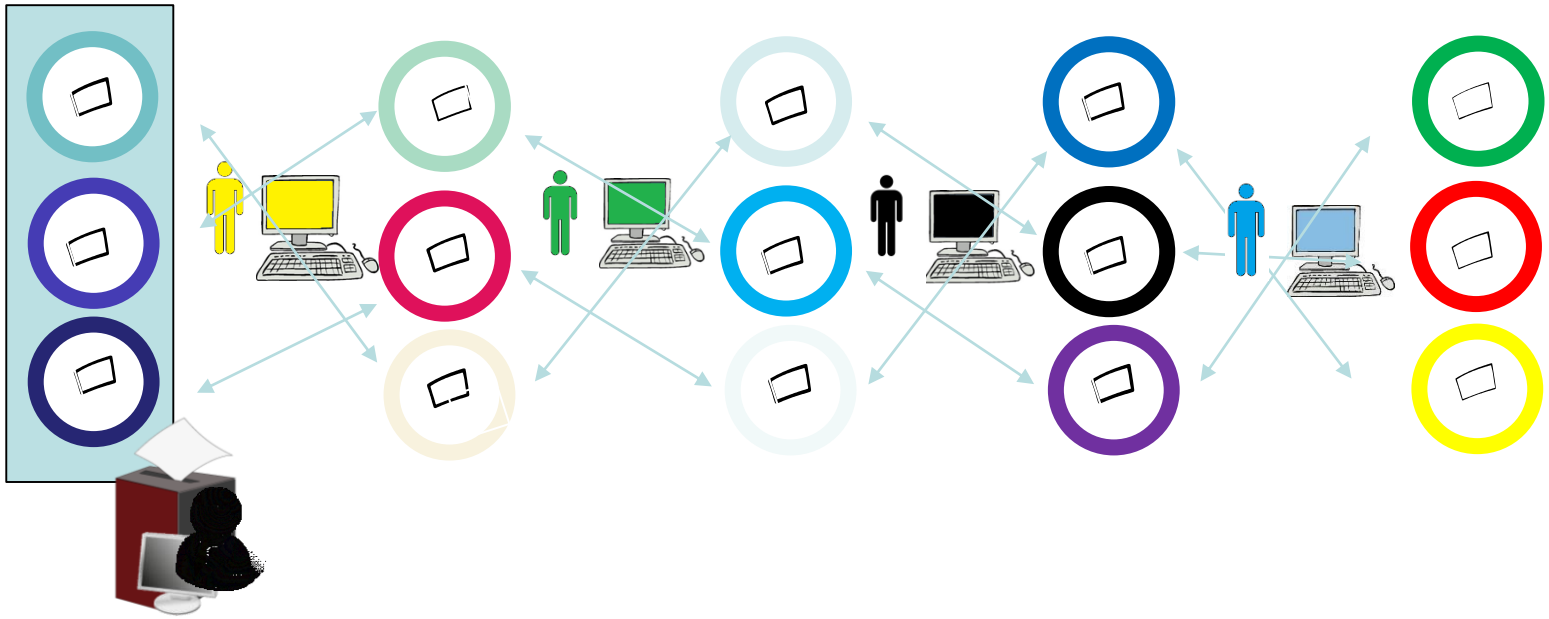

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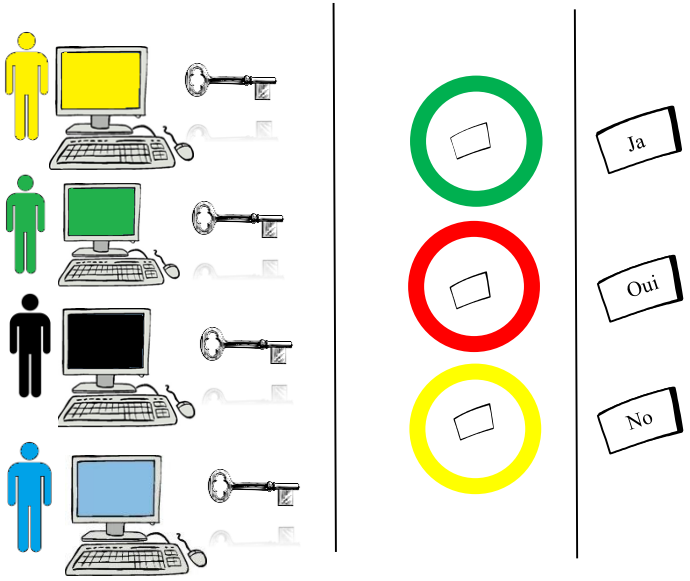

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Tallied as recorded

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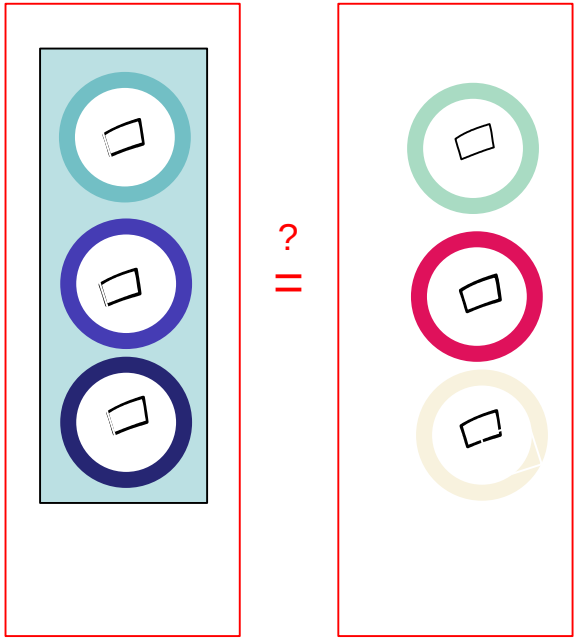
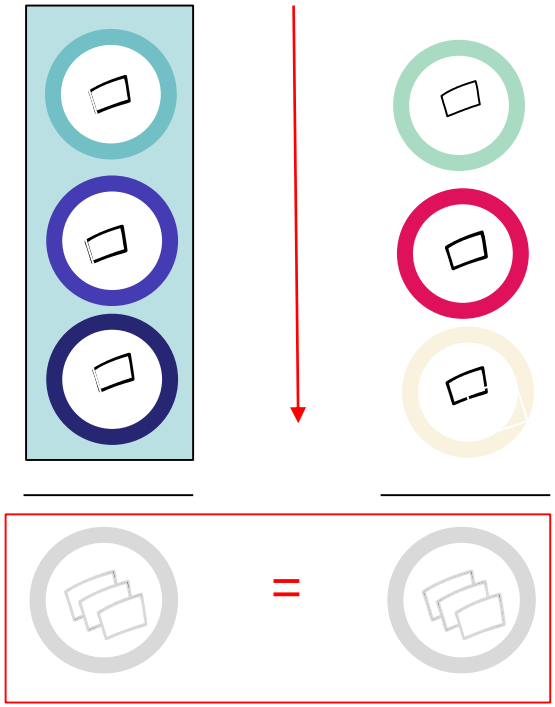
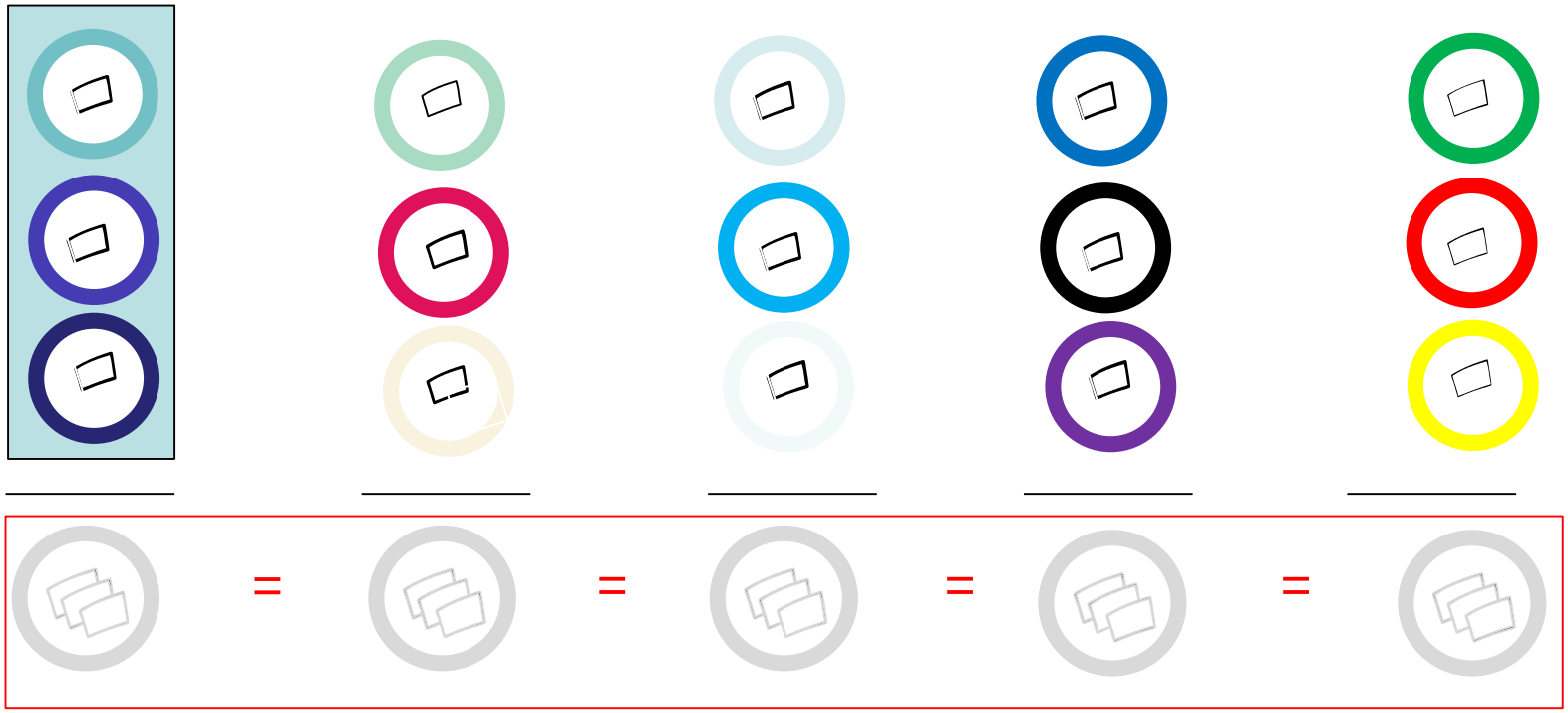


Tallied as recorded



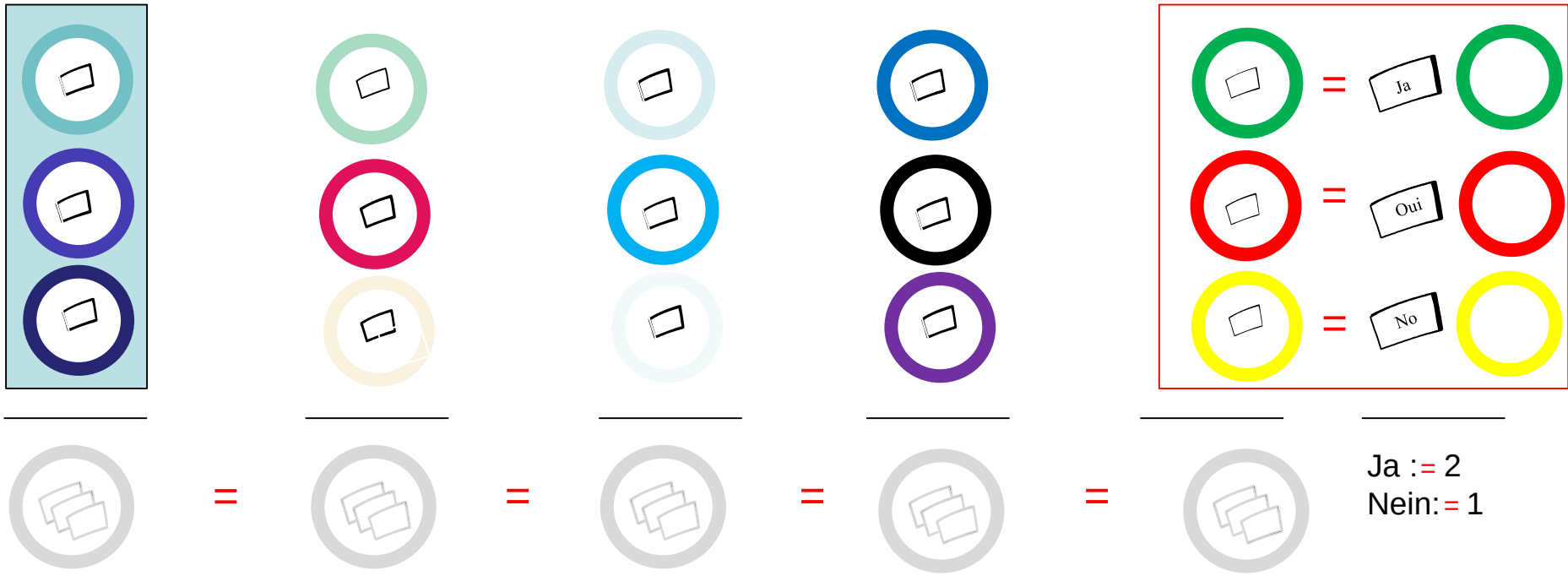
Can be verified and re-verified
By checking equations

Tallied as recorded



Full chain can be verified and re-verified
By checking equations

Tallied as recorded



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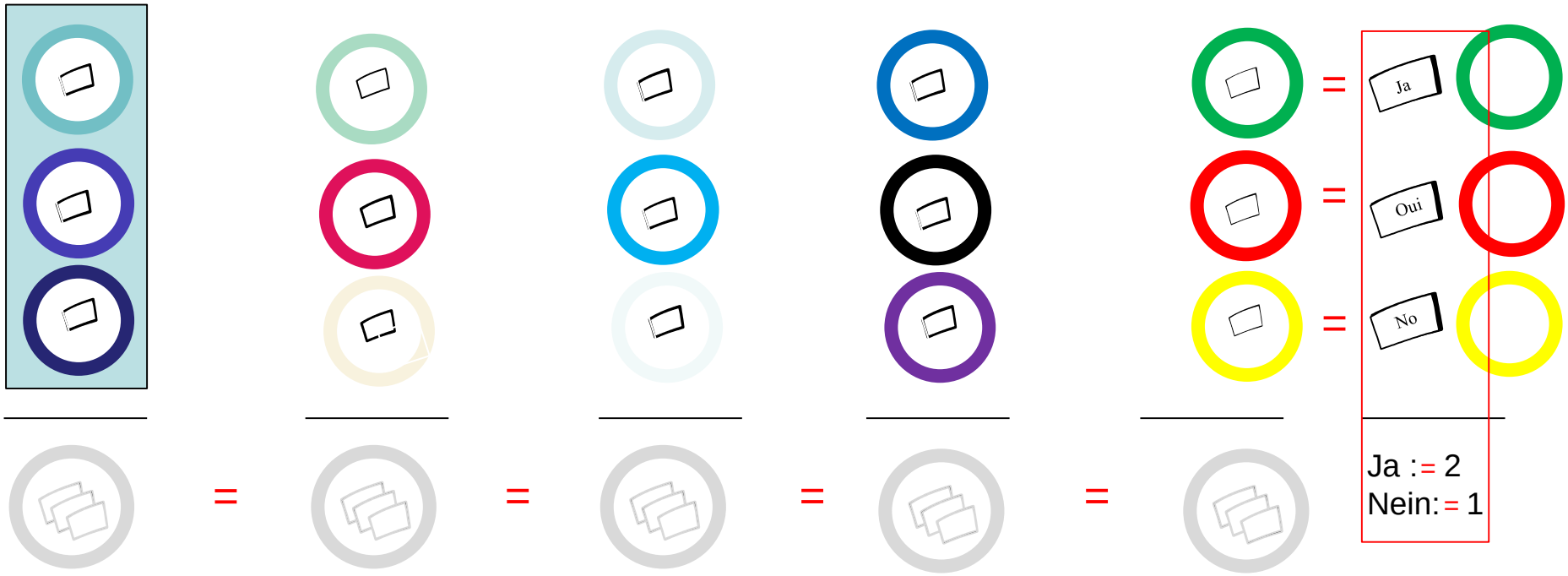
Tallied as recorded



Full chain can be verified and re-verified
By checking equations

Ordinance of the FCh on E-Voting

Voters or obervers need to be able to detect fraud, assuming that

- 1 out 4 trustees is behaving correctly
- Printing office does not leak codes

Ordinance of the FCh on E-Voting

- Crypto-Protocol
  - Proof of compliance
  - Audit of proof
- Certification
  - Accredited by Swiss Accreditation Service
  - Software EAL2 / EAL4
  - ISO27001
- Source Code Publication

Public Intrusion Test

- Decision by Confederation and Cantons
- 1.Q 2019 enabled by Swiss Post
- Pre-Register: https://pit.post.ch/

Tell your friends!

Conclusion

- Verifiability as a foundation of trust
- Required by the FCh ordinance
- Assessed through certification
- Documented towards the public

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