What are the characteristics of blockchains and challenges to stay compliant with legal regulations?

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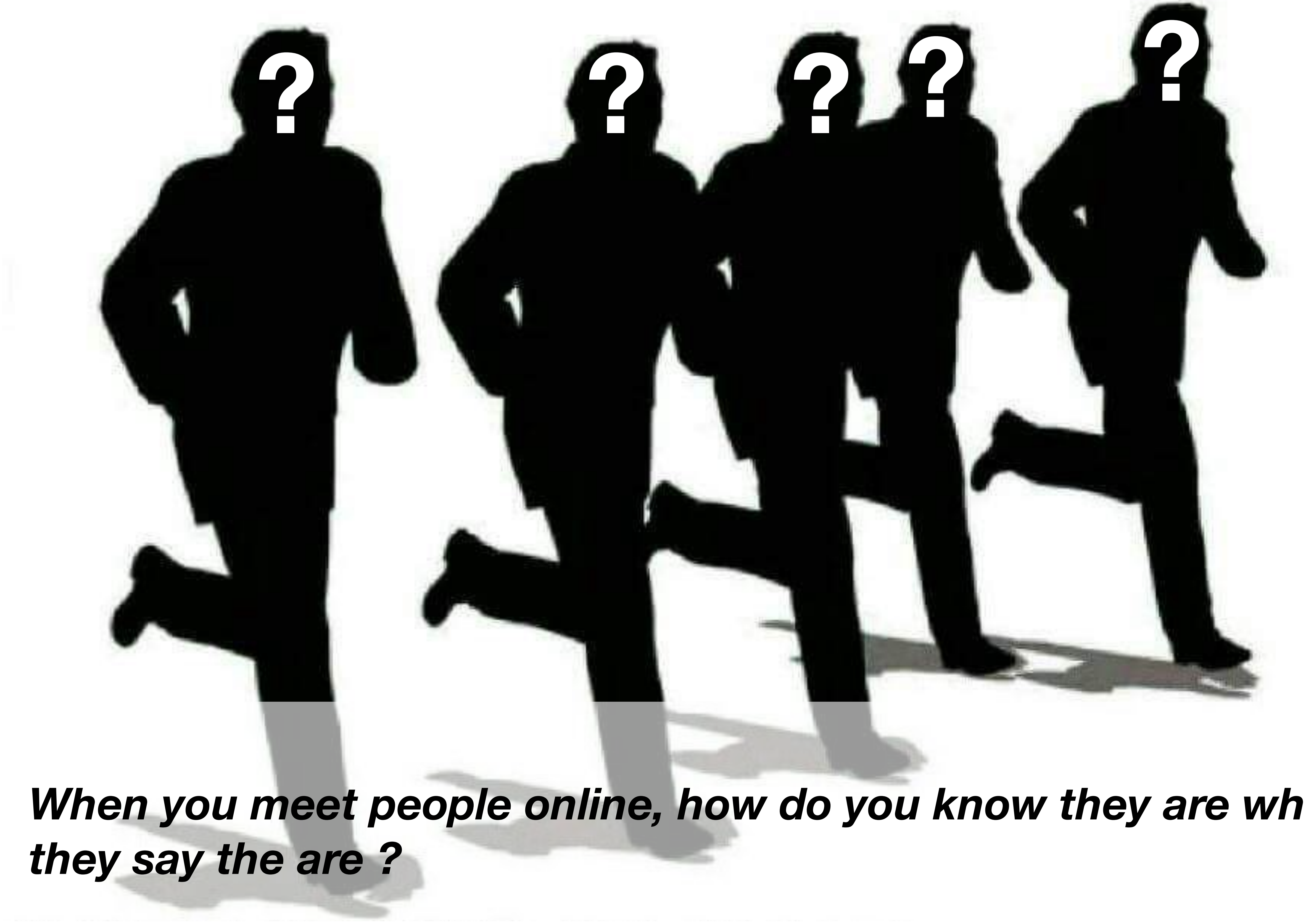
How do you know that your vote has actually been counted?



When you meet people online, how do you know they are who they say the are ?

Content

1. What are blockchain technologies?

2. What do they provide?

3. What are the main legal challenges?

What are blockchain technologies?

- What are blockchains?

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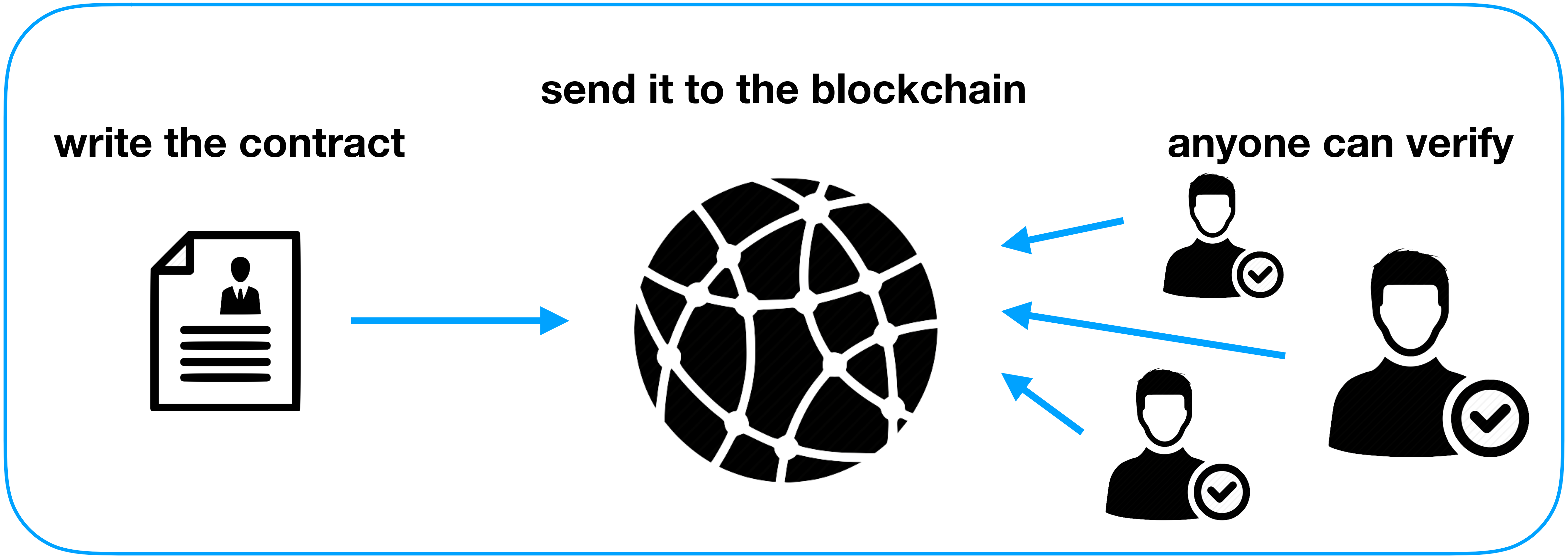

What do they provide?

- Key blockchains features

Decentralisation

e.g.
- Payement system without trusting a central bank

High Integrity

e.g.
- No-one can tamper with bank records
- No-one can suppress someone else's bank account

High Availability

e.g.
- No blackouts or equipment failure can prevent users from using their bank account

Transparency

e.g.
- Anyone can verify that a given deposit has been paid

Authenticity

e.g.
- Coin transfers come from the rightful owner

Non-Repudiation

e.g.
- Users cannot deny having received or sent coins

What are the main legal challenges?

Disclaimer: I am not a lawyer

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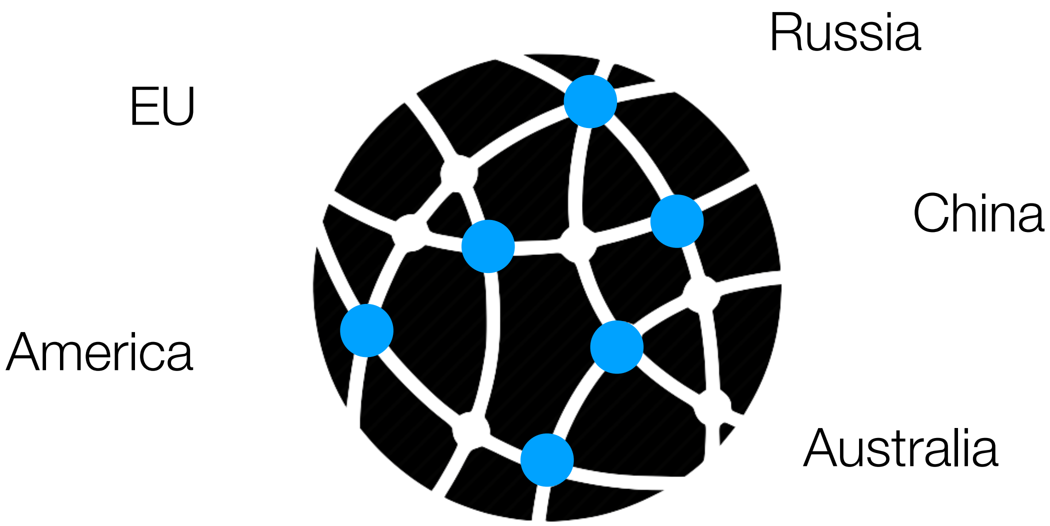
- When blockchains meet the GDPR…

What if these records are personal data?

Who is data processor?
Who is data controller?

Cannot delete or modify data
Cannot 'stop' a smart contract

Where are these data stored?



Hard to control geo locations

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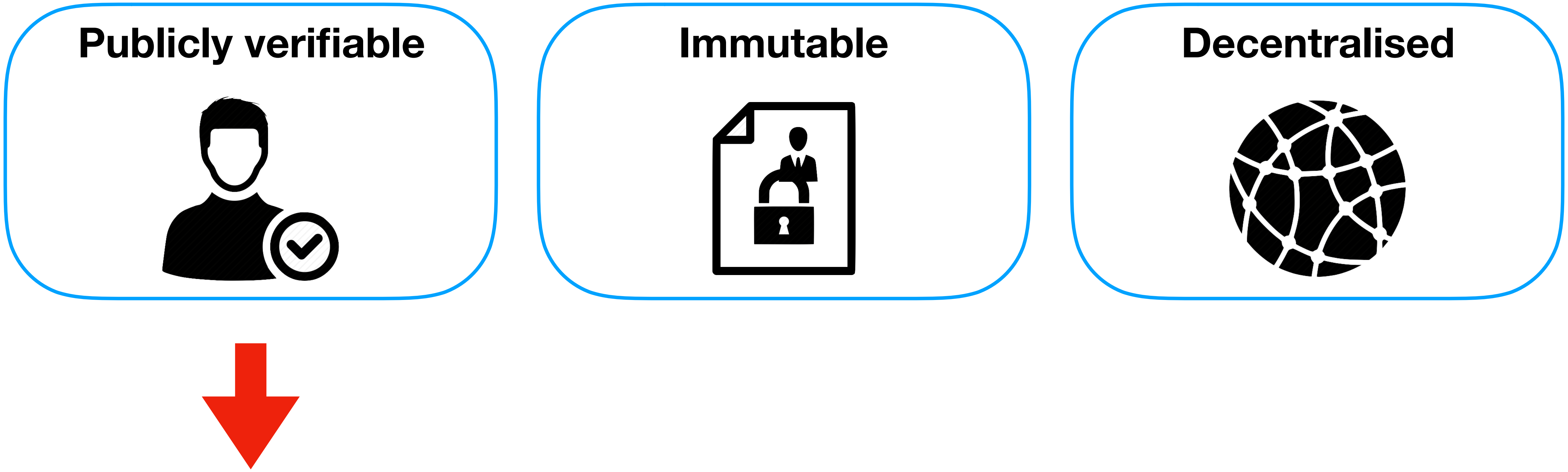

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- Financial data
- Company assets
- Identity data

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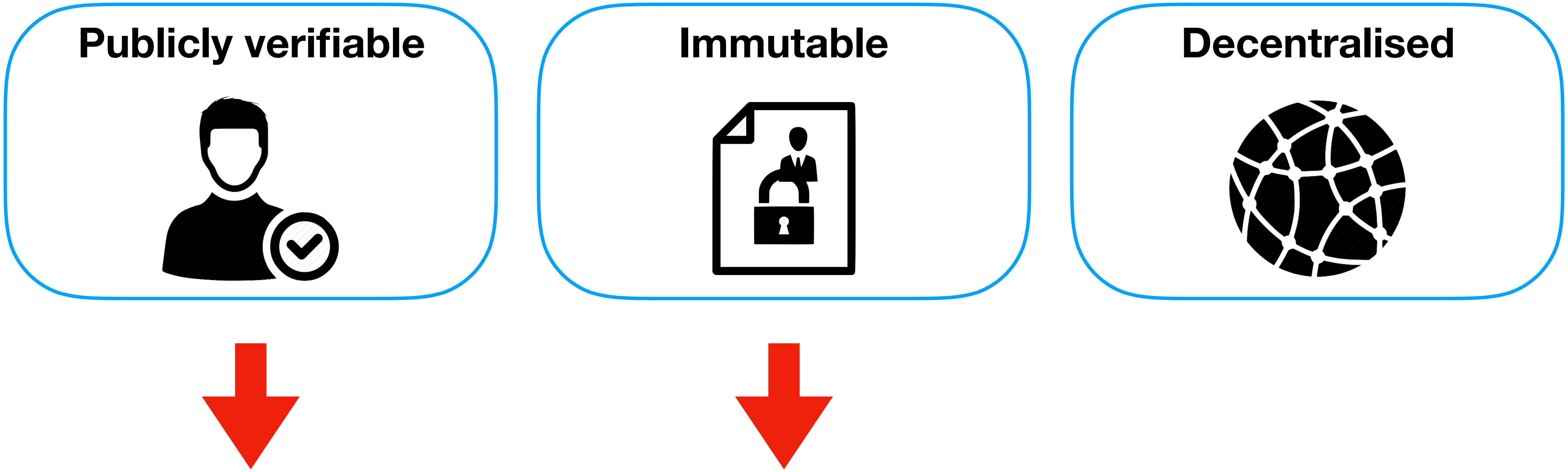

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And the right to be forgotten?

- Copyright pictures
- Defamatory statements
- Leaked data

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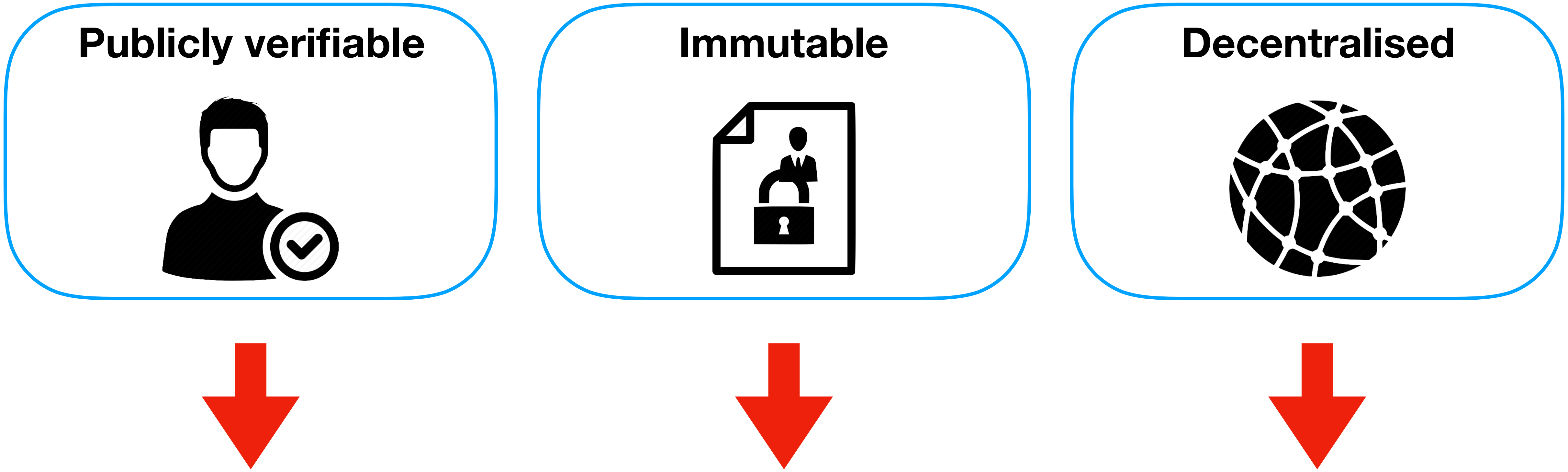

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Who do we blame?
How do we shut it down?

- International legislations
- Huge massive of users

What are the main legal challenges?

- Possible mitigations

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Idea I. Use encryptions

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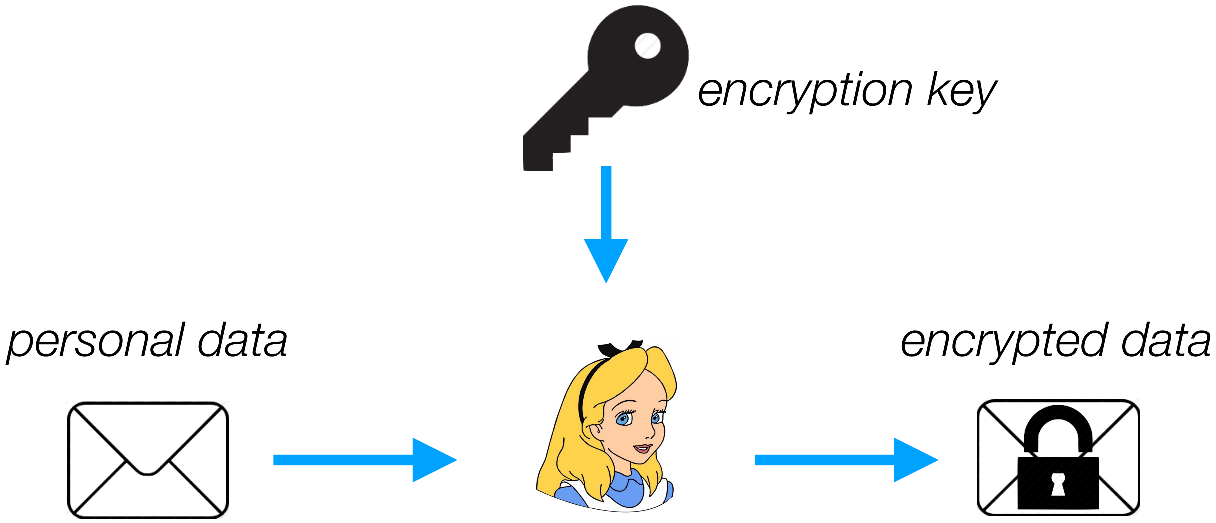
A user, *Alice*, wants to encrypt her personal data



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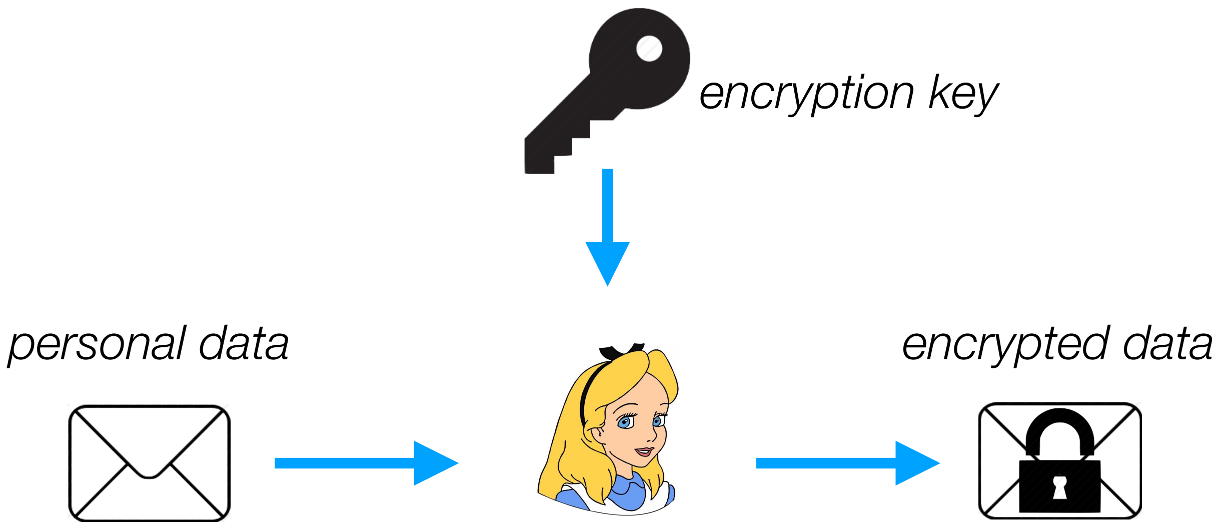
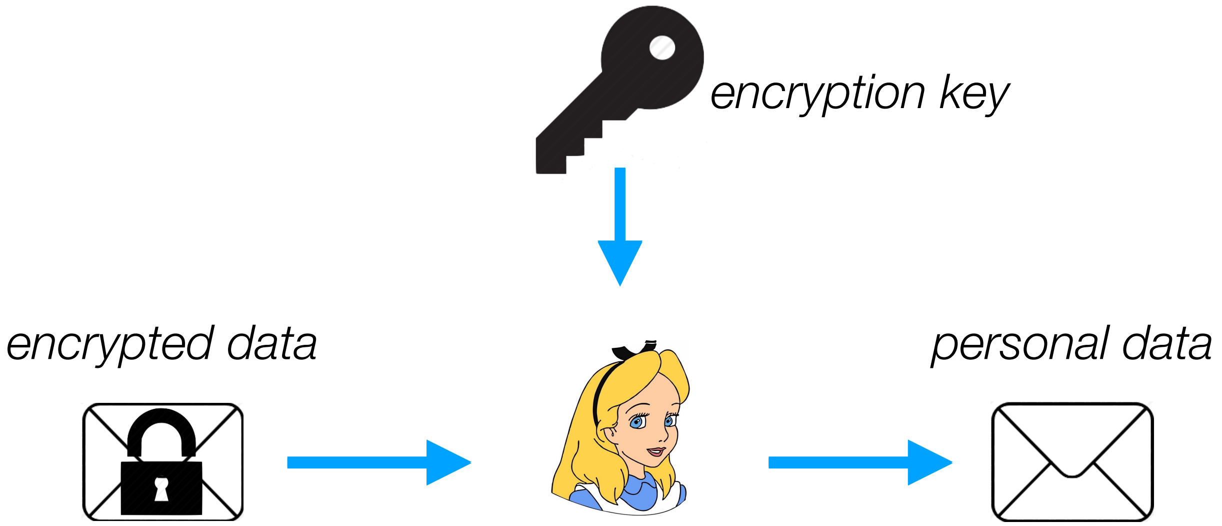


Only who has the encryption key can recover the data



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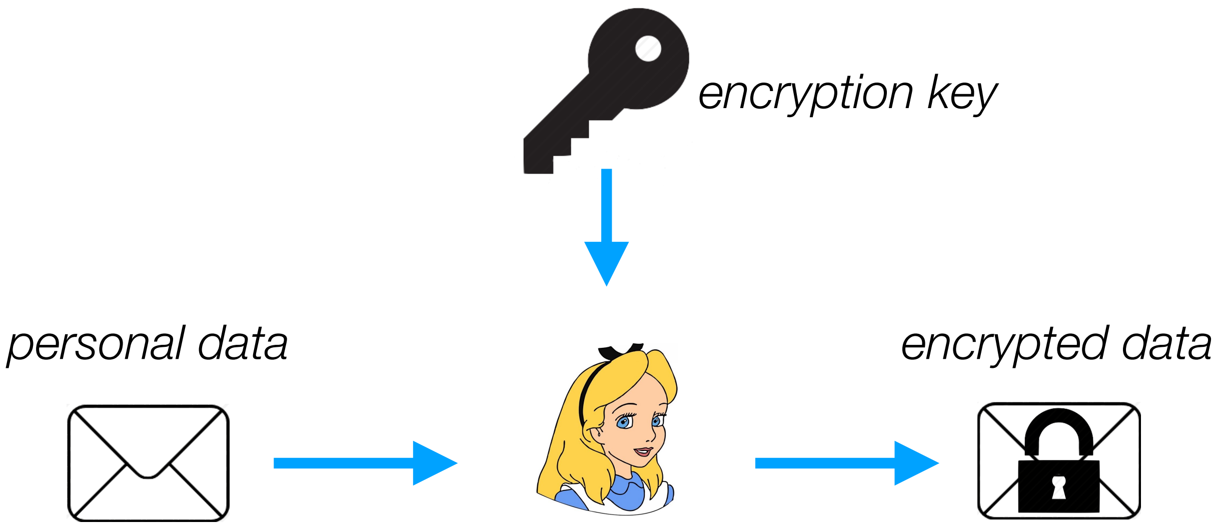

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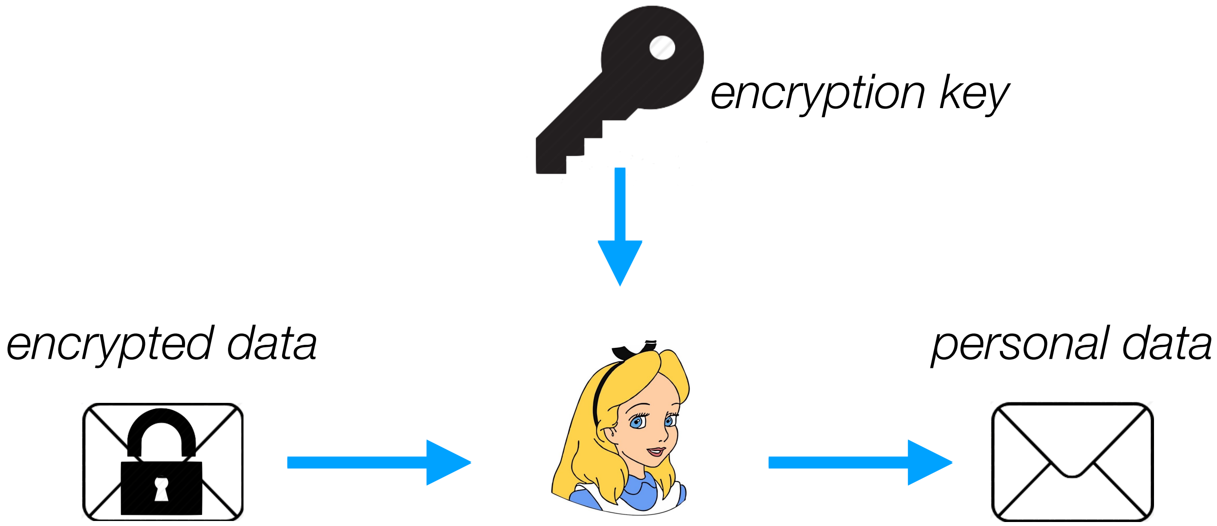

Encrypted data (🔒) look like random numbers (01010 -0—1 11000)

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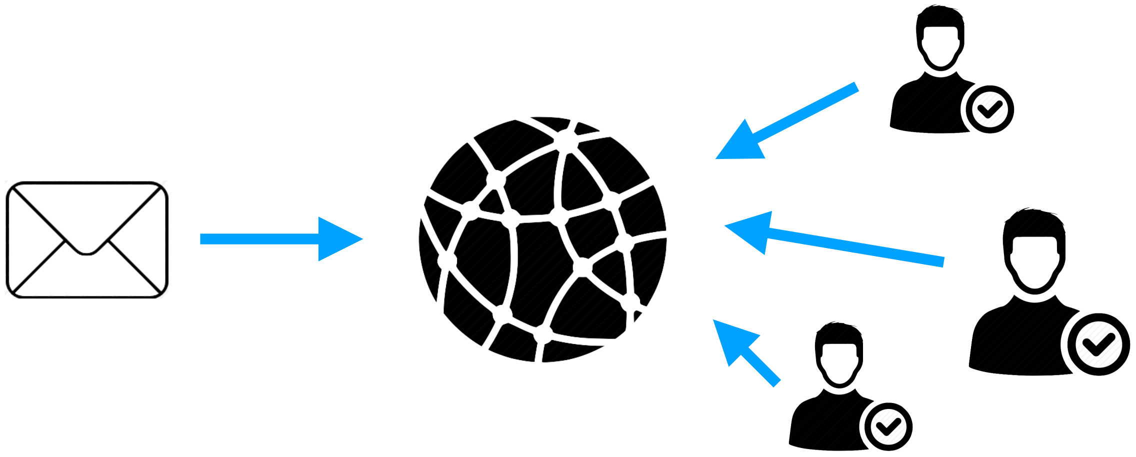
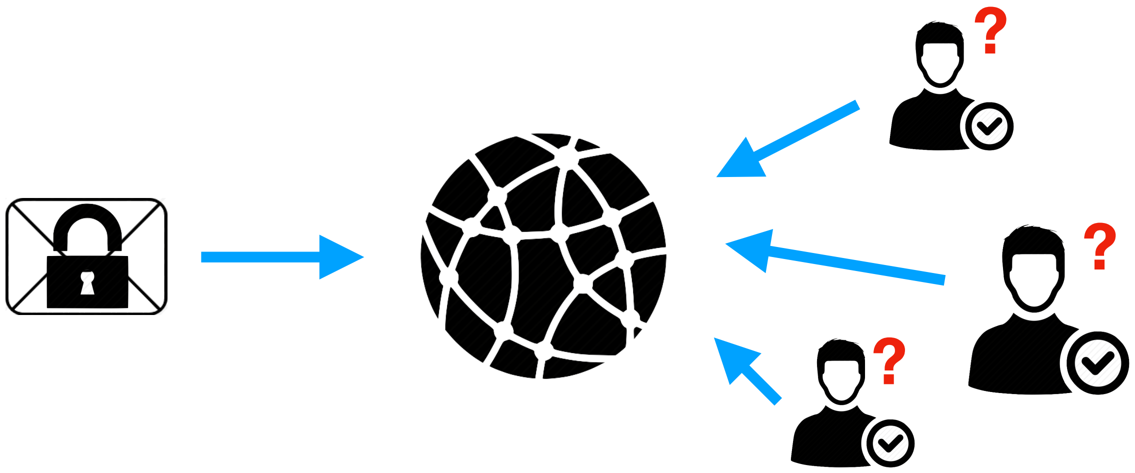
Idea I. Use encryptions

Instead of sending data directly to the blockchain…



Send only the encryptions (i.e., the encrypted data)



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How can we be sure that users encrypted the correct data?

(i.e., if data are encrypted, what about public verifiability?)

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Idea II. Verify encryptions with zero-knowledge proofs

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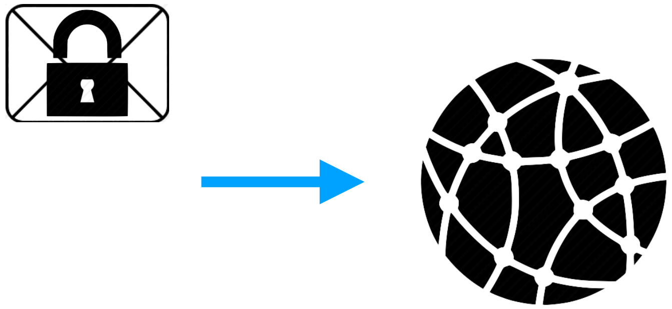

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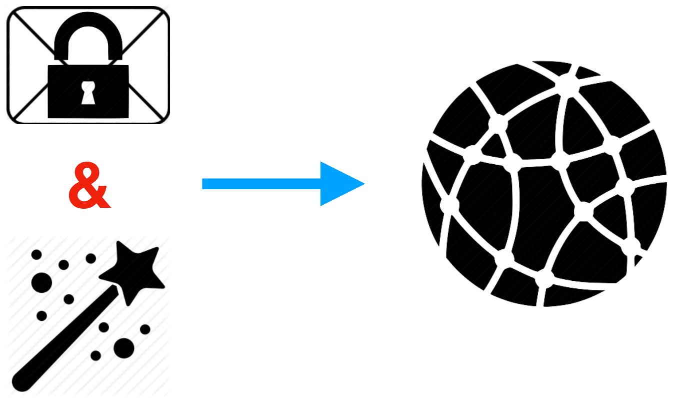

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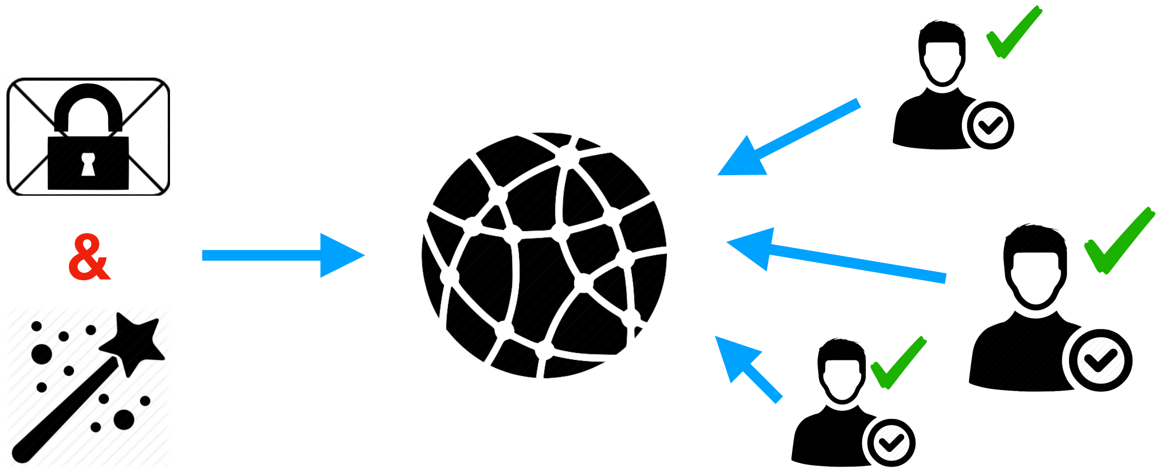

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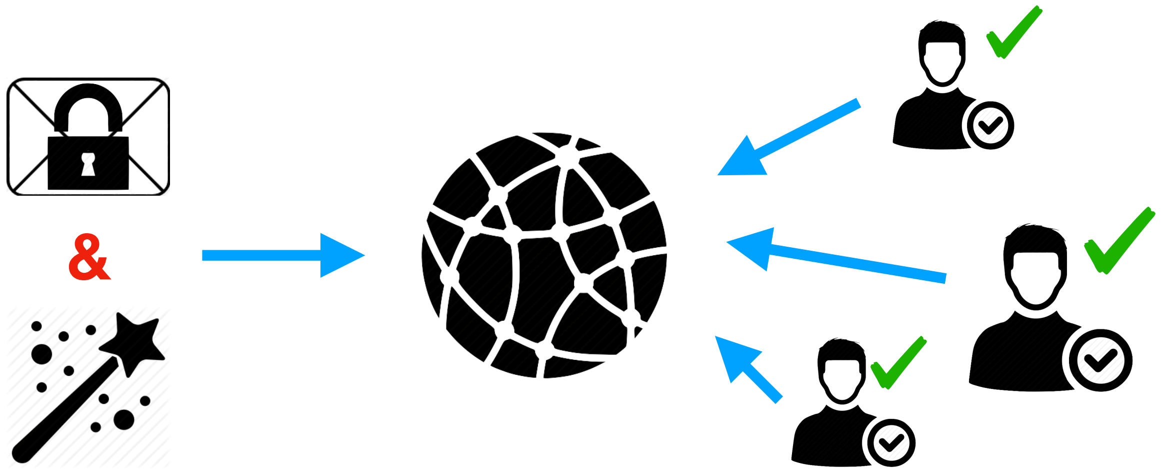
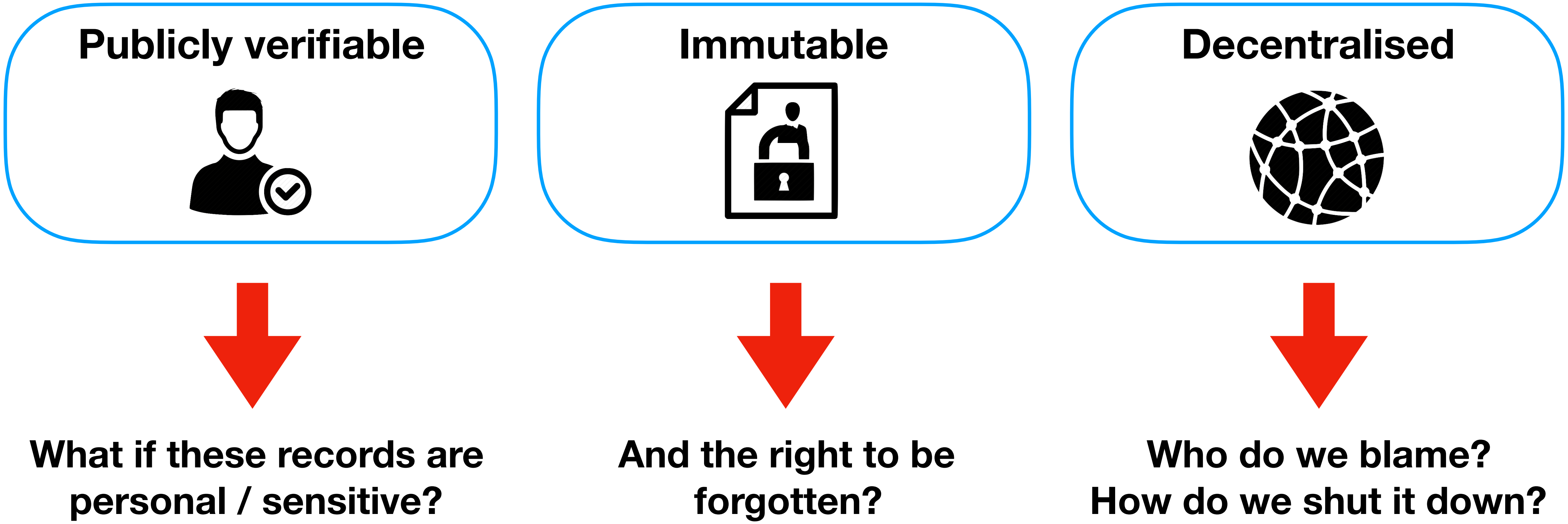


In a few words:

- 🪄 prove that 🔒 is correct
- 🪄 don’t leak info about ✉
- 🪄 can only be generated by who knows ✉

What are the main legal challenges?

- How does it mitigate the problems?



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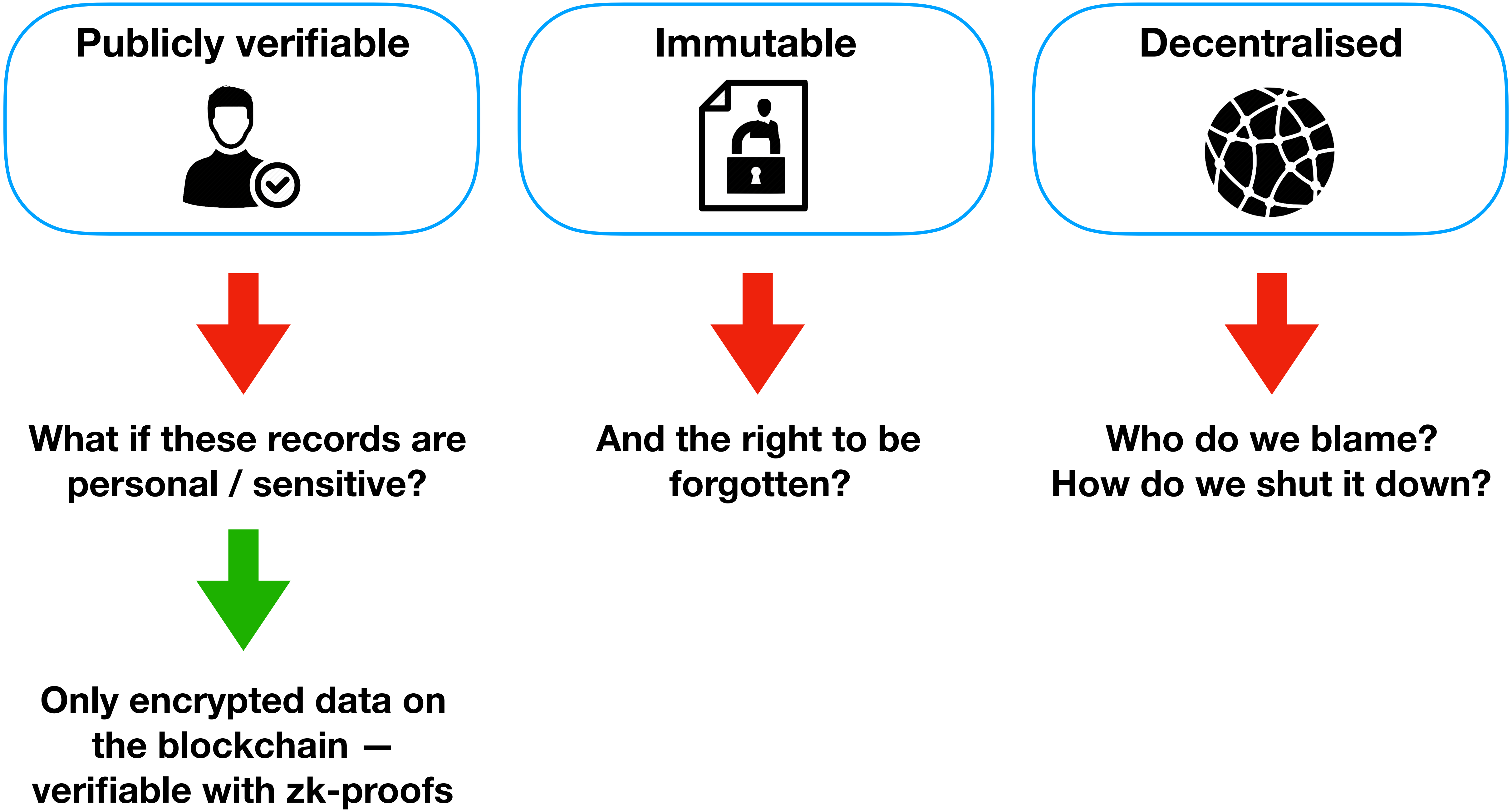

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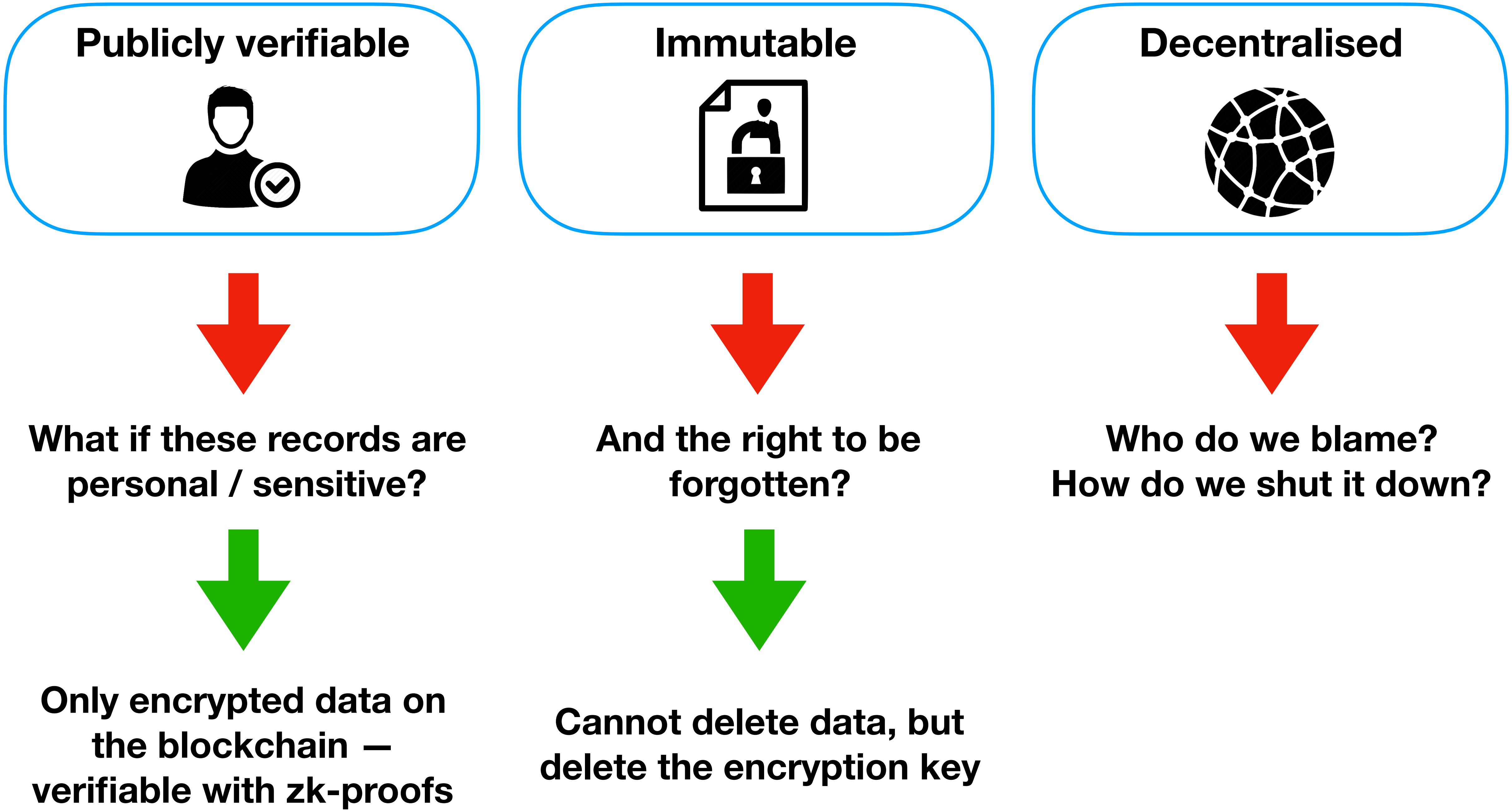

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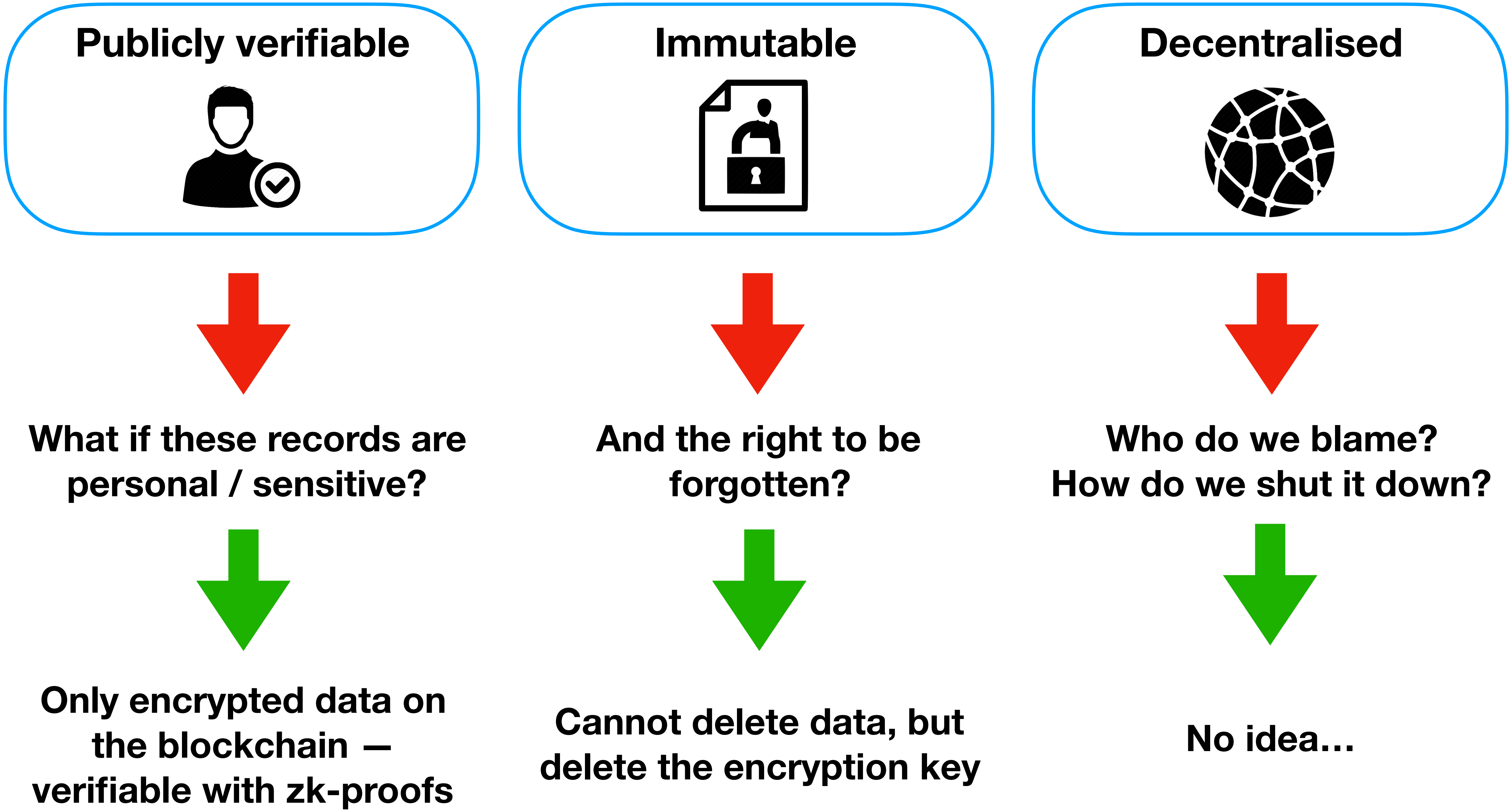

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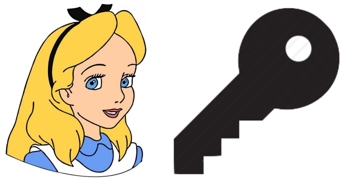

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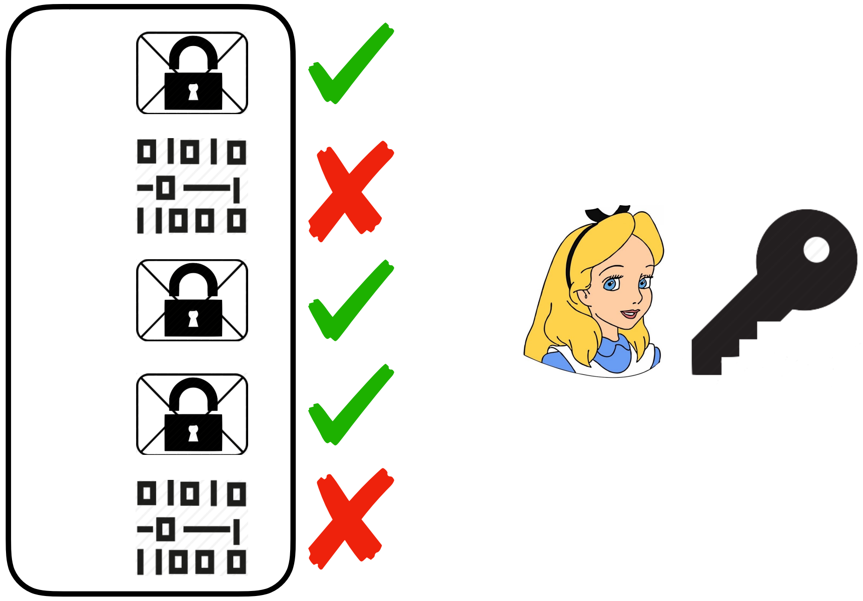

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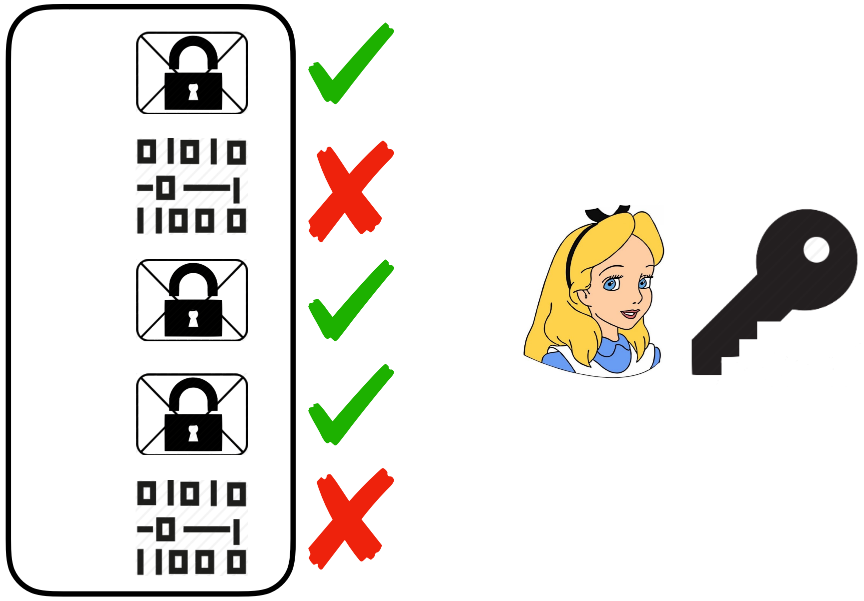
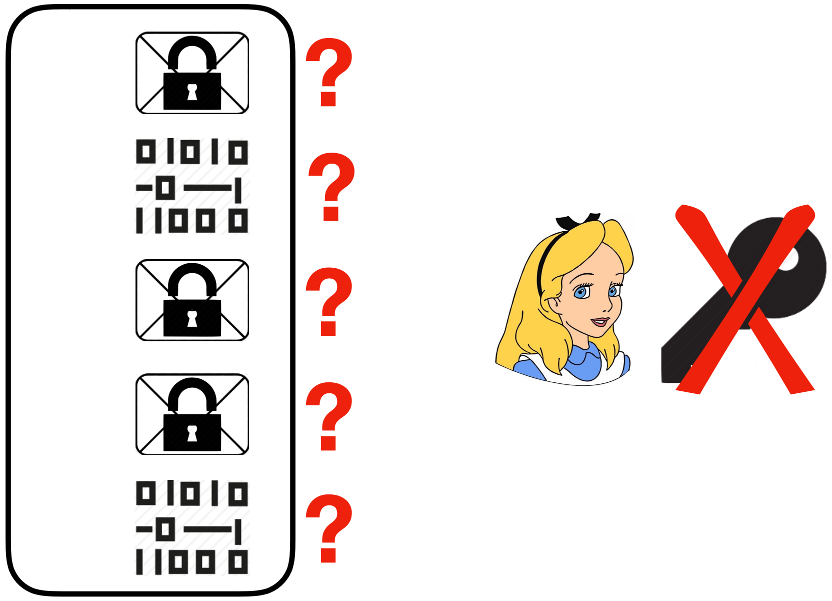


If Alice does not know the encryption key (i.e, the key has been deleted), she cannot



Conclusion

- What did we talked about?

Blockchains are cool for engineers

provide unique properties
enable many useful applications

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Blockchains are cool for engineers

provide unique properties
enable many useful applications

But give headache to lawyers

nothing can be erased or modified
no-one to blame, international, …

Good Luck

Thank you for you attention
Questions?

Alberto Sonnino
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