Deutsche Bank
Legal

Blockchain and Data Protection

Tensions between blockchain technology and data protection principles

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Agenda (1/2)

1	Allocation of roles and responibilities under the GDPR
2	Data subject rights under the GDPR
3	Principles of purpose limitation and data minimization vs blockchain finality
4	Techniques to mitigate data protection risks

Agenda (2/2)

1. Allocation of roles and responsibilities (1/8)

1. **Exhaustive list of roles under the GDPR**:
   - **(Joint) controller, Art. 4 (7), Art. 26**: „natural or legal person (…) which, alone or jointly with others, determines the purposes and means of the processing of personal data (…)“ > ***similar to „business“ under CCPA***
   - **Processor, Art. 4 (8)**: „natural or legal person (…) which processes personal data on behalf of the controller“ > ***similar to „service provider“ under CCPA***
2. **The usual players in a blockchain environment:**
   - Miners
   - Nodes
   - Wallets
   - Users
   - Developers of smart contracts
   - Oracles
   - Governance bodies

1. Allocation of roles and responsibilities (2/8)

1. Miners

- **Definition:**
  - **Mining is the act of solving a mathematic puzzle within the proof of consensus model** based on the protocol as defined in the blockchain software (NIST)
  - **Miners validate transactions** to be added to the blockchain
- **Legal implication:**
  - Miners ≠ controllers ►not determine the specific purpose of any data processing activity
  - Miners ≠ processors ►not carry out specific services based on instructions of the controllers
    Note: The blockchain protocoll doesn´t contain instructions as to how to deal with personal data written on a blockchain

1. Allocation of roles and responsibilities (3/8)

2. Nodes

- **Definition:**
  - **Nodes are the decentralized computers that store a copy of the blockchain**
  - Storing is an IT operation and cannot be linked to a decision-making process (controller)
- **Legal implication:**
  - Nodes ≠ controllers ≠ processors ►using the blockchain technology and participating in the blockchain network cannot be interpreted as a determination of the means and the purpose of a specific data processing activity ►belong to blockchain infrastructure

1. Allocation of roles and responsibilities (4/8)

3. Wallets

- **Definition:**
  - **Wallets are software packages at the application level** designed to store and manage asymetric keys and addresses used for transactions (NIST)
  - **Allow blockchain users to control their own private key and to interact with the blockchain network** by sending transactions to miners for validation purposes
- **Legal implication:**
  - Wallets ≠ controllers ≠ processors ►wallets are only the vehicel to pass data to miners ►this happens under the control of the blockchain users

1. Allocation of roles and responsibilities (5/8)

4. Users

- **Definition:**
  - **Participate in any transaction in a blockchain network** provided that such transaction stores or processes personal data
  - CNIL: User = controller when (i) the user is a **natural person**; and (ii) the processing is related to a **professional or commercial activity**; or, when the user is a **legal person that submitts personal data to a blockchain**
  - EU Blockchain Observatory: User = controller when the user submitts personal data to the blockchain as part of his business activity
- **Legal implication:**
  - **Delineation from the household exemption** of Art. 2 (2c) of the GDPR ►household/private activity ►GDPR doesn´t apply ► user ≠ controller

1. Allocation of roles and responsibilities (6/8)

5. Developers of smart contracts

- **Definition:**
  - **Smart contract is a piece of software that, once deployed to a blockchain network, may be executed independently from their developer** when called by a blockchain user
  - Developer creates an algorithm to be built in the software

- **Legal implication:**
  - CNIL: Developer has no role to play unless he intervenes in the data processing actively
  - Developer **only provide a software solution to blockchain users** and don´t operate that software while blockchain users write personal data to the blockchain leveraging the algorithm of the smart contract
  - Developer ≠ controller ≠ processor

1. Allocation of roles and responsibilities (7/8)

6. Oracles

- **Definition:**
    - Oracles are agents that **allow the transfer of external data feeds to the blockchain** leveraging smart contracts
    - Necessary to process external real-world events to be inputted onto the blockchain for further usage
    - Oracles have a strong influence on the data processing operation and its result carried out by the smart contract algorithm

- **Legal implication:**
    - Oracles = controller if they have a **commercial interest in the related data processing and the outcome** of that data processing activity
    - Requires case-by-case consideration
    - Rule of thumb: Oracles belong to blockchain infrastructure

1. Allocation of roles and responsibilities (8/8)

7. Governance bodies

- **Definition:**
  - Only applicable in private blockchains
  - Group of natural persons and/or legal entities tasked with monitoring blockchain transactions
  - Defining the roles of the participants upfront

- **Legal implication:**
  - Governance body = controller if it has control over the processing of personal data by determining its purpose and means (usage of smart contract algorithms)
  - Governance body may determine one participant to act as controller provided that participant is empowered to make decisions on behalf of the group. Other group members = processor or (joint-/co) controllers

2. Data subject rights under the GDPR (1/3)

1. How do data subject rights apply to the blockchain?

a) Applicability of the GDPR

- Once one block contains personal data and the block is added to the blockchain ► **storage = data processing pursuant to Art. 4 sec. 2 of the GDPR**
- Data subject may exercise his rights pursuant to Art. 15 – 22 of the GDPR. **Problem: against whom?**

b) Distinction between public and private blockchains in relation to enforcing data subject rights

- Private blockchains: Governance body to be the first choice to address any data subject rights. Joint controllers according to Art. 26 of the GDPR
- Public blockchains: Data subjects face a challenge to (i) identify the controller, and to (ii) get the controller to carry out his obligations

2. Data subject rights under the GDPR (2/3)

2. Factual enforceability of particular data subject rights

a) Right to access personal data, Art. 15 GDPR

- Basic right: prerequisite for the exercise of any other right under the GDPR
- Necessary to understand which data is being processed and for what purpose
- **Problem:** In a public blockchain **a controller, once identified, is factually unable to access data** submitted to the blockchain: data is typically encrypted or hashed; impossible to determine whether the related data is personal and relates to the data subject concerned

b) Right to rectify personal data, Art. 16 GDPR

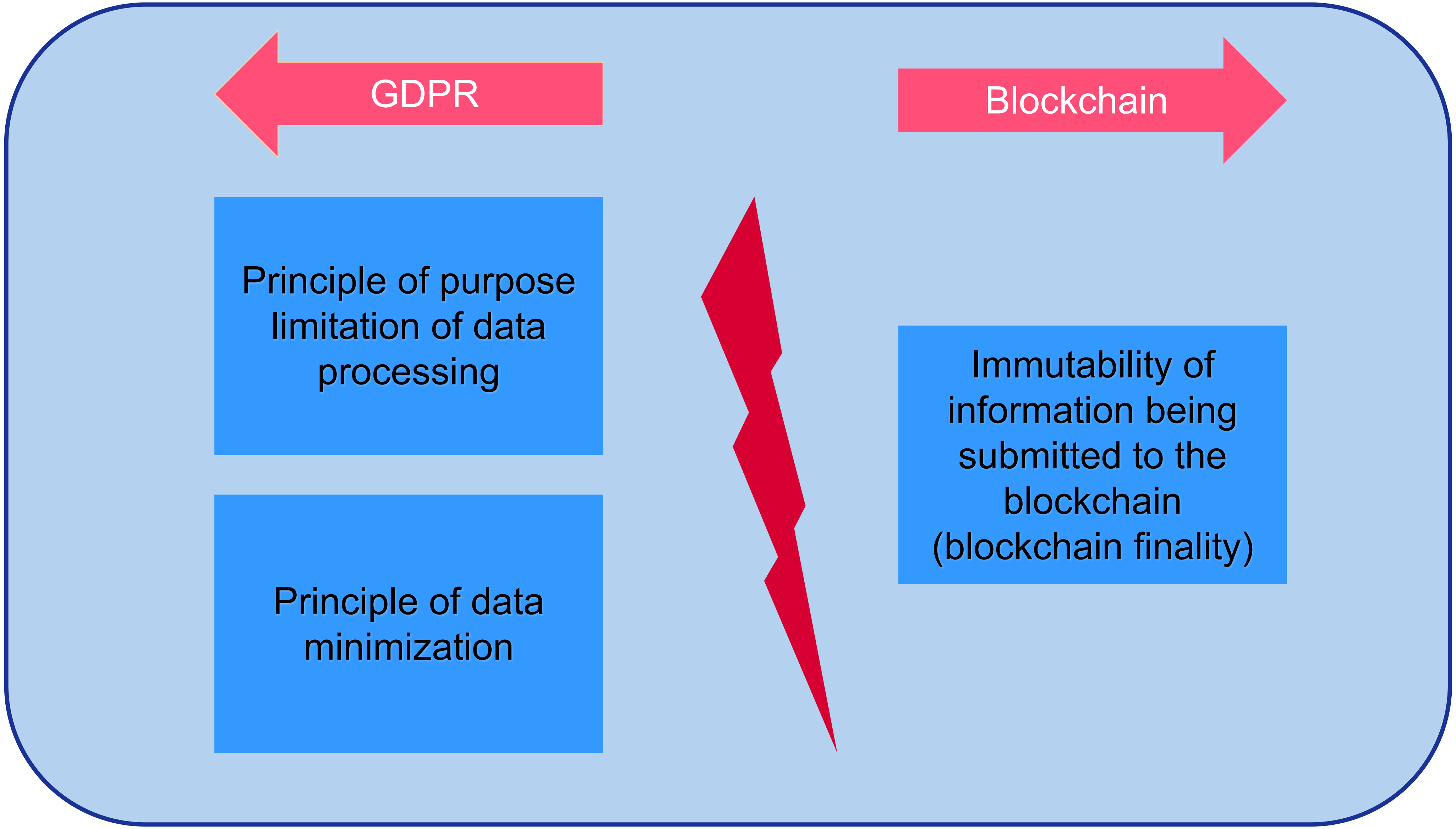
- Right to request rectification of inaccurate personal data and to complete personal data which is incomplete
- **Problem: Impossibility to modify data** registered onto a blockchain

2. Data subject rights under the GDPR (3/3)

c) Right to erasure („right to be forgotten“), Art. 17 GDPR

- **What does erasure mean?**
  - Data subject may request the erasure of his/her personal data provided one of the conditions set out in Art. 17 sec. 1 GDPR applies
  - **Erasure as a legal term is defined very broadly** (e.g. expunge, overwriting, making data unusable)
  - **Problem: Impossibility to delete data** once registered onto the blockchain
  - But: This is not a Catch 22 situation since alternative solutions are permissible when the erasure is virtually not viable ►see *techniques to mitigate data protection risks*

3. Principles of purpose limitation and data minimization vs blockchain finality (1/3)



3. Principles of purpose limitation and data minimization vs blockchain finality (2/3)

1. Principle of purpose limitation

- **Definition:**
  - "Personal data shall be collected for specific, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes" (Art. 5 sec. 1b GDPR) and "A business shall not (…) use personal information collected for additional purposes without providing the consumer with notice consistent with this section" (sec. 1798.100 (b) CCPA)
  - Purpose limitation is the "cornerstone of data protection" (Art. 29 Data Protection Working Party [now: EDPB])
- **Legal implication on blockchain:**
  - Blockchain, by nature, continuously processes data by storing it onto the blockchain which also includes legacy personal data (data which is not needed any more, e.g. after completion of a particular transaction)

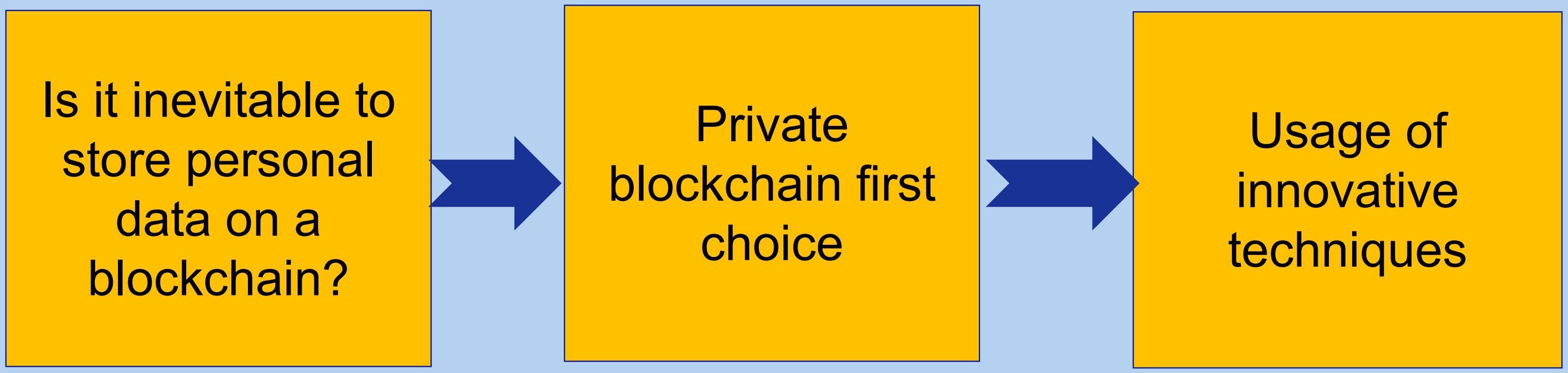
3. Principles of purpose limitation and data minimization vs blockchain finality (3/3)

2. Principle of data minimization

- **Definition:**
  - Only those data which is necessary to meet the purpose determined by the controller must be collected and processed
  - Period for which the personal data is being stored must be limited to a strict minimum (Recital 39 of the GDPR)
- **Legal implication on blockchain:**
  - Blockchain artefacts clash with the data minimization principle:
    ► Ever-growing nature of databases containing personal data
    ► Replication of data in a blockchain network where each node stores a full copy of the database

4. Techniques to mitigate data protection risks (1/5)

Assessment of the permissibility of submitting personal data to the blockchain:



4. Techniques to mitigate data protection risks (2/5)

- **Big picture:** How is the data being processed and is there any need to store it on a blockchain? Offchain storage should be the first choice
- **Usage of private blockchains as primary objective**
- **Usage of innovative encryption techniques**, particularly with regard to public blockchains:
  - **Anonymization** as primary approach
  - If anonymization is not doable, **state-of-the-art encryption, particularly hashing**
  - Please note: Hashing is an encryption technique and does not entail anonymization ► Hashing does not turn personal data into non personal data ► GDPR applies

4. Techniques to mitigate data protection risks (3/5)

- **Usage of interoperable blockchains („multi-layered“)**
  - **Challenge:** Reconciling the storage of personal data which is not needed any more („**legacy data**“) and the principles of purpose limitation and data minimization
  - **Removing legacy data from a private blockchain and transferring it to a public blockchain**
  - Both blockchains are intertwined: the public blockchain links to the private blockchain
    ► For real time data processing: private blockchain
    ► For legacy data: public blockchain
  - **Problem:** Legacy data remain on the public blockchain ► data is being replicated and still visible
  - **Result:** Good instrument for safeguarding personal data, but not in line with the principles of purpose limitation and data minimization

4. Techniques to mitigate data protection risks (4/5)

- **Off-chain storage and hashing of legacy data („hashing-out")**
  - **<u>Challenge:</u>** Reconciling the storage of legacy data and the principles of purpose limitation and data minimization
  - **Removing legacy data from the blockchain and storing it in an external off-chain database; linking personal data via hash point**
  - Hashes of the personal data being put off-chain remain onto the blockchain
  - **<u>Problem:</u> Hash remains on the blockchain and still qualifies as personal data**
    ► GDPR applies to on-chain hash values
    ► Does hashing-out resolve the issue around the above principles and erasure requests?

4. Techniques to mitigate data protection risks (5/5)

- **Erasure of personal data by deleting off-chain legacy data**
  - **Hashing-out and deleting legacy data comply with an erasure request** even though the *hash of the personal data remains on the blockchain*
  - **Rationale:** ► The on-chain hash has nothing to relate to as soon as the corresponding personal data on the external off-chain database has been deleted; the hash becomes a random string with no meaning
    ► A cryptographic hash function is a „one-way function“: it is not possible to recreate or reverse engineer the original data from the hash function
    ► **Deletion of the off-chain legacy/reference data changes the legal nature of the hash value** from personal data to non personal data
  - **Result:** Hashing-out is a technique to comply with the principles of purpose limitation and data minimization as well as with erasure requests

5. Data Privacy Impact Assessment

Definition and impact on controllers

- Controller has to carry out a DPIA pursuant to Art. 35 GDPR **prior to the data processing operation** if
  ► **new technologies are used**
  ► **processing is likely to result in a high risk to the rights and freedoms of data subjects**
- DPIA involves **balancing the interests of the data controller against those of the data subjects**, in particular:
  ► description of the data processing and the purpose(s)
  ► assessment of the necessity and proportionality of the processing in relation to the purpose
  ► an assessment of the risks to the data subjects
  ► the measures in place to address the risk identified

6. Privacy by Design (1/2)

1. Definition and impact on controllers

- **CCPA and GDPR require businesses to adopt security protocols appropriate to safeguard collected personal information**
- **Art. 25 GDPR more specifically requires controllers to establish appropriate technical and organizational measures** to implement data protection principles and to safeguard the rights of data subjects
  ► controller must **choose that technology from the outset with the least impact on the rights of data subjects**
  ► privacy considerations must be factored in at the earliest possible stage
  ► controller has to **implement measures to ensure minimization of the data to be processed as well as security** (e.g. pseudonymization, encryption)

6. Privacy by Design (2/2)

2. Legal implication on blockchain

- Controller should follow the sequence of assessing the permissibility of submitting personal data to the blockchain (see chart above)
- Usage of state-of-the-art encryption techniques whenever on-chain storage of personal data is inevitable (ultima ratio!)
  ► controller should register personal data and hash or, at least, encrypt the data (CNIL as of Nov 6, 2018)

3. Potential use cases in the industry

- **Health sector:** Record and authenticate medical data and customize its use for other parties (e.g. personalized medicine, data sharing for public health research) ► dealing with sensitive (health) data implies that strong privacy mechanisms must be put in place ►need to conduct both DPDD and DPIA
- **Crypto currencies:** Adding additional layers of privacy to the transactional information (identity of blockchain users is obfuscated)

7. Legal grounds under the GDPR

1. **Contractual necessity, Art. 6 (1)(b) GDPR**
   - Processing necessary for the performance of a contract
   - Relevant regarding smart contracts
2. **Consent, Art. 6 (1)(a) GDPR**
   - Data subject has given consent to the processing of his or her data for one or more specific purposes
   - Consent can be withdrawn by the data subject at any time
   - Unclear to whom the user must give consent in a blockchain context
3. **Legitimate interest, Art. 6 (1)(f) GDPR**
   - Processing necessary for the purposes of the legitimate interests pursued by the controller or by a third party
   - Submitting of personal data to a blockchain is legitimate if, e.g., the processing activity aims to prevent frauds (Recital 47 of the GDPR)
4. **Compliance with legal obligation, Art. 6 (1)(c) GDPR and public interest, Art. 6 (1)(e) GDPR**

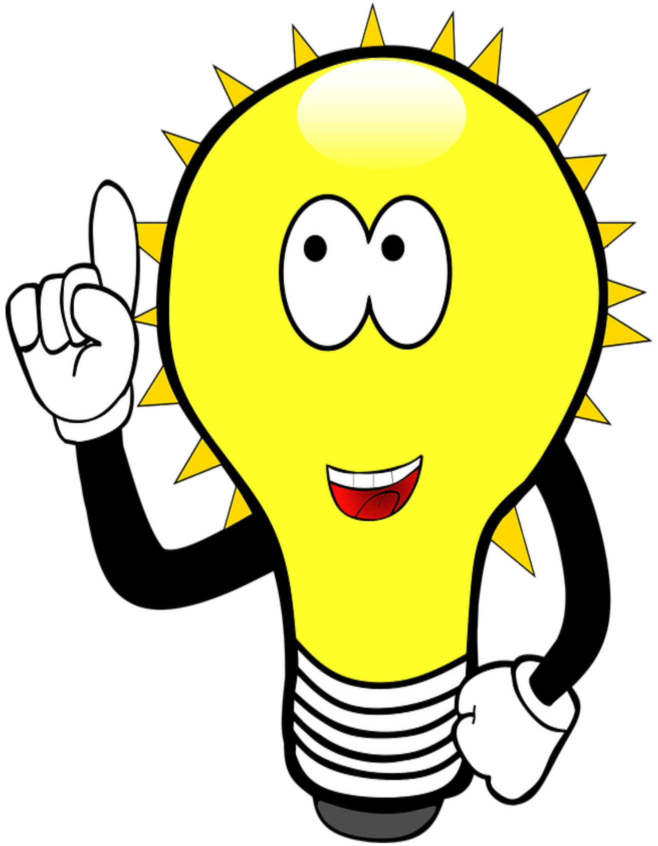
8. Key Take Aways

It is just technology

Law is technology neutral

Tensions with GDPR can be overcome

Usage of state-of-the-art encryption is key



Carry out PIA and DPDD

Private blockchain first

Track guidance of data protection authorities

Question & Answer

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