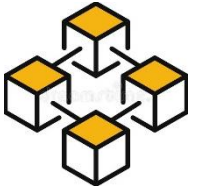




## **UNIT 7.4**

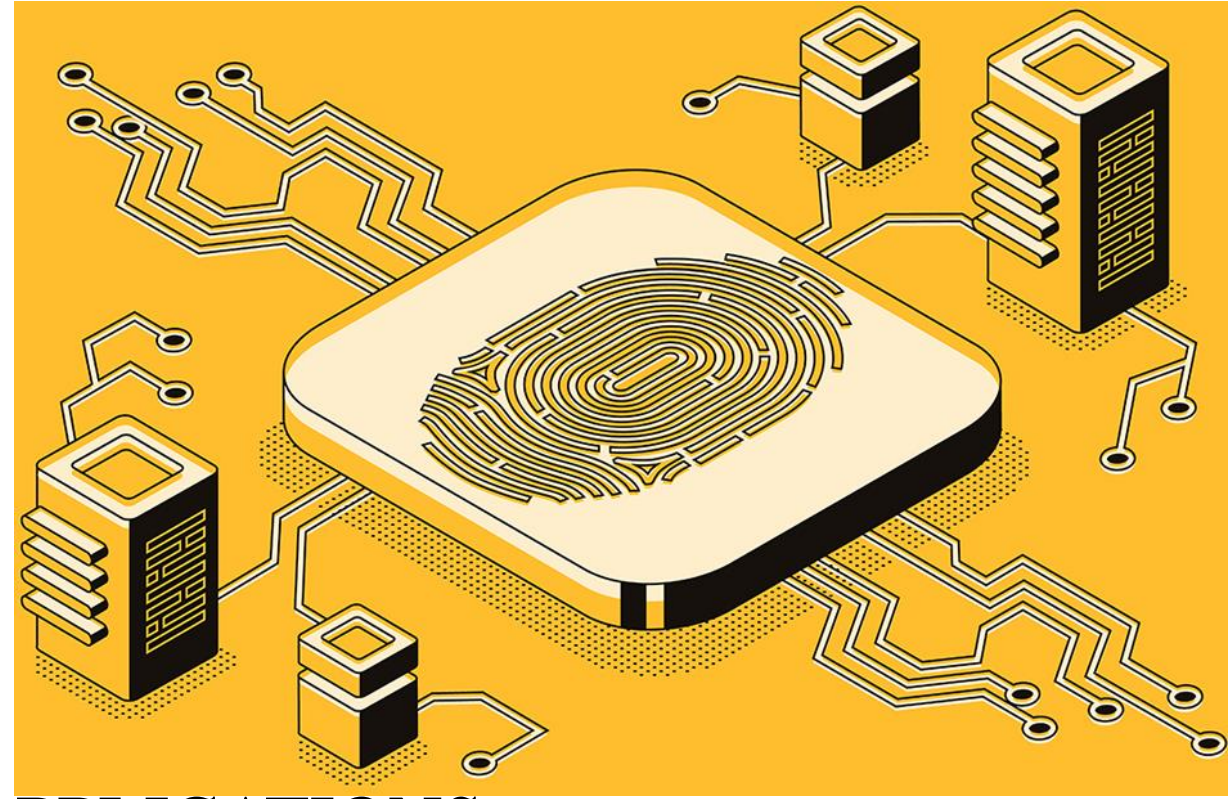
# **BLOCKCHAIN APPLICATIONS DATA MANAGEMENT**

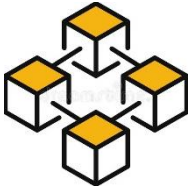
Lecturer: Ph.D Lê Quang Huy



# CONTENTS

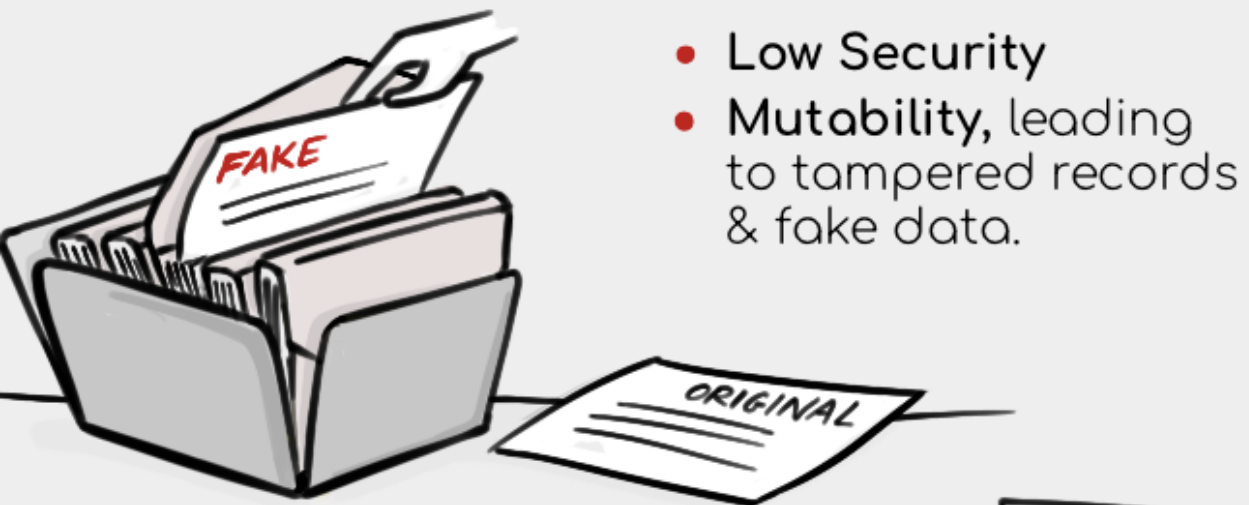
1. INTRODUCTION
2. DATA MANAGEMENT
3. BLOCKCHAIN DATA SECURITY
4. BLOCKCHAIN DATA SECURITY APPLICATIONS
5. SUMMARY
6. DISCUSSION





# 1. INTRODUCTION

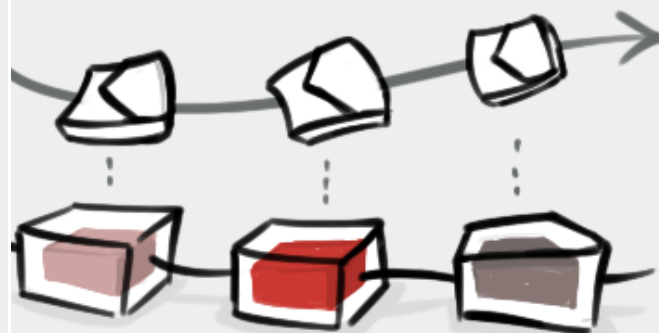
## Current problem with Data Management



Source & Authenticity is hard to be traced.



## This foundational structure of blockchain ensures:



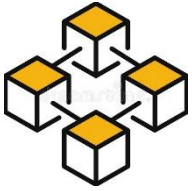
### Data transparency & traceability:

Since hash of one block is carried forward to the next one, all data can be traced back to its origin.

### Data Immutability:

Data in a blockchain cannot be edited. If done it can easily be detected and tracked. This prevents fraud and ensures high security.





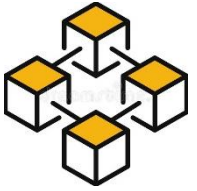
## 2. DATA MANAGEMENT

2.1. DATA MANAGEMENT

2.2. IMPORTANCE OF DATA MANAGEMENT

2.3. TYPE OF DATA MANAGEMENT

2.4. DATA MANAGEMENT STRATEGY



## 2.1. DATA MANAGEMENT

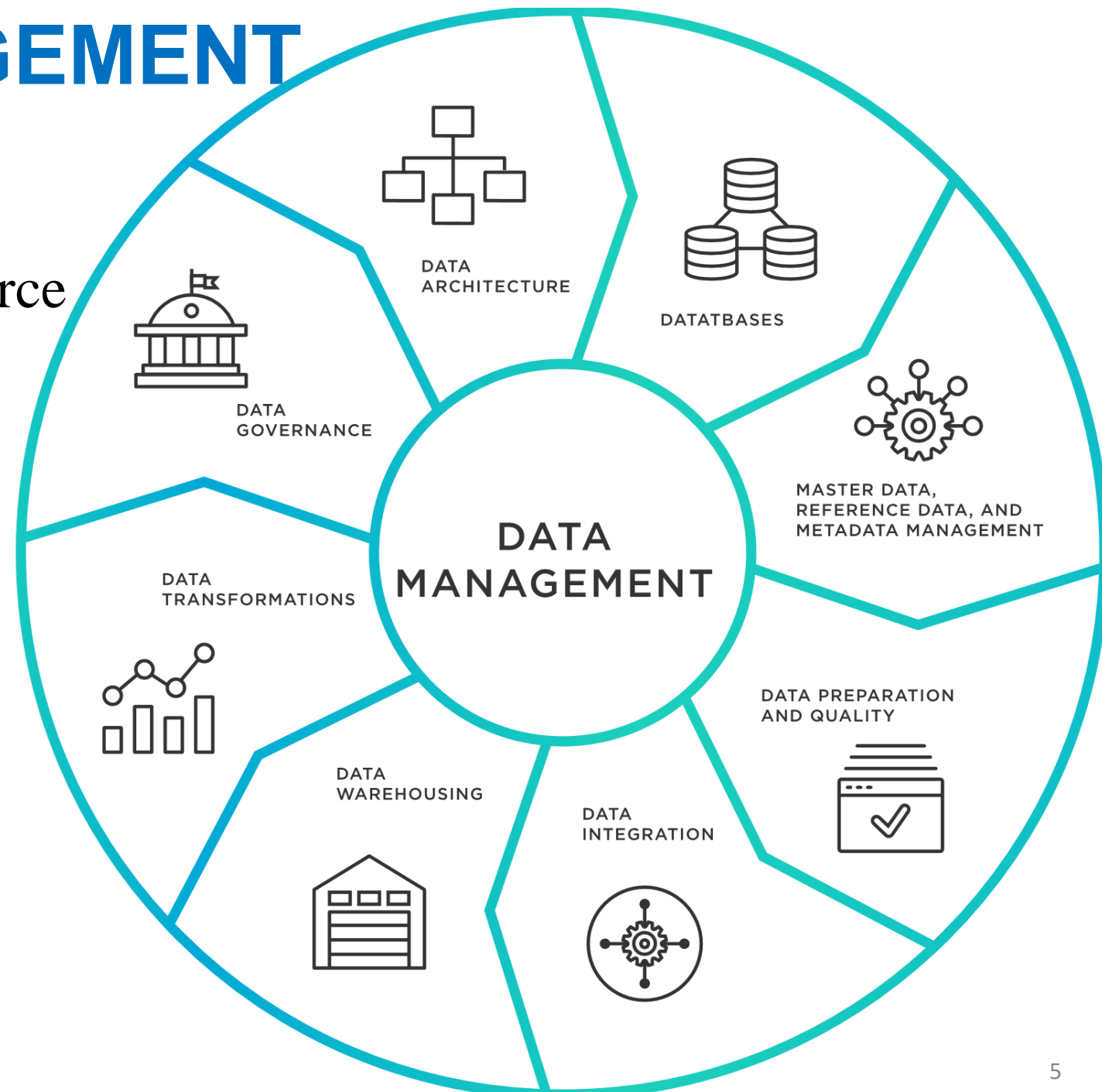
Data management:

- Handling data as a valuable resource

Practice of:

- Collecting, storing, protecting,
- delivering, and processing data.

Areas of data management:







## 2.2. IMPORTANCE OF DATA MANAGEMENT

Importance of data management

Data:

- Corporate asset (revenue, profits)
- Make better decisions, optimize operations

If lack of proper data management:

- Incompatible data, inconsistent data quality problems
- Limit to run business intelligence (BI) and analytics applications
- Lead to faulty findings.
- Large data, difficult to manage

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### PRODUCTIVITY

With good data management, your company will be more organized and productive. Employees will have an easier time finding, understanding, and relaying information.



### COST EFFICIENCY

Data management can help your organization avoid unnecessary extra costs such as unneeded duplication. When data is easily accessible, You won't have to worry about employees conducting the same research over and over again.



### OPERATIONAL NIMBLENESS

Great data management makes it easy for companies to respond quickly to the world around them. This means companies can respond efficiently to market changes and react appropriately to competitors.

## WHY IS DATA MANAGEMENT IMPORTANT?

Source: <http://www.blue-pencil.ca/what-is-data-management-and-why-it-is-important/>



### SECURITY RISKS

Proper data management helps ensure that your information stays secure and never ends up in the wrong hands. A strong data management system will help protect your information from theft and attacks.



### REDUCED DATA LOSS

With a data management plan in place, you greatly reduce the risk of losing vital company information. It also ensures your important information is backed up and retrievable in case something happens to the original copies.



### ACCURATE DECISIONS

Proper data management helps ensure all employees and workers view and analyze the same, most recent information. This helps ensure that your company will be making the most accurate decisions based on the most accurate information



## 2.3. TYPE OF DATA MANAGEMENT

# Types of Data Management

Data  
Integration

Data  
Modeling

Data  
Storage

Data  
Catalogs

Data  
Processing

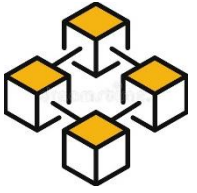
Data  
Governance

Data Lifecycle  
Management (DLM)

Data Pipelines  
ETLs

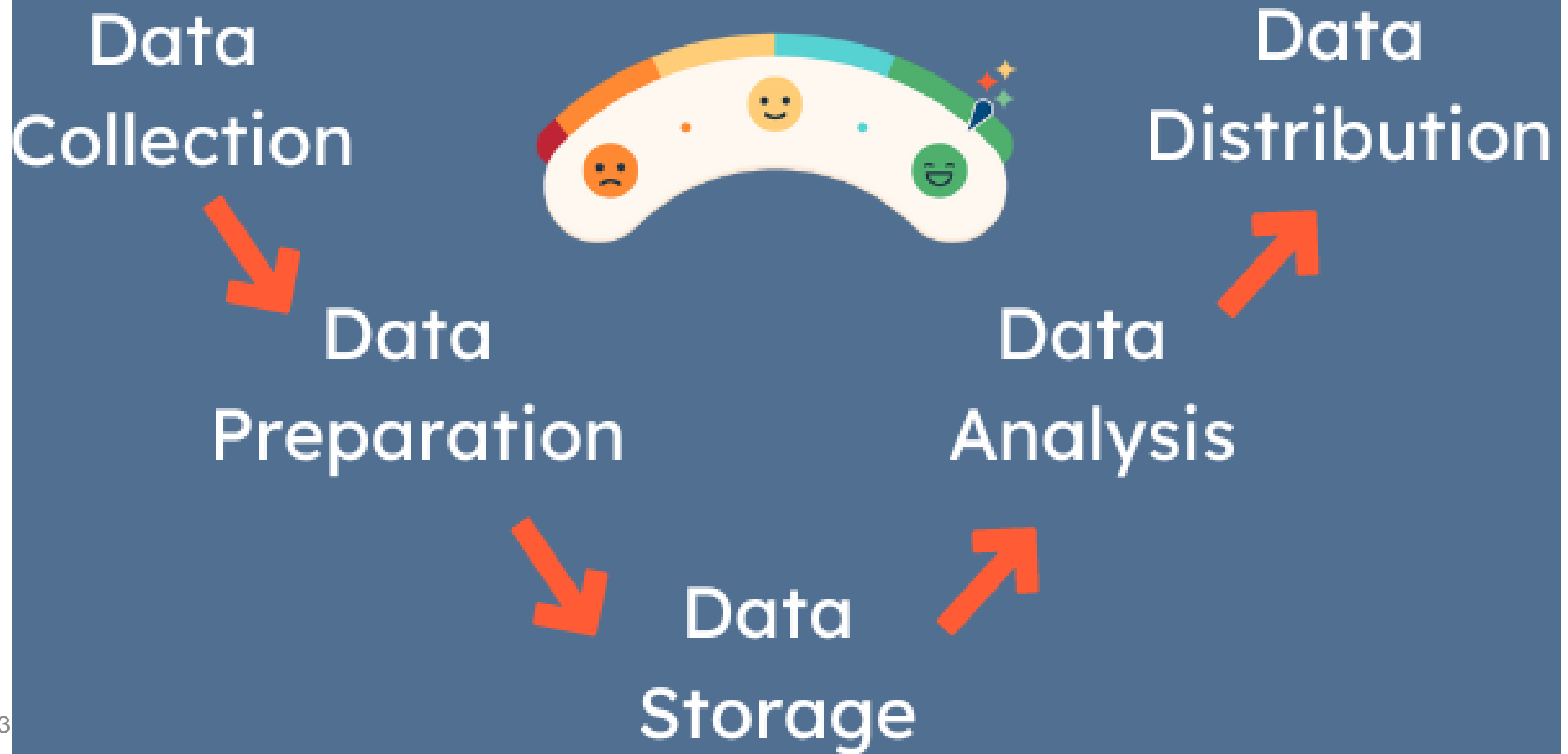
Data Security

Data  
Architecture



## 2.4. DATA MANAGEMENT STRATEGY

### Data Management Processes

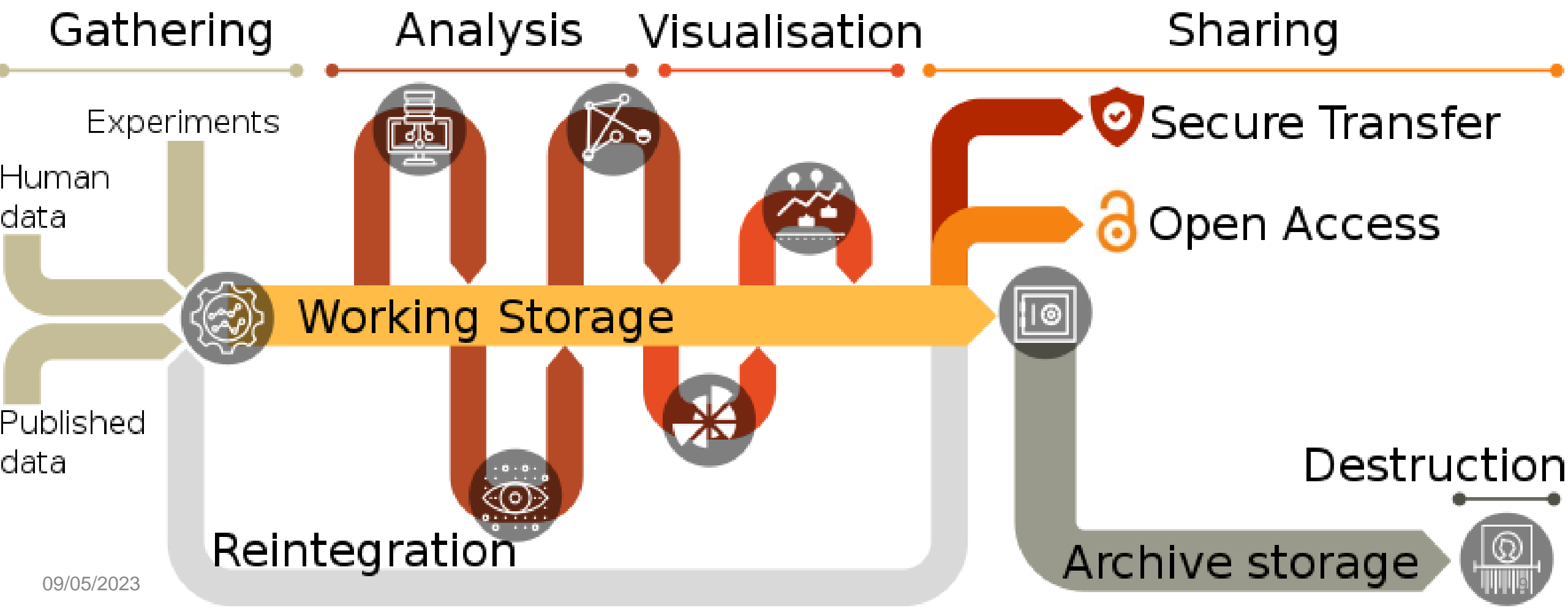






## 2.4. DATA MANAGEMENT STRATEGY

- Data lifecycle



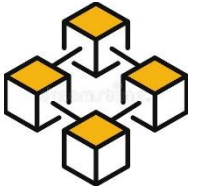
A stylized icon representing a blockchain, consisting of several yellow cubes connected by lines to form a network structure.

# 3. BLOCKCHAIN DATA SECURITY

3.1. INTRODUCTION

3.2. BLOCKCHAIN DATA SECURITY

3.3. BLOCKCHAIN DATA SECURITY USECASE

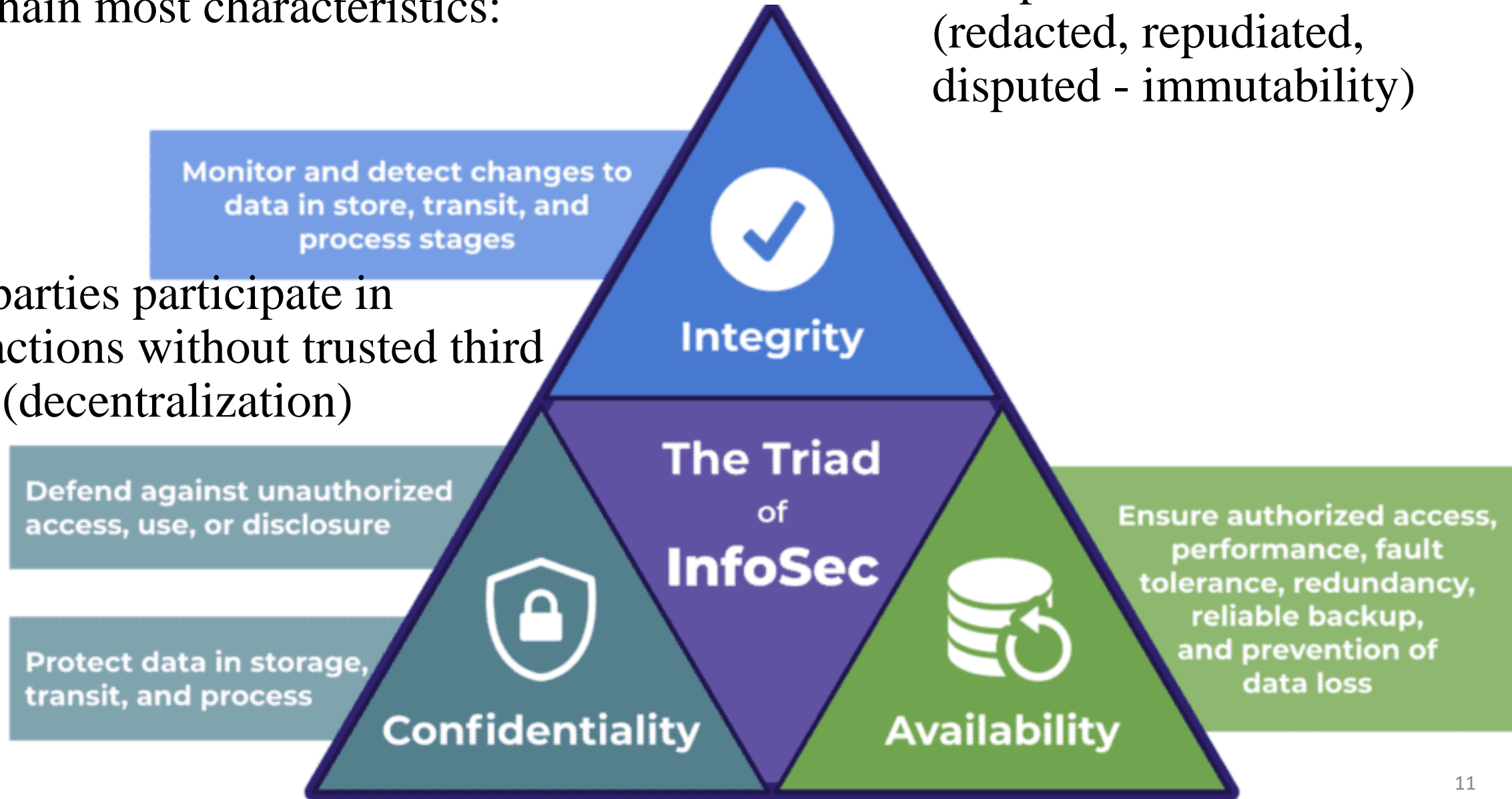


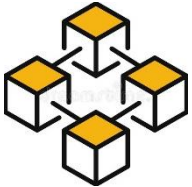
## 3.1. INTRODUCTION

Blockchain most characteristics:

- Two parties participate in transactions without trusted third party (decentralization)

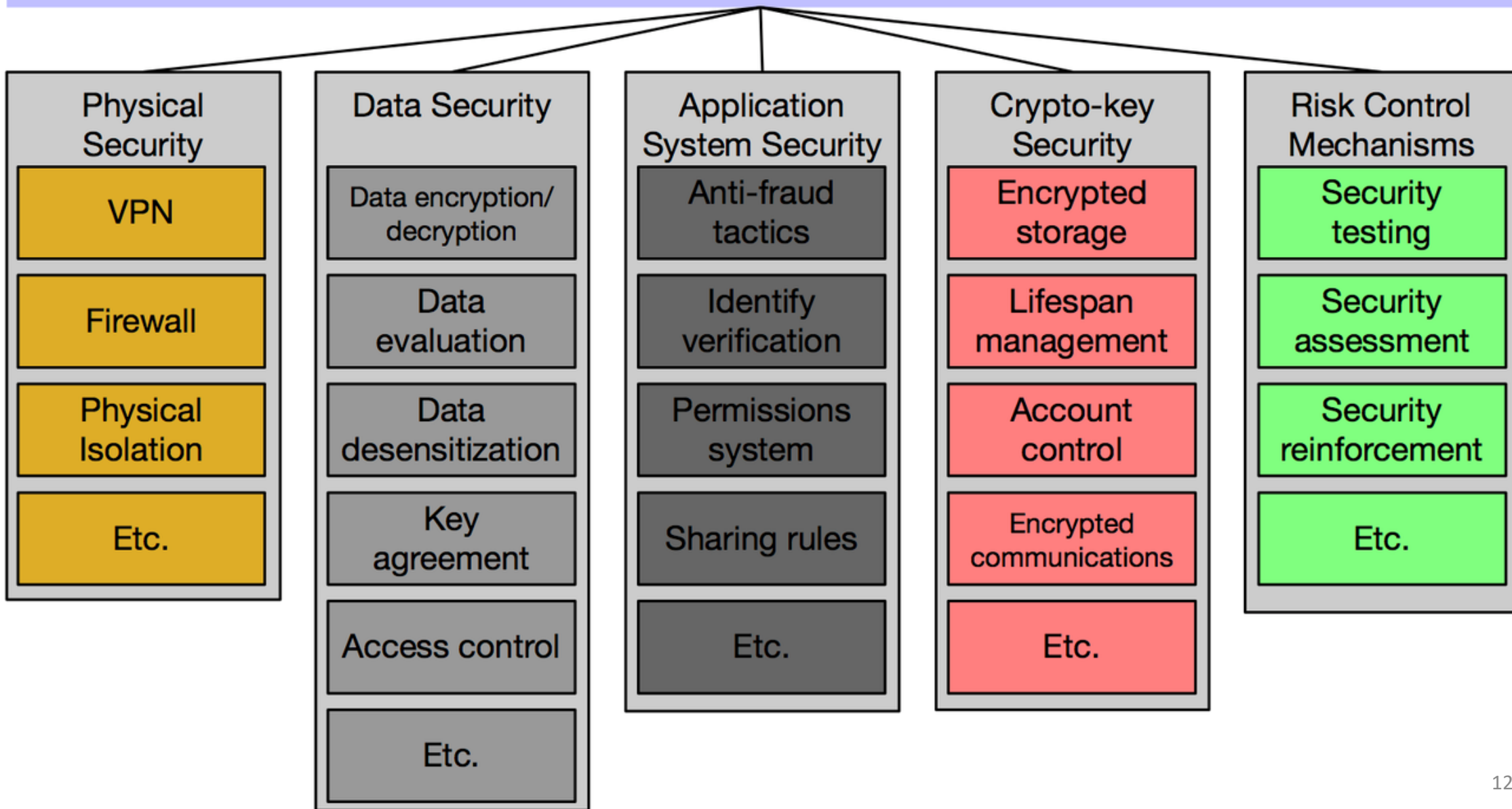
- Tamper-resistant data entries (redacted, repudiated, disputed - immutability)





# 3.1. INTRODUCTION

## Blockchain Security System





## 3.2. BLOCKCHAIN DATA SECURITY

### Applications for Blockchain Data Security:

- Tracking:
  - track usage and ownership of records
  - clear dual record system with direct document history
- Confidence:
  - built-in proof-of-origin techniques to prevent fraud
  - encryption and hashing (tokenization) to protect data
- Redundant: decentralize data storage (copies)
- Acceleration: Preparation, issuance, and retrieval of documents are automated using smart contracts.

### Blockchain and Data management

#### Data storage

Data is stored in multiple computers, having no central authority to control. Even if one or two systems breakdown, the data will not be lost.

#### Data security

Blockchain stores digital records on a peer-to-peer network, allowing only the concerned participants on the network to access, view, alter, add, or delete the stored content.

#### Data quality

Blockchain helps companies to improve the data quality in terms of exactness, reliability, and security.

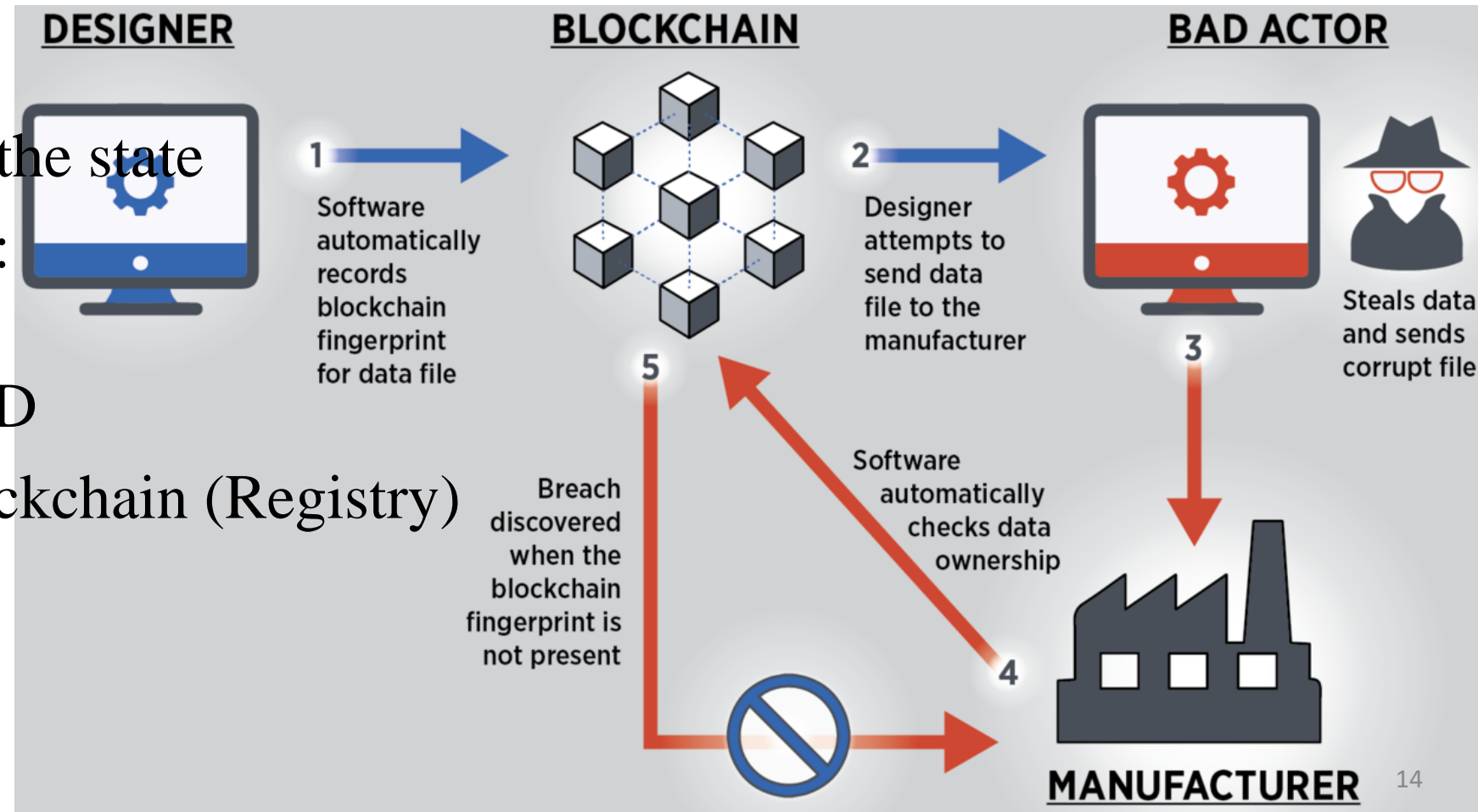
## 3.2. BLOCKCHAIN DATA SECURITY

Blockchain data security methods (technique):

- Timestamp, Integrity (architecture)
- Proof of existence
- Proof of ownership
- Irrefutable evidence of the state

Approaches (techniques):

- Reference to Object:  
Hashing object/ObjectID
- Record objects into blockchain (Registry)
- Verify objects







# 3.3. BLOCKCHAIN DATA SECURITY USECASE

## Five use cases for Blockchain Data Management



### Legal Document Management

Prove the timestamp integrity and ownership of wills, contracts, court papers or any other legal document.



### Accounting

An accounting record that is secured on the Blockchain can be rendered immune from malicious tampering or backdating.



### Intellectual Property

By combining PKI with Blockchain technology, we can provide a complete digital intellectual property rights solution



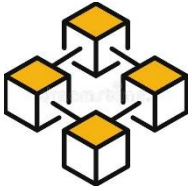
### Government

Eliminating counterfeiting and tampering or licenses, certificates and public records.

### Security

Blockchain can be used to eliminate log falsification or tampering of data.





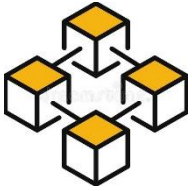
# 4. BLOCKCHAIN DATA SECURITY TECHNIQUE

4.1. INTEGRITY & TIMESTAMP

4.2. PROOF OF EXISTENCE

4.3. PROOF OF OWNERSHIP

4.4. TRANSFER OF OWNERSHIP



## 4.1. INTEGRITY & TIMESTAMP

Integrity (data):

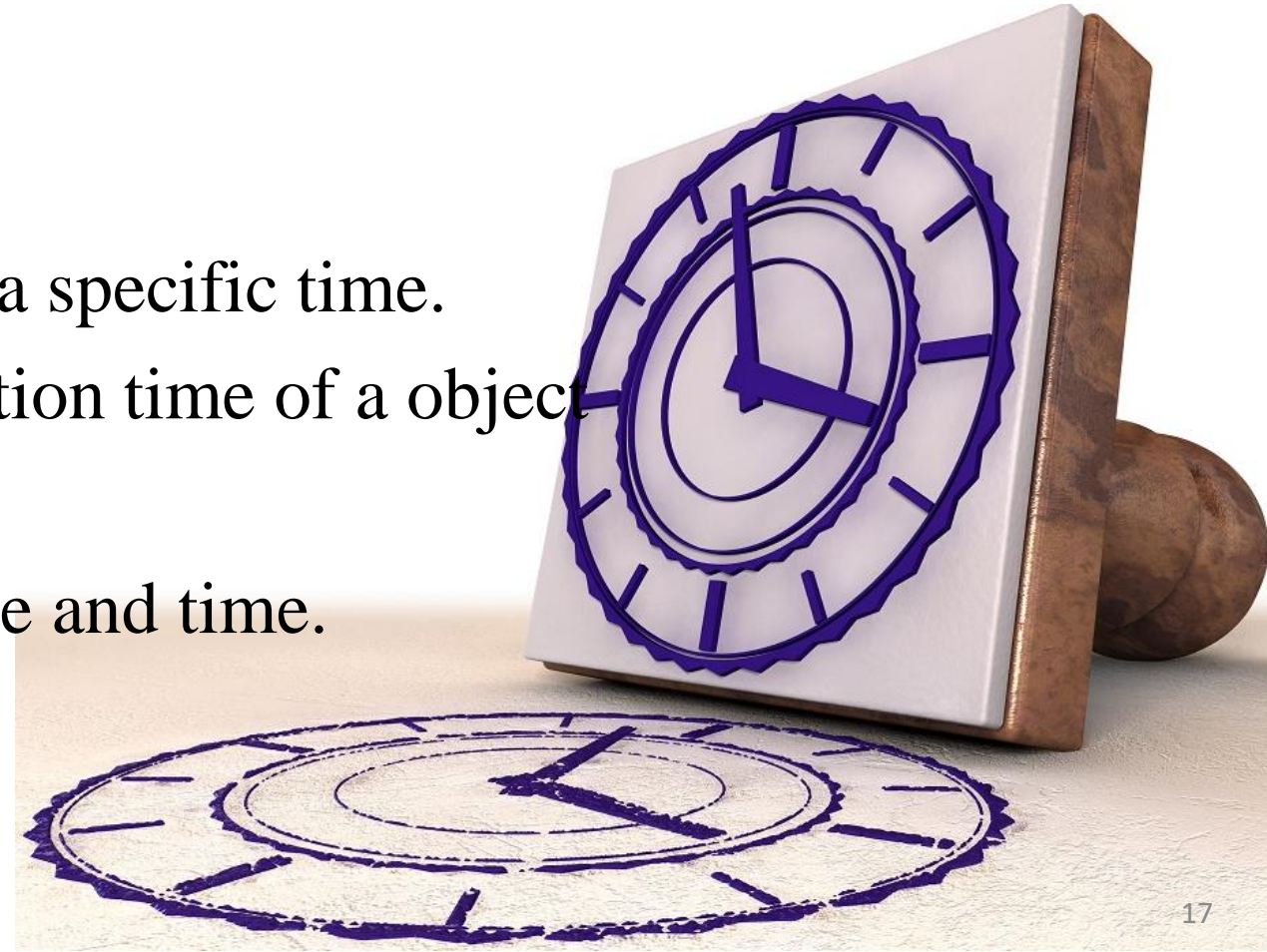
- Security
- Traceability
- Transparency

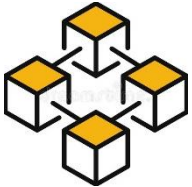
Timestamps:

- Certify object was created/modified at a specific time.
- Keeping track of the creation/modification time of a object

Blockchain timestamp:

- Blockheader, transaction includes a date and time.



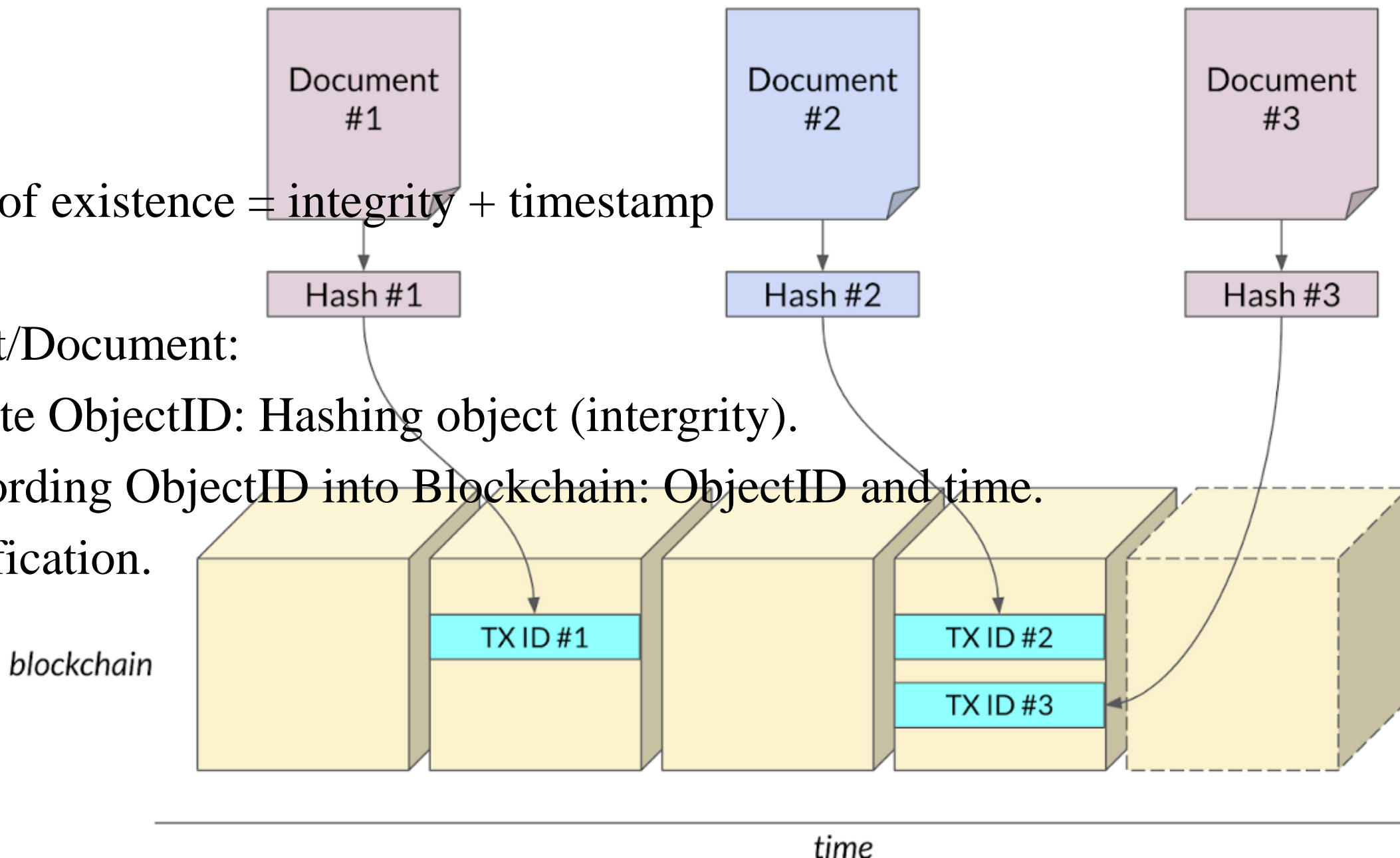


## 4.2. PROOF OF EXISTENCE

Proof of existence = integrity + timestamp

Object/Document:

- Create ObjectID: Hashing object (integrity).
- Recording ObjectID into Blockchain: ObjectID and time.
- Verification.







## 4.3. PROOF OF OWNERSHIP

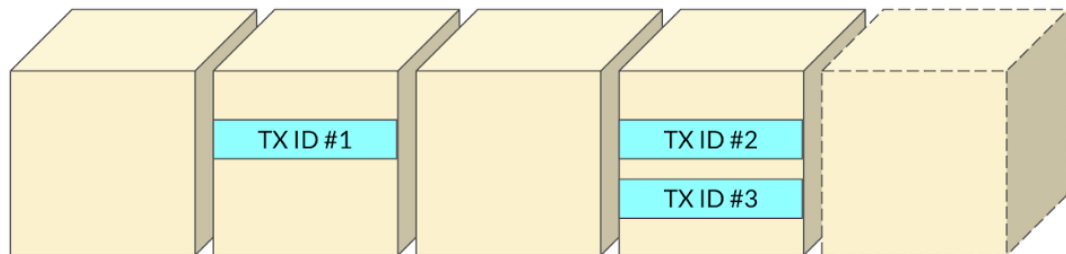
- Ownership = existence + owner identity
- Owner Identity: User Account System
  - Inside blockchain
  - Outside blockchain
  - UserID, Signature, ...
- Record both Owner ID and Object existence on blockchain
- Verification.

User	User ID
Alice Wong	alice
Bob Dylan	bob
Charlie Brown	charlie
...	...

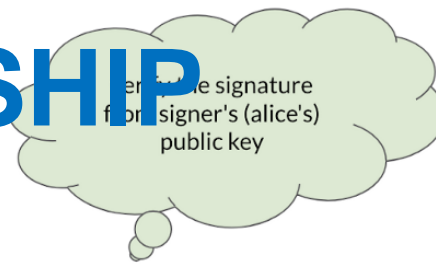
TX ID	User ID
#1	alice
#2	bob
#3	alice
...	...

User	User ID
Alice Wong	alice
Bob Dylan	bob
Charlie Brown	charlie
...	...

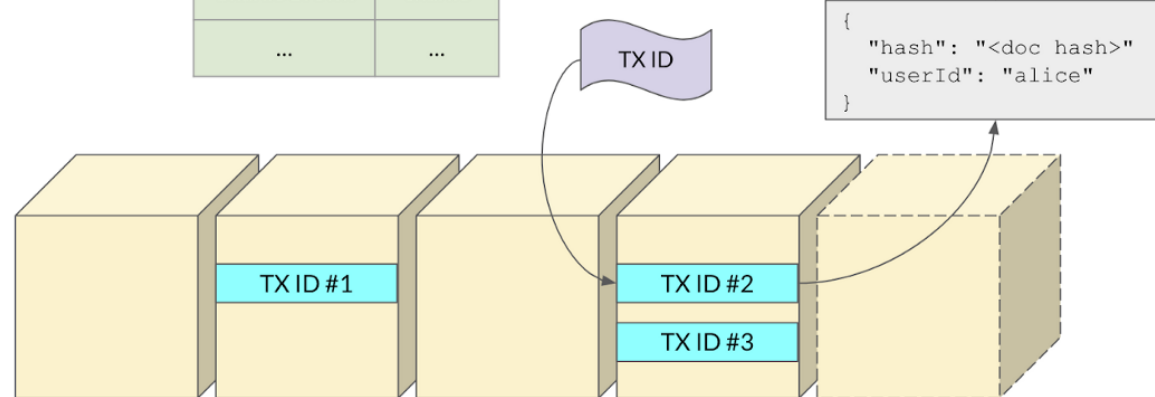
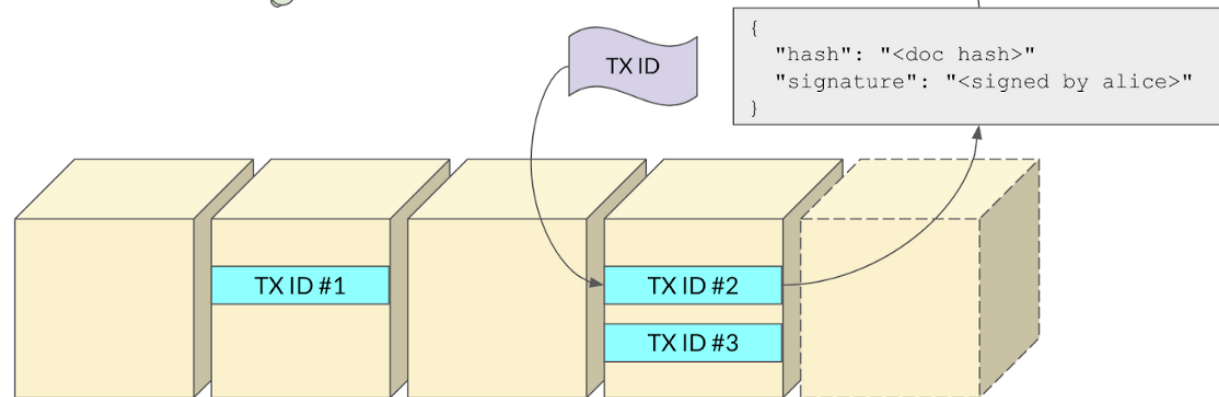
blockchain

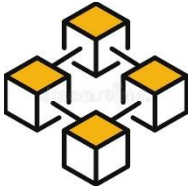


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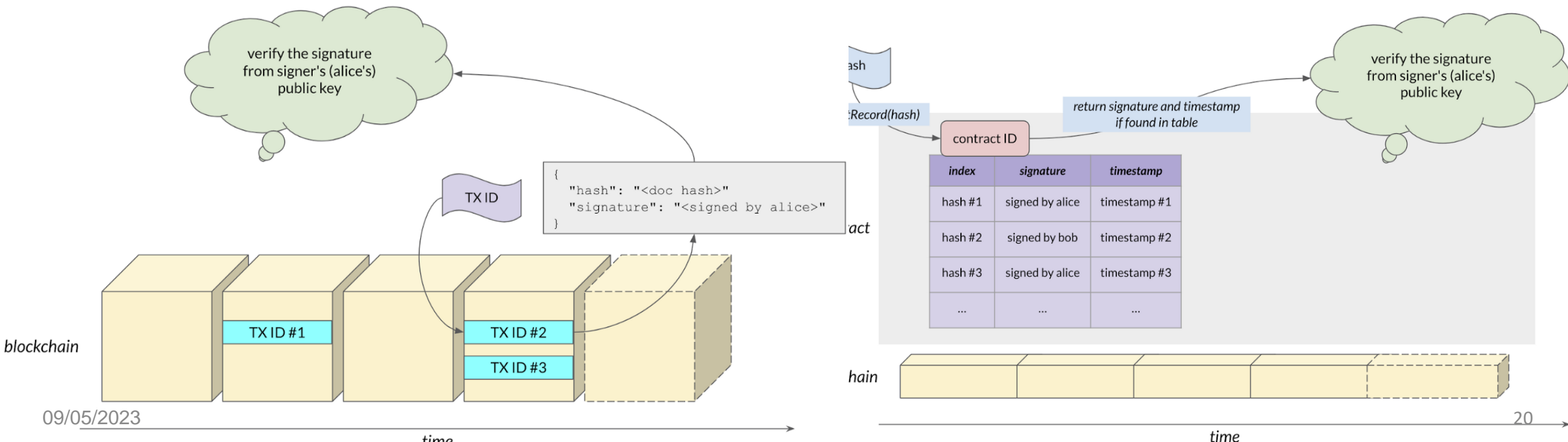
blockchain



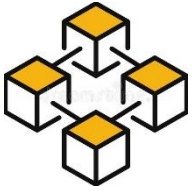


## 4.4. TRANSFER OF OWNERSHIP

- More Information in Transaction Record:
  - UserID,
  - Public key: native, PKI

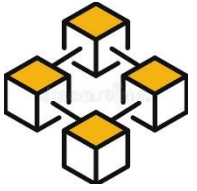






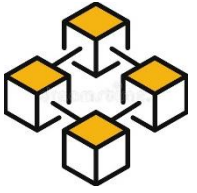
## 5. SUMMARY

- Data management: handling data as a valuable resource. Data security
- Blockchain data security:
  - Tracking; Confidence
  - Redundant; Acceleration
- Blockchain data security technique:
  - Integrity & timestamp; Proof of existence
  - Proof of ownership; Transfer of ownership



## 6. DISCUSSION





**FINISH**

*Thank You*