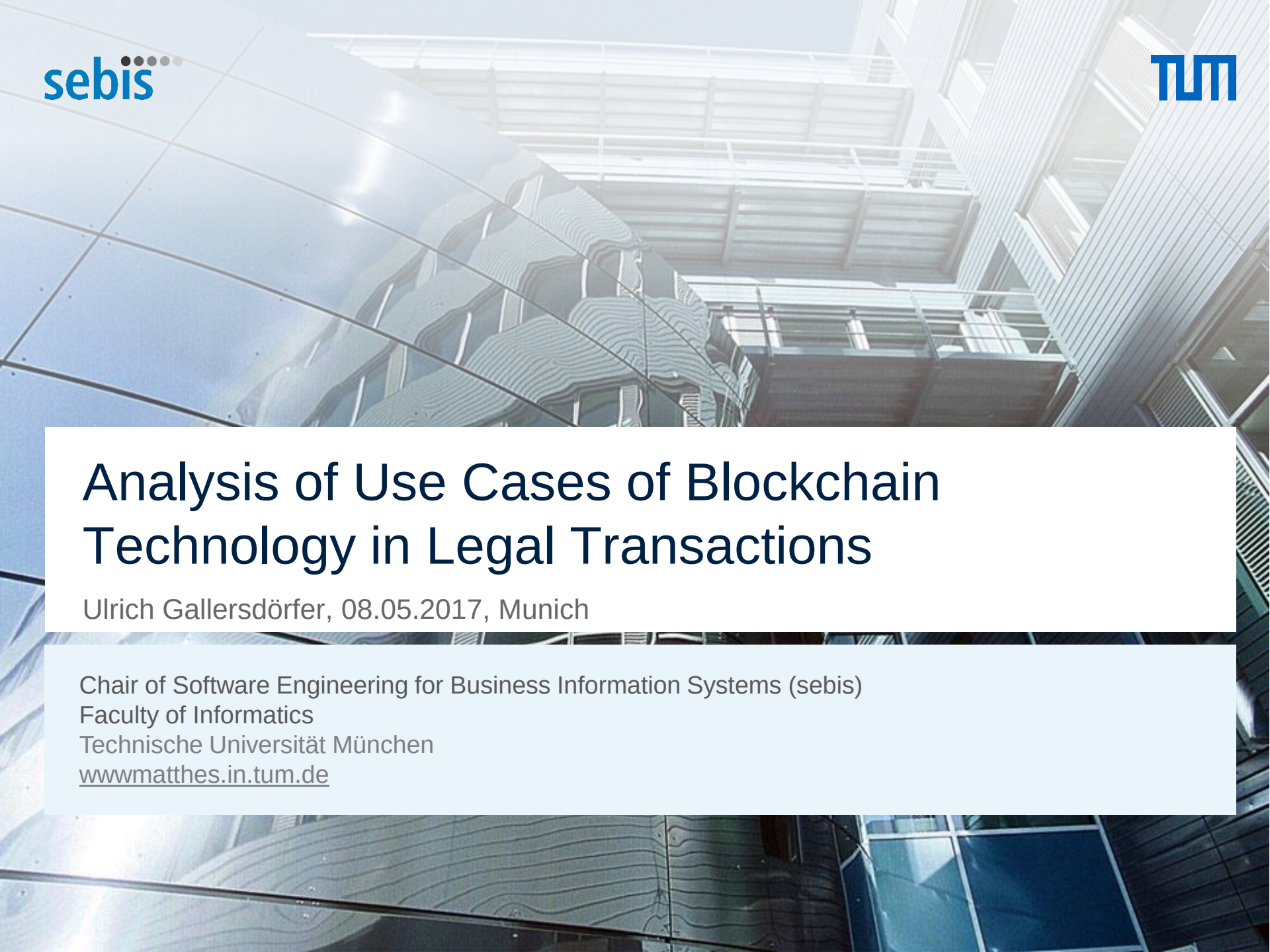

# Analysis of Use Cases of Blockchain Technology in Legal Transactions

Ulrich Gallersdörfer, 08.05.2017, Munich

Chair of Software Engineering for Business Information Systems (sebis)
Faculty of Informatics
Technische Universität München
wwwmatthes.in.tum.de

# Outline

1. Motivation
2. Blockchain – An Introduction
3. Foundations
4. Research Questions & Results
5. Use Case Analysis
6. Reflection and Discussion

Not all contents are covered due to the extent of this thesis.

Risks
@ IRIS17[1]

Prototype
@ Discussion

Further Results
@ Paper[2]

[1] https://wwwmatthes.in.tum.de/file/yxhmgsrmby7k/Sebis-Public-Website/-/Master-s-Thesis-Ulrich-Gallersdoerfer/170224%20Gallersdoerfer%20IRIS%202017.pdf
[2] https://wwwmatthes.in.tum.de/pages/z0tgbukmqlbr/Master-s-Thesis-Ulrich-Gallersdoerfer


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# Motivation

Blockchain is Eating Wall Street | Alex Tapscott | TEDxSanFrancisco

TEDx Talks
vor 2 Monaten • 29.630 Aufrufe
Author of best seller "**blockchain** revolution", Alex share in this talk about how the **blockchain** the technology behind bitcoin Is ...

VS.

*„Blockchains are overhyped.“*

Gideon Greenspan, Founder / CEO of Coin Sciences Ltd.

http://www.multichain.com/blog/2015/11/avoiding-pointless-blockchain-project/


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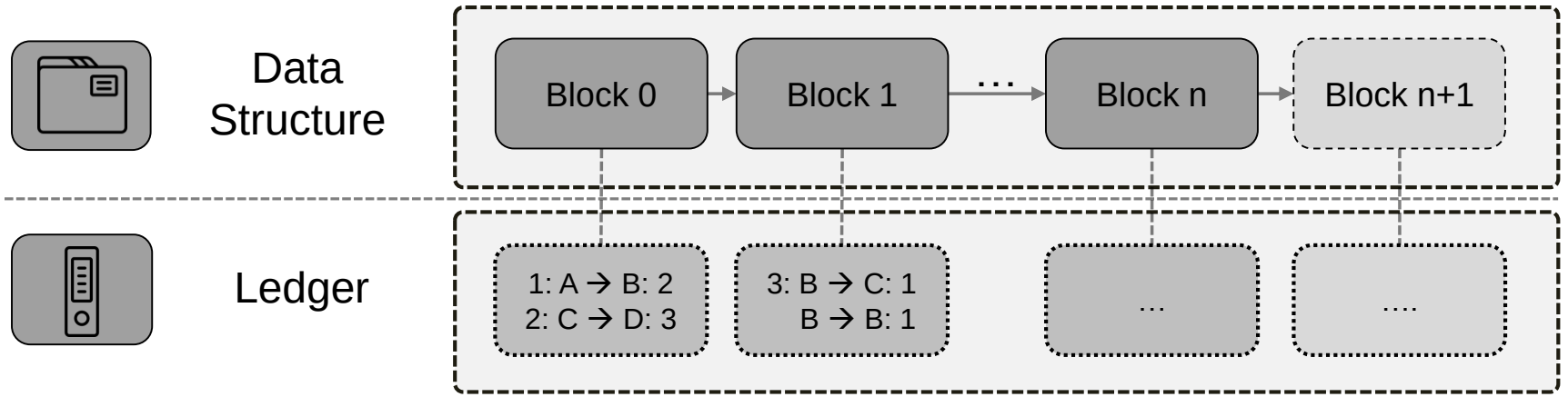
# Blockchain – An Introduction (Recap)

## A Definition of the Term „Blockchain“

“A blockchain […] is a **distributed database** that maintains a continuously-growing list of ordered records called blocks. Each block contains a timestamp and a link to a previous block. **By design** blockchains are **inherently resistant to modification** of the data: once recorded, the data in a block cannot be altered retroactively.”

https://en.wikipedia.org/wiki/Blockchain_(database)





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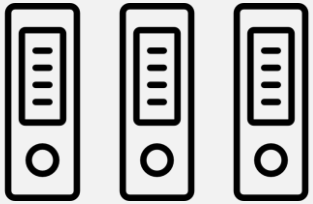
# Foundations

## Expert Interviews

14 Interview Partners

15 Use Cases

## Literature Review



## Blockchain Projects

Ethereum

Bitcoin

ZCash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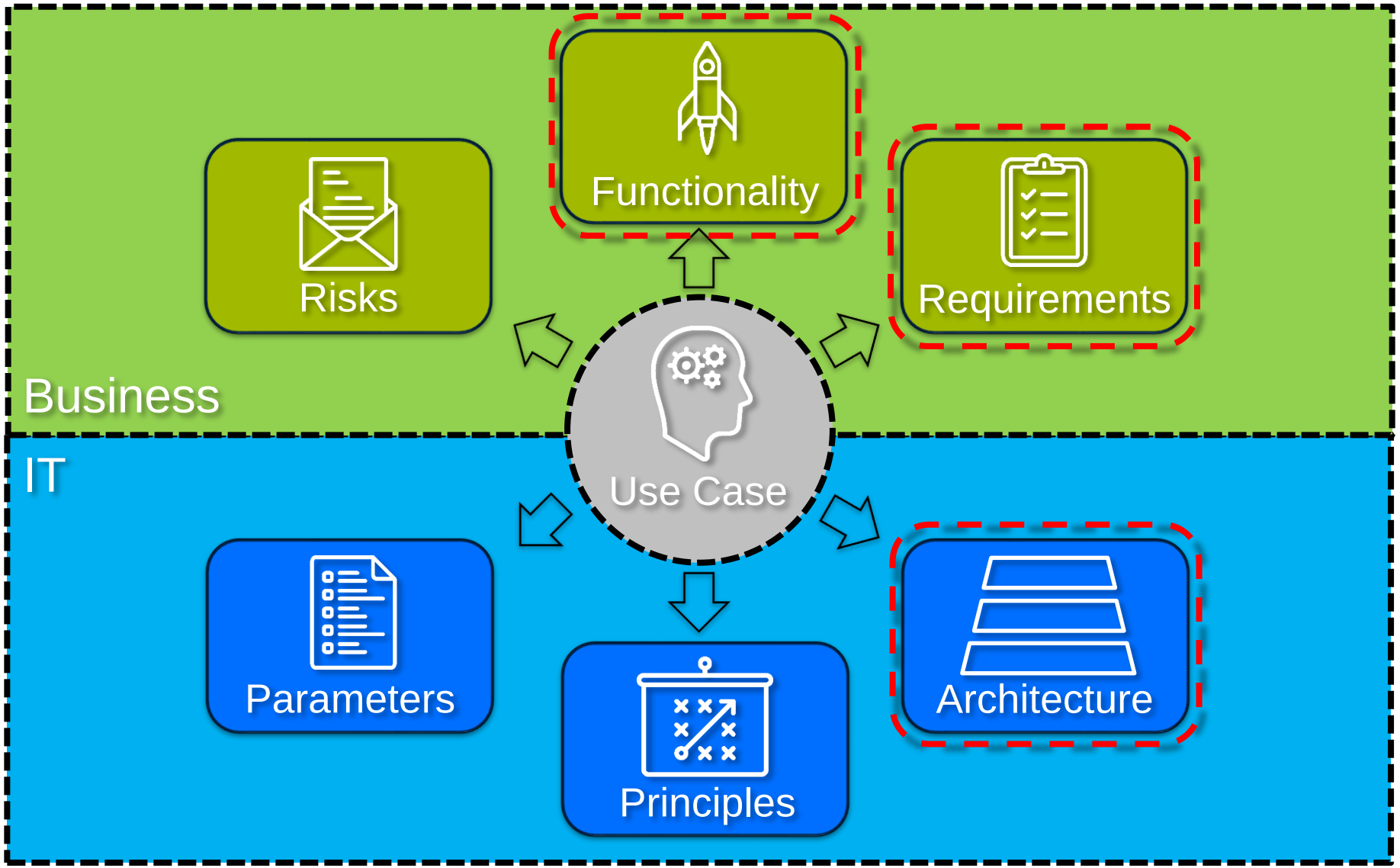
# Use Cases in the Blockchain Environment





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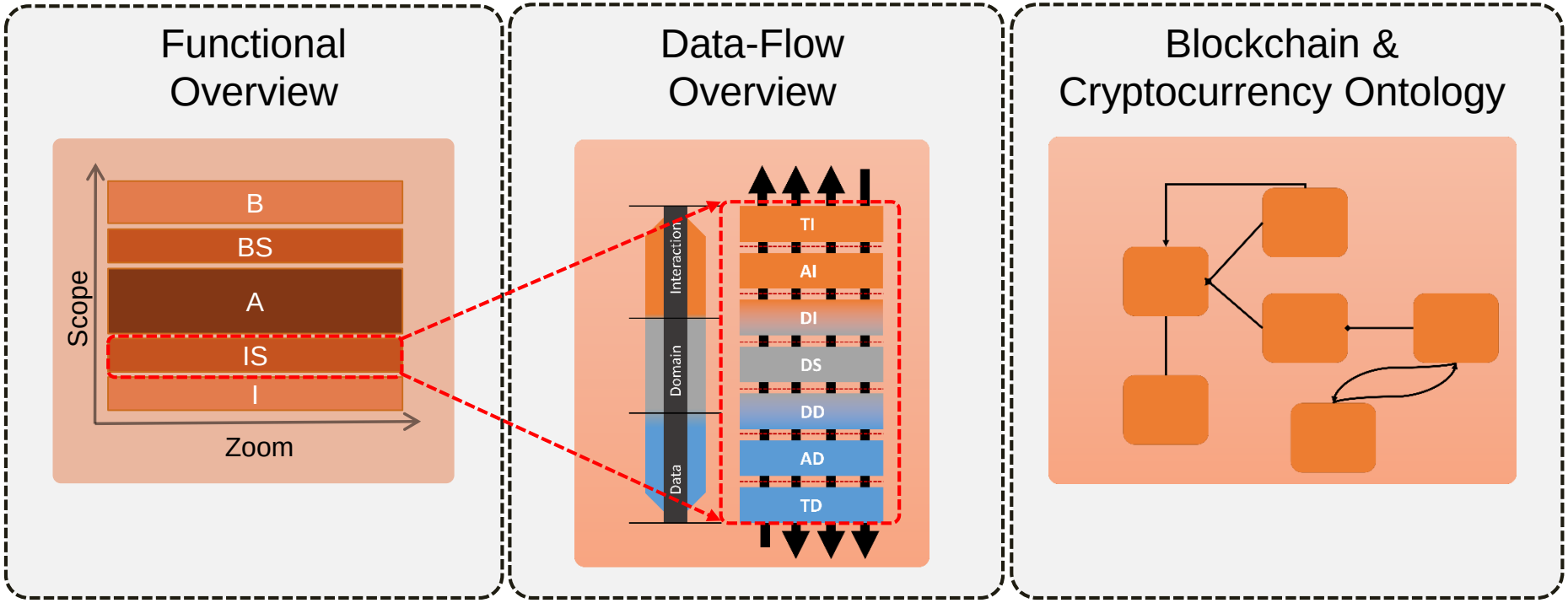
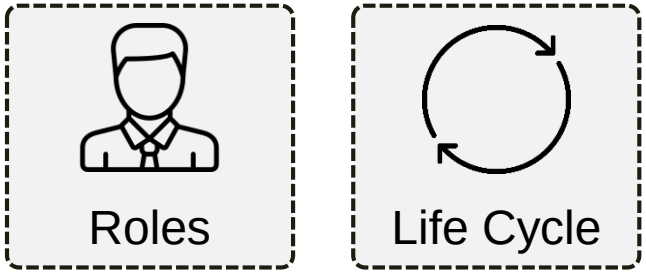
# Blockchain Architecture




Two additional Architectural Views





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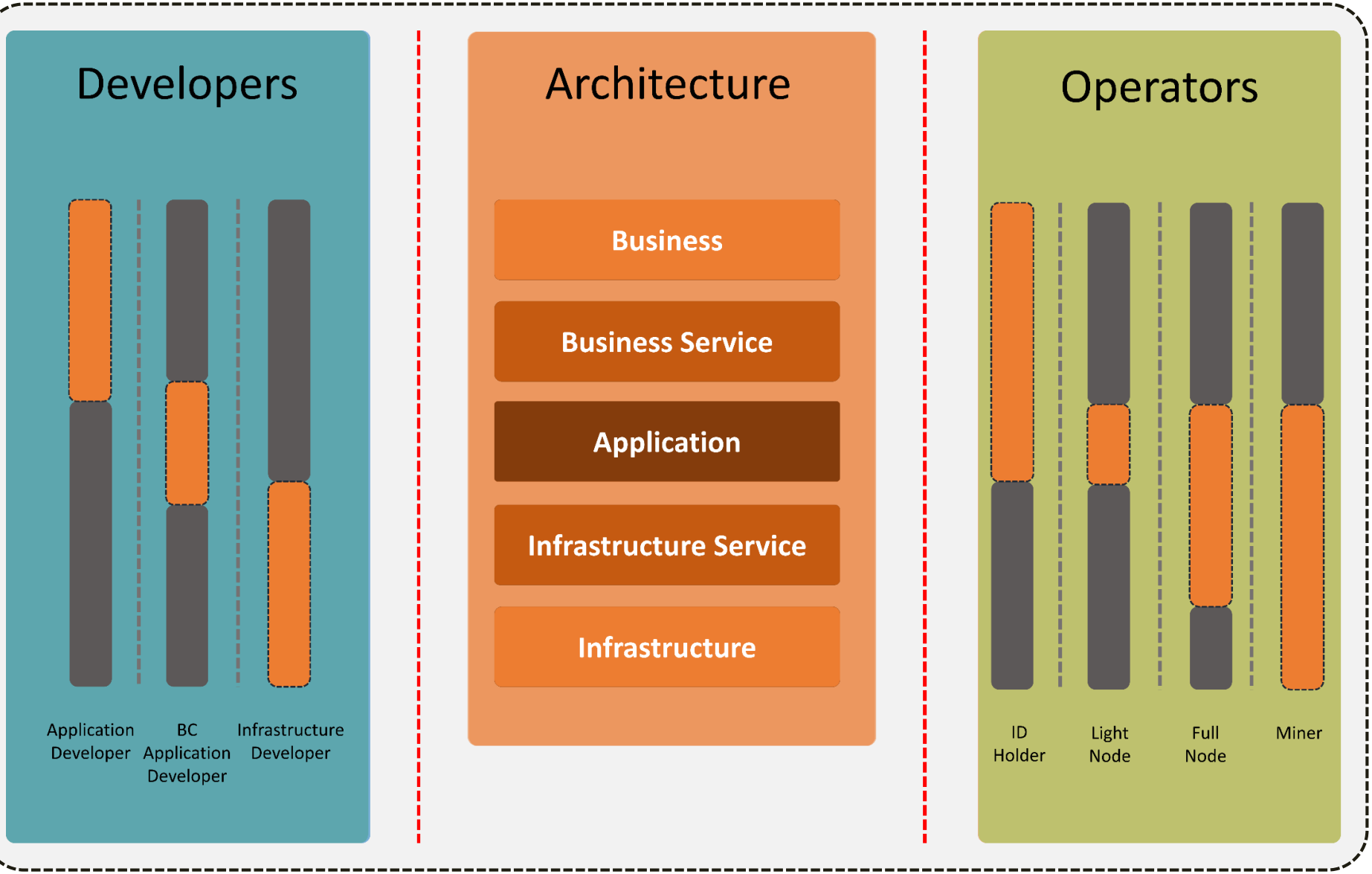
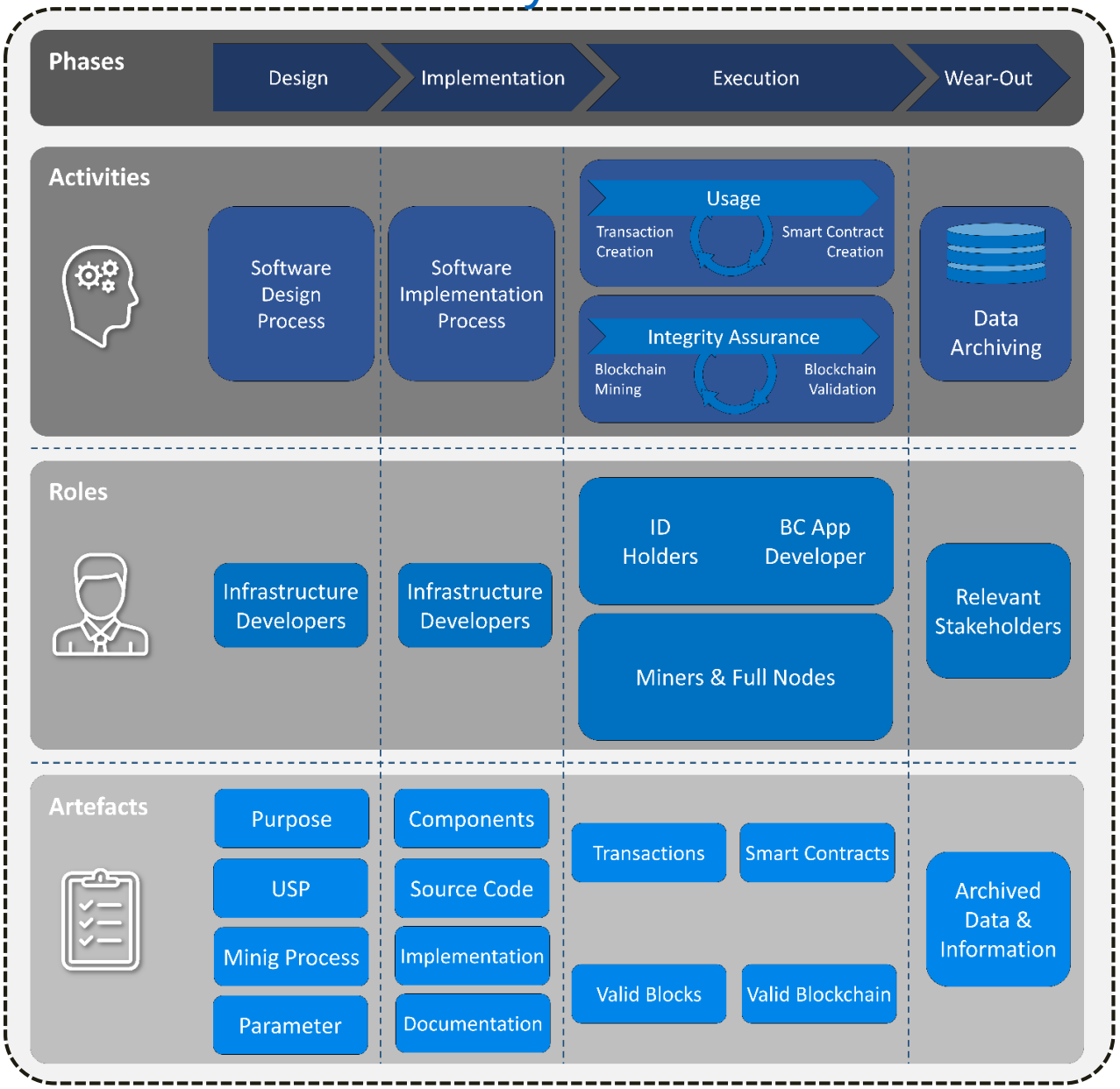
# Blockchain Architecture: Roles



# Blockchain Architecture: Life Cycle





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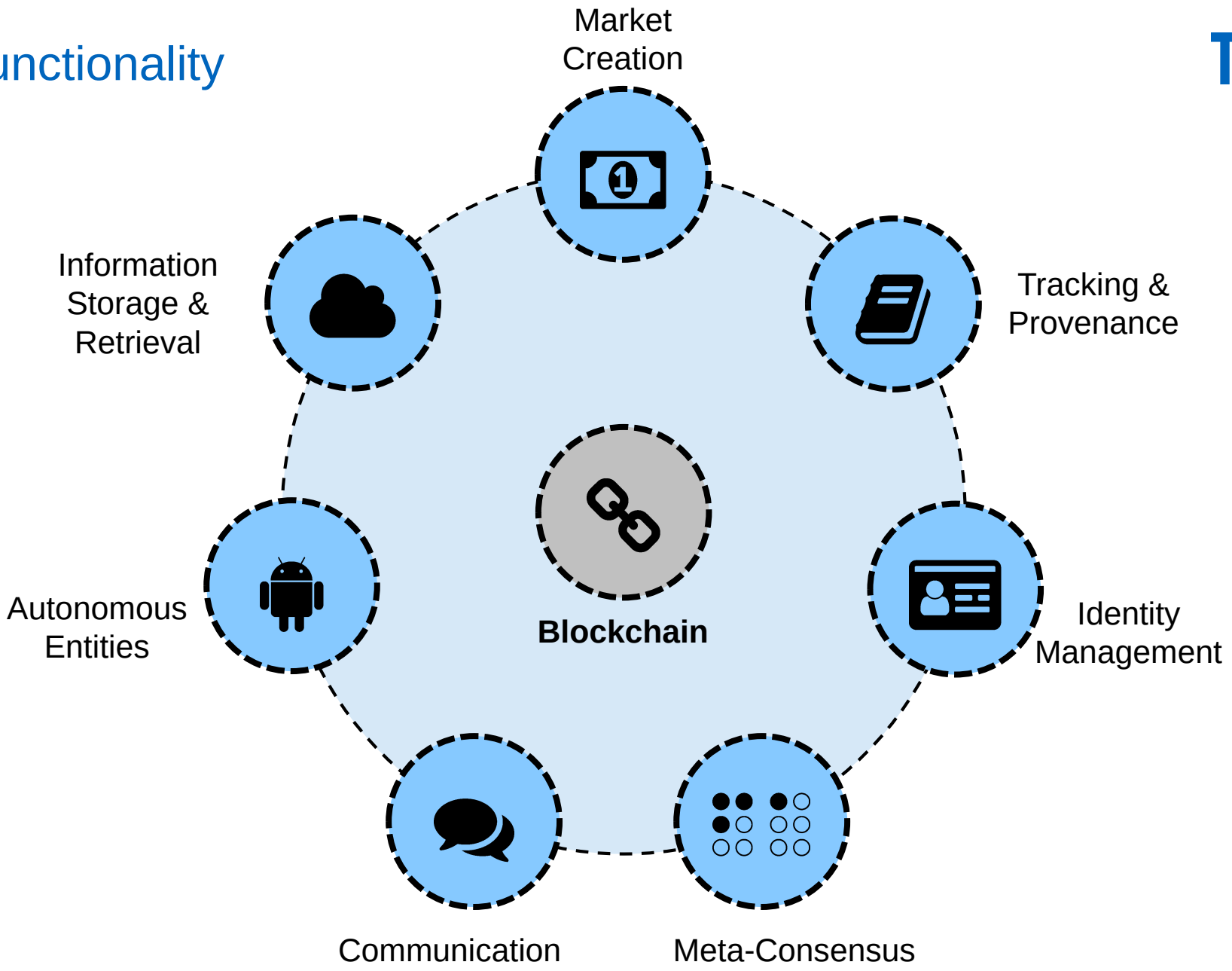
# Functionality





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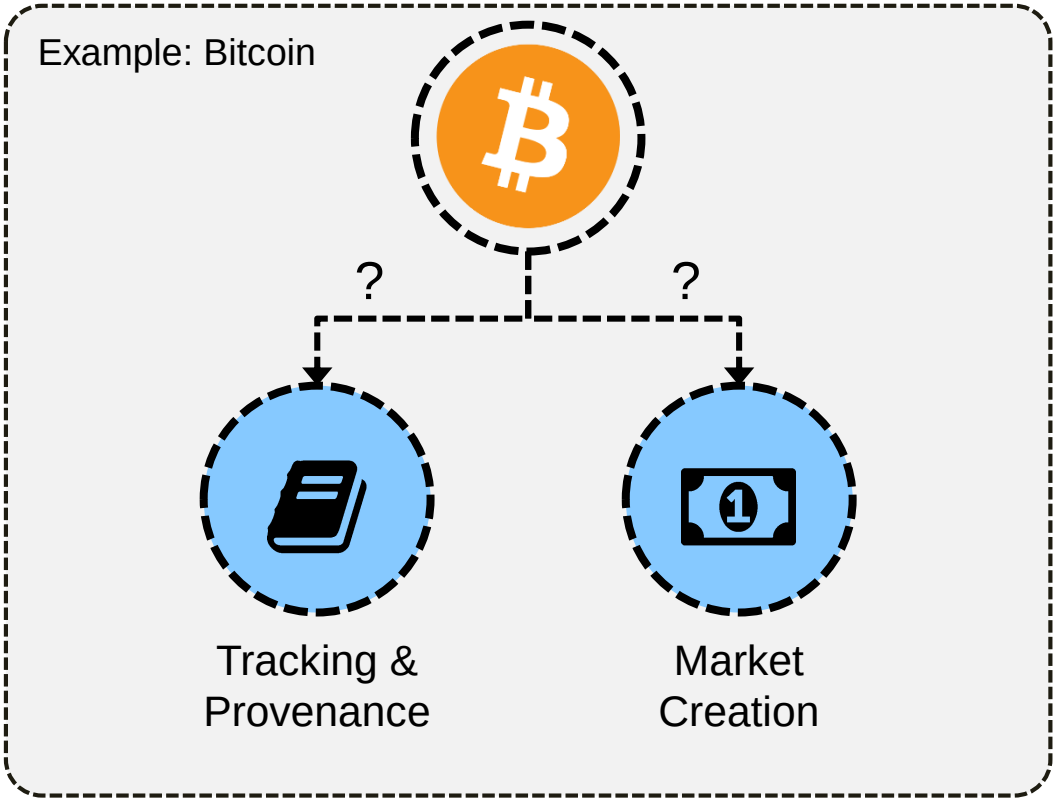
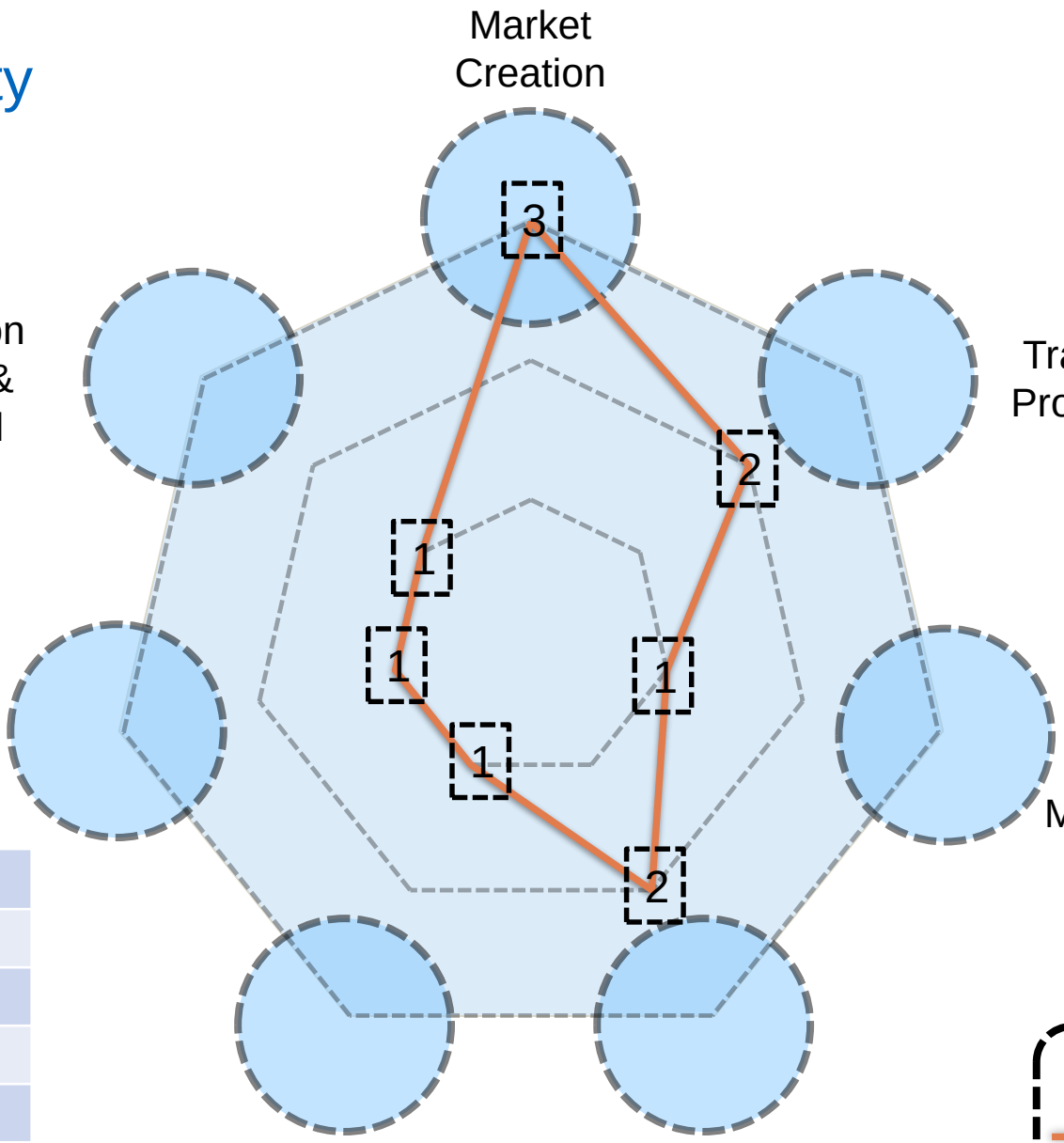
# Functionality: Categorization Example




➔ No clear classification in one functionality

➔ Solution: Weight Categories by usage from 1 (low usage) to 3 (high usage)

# Functionality




| | |
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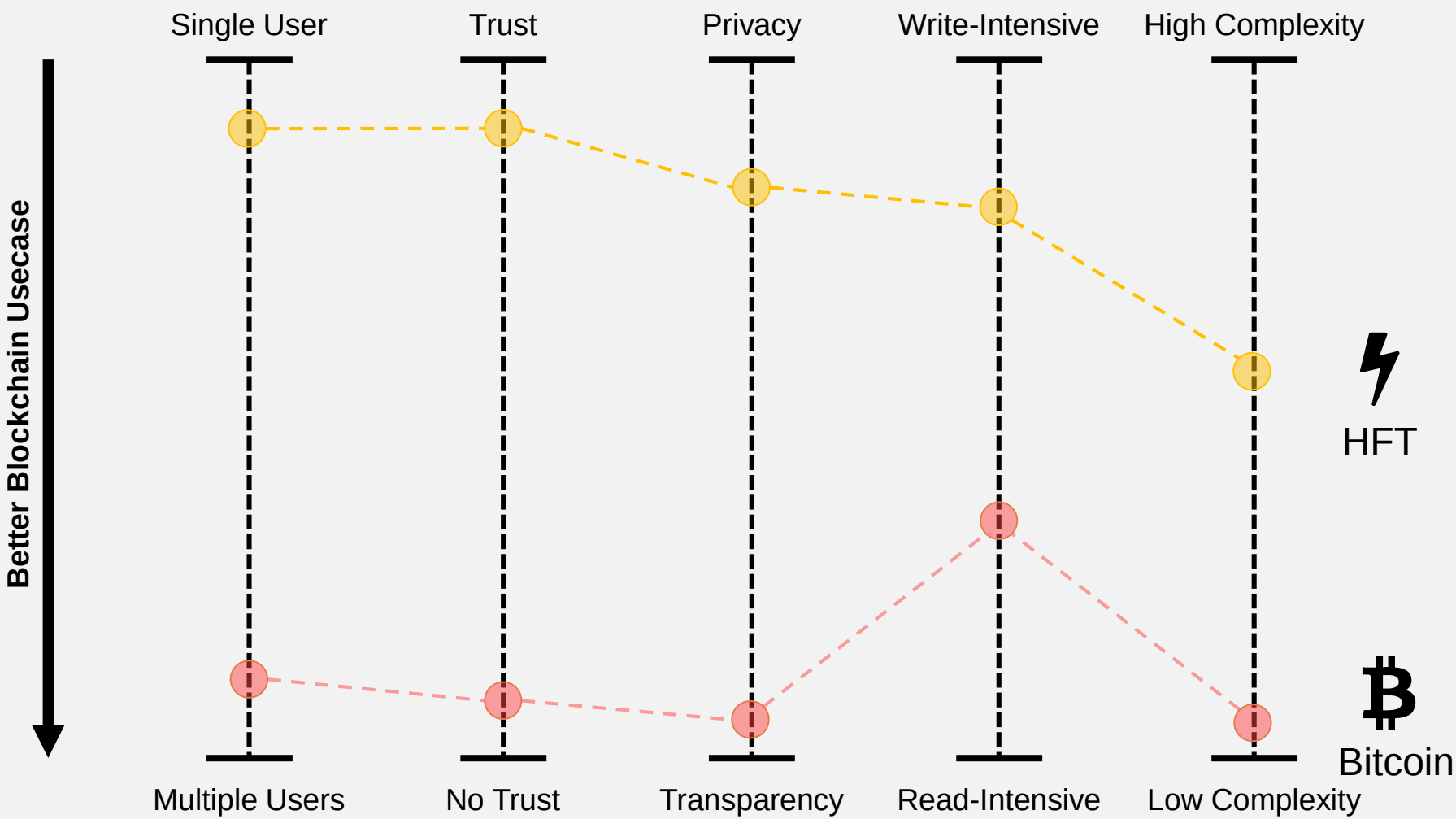
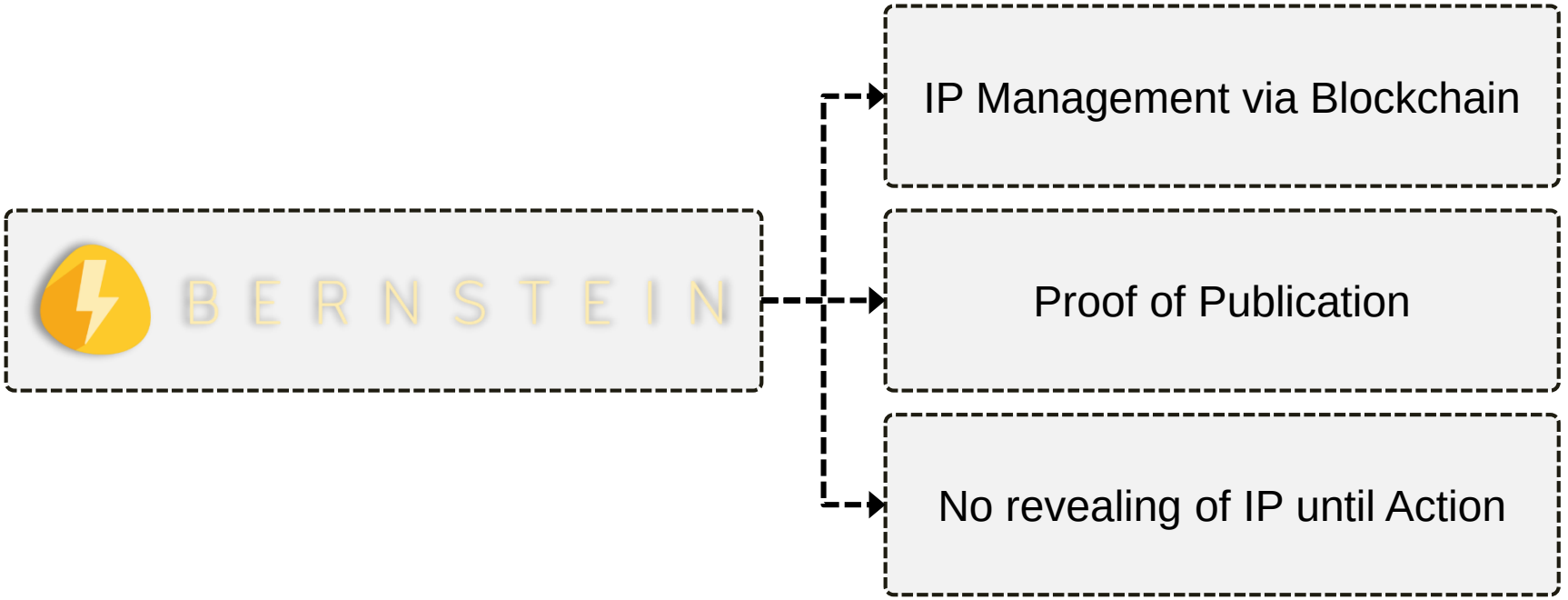
| | 3 |
| | 3 |
| | 2 |
| | 1 |
| | 1 |
| | 3 |
| | 1 |

# Requirements for Use Cases (Interview Results)



# Use Case: Intellectual Property Management





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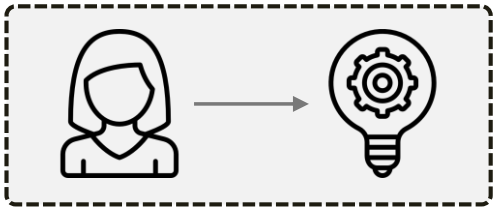
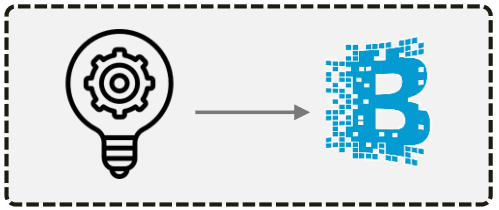
# Use Case: Process

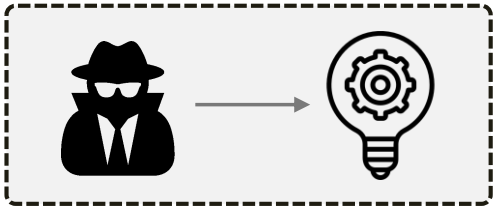
**1** Alice **has** an **idea**.



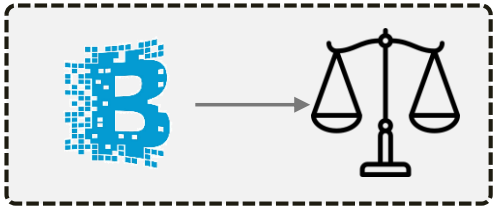
**2** She wants to **protect** her **IP**, she therefore **stores** the IP in the **Blockchain**.



**3** Mallory **steals** her idea.



**4** Alice can **prove** her possession at court using the **Blockchain** entry.

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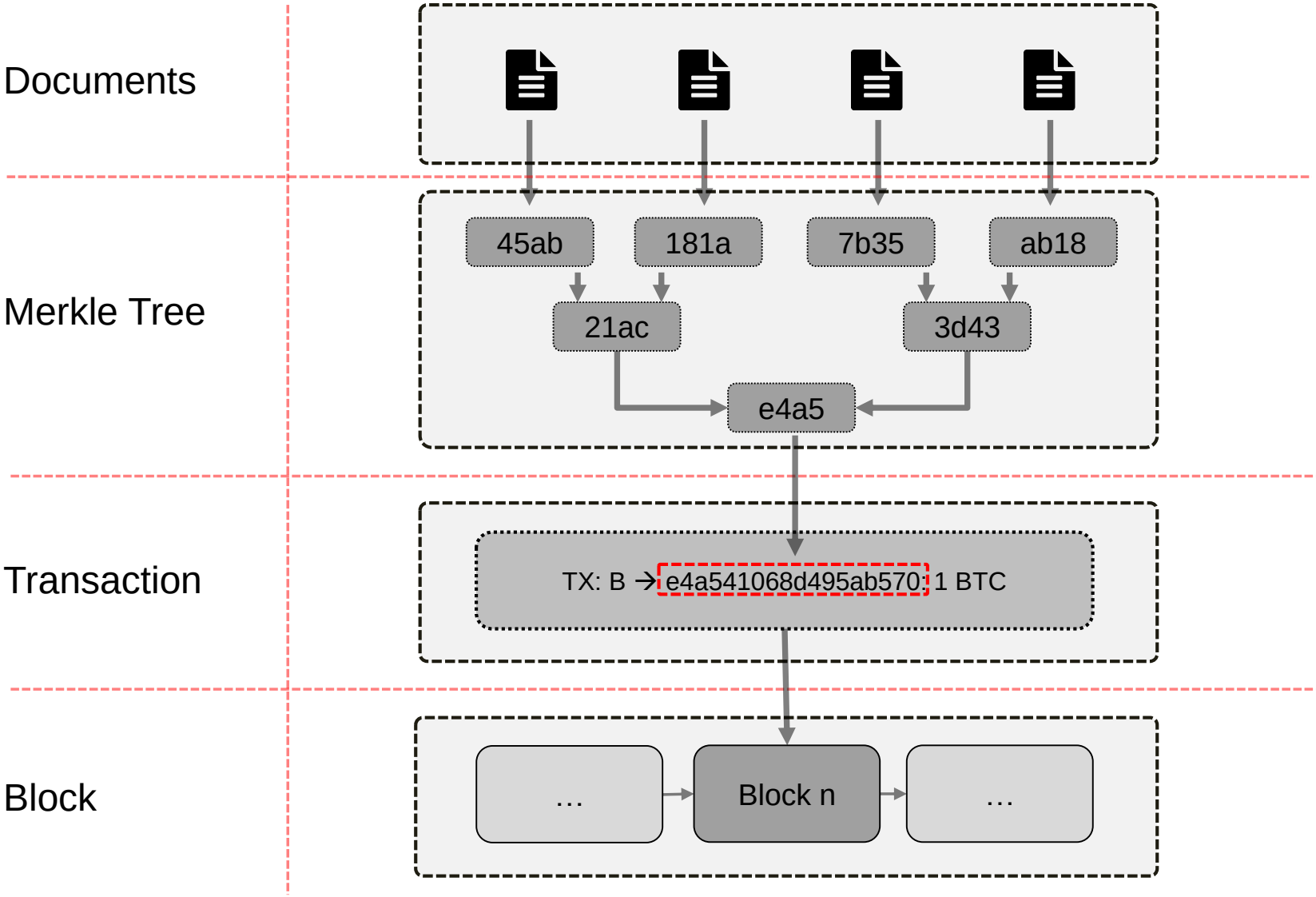
# Use Case: Implementation





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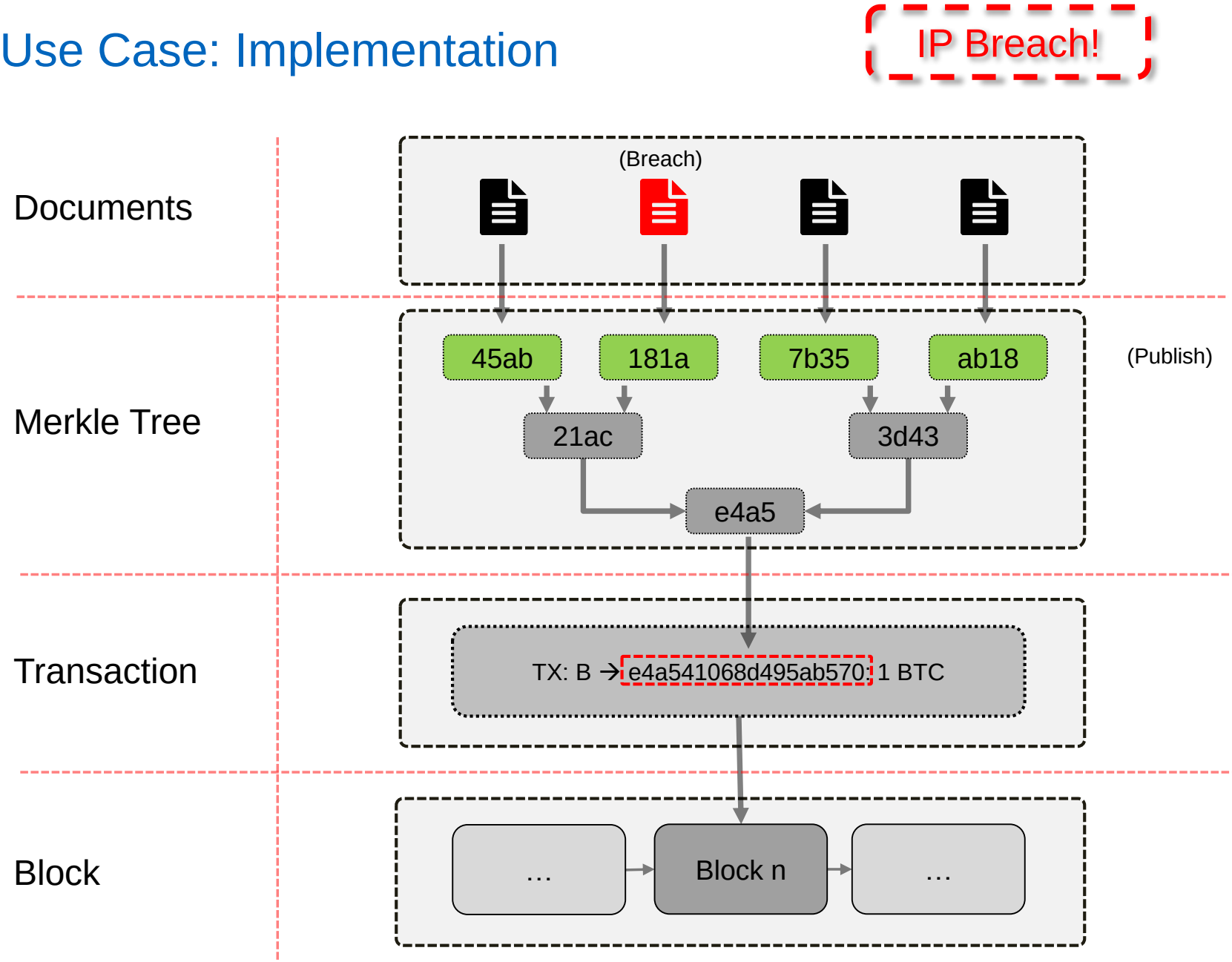
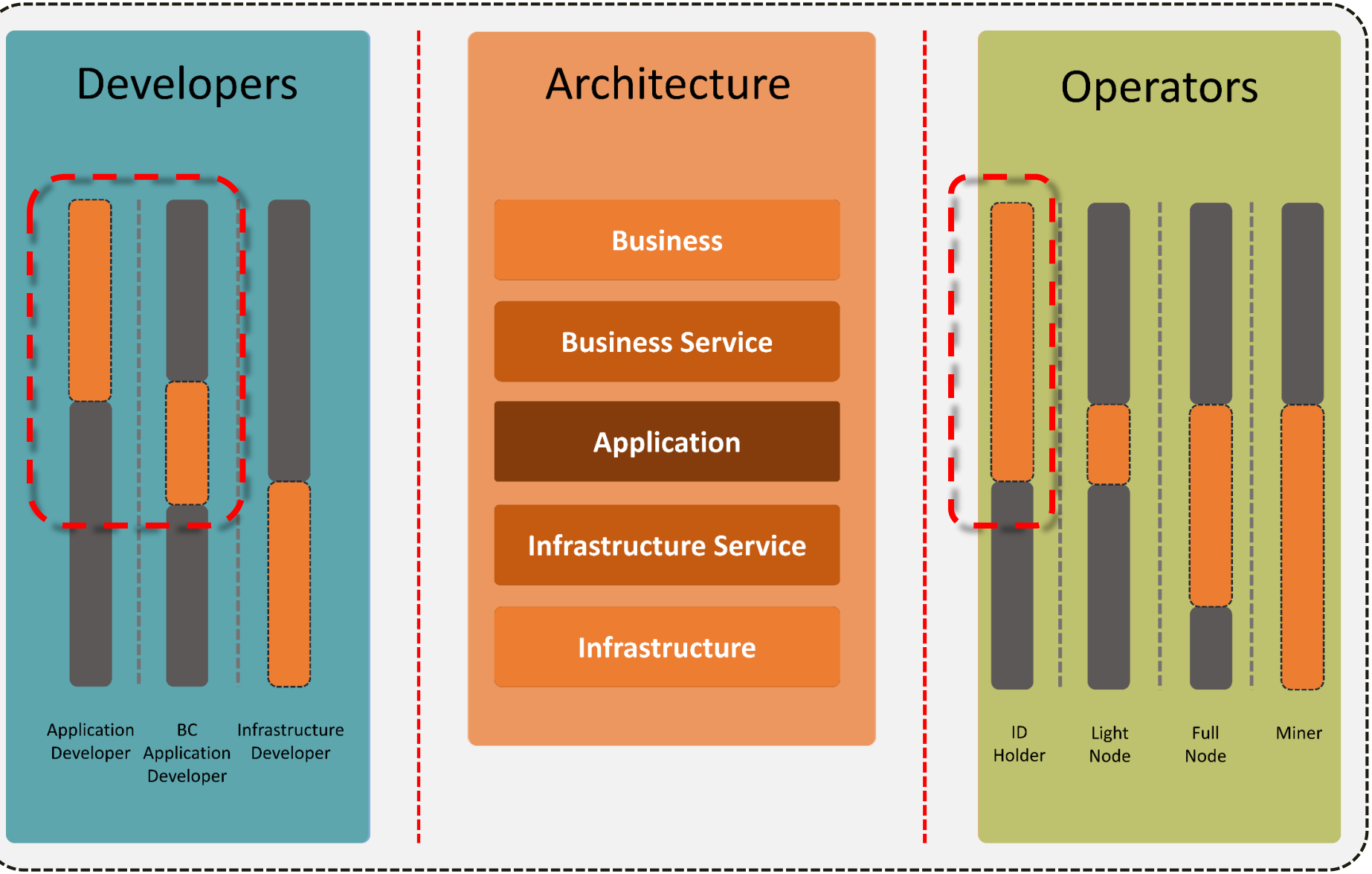
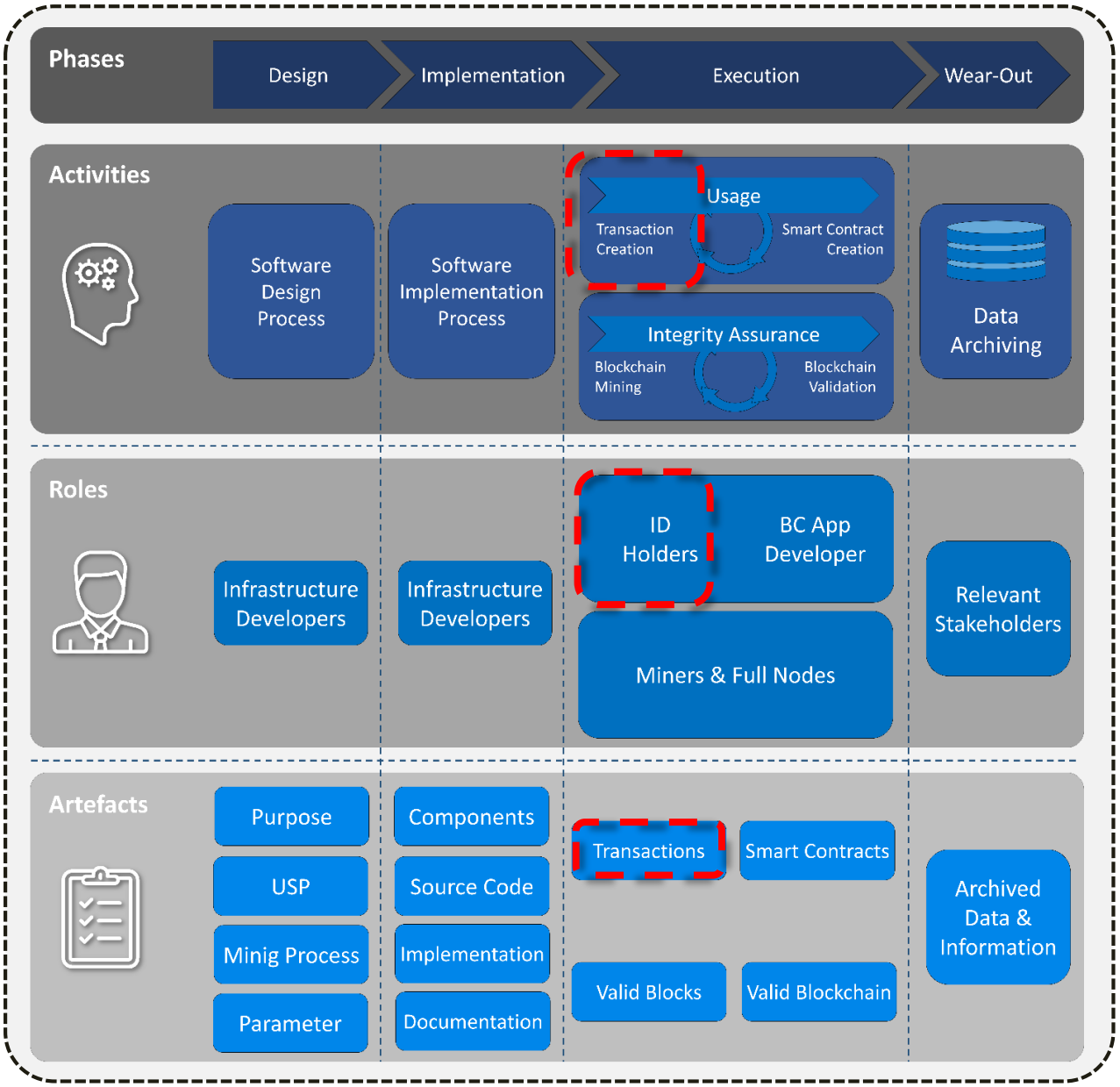
# Use Case: Implementation



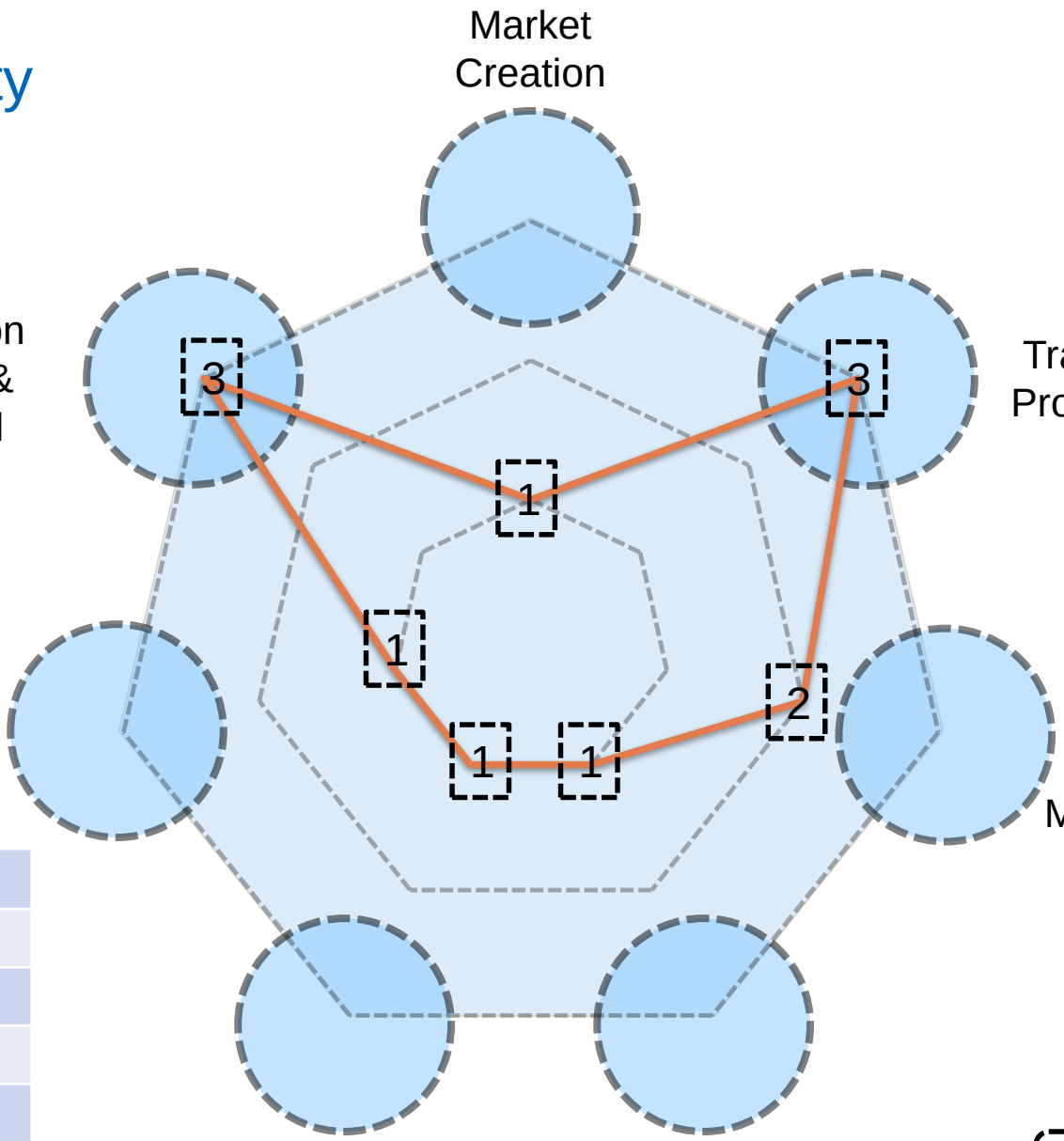
# Roles


Developers
Application Developer
BC Application Developer
Infrastructure Developer
Architecture
Business
Business Service
Application
Infrastructure Service
Infrastructure
Operators
ID Holder
Light Node
Full Node
Miner

# Life Cycle


Phases
Design
Implementation
Execution
Wear-Out
Activities
Software Design Process
Software Implementation Process
Usage
Transaction Creation
Smart Contract Creation
Integrity Assurance
Blockchain Mining
Blockchain Validation
Data Archiving
Roles
Infrastructure Developers
Infrastructure Developers
ID Holders
BC App Developer
Miners & Full Nodes
Relevant Stakeholders
Artefacts
Purpose
USP
Minig Process
Parameter
Components
Source Code
Implementation
Documentation
Transactions
Smart Contracts
Valid Blocks
Valid Blockchain
Archived Data & Information

# Functionality




| | |
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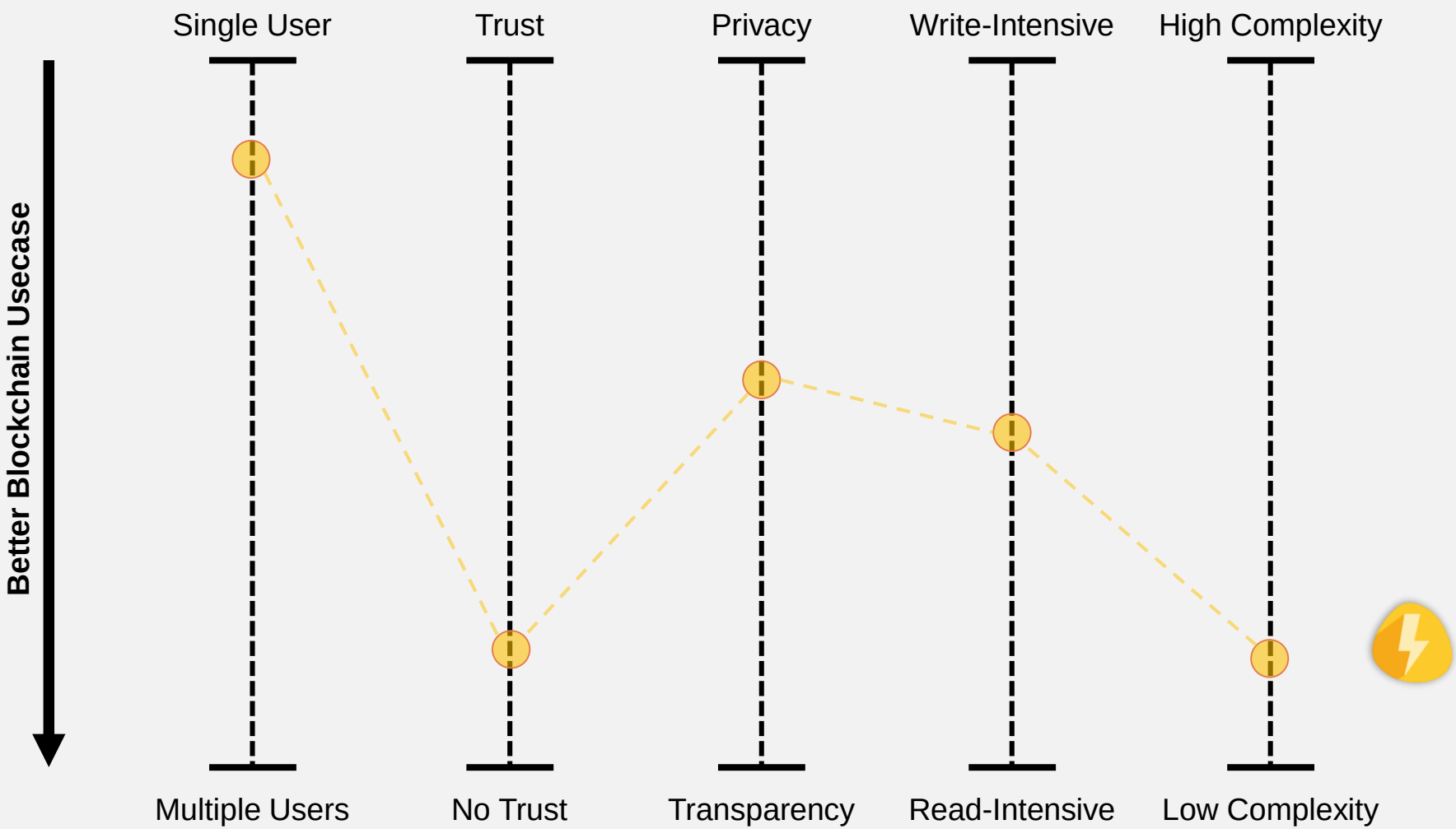
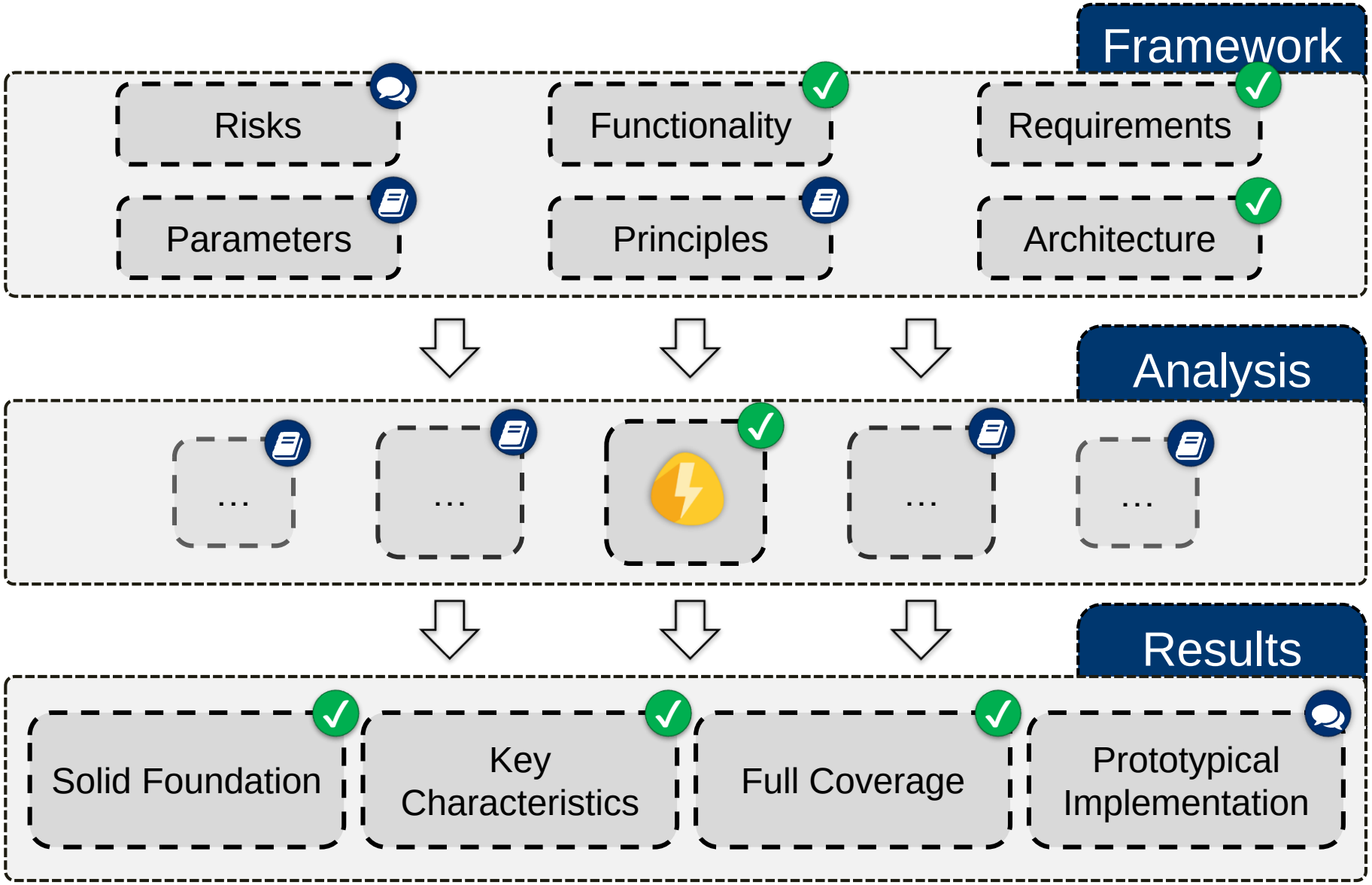
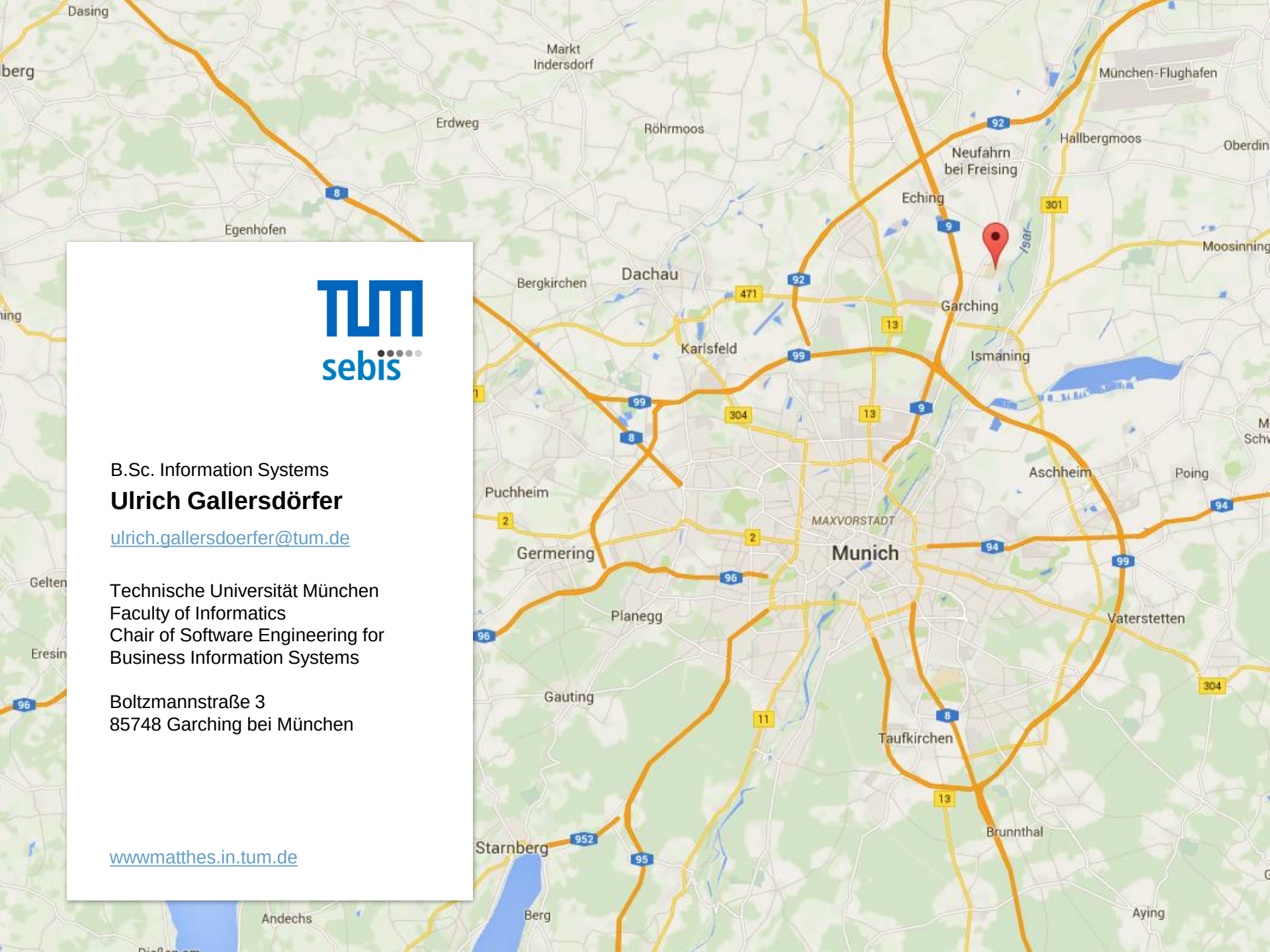
| | 1 |
| | 3 |
| | 2 |
| | 1 |
| | 1 |
| | 1 |
| | 3 |

# Requirements for Use Cases (Interview Result)



# Reflection & Discussion







B.Sc. Information Systems

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# Backup

Ulrich Gallersdörfer, 08.05.2017, Munich

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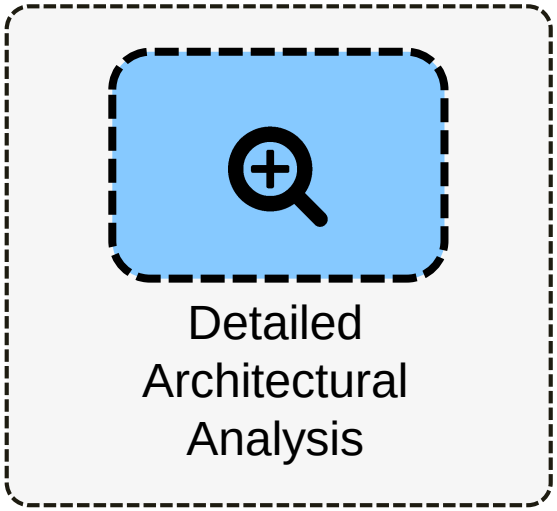
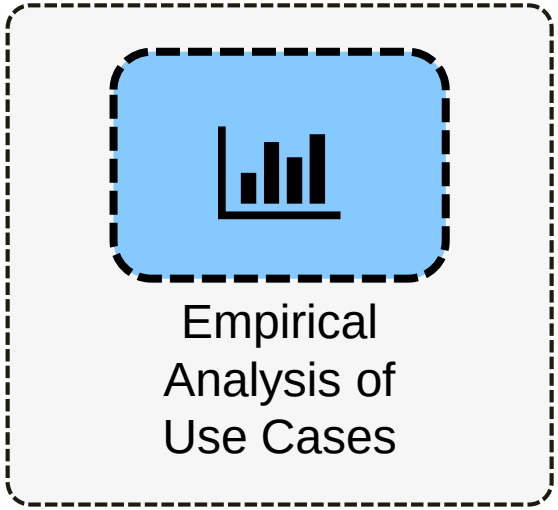
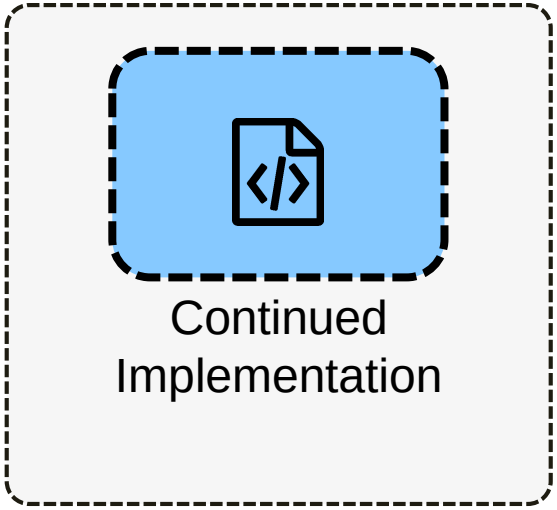
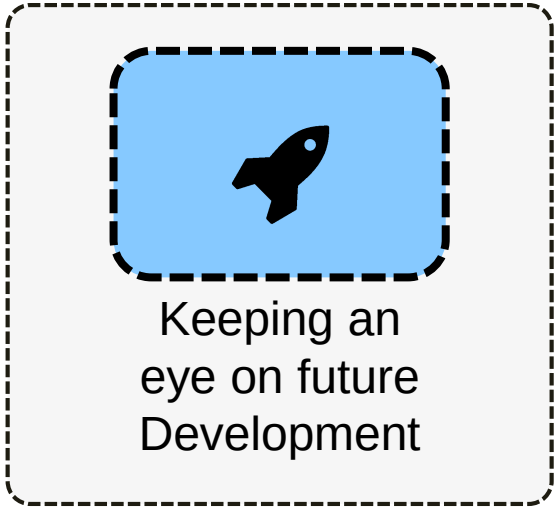
# Future Work





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# Sources

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Wood, G. (2014). Ethereum: A secure decentralised generalised transaction ledger. *Ethereum Project Yellow Paper*.

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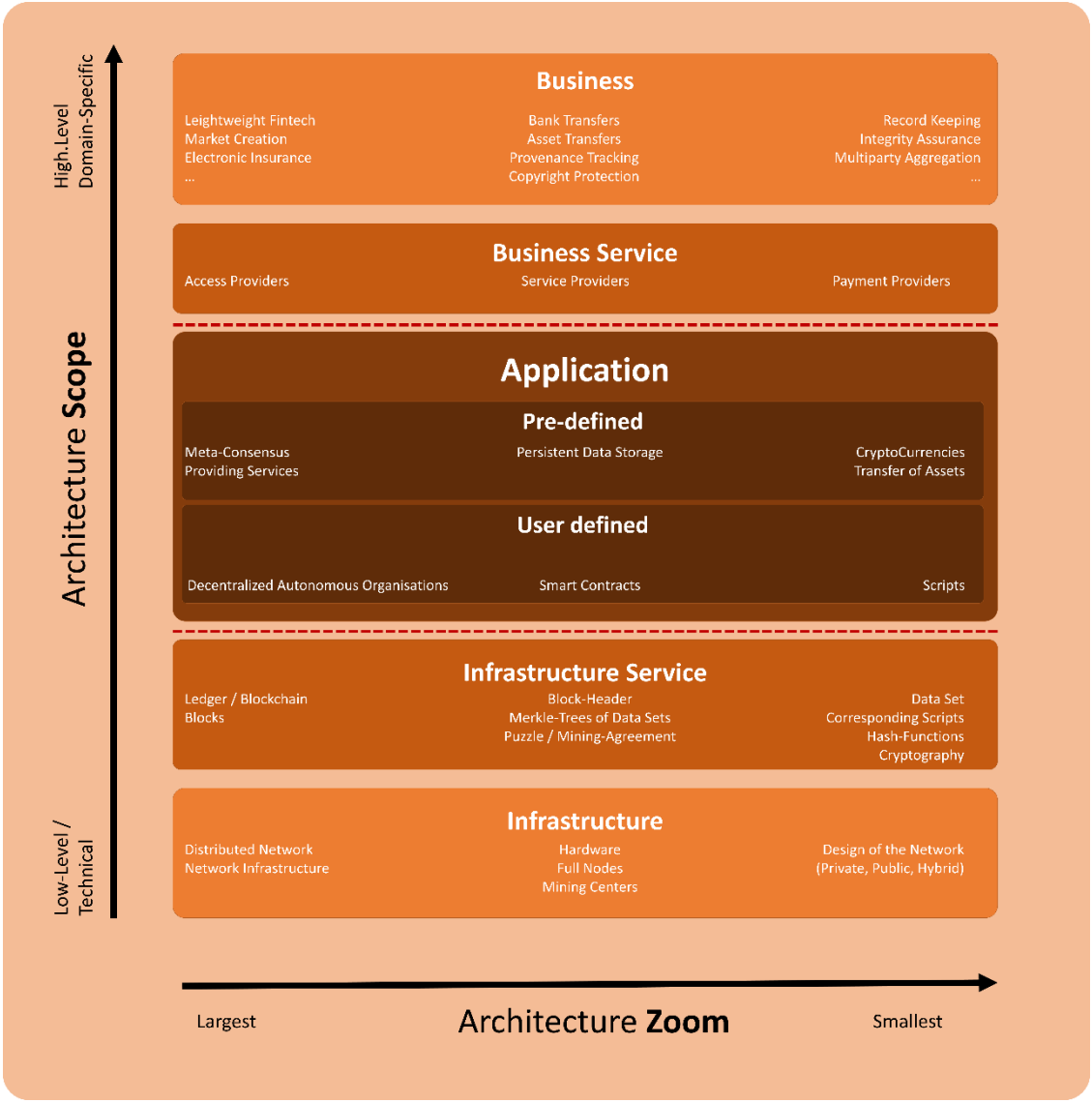
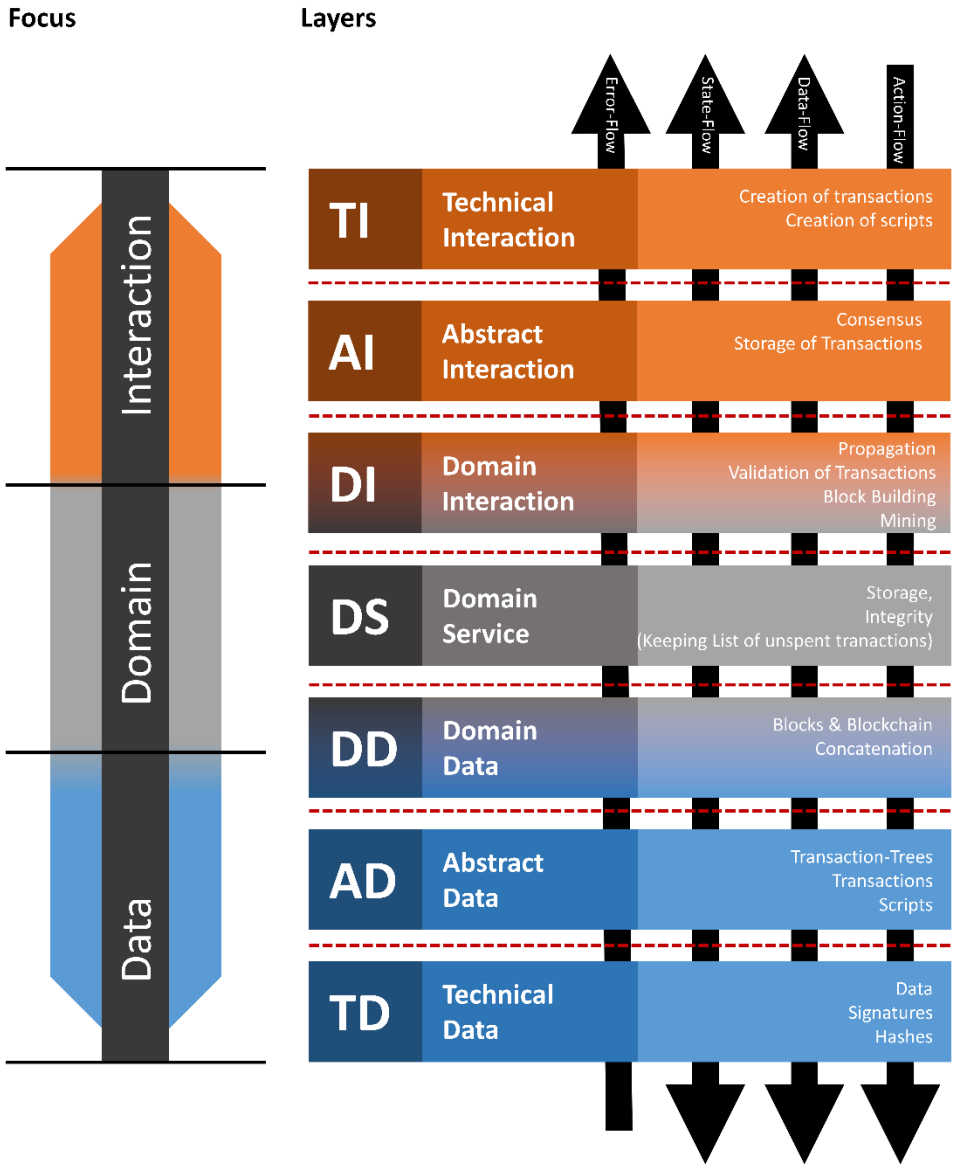
# Blockchain Architecture



# Blockchain Architecture





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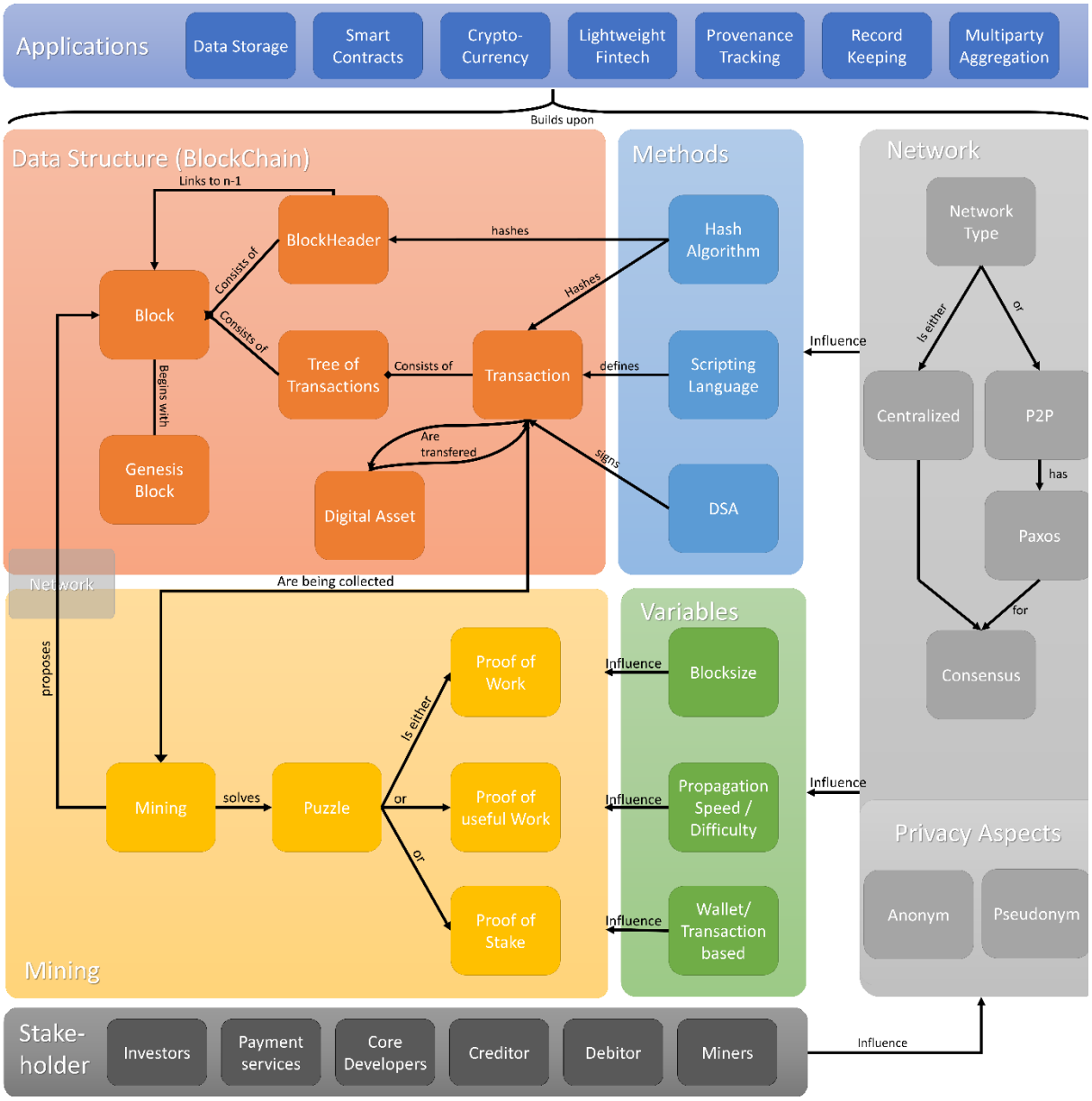
# Blockchain Architecture





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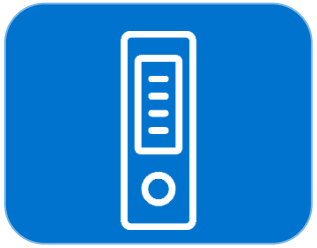
# A deep dive into BlockChain Technology

## BlockChain Overview

Data Structure

Consensus

Mining



Ledger

See further explanations on the whiteboard.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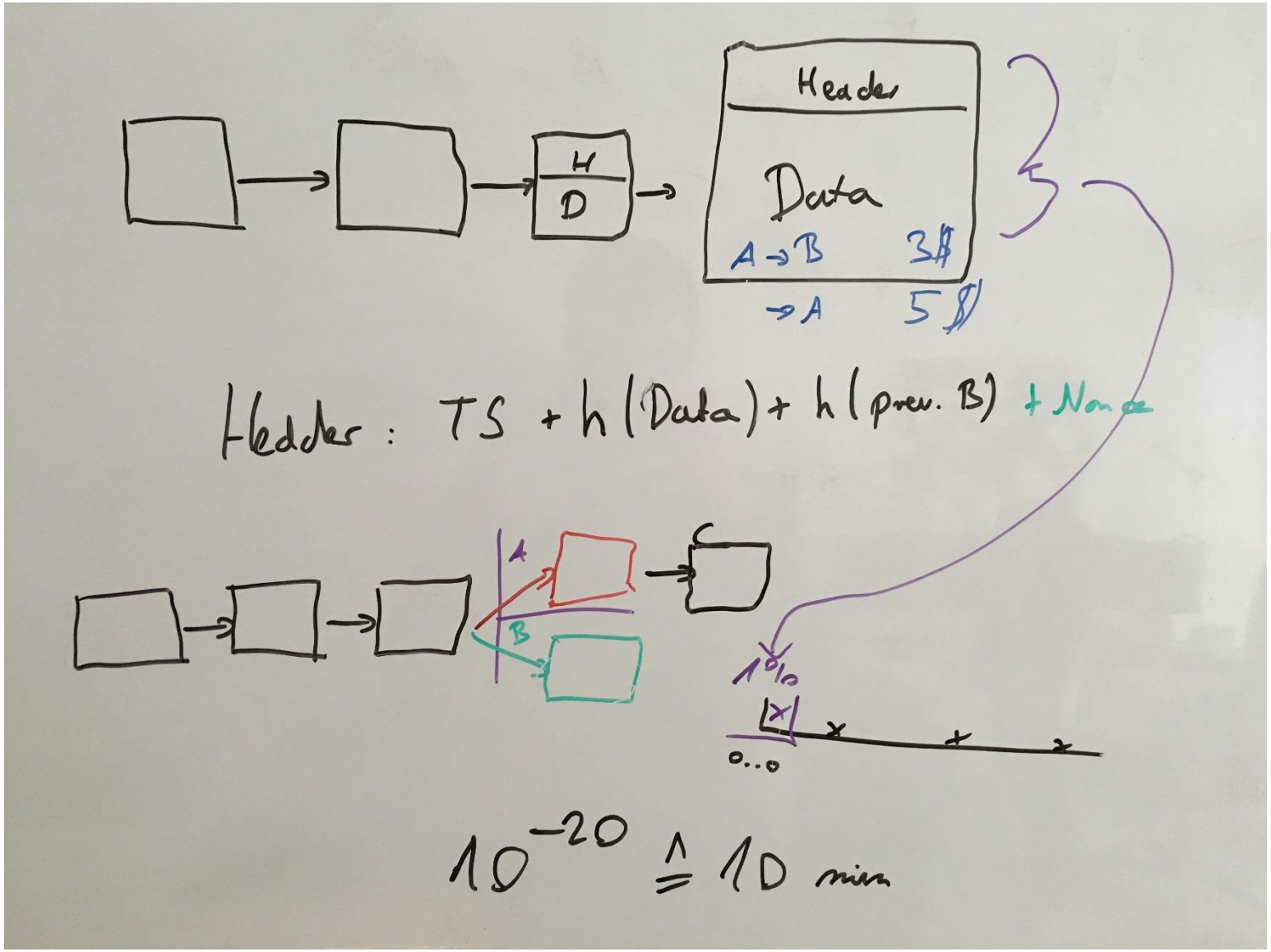
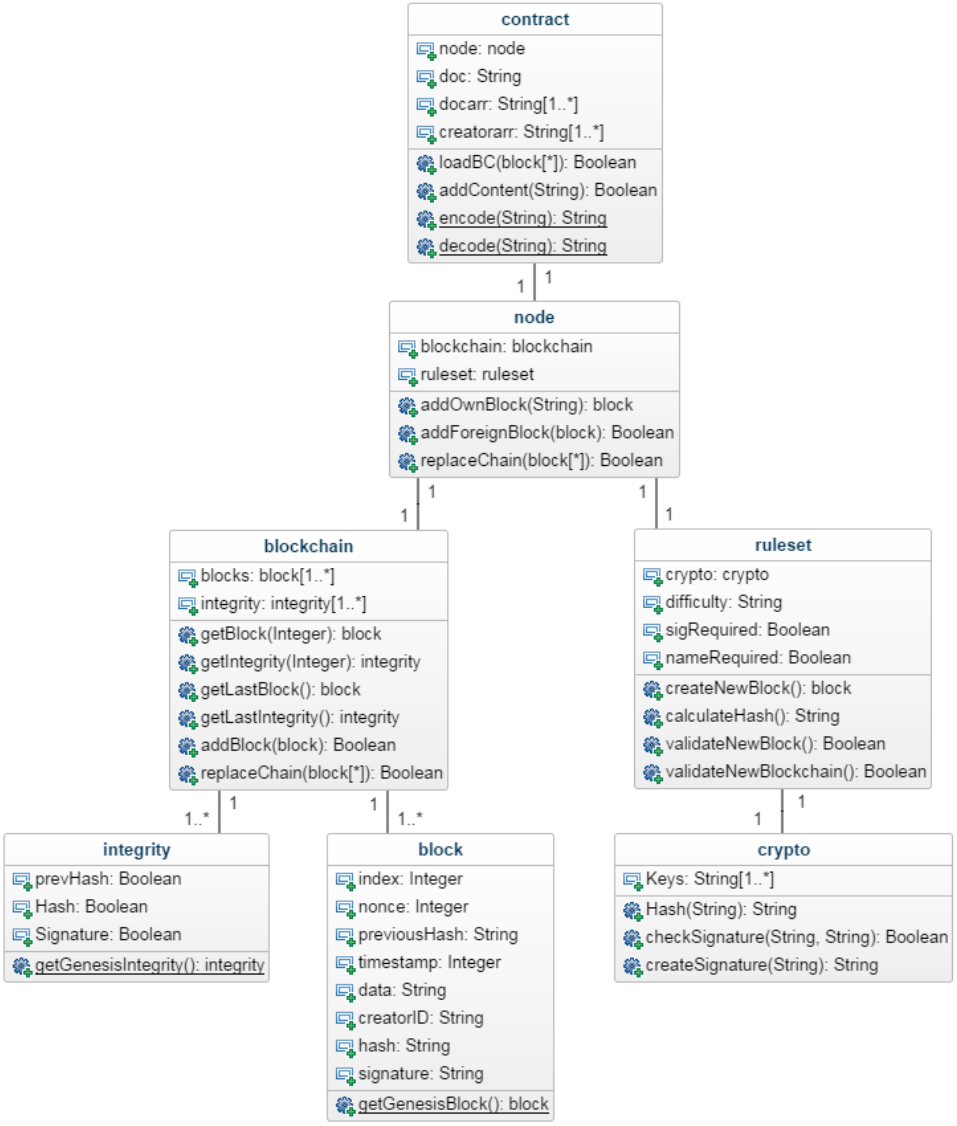
# Picture of the Whiteboard



# Implementation: Class Diagram





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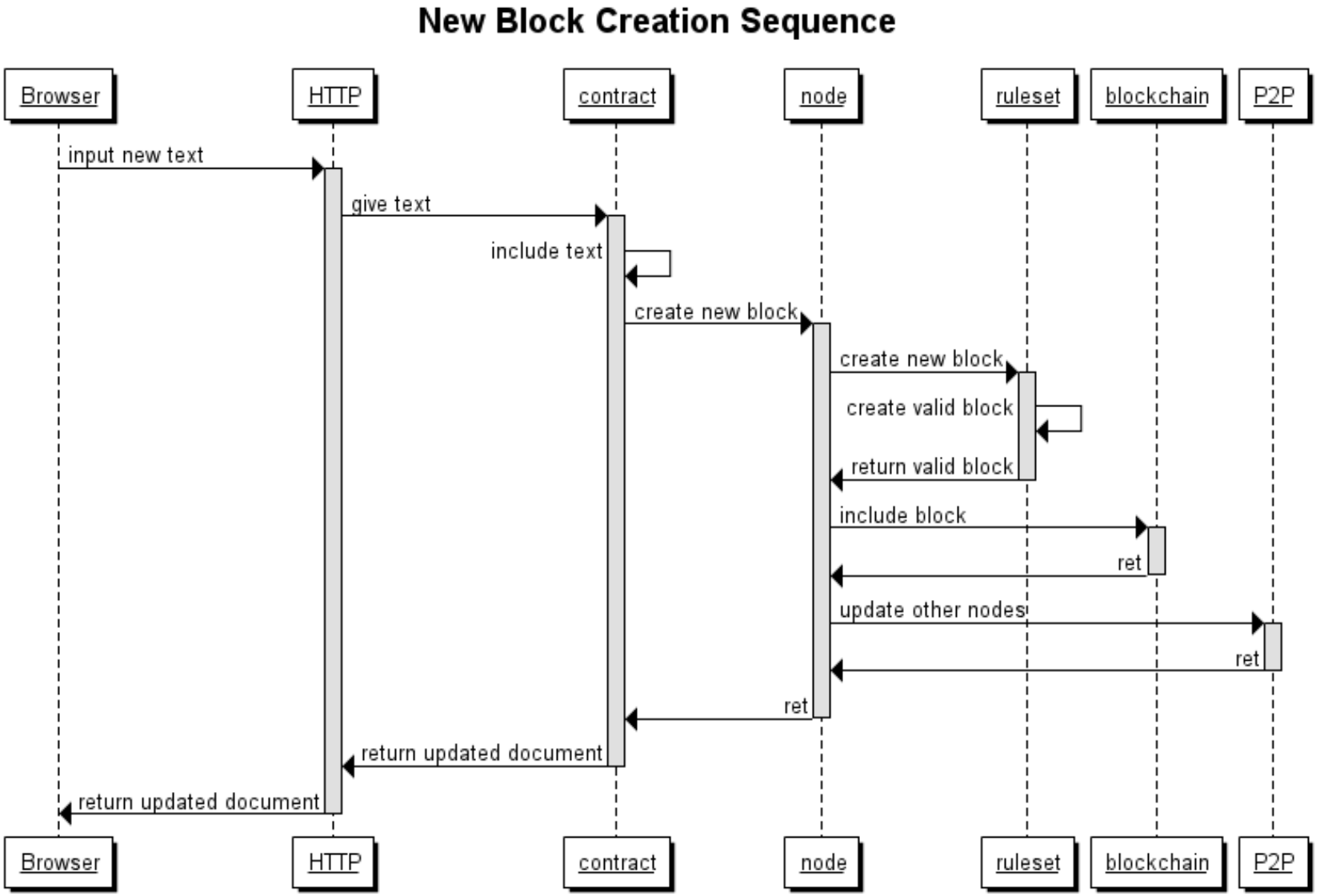
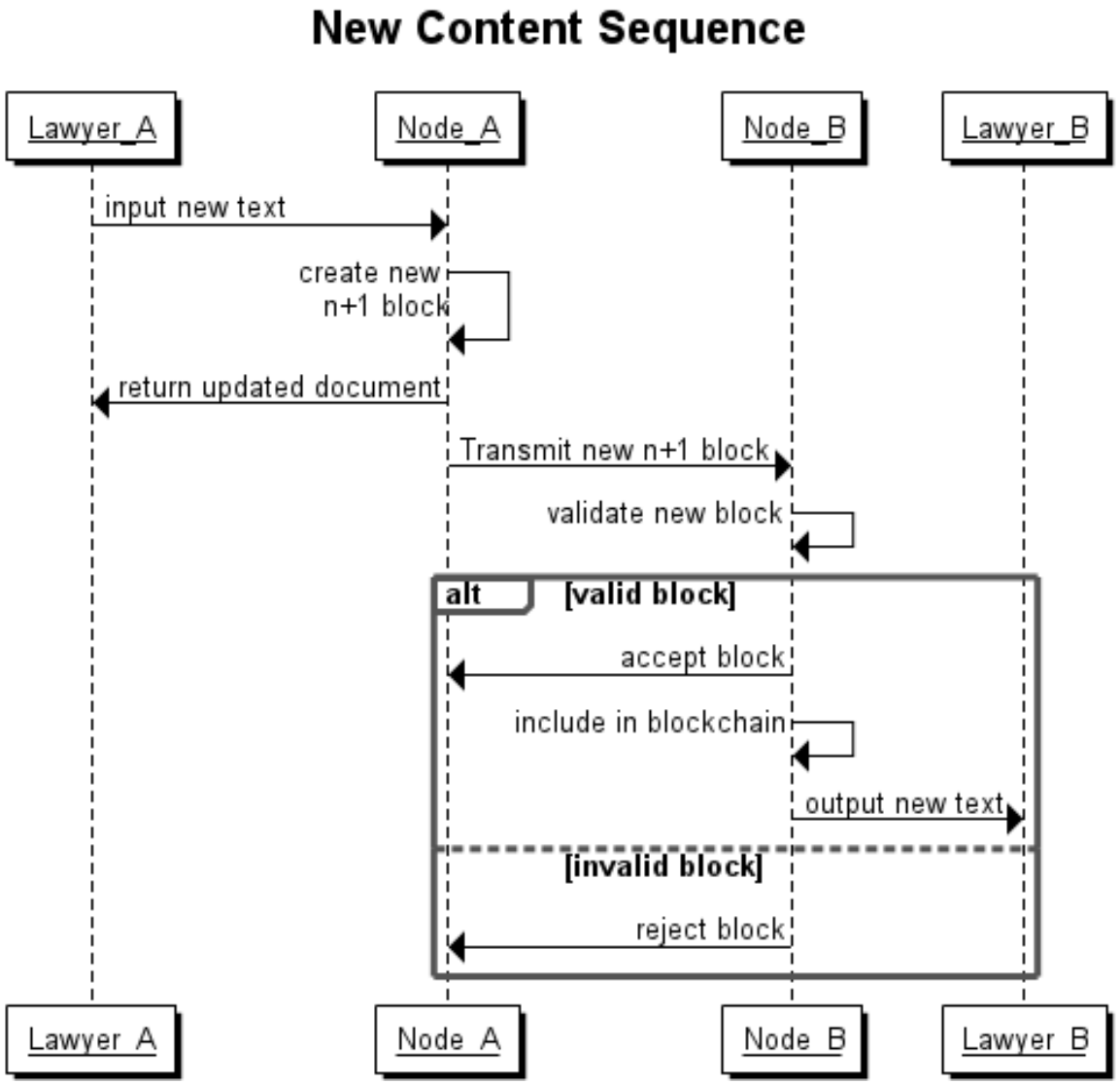
# Dataflow Class Layer



# Dataflow Network Layer





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