

Testing Blockchain Solutions

First experiences with a new technology

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Webinar SogetiLabs January 30 2019





Dilbert on Blockchain



Something about me...



Agile Quality Coach

Blockchain since end of 2017

Haarlem, Sailing, Theatre group, Travelling

0,06671503

H10



Content

Blockchain Context and Use Cases

Blockchain Key Concepts

Case: Loyalty Blockchain

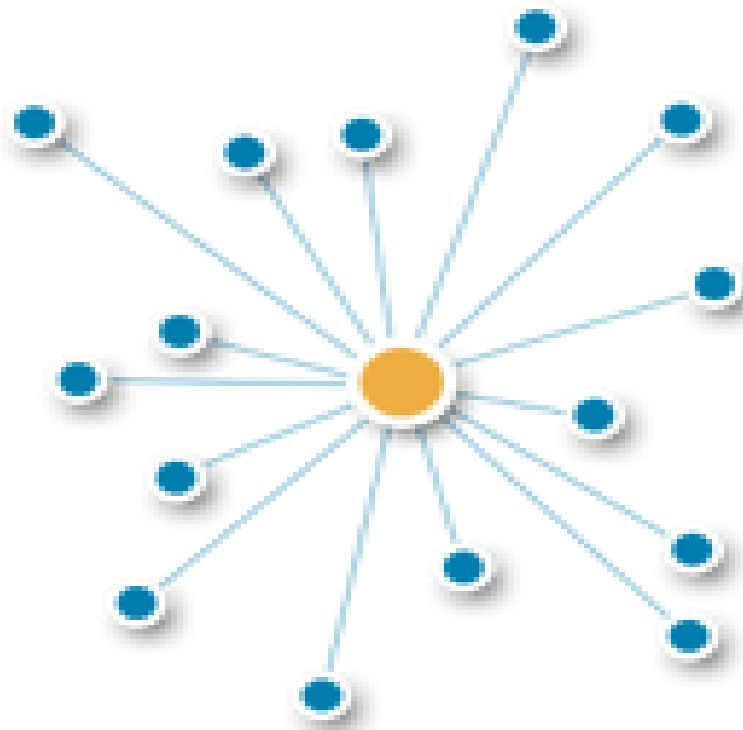
Generic Blockchain Test Strategy

Q/A (and during if you like...)

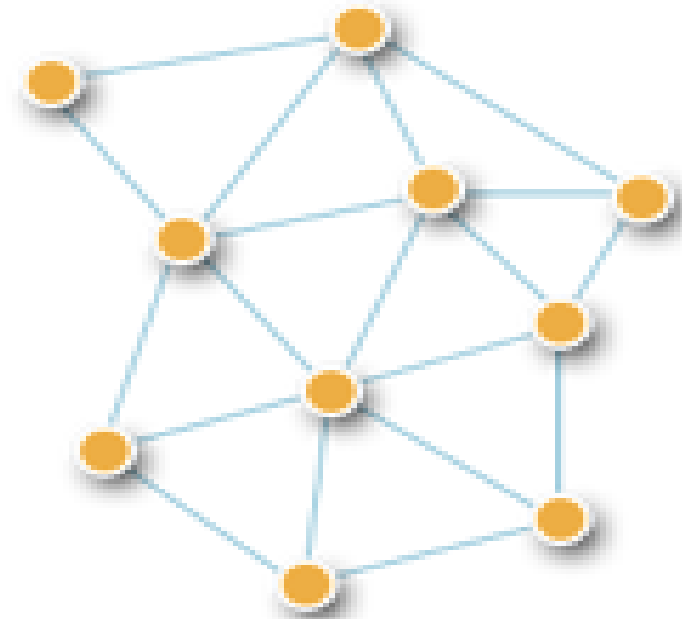


Blockchain Context: Origin

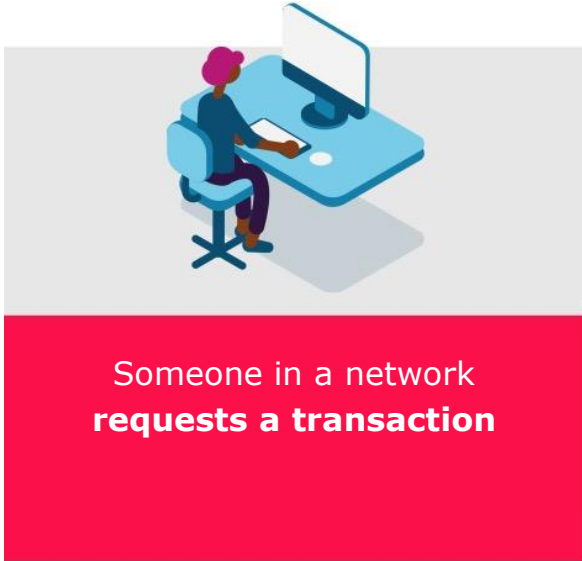
Centralized



Distributed

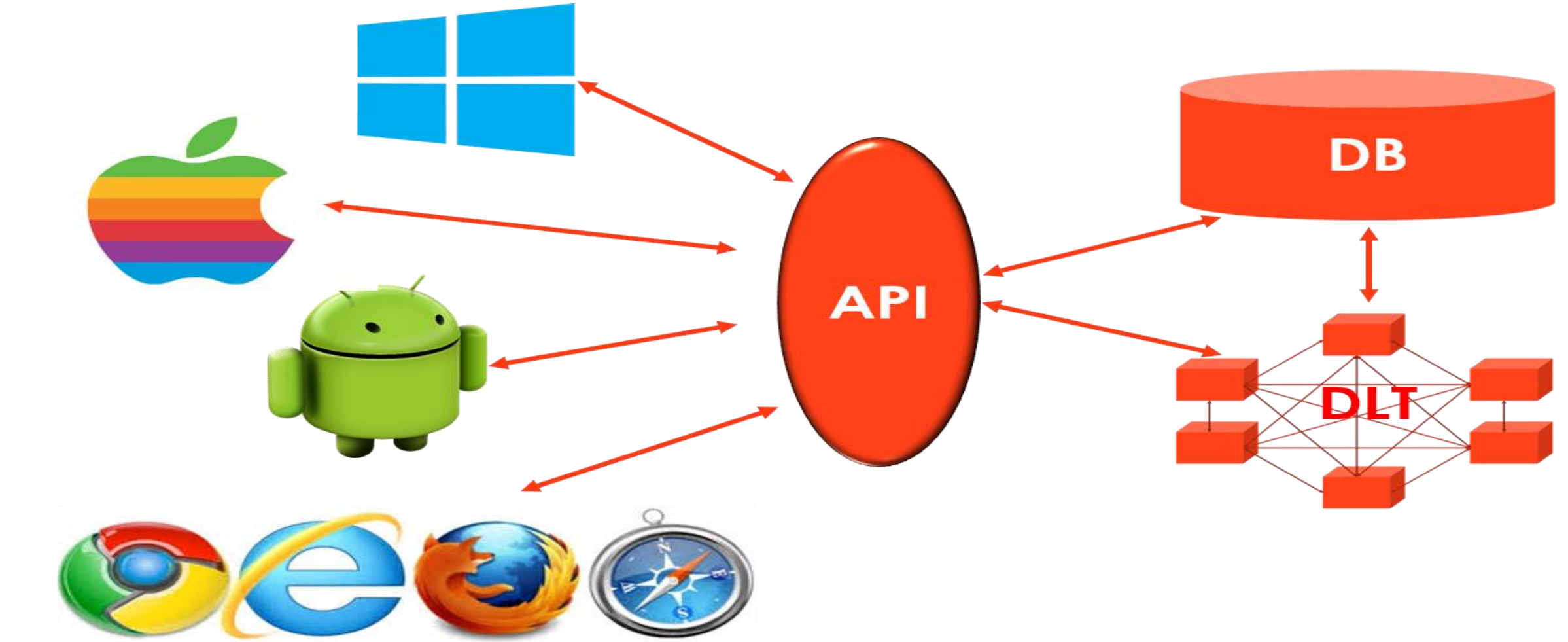


Blockchain Context: Function



Blockchain Context: Architecture

We're talking about
Blockchain Solutions



Added value of Blockchain

Is Blockchain necessary for your usecase?

- Is there a benefit against centralized systems?
- Which parties will benefit?
- What are the risks?



Example of added value using Blockchain technology

GUTS

What are they building?

GUTS uses blockchain technology to create a transparent ticketing ecosystem.

What problem are they solving?

where disgraceful secondary market prices and ticket fraud are non-existent.



Example of added value using Blockchain technology

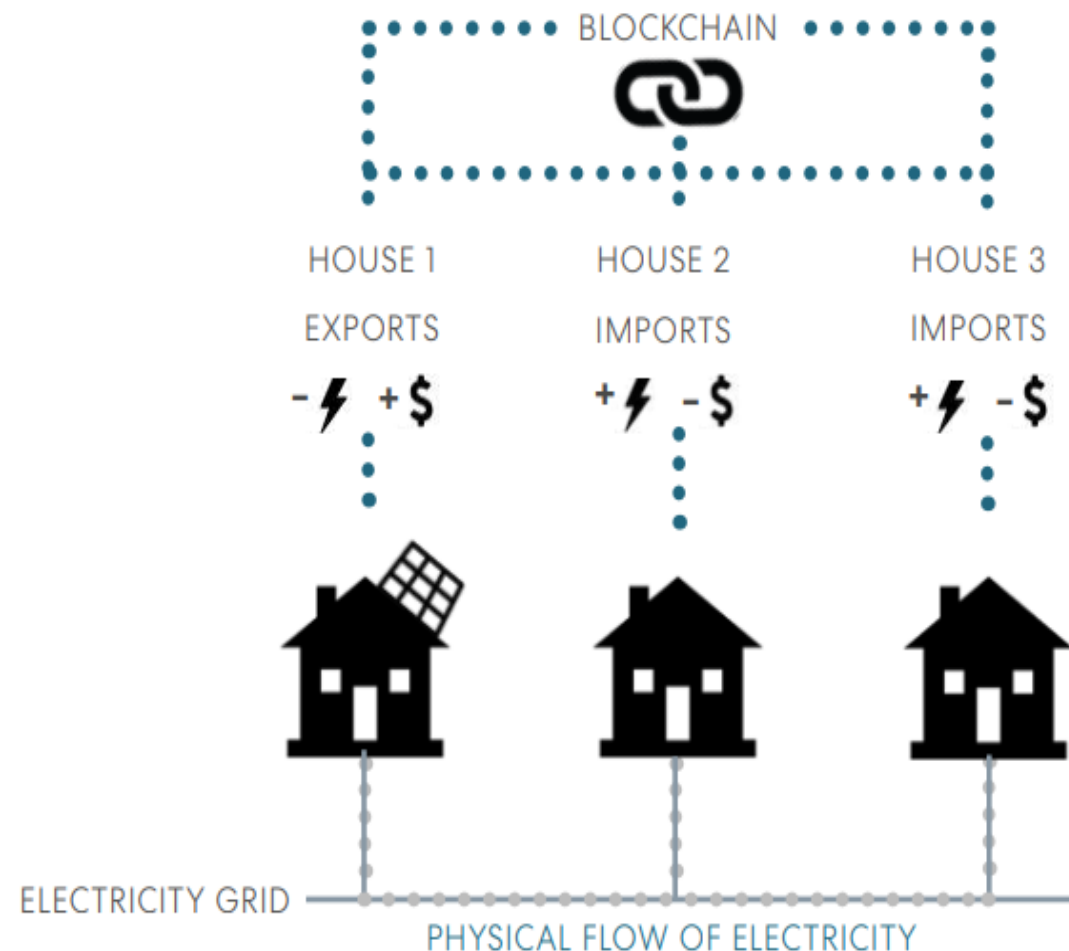
Power Ledger

What are they building?

Peer-to-Peer electricity trading across the regulated electricity network (the grid)

What problems are they solving?

- Better returns for excess generated energy
- Transparent, secure and instant electricity transactions
- Low-cost payment system



Example of added value using Blockchain technology

DENT



What are they building?

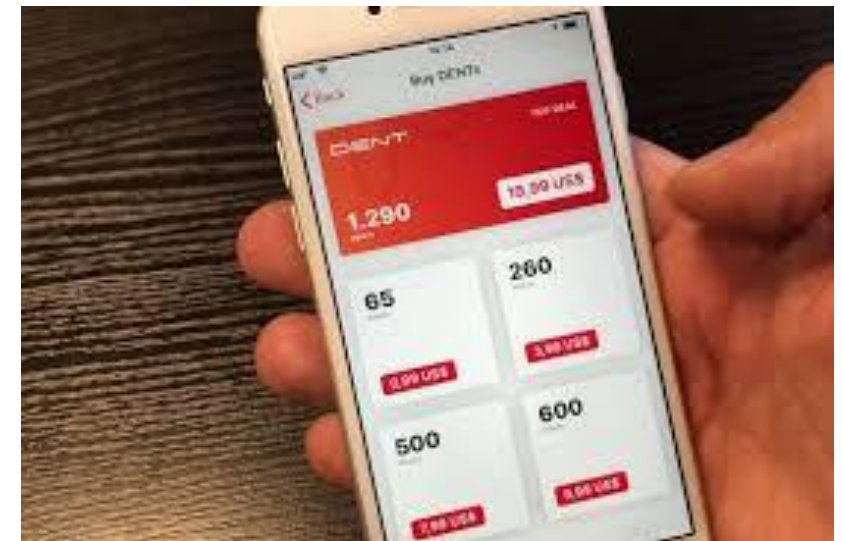
Market place for buying/selling un-used data packages worldwide

What problems are they solving?

- Big cost reduction for users
- Solves roaming problem

How?

Smart contracts are build on the Ethereum blockchain;
Already 110 telco's in 33 countries made partnerships with Dent.



"DENT aims to turn unused \$4.8 Billion USD per month into usage"

Risks

Loss of Control

Scalability

Security

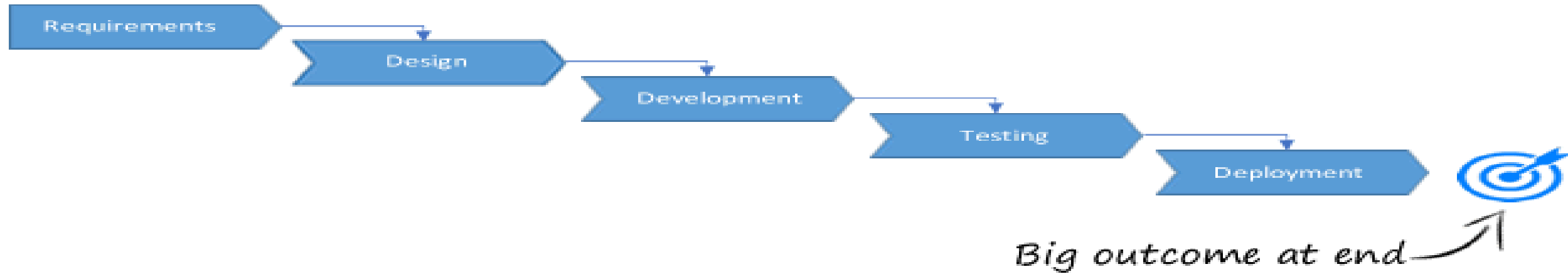
Ecosystems

Unpaved roads

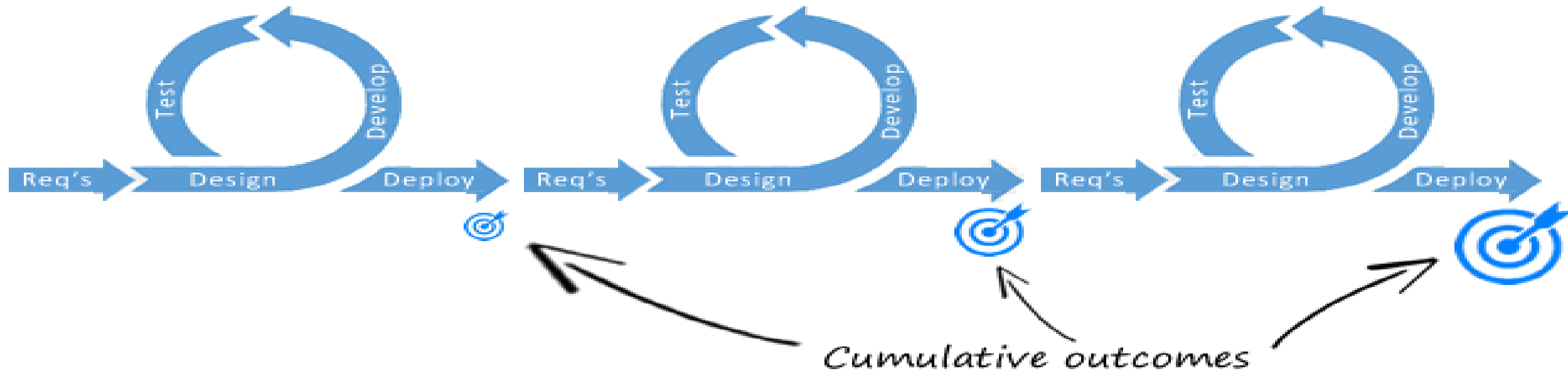
Choices to be made

Blockchain Context: Development

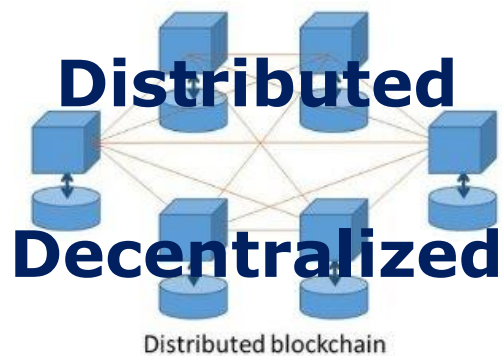
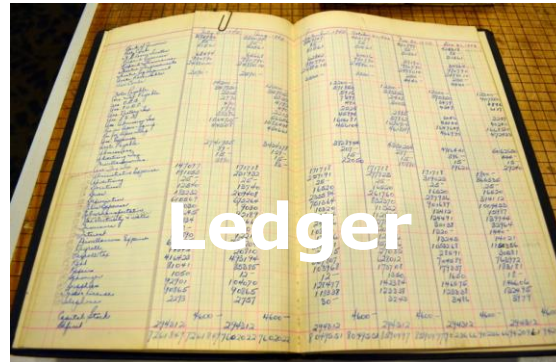
Waterfall



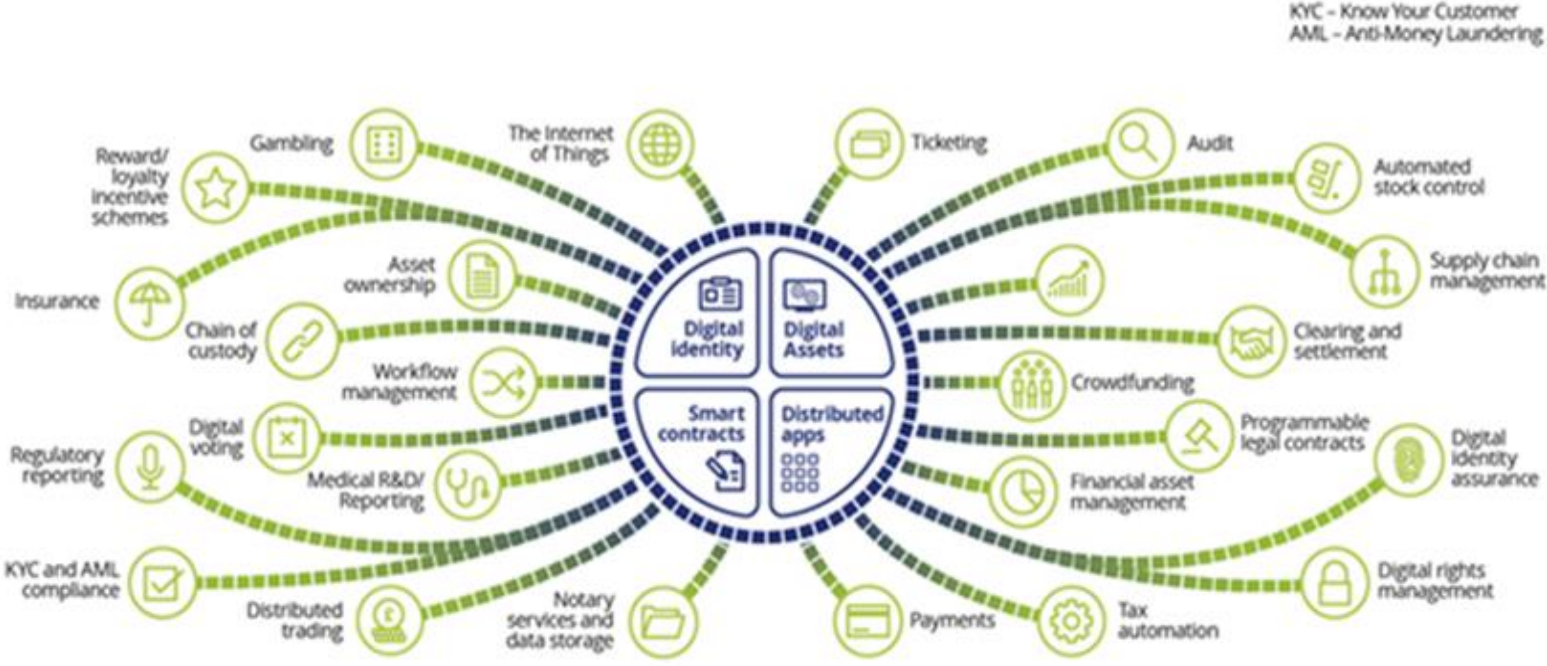
Agile



Key concepts



Choices



Characteristic	Ethereum	Hyperledger Fabric	R3 Corda
Description of platform	– Generic blockchain platform	– Modular blockchain platform	– Specialized distributed ledger platform for financial industry
Governance	– Ethereum developers	– Linux Foundation	– R3
Mode of operation	– Permissionless, public or private ⁴	– Permissioned, private	– Permissioned, private
Consensus	– Mining based on proof-of-work (PoW) – Ledger level	– Broad understanding of consensus that allows multiple approaches – Transaction level	– Specific understanding of consensus (i.e., notary nodes) – Transaction level
Smart contracts	– Smart contract code (e.g., Solidity)	– Smart contract code (e.g., Go, Java)	– Smart contract code (e.g., Kotlin, Java) – Smart legal contract (legal prose)
Currency	– Ether – Tokens via smart contract	– None – Currency and tokens via chaincode	– None

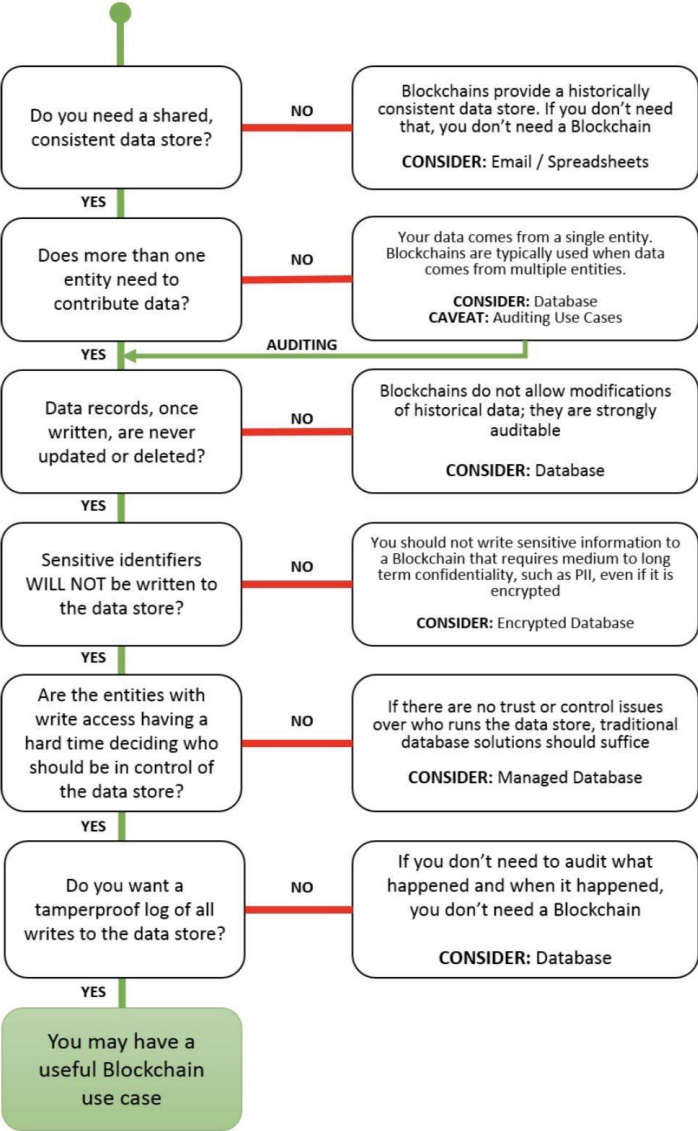
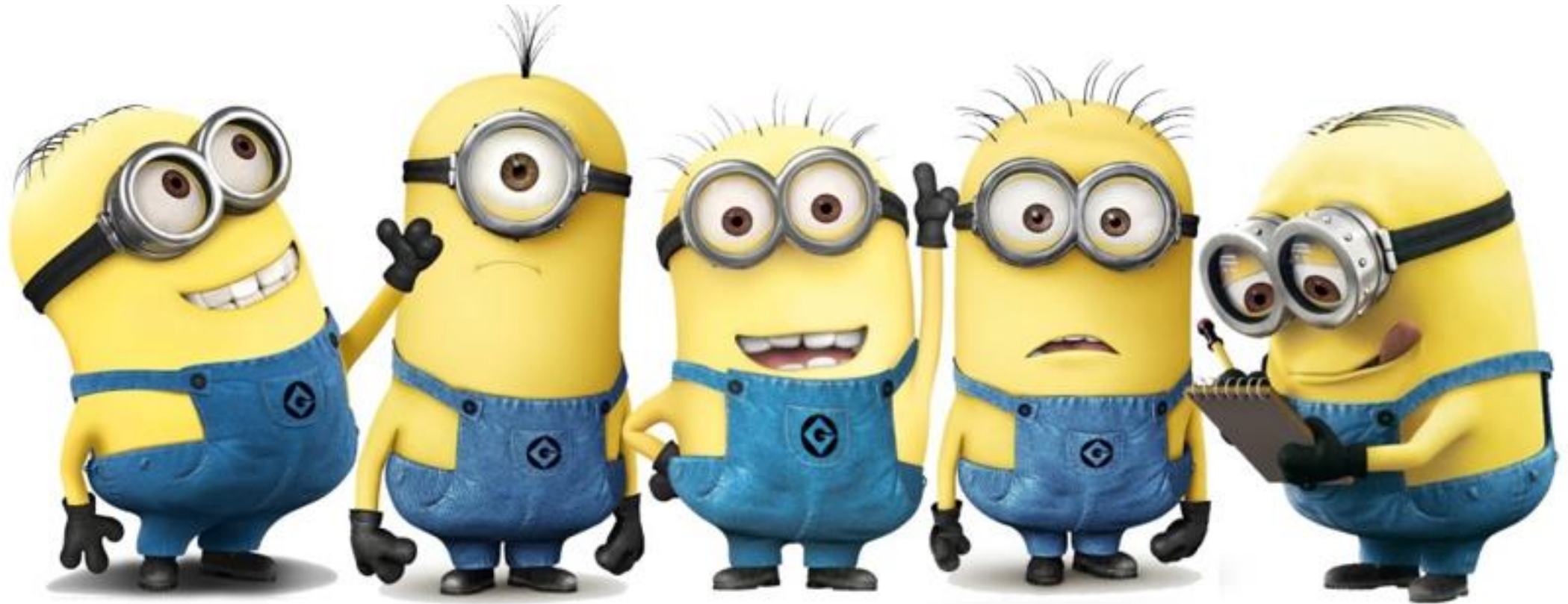


Figure 6 - DHS Science & Technology Directorate Flowchart

Questions



Loyalty Demo > Concept

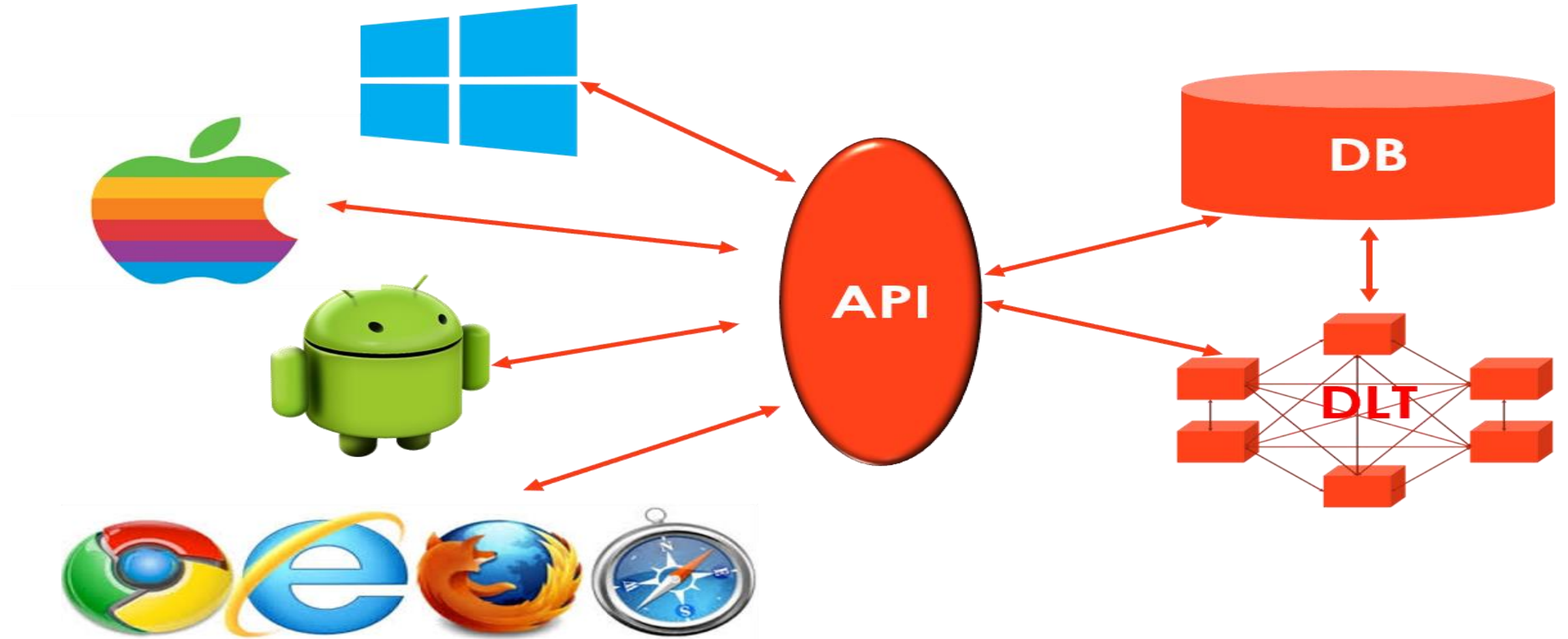




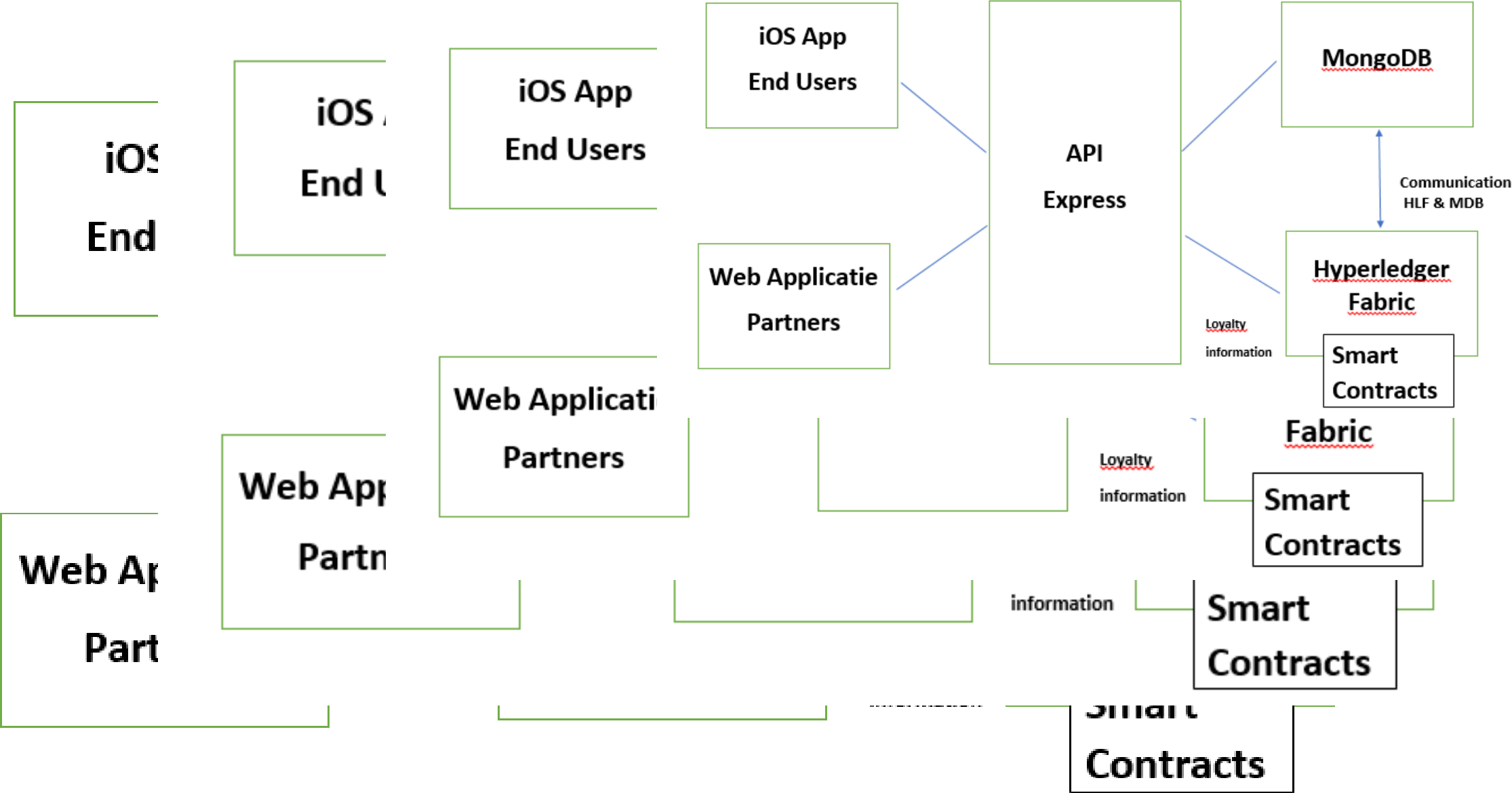
Loyalty Demo > Concept



Loyalty Demo > Architecture



Loyalty Demo > Architecture



Loyalty Demo > PRA



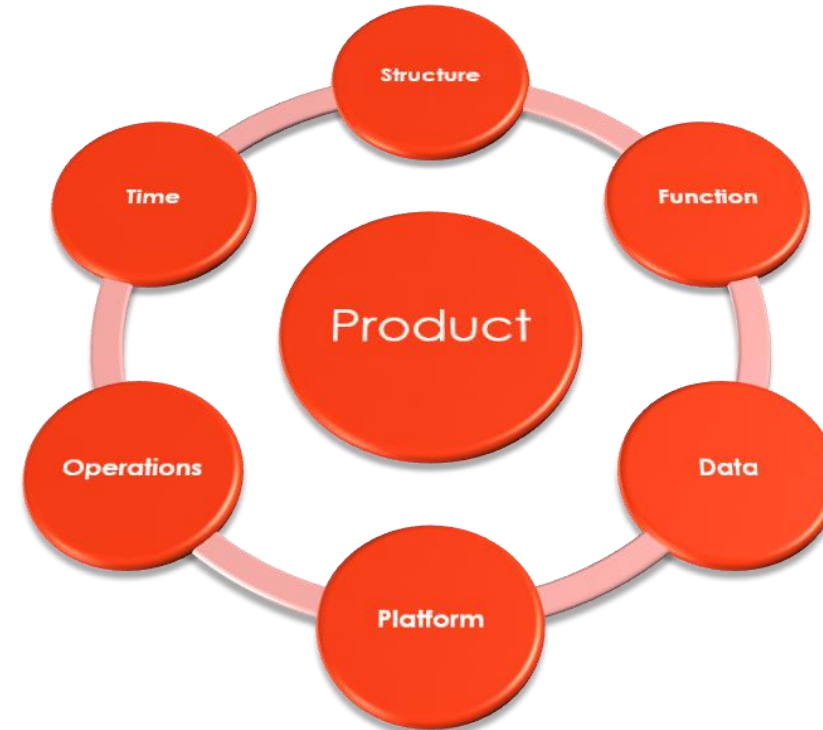
15		Smart contract is wrong because
16	Functions	Buy Products
17	Functions	Settle
18	Data	Onmuteerbaar contract
19	Functions	Het verdelen van de punten gaat n
20	Security	Transactie: prevent unauthorized t
21	Data	Data wordt niet correct verwerkt b
22	Data	Scheiding data ontmuteerbaar vs v
23		Incorrect balance

(“What is a PRA....” still true !?)

Loyalty Demo > PRA



SF DPOT



Time: *Differences in Timezones*

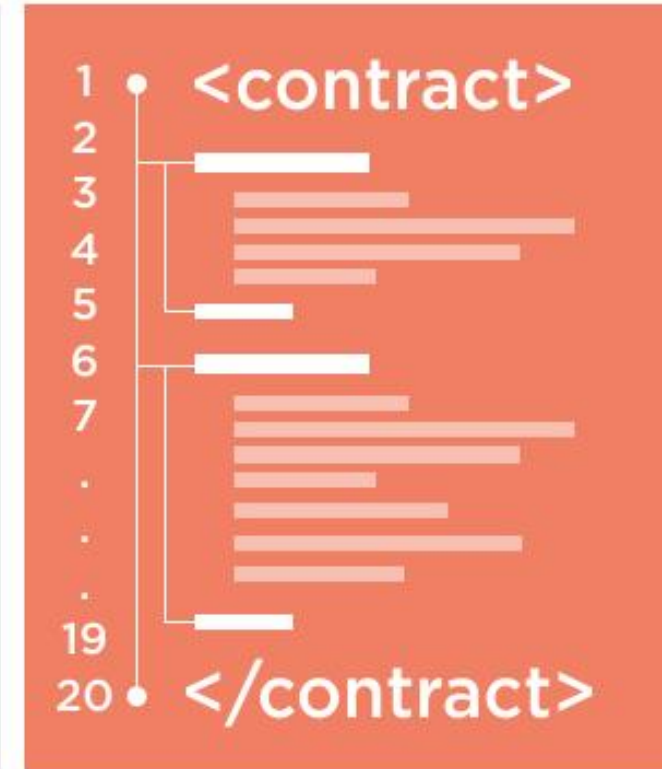
Data: *Wrong / Private Data stored in Blockchain*

Function: *Errors in Smart Contracts for settlements, User receive and User Pay.*

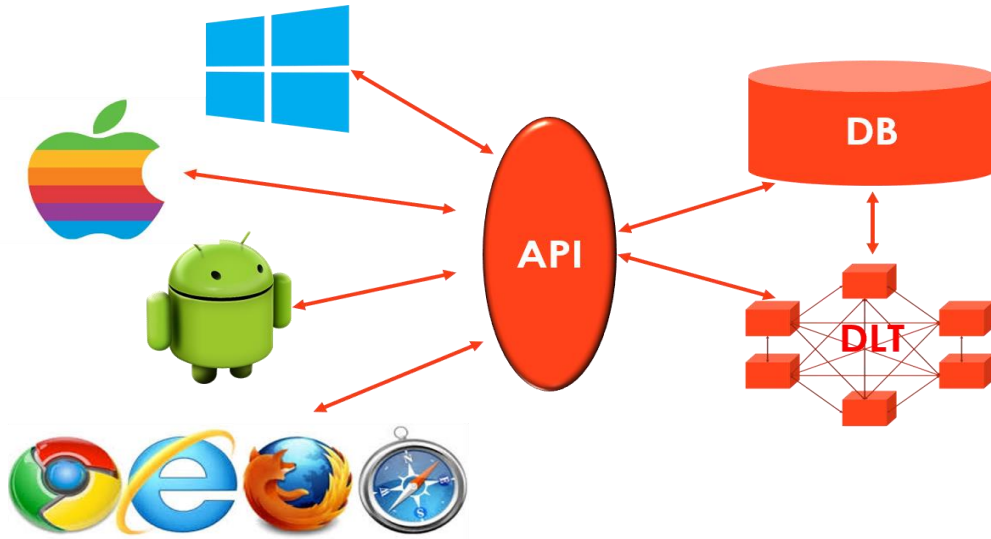
Loyalty Demo > Test Goals

Smart Contract has 3 simple functions:

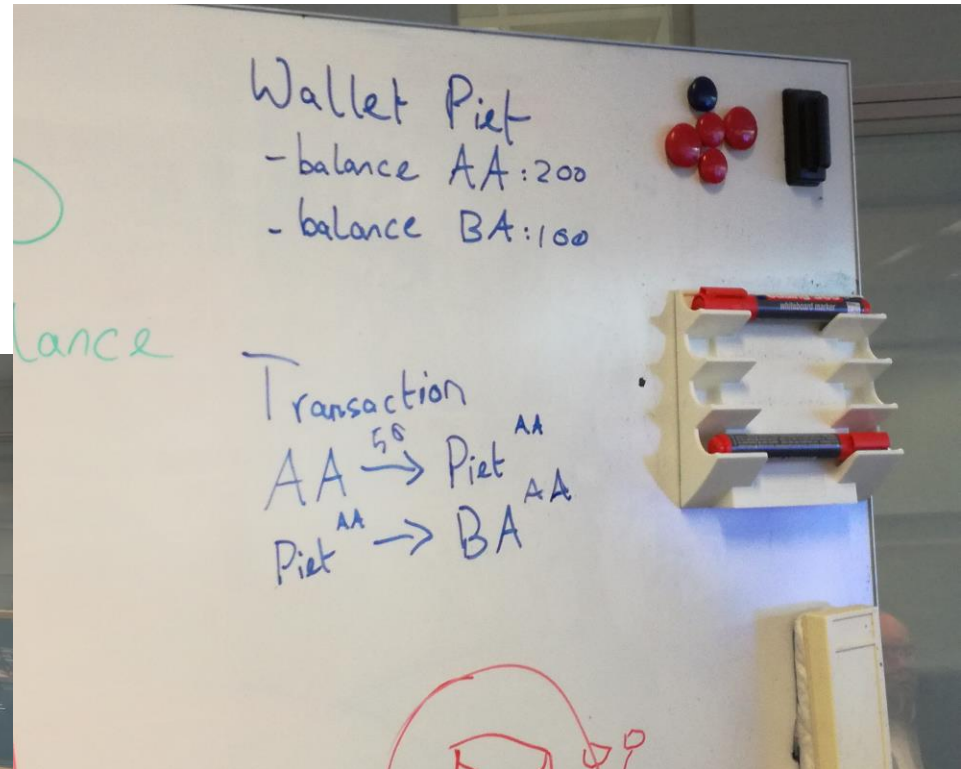
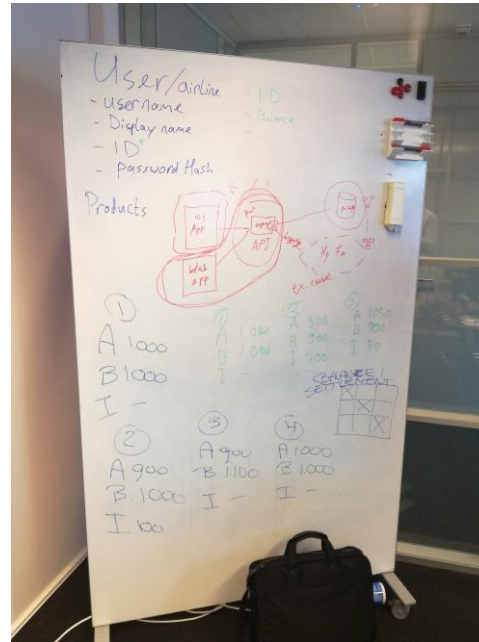
- Airline to User
Collecting Points
- User to Airline
Paying with points
- Airline to Airline
Settlements



Loyalty Demo > Test Execution



- Review
- Code review
- Testing against "API"
- Testing against FE / UI



Loyalty Demo > Test Results

One typo: DA > DL

Root cause: programming but...

REVIEW!

Small issue> Big consequences



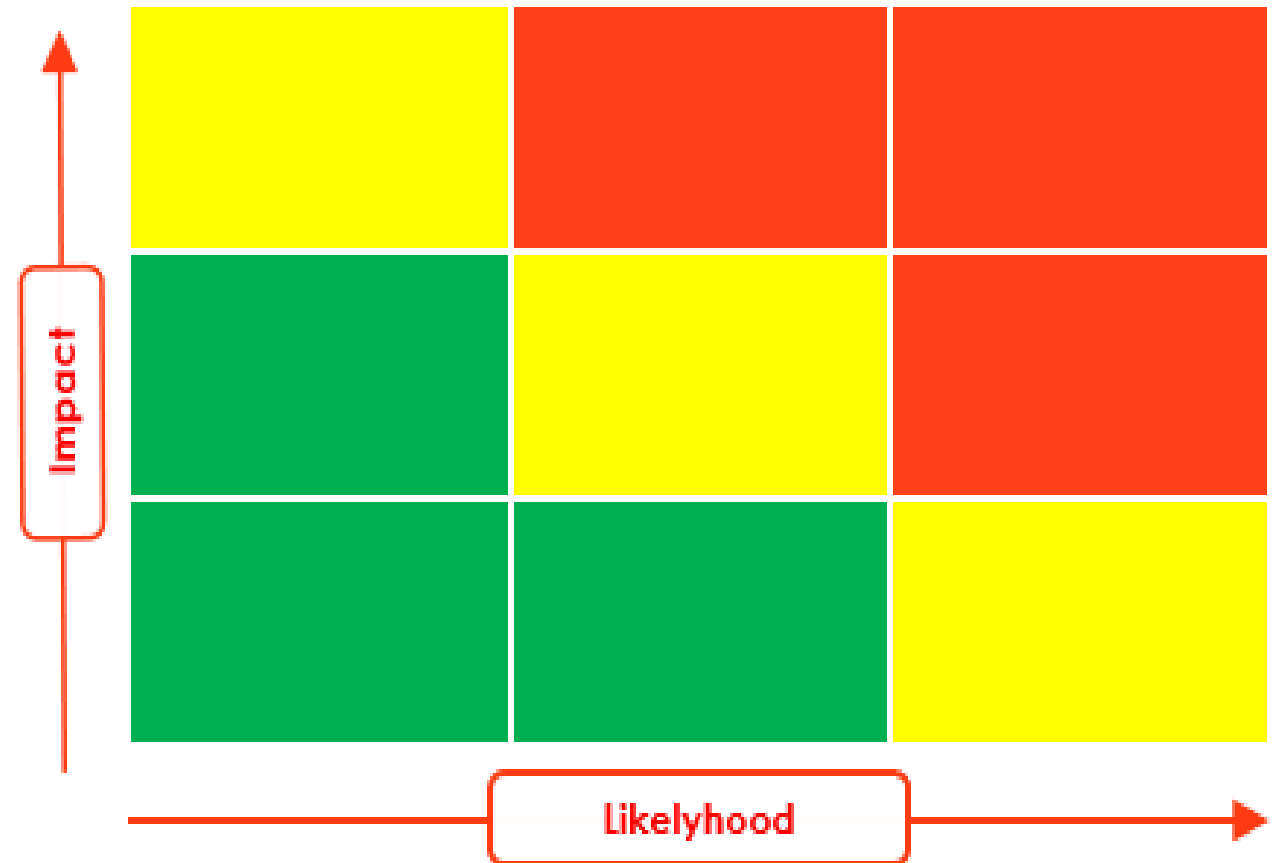
The Blockchain Risk Analysis

'No Risk, No Test' still holds true.

Trust is the prime reason to apply Blockchain technology.

What would harm the trustworthiness?

- Unauthorized access to the blockchain,
- A breach in Data Integrity,
- Failing business rules in a smart contract,
- etc.



The Blockchain Risk Analysis

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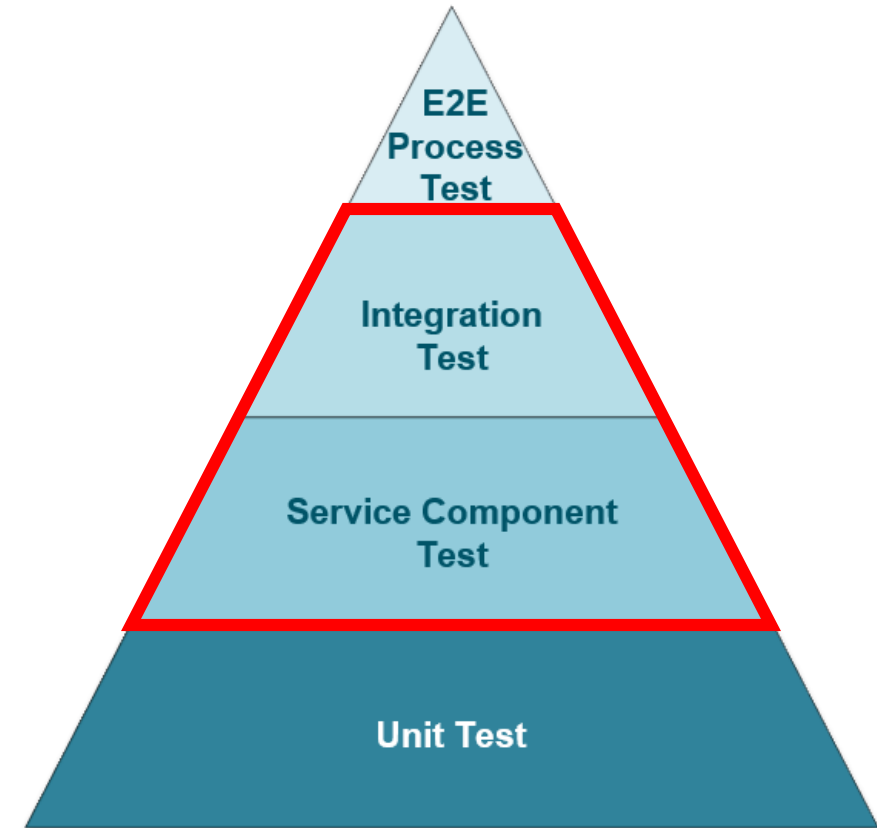
The Test Pyramid

E2E: no different than any other business solution

Integration Test: identify components that have BC characteristics and increase test coverage/intensity

Service Component Test: identify blockchain objects that need to be tested as a whole

Unit test: no different than any other business solution



The Blockchain Test Approach

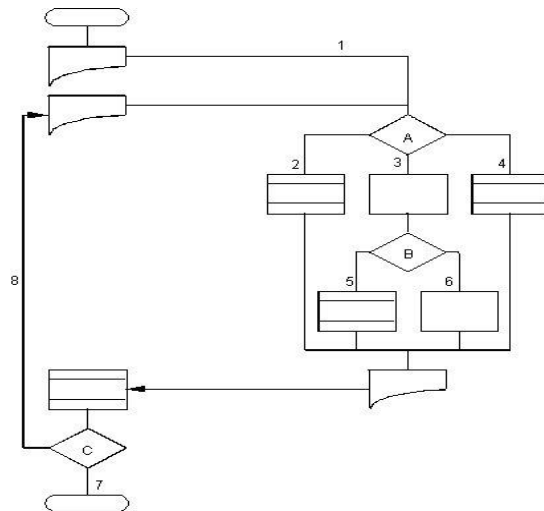
MC/DC: EXAMPLE
288088C

Test case	a	b	c	outcome
1	True	True	True	True
2	True	True	False	False
3	True	False	True	True
4	True	False	False	False
5	False	True	True	False
6	False	True	False	False
7	False	False	True	False
8	False	False	False	False
1	True	True	True	True
5	False	True	True	False

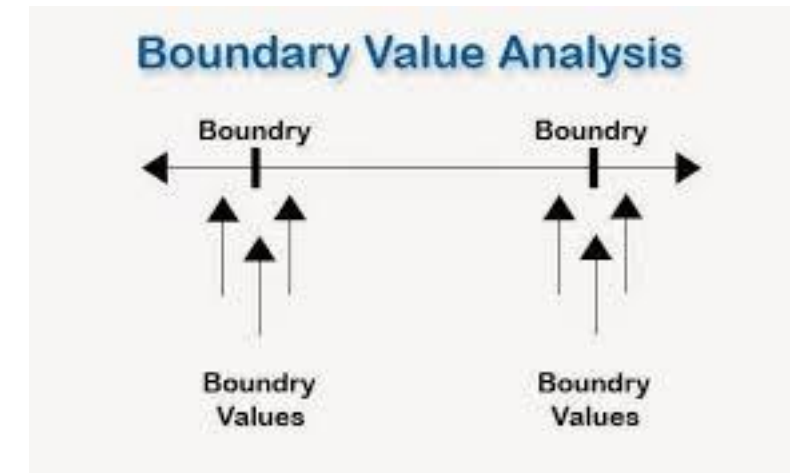


Decision	28	0	4	88%
Condition	43	0	5	90%
MC/DC	19	0	5	79%
MCC	35	0	5	88%
Boundary Value	0	0	0	--
User-Defined Target	1	0	0	100%
Assertion Violation	1	0	0	100%
Total	187	0	28	87%

Statement	Function	Function Call	Decision	Condition	MC/DC	MCC	Boundary Vi
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- Higher coverage
- Reviews!
- Independent of other components



Key Learning Points

1. The Blockchain content is immutable
 - Right First Time!
 - Agile principles cannot be practiced to the full
2. It is still a young technology, community addresses the weak spots
 - Keep up!



Key Learning Points

3. Blockchain Explorer

<https://blockexplorer.com/>

4. One node, two nodes, three...

Rollouts, Autotests

5. Testenvironment(s)

Part of development strategy

6. Testautomation



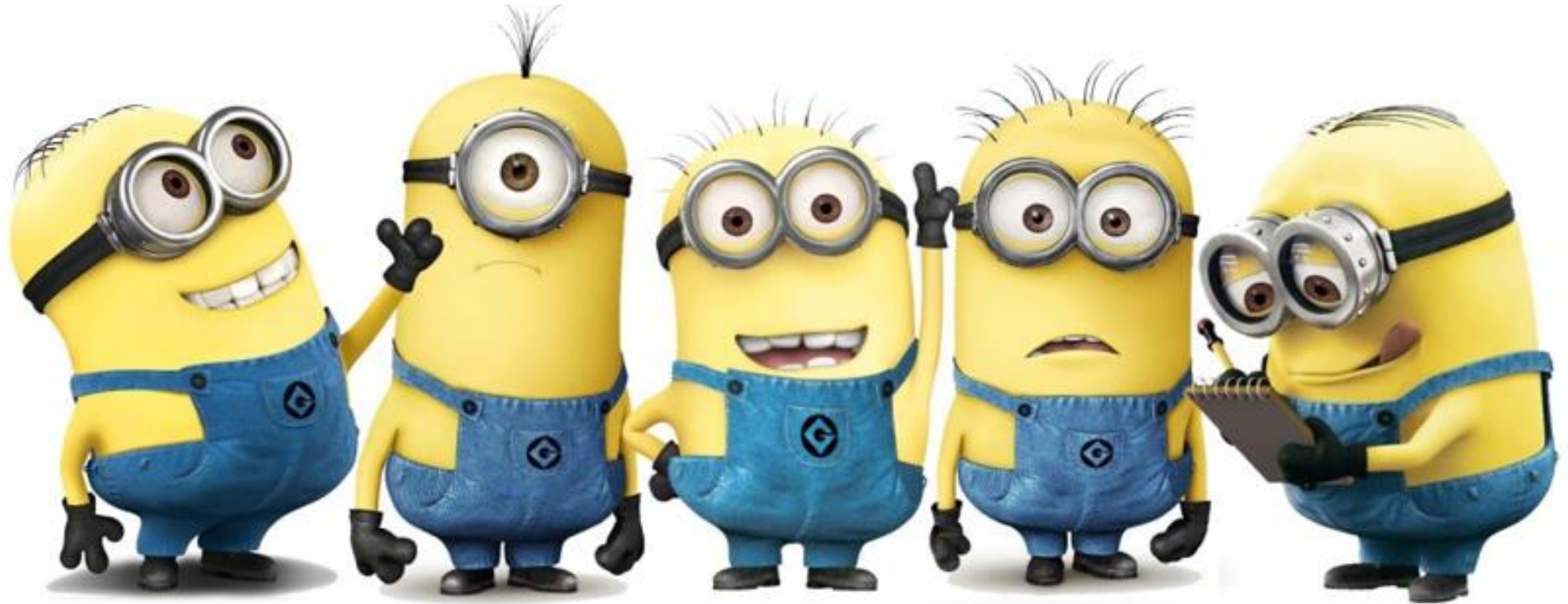
Our Activities

1. Guild
2. Blockchain Product Risk Analysis
3. Workshop "Being the Blockchain"

Ideas or suggestions? Call me/ Mail me!



Questions



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Thank You!

