CPL200 – SAP S/4HANA and Blockchain Integration

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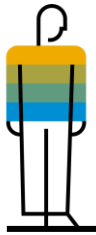

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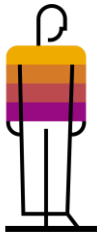

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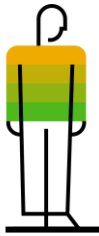

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Agenda

Introduction to Blockchain

- Value Drivers for Blockchain

Architecture for Blockchain Applications

- How to build business application on top of Blockchain?

Example: Guarantee Insurance

- Asset Transfer of Insurance Guarantees

SAP Cloud Platform Blockchain

- Develop with SAP Leonardo Blockchain Service

Introduction to Blockchain

What is the Blockchain Technology?

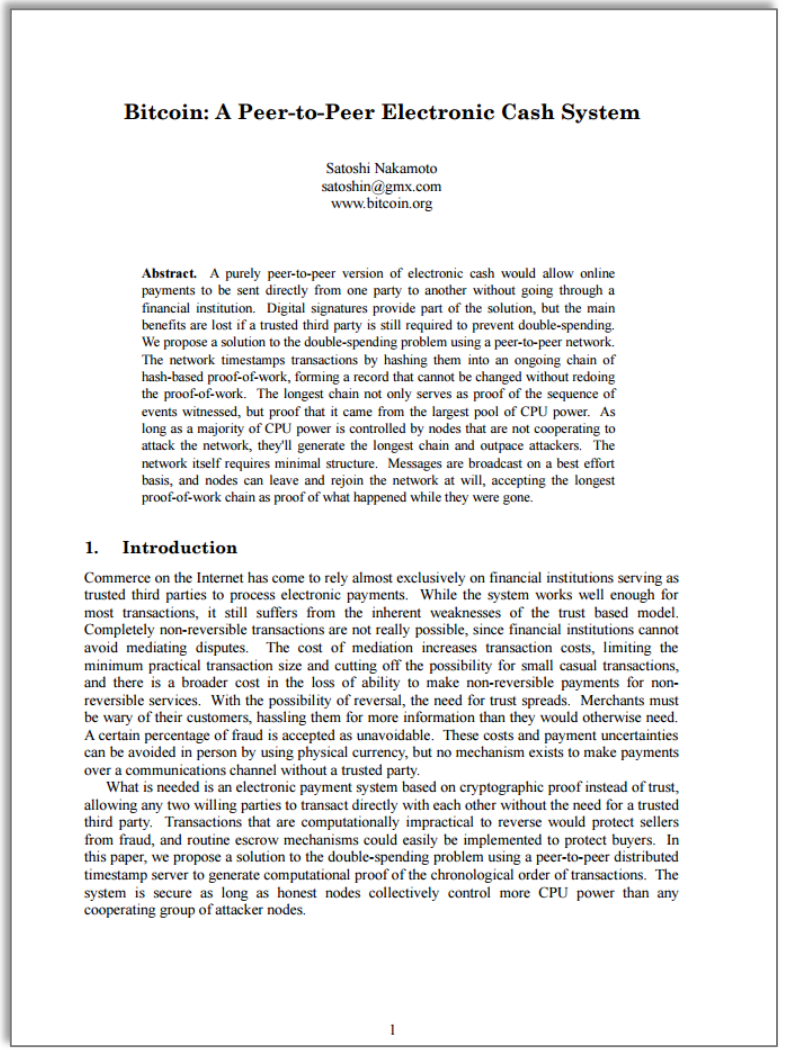
Blockchain is the underlying technology of Bitcoin (2008)

Composition of Existing Technologies

- Decentralized peer-to-peer technology
- Private/Public key encryption and hashing algorithms
- Consensus algorithm

Database

A Blockchain can be seen as a specific type of a distributed database with transparency, immutability and a decentral operation mode



Bitcoin: A Peer-to-Peer Electronic Cash System

Satoshi Nakamoto
satoshin@gmx.com
www.bitcoin.org

Abstract. A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

1. Introduction

Commerce on the Internet has come to rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments. While the system works well enough for most transactions, it still suffers from the inherent weaknesses of the trust based model. Completely non-reversible transactions are not really possible, since financial institutions cannot avoid mediating disputes. The cost of mediation increases transaction costs, limiting the minimum practical transaction size and cutting off the possibility for small casual transactions, and there is a broader cost in the loss of ability to make non-reversible payments for non-reversible services. With the possibility of reversal, the need for trust spreads. Merchants must be wary of their customers, hassling them for more information than they would otherwise need. A certain percentage of fraud is accepted as unavoidable. These costs and payment uncertainties can be avoided in person by using physical currency, but no mechanism exists to make payments over a communications channel without a trusted party.

What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party. Transactions that are computationally impractical to reverse would protect sellers from fraud, and routine escrow mechanisms could easily be implemented to protect buyers. In this paper, we propose a solution to the double-spending problem using a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions. The system is secure as long as honest nodes collectively control more CPU power than any cooperating group of attacker nodes.

1

Value Drivers of Blockchain

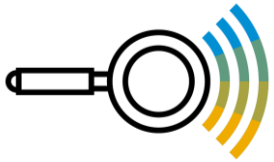
MULTI-PARTY COLLABORATION

INFORMATION IMBALANCE

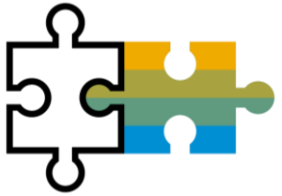
PROCESS OPTIMIZATION

SECURITY

DIGITAL ASSETS



TRANSPARENCY & AUDITABILITY



Blockchain Deployment Options

Public

Open for everyone to participate and read/write.

Permissionless Blockchain

Consortium

Access and permissions controlled by pre-selected
set of nodes

Permissioned Blockchain

Overview: Smart Contracts in Blockchains

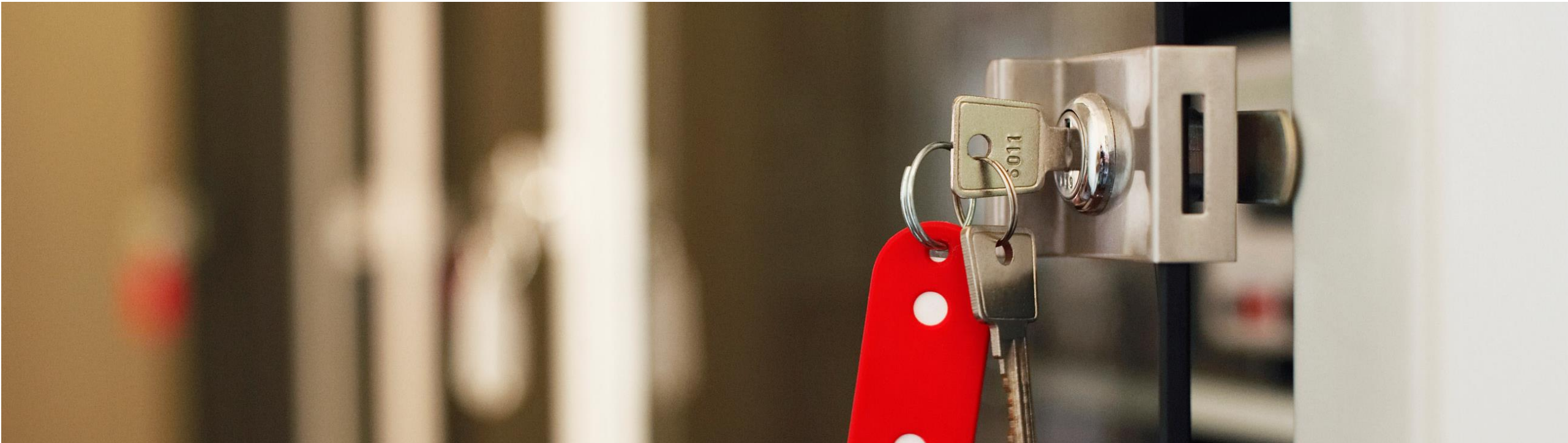
A **smart contract** is a piece of code embedded in the Blockchain and being executed by each validator.

It can represent a **business contract** and guarantees **automation of business rule execution**.

Smart contract is a new concept and creates challenges:

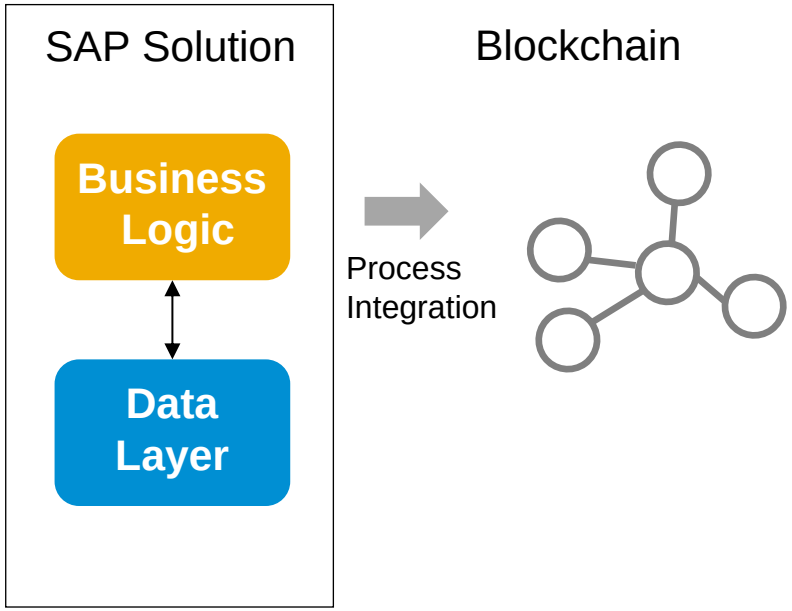
- Code is Law philosophy is not the same as human interpretation of law
- Decentral code execution requires a new development paradigm
- Execution of Smart Contracts increases complexity of the blockchain platform
- Security issues in Smart Contracts can result in higher damage being published in public blockchains

Architecture for Blockchain Applications



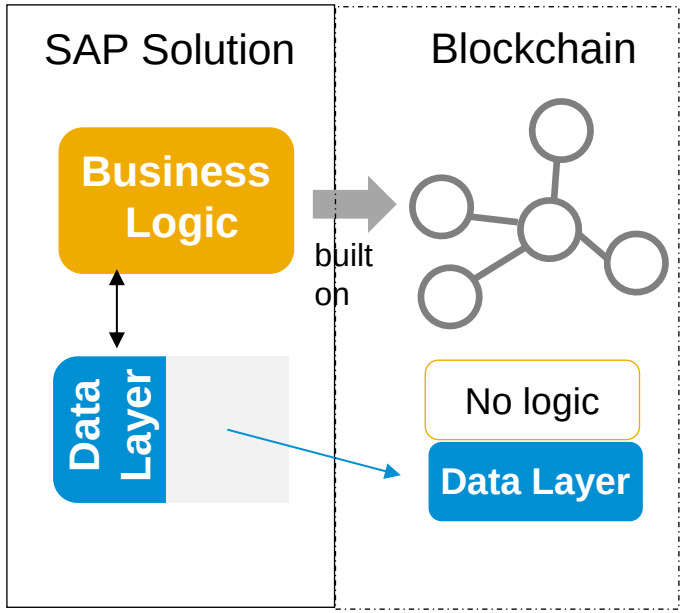
Application Patterns – How much Blockchain is in?

1 Integration with existing blockchains



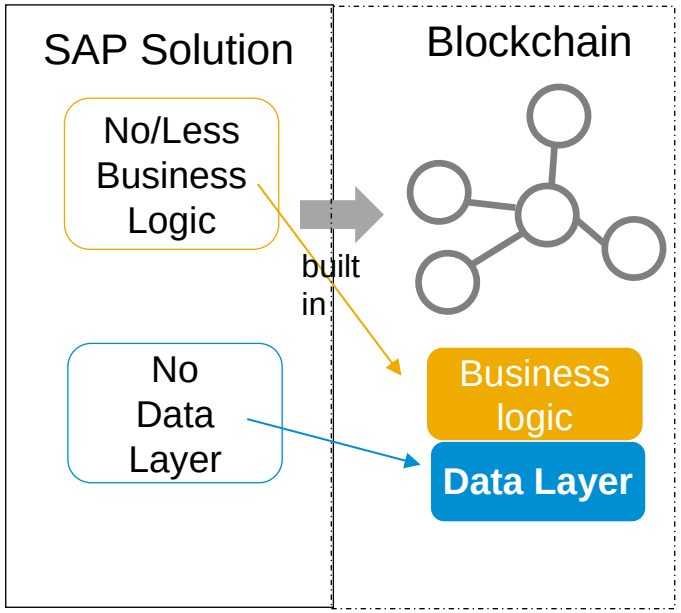
- (Public) Document Proof
- Bitcoin as payment option
- Integration with Ripple

2 Multi-Party Collobaration *without* Smart Contracts



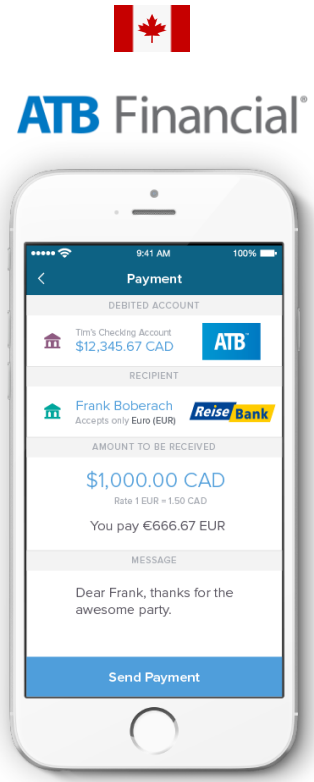
- Transparency Data Platform
  (Data Storage & Retrieval)
- Intercompany Settlement
  (Asset transfer)

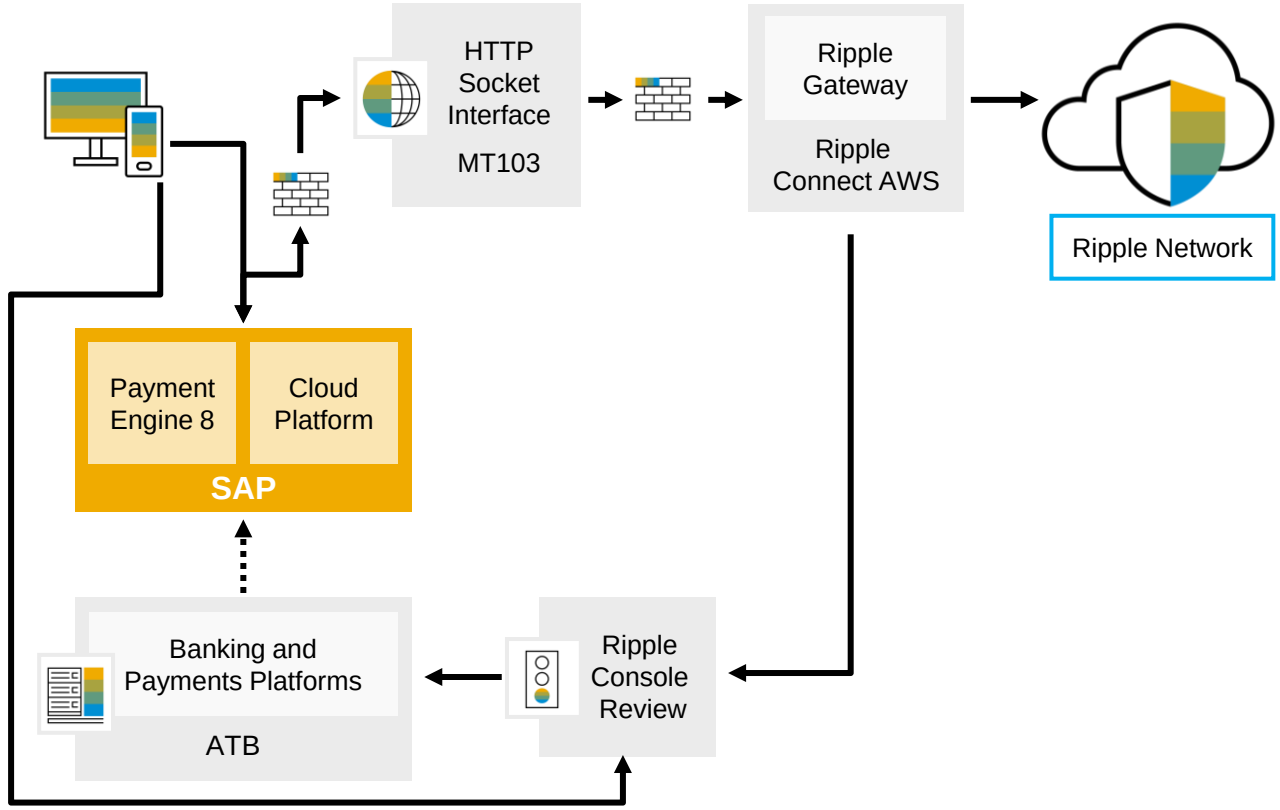
3 Multi-Party Collobaration *with* Smart Contracts

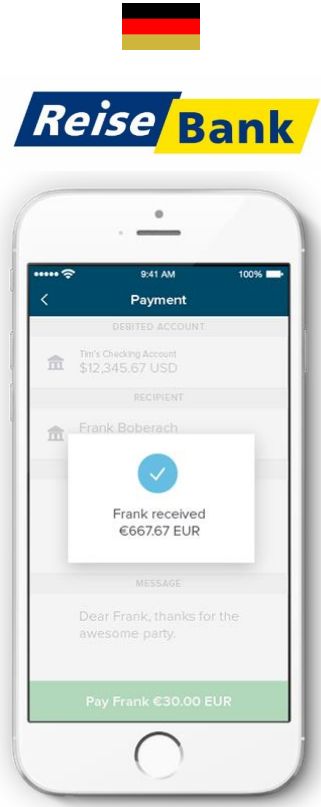


- Consortium Platform
- Business Networks

Pattern 1: Banking Innovation with SAP & Ripple







Overseas payment process took 20 sec instead of 3 days

Ripple technology is an open-source system based on Internet protocols, permitting domestic and international payments in any combination of currencies to be settled directly between the parties without the need for central clearing houses or correspondent banks.

Pattern 2: Blockchain in a Public Sector Scenario

Proof-Of-Concept with Autonomous Province of South Tyrol (Italy)

Challenge

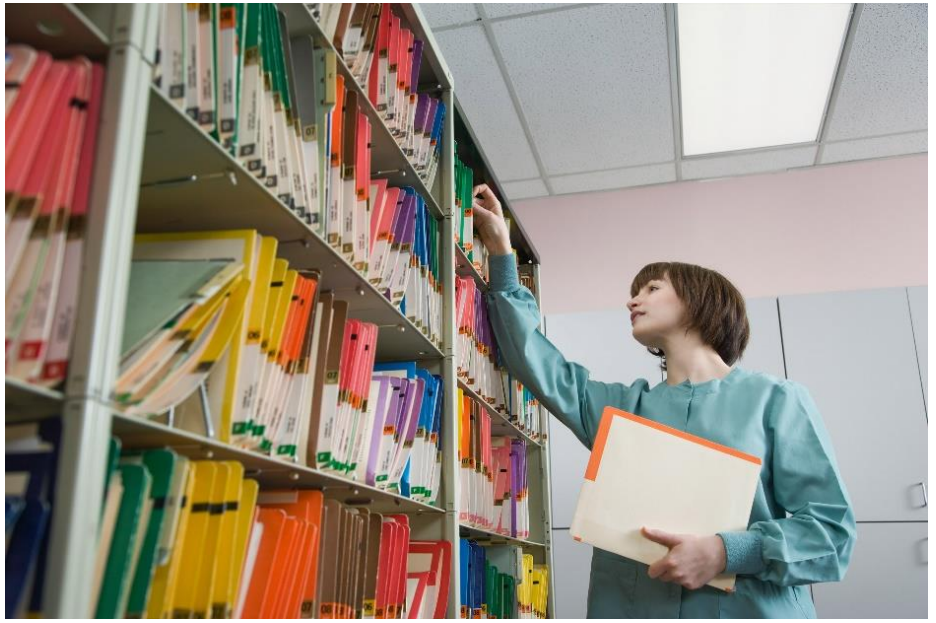
- Government employees **spend too much time** on stating facts, confirming them or sharing them

AUTONOME PROVINZ BOZEN SÜDTIROL

PROVINCIA AUTONOMA DI BOLZANO ALTO ADIGE

Proof-of-Concept Objectives

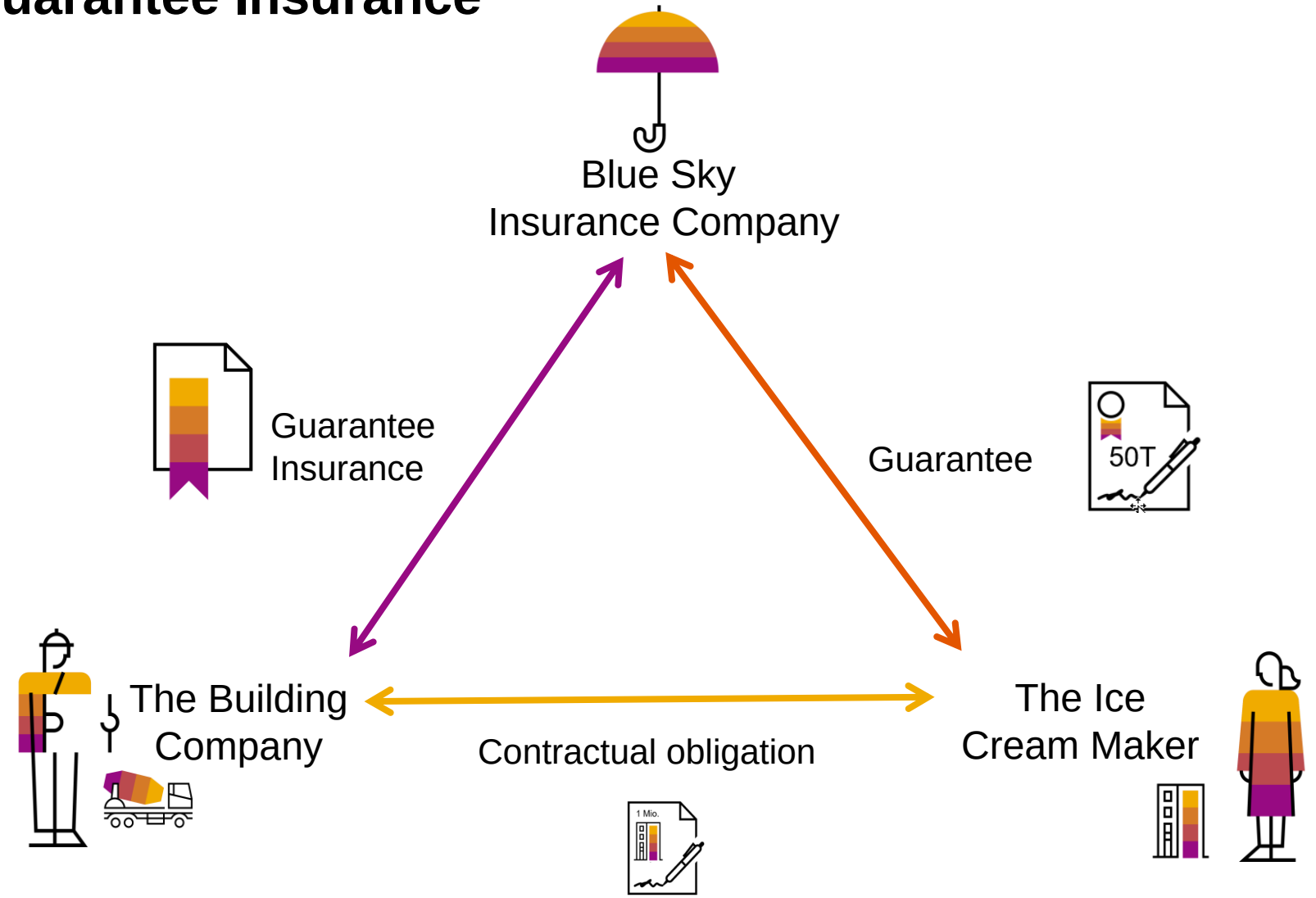
- Show feasibility of using blockchain technology for public administration
- Demonstrate benefit to reduce manual document authentication by office managers significantly (one-click)
- Build foundation for future extended usage of blockchain for any governmental administrative processes in Italy
- Leverage blockchain and build process extension to non-SAP application based on SAP Cloud Platform



Blog on PoC Details: http://news.sap.com/blockchain-could-be-a-game-changer-but-not-because-its-cool-technology/

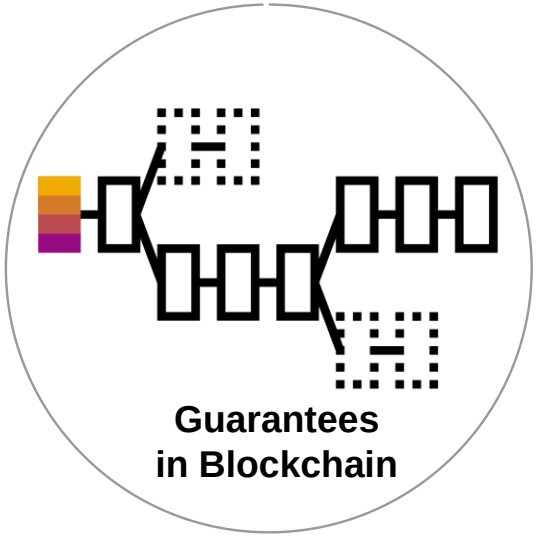
Example: Guarantee Insurance

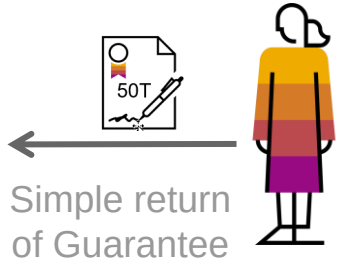
Use Case Guarantee Insurance



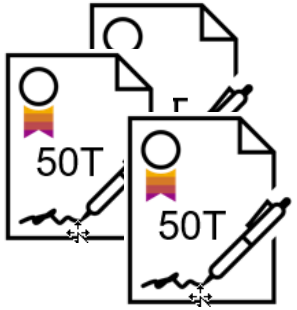
Advantages of Guarantees in Blockchain

Reduced processing time

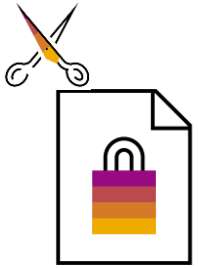




Simple return of Guarantee



Fraud is avoided as Guarantee cannot be copied.

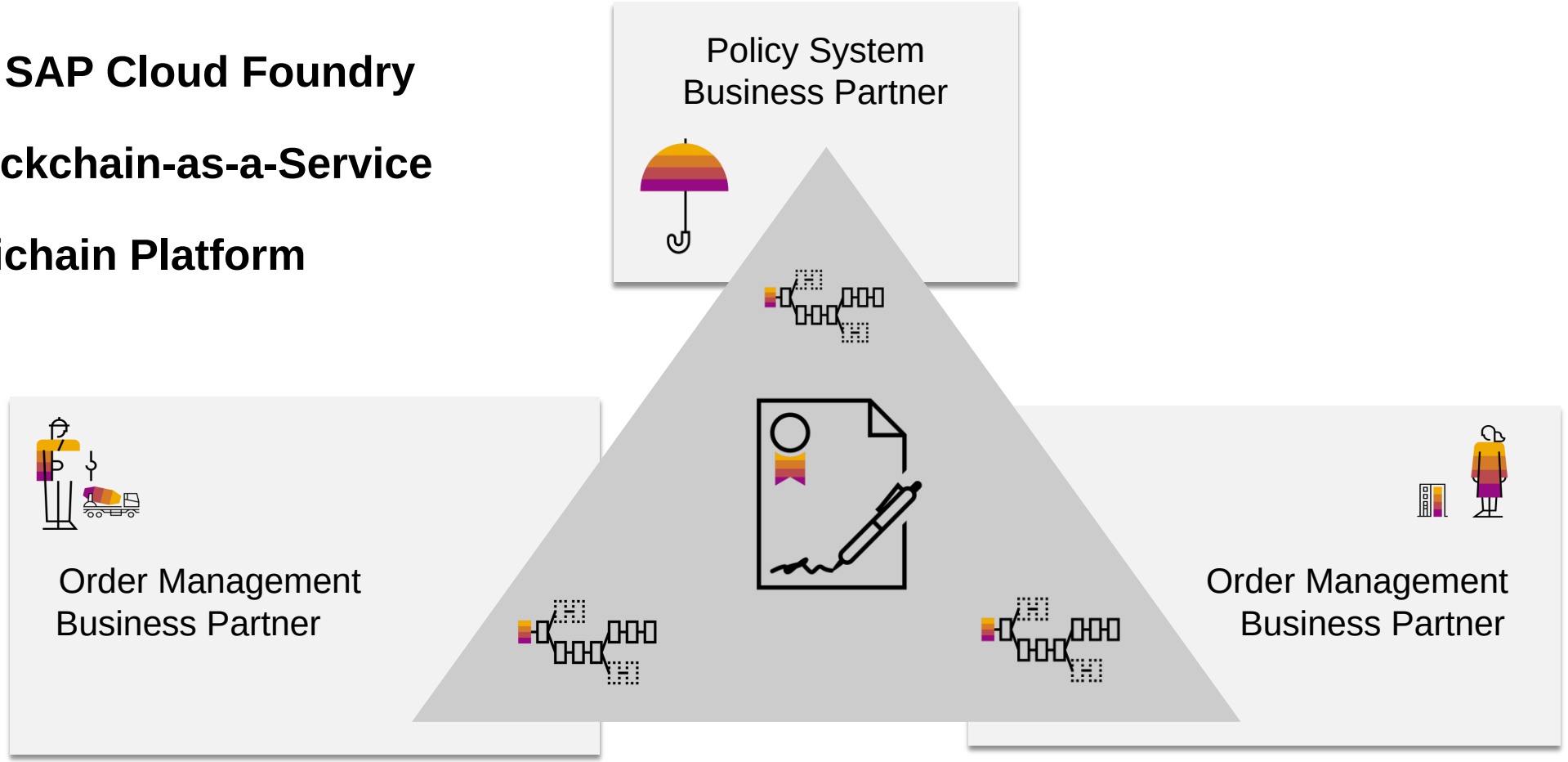


Guarantee indestructible

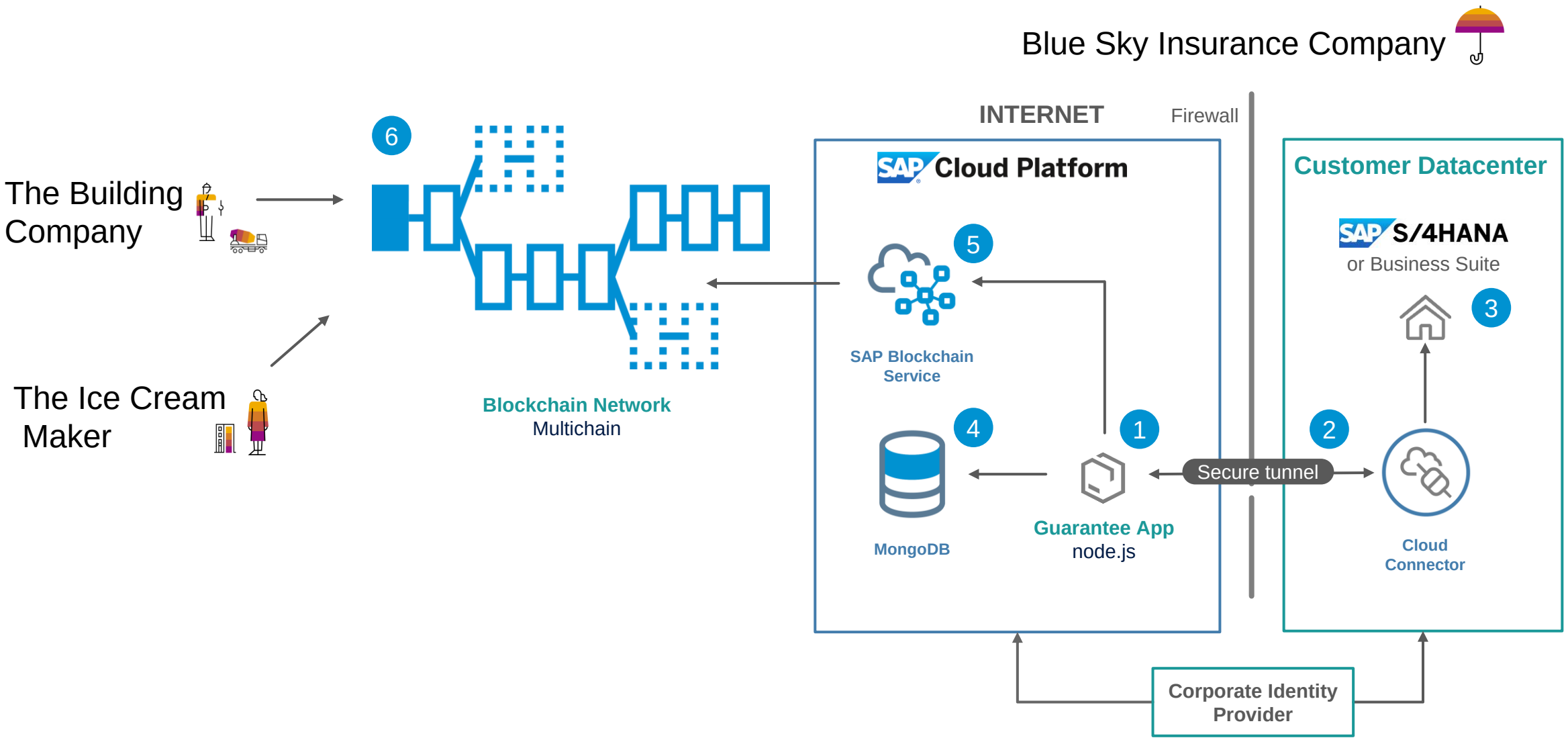
Ownership of Guarantee is transparent to all involved parties

Guarantee transferred to Blockchain

- SAP together with a German Insurance Company
- Showcase for Guarantees
- Based on SAP Cloud Foundry
- Using Blockchain-as-a-Service
- With Multichain Platform



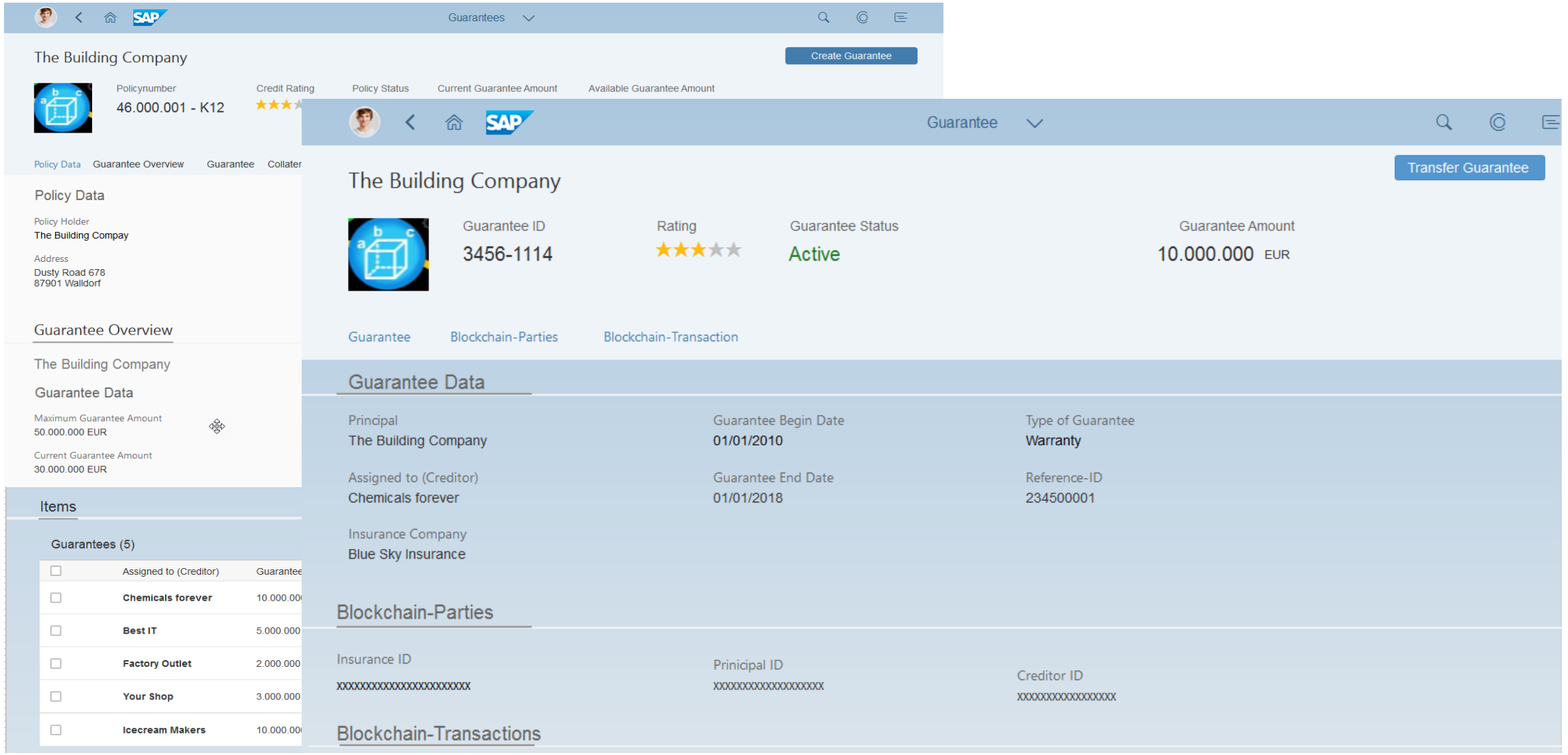
Blockchain Architecture and S/4 HANA Integration



Demo

Insurance Guarantee Use Case

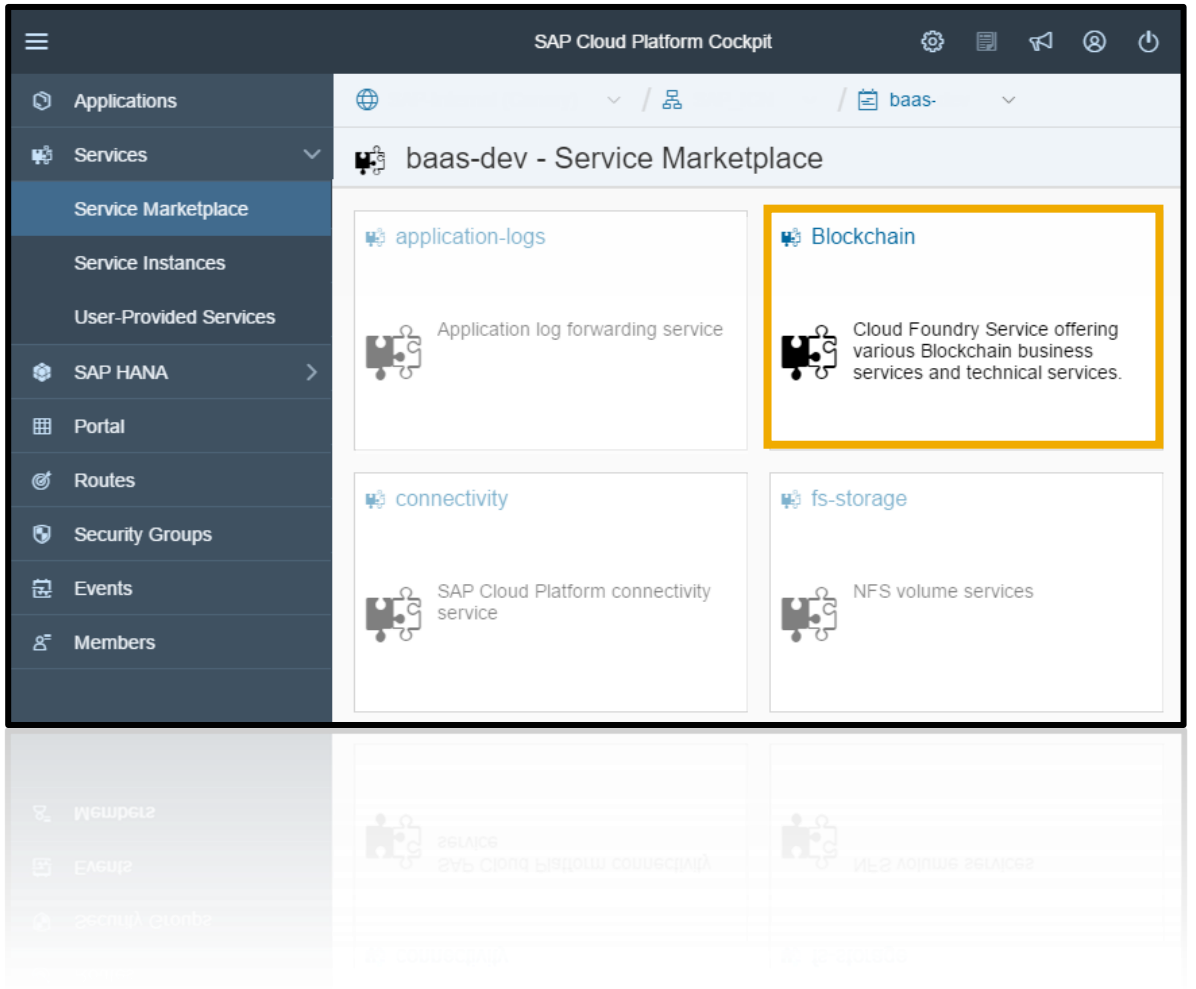
Demo



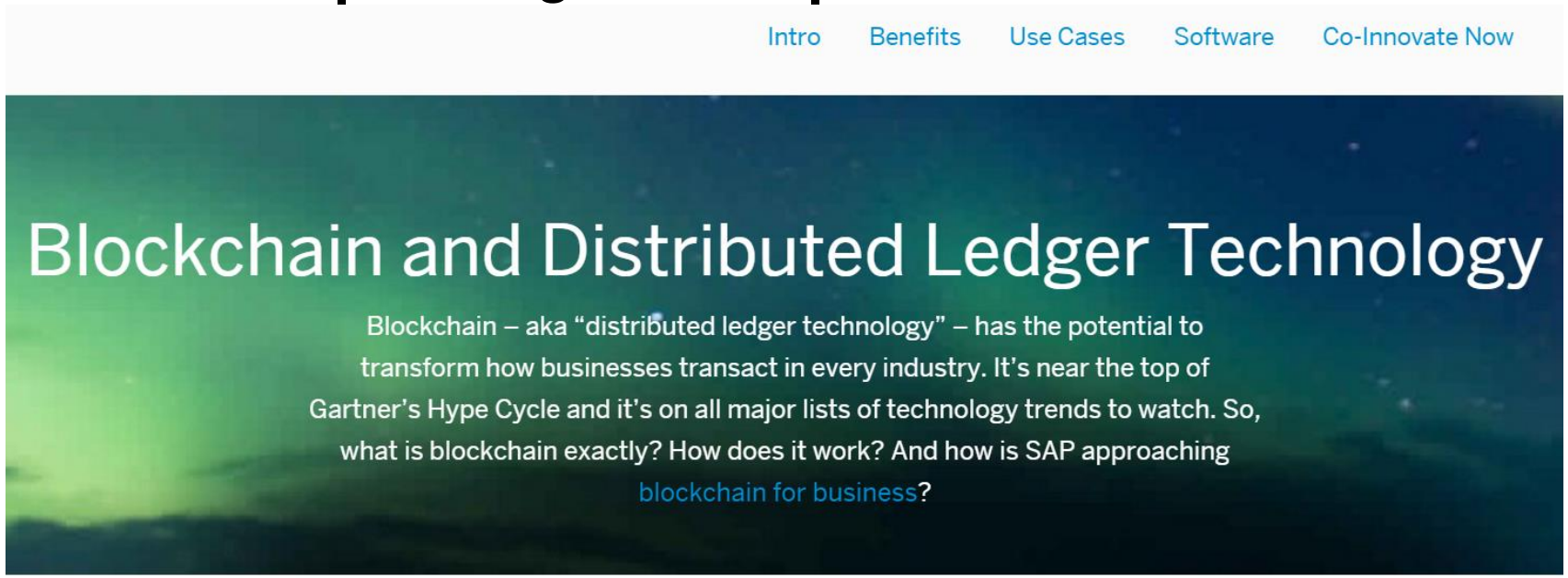
SAP Cloud Platform Blockchain

Develop with SAP Leonardo Blockchain Service

- **Build** Blockchain Industry and LoB Process Extensions for SAP and Non-SAP
- **Integrate** into existing Blockchain Ecosystem
- **Combine** Distributed Ledger with Internet of Things and Machine Learning capabilities on one platform
- Foundation for building transactional applications that establish trust and transparency while streamlining business processes across company boundaries.



Resources | Getting Started | Test Installations



Blockchain explained from an enterprise perspective

Every business is based on transactions. But these transactions are often routed through third-party intermediaries like banks, lawyers, and brokers – which can make processing time-consuming and expensive. Blockchain technology has the potential to reduce the role of middlemen, dramatically speeding up multi-participant transactions and lowering costs, while ensuring all parties are protected. [illegible] machines, and algorithms would be free to transact and communicate with one another in a frictionless way. This is the promise of blockchain.

https://sap.com/blockchain

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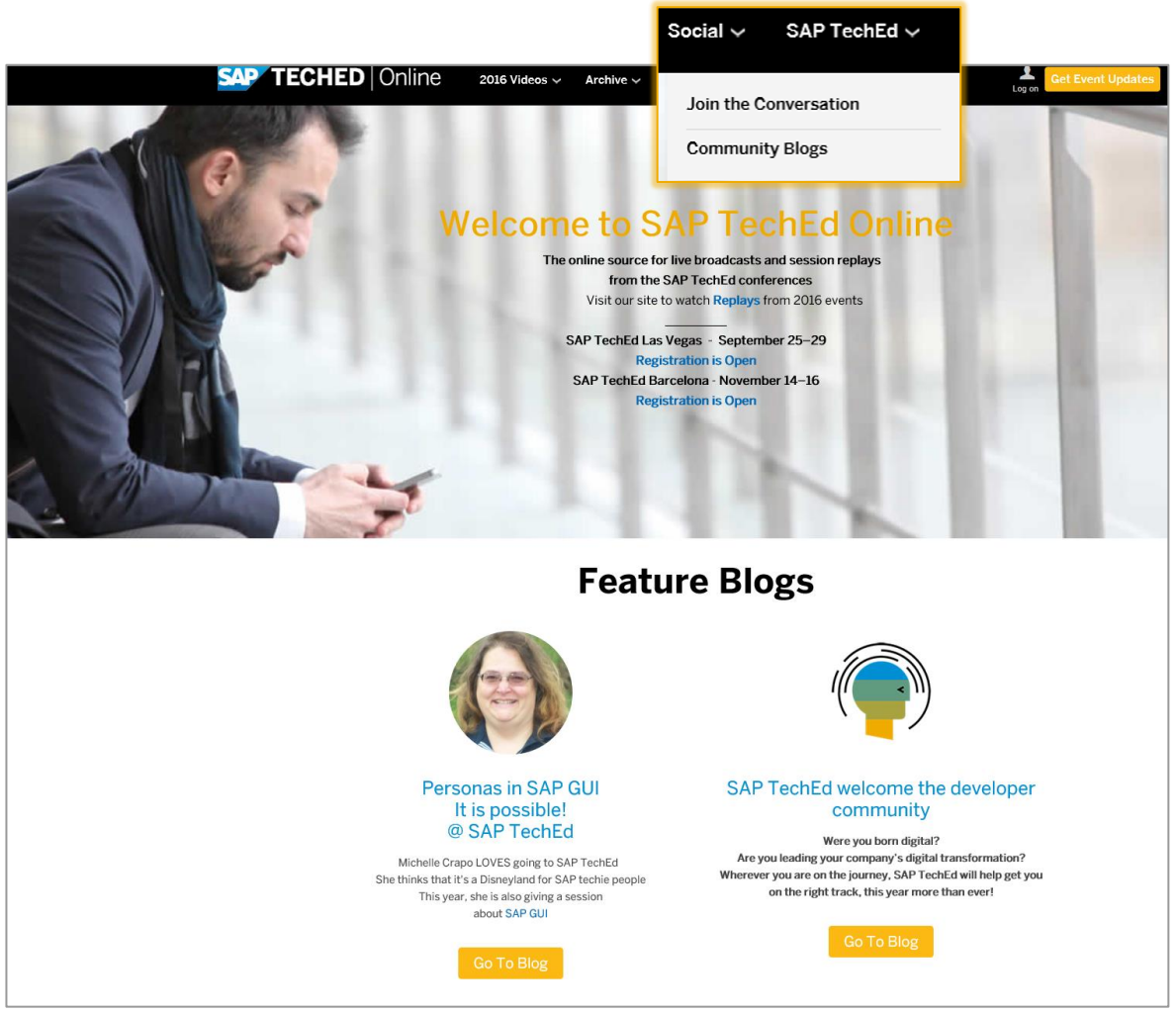

Further information

Related SAP TechEd sessions

CPL103 – Blockchain and SAP: Use Cases, Scenarios, and New Solutions
CPL102 – SCP Blockchain Service Introduction & Overview
CPL 200 – SAP S/4HANA and Blockchain Integration
CPL101 – Blockchain: Just Hype or Relevant Technology for Building New Business Apps
CPL116 – Blockchain in a Public Sector Scenario
CPL117 – Blockchain in Financial Service: Bonded Loans – a Commercial Lending POC
CPL118 – Blockchain in an Industry Scenario: Secure, Paperless Ocean Shipping
CPL135 – Innovating SAP S/4HANA with SAP Cloud Platform: Blockchain Integration

CPL227 – Enterprise Blockchain Architecture with Hyperledger
CPL261 – How to Build Smart Contracts with Hyperledger: Deep Dive

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scn.sap.com
www.sap.com/blockchain

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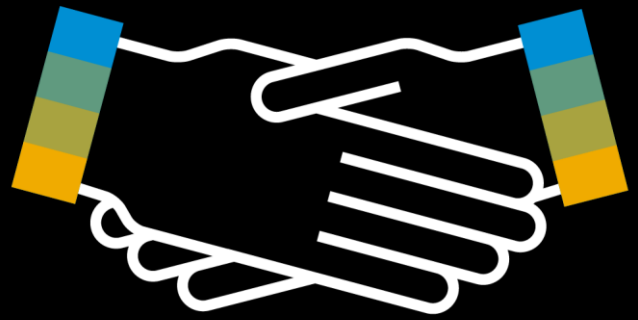

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