Rethinking Digital Financial Market Interaction

A conceptional View of current Opportunities and Challenges

EMF-ECBC Academy Training, Stavanger - May 5, 2026

Peter Kohl-Landgraf - DZ BANK

DZ BANK Group

2026: Spotlight on selected Digital Asset News

Ongoing: Industry Experiments

KfW plans novel live DLT bond issuance experiments

Nomura, Mizuho, JSCC to trial tokenized collateral on Canton Network

DZ Bank, ABN AMRO execute on-chain smart derivative contract

Premiere: DZ BANK and KfW fully map the lifecycle of a crypto security on a public blockchain

Progressing: Public Sector Solutions

ECB launches Appia consultation re wholesale DLT settlement infrastructure

French finance minister calls for euro stablecoin sovereignty

Bank of England launches Pilot for Tokenized Asset Settlement

BIS Project Agorá enters testing phase for tokenized cross border payments

Reshaping: Market Infrastructure

ECB, Eurosystem to accept tokenized securities as central bank collateral

European reg changes to promote blockchain-based covered bonds

40 organizations push for expedited DLT Pilot Regime reforms

Euro stablecoins could drive more sovereign bond demand than you'd think

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„From Information To Agents“

A brief History of Digitalization and Autonomy

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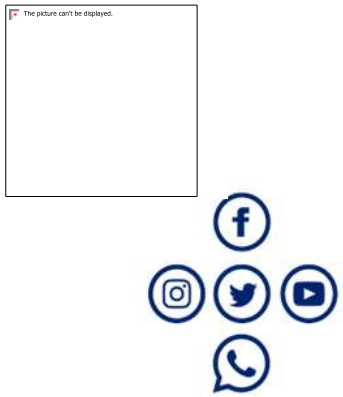
4 Regimes: The Evolution of Digitalization over 3 Decades

1991: Web1

Information

Website
- **Consumer**
- Control: Institution
- Autonomy: Low

2005: Web2



People

Social Media
- **Interaction**
- Control: Platform
- Autonomy: Medium

2015: Web3

Value

DLT and Blockchain
- **Tokenization**
- Control: Protocol
- Autonomy: High

2026: Web4

Action

AI and Smart Contracts
- **Programmability**
- Control: Agents
- Autonomy: Depends

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Innovating Financial Market Workflows

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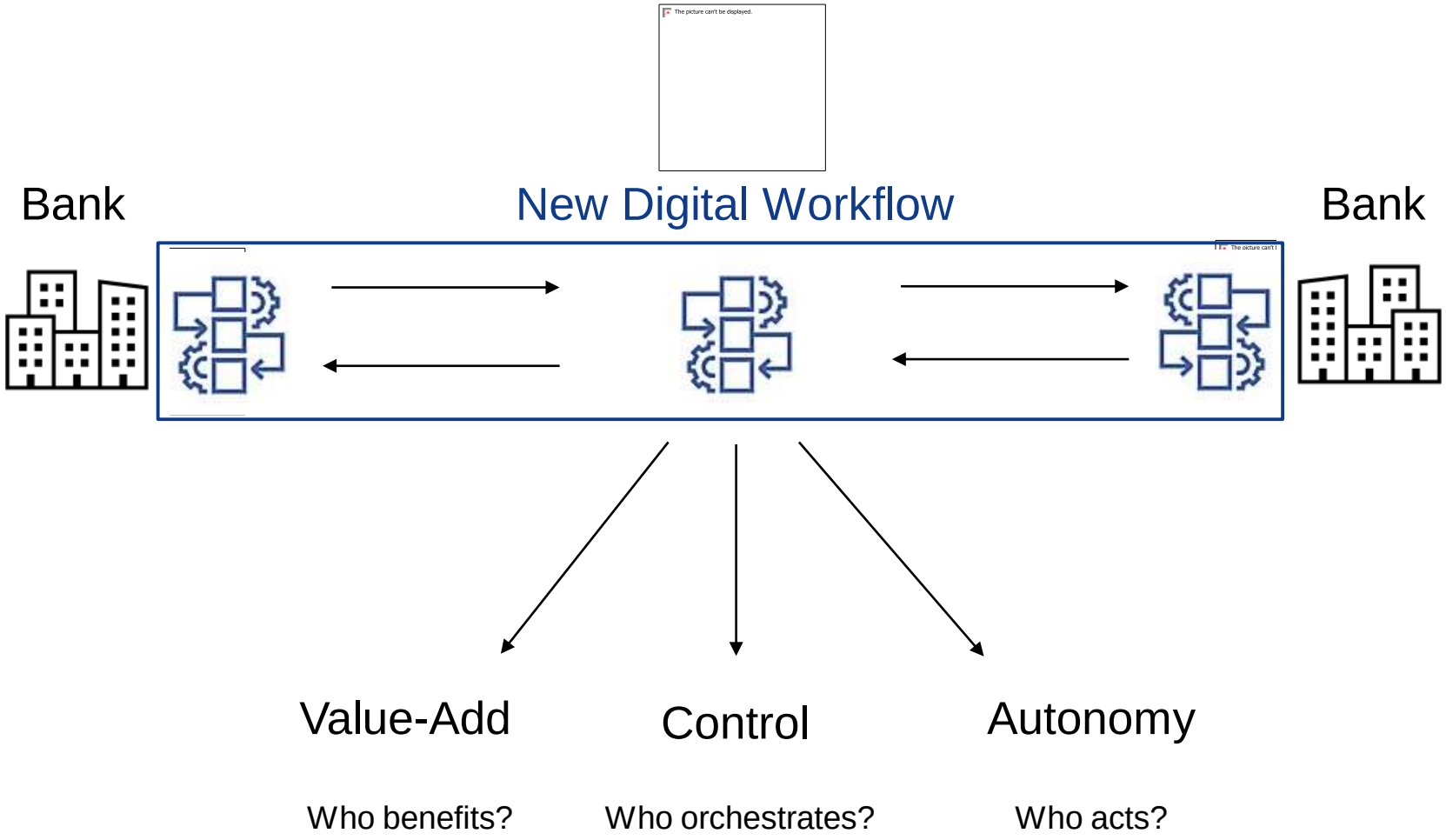
Innovating Digital Workflows: A Decision Challenge



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DLT in Financial Markets

Core Components and Applications

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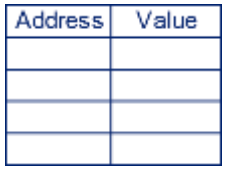
Building Blocks for DLT-based Financial Interaction

Tokenized Assets

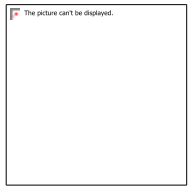


Tokenized Bonds
Digital Securities
RWA Tokenization

Digital Cash

Stablecoins
Tokenized Deposits
CDBC

Interoperability



Platforms versus Networks
Public versus Permissioned
Vision: Unified Ledger

Programmability

Smart Financial Contracts
as Digital Intermediaries
and Digital Escrows

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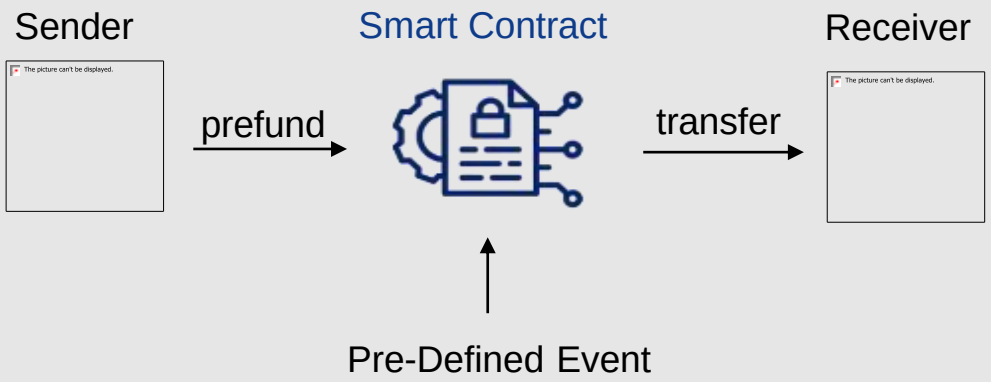
Connecting the Blocks – Example: Settlement of Tokenized Securities

Tokenization

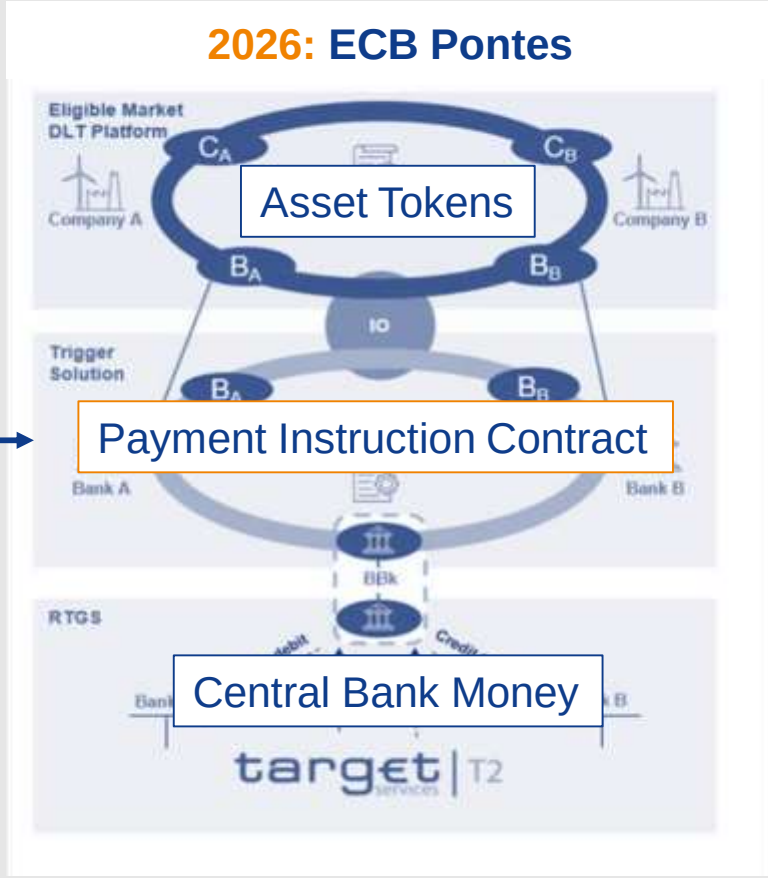
Participant	Token Amount
Alice	100
Bob	500
Liz	200
Smart Contract *0xABdb9d2360..*	***50***

- Decentralized Accounting
- Direct Transfer
- Algorithmic Control

Digital Escrow Mechanism



Digital Cash and Interoperability



Triggersolution - Picture Source: https://www.ecb.europa.eu/press/intro/news/ecb.mipnews231213_annex4.bg.pdf

Project: Smart Bond Contract

Complete Digital Redesign of a Bond‘s Live Cycle

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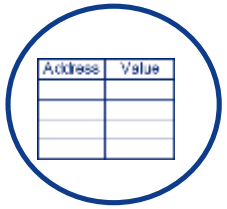
From Issuance to Maturity: A Holistic Digital Workflow

Digital Workflow for Initiation

1. Digital Terms and Initiation
2. Execution & Documentation

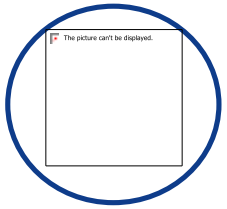
Components of a Tokenized Bond

3. Digital Issuance via Token-Register



4. Settlement + DvP

5. Digital Custody



Digital Workflow for the Live Cycle

6. Secondary market trading
7. Coupon Payments
8. Redemption

Smart Bond Contract

- Digital Documentation (ICMA)
- Automated ISIN Publication

- High Level of Automation
- Payment-Solution Agnostic

- Functional Trading Pattern
- Algorithmic Live-Cycle Checks

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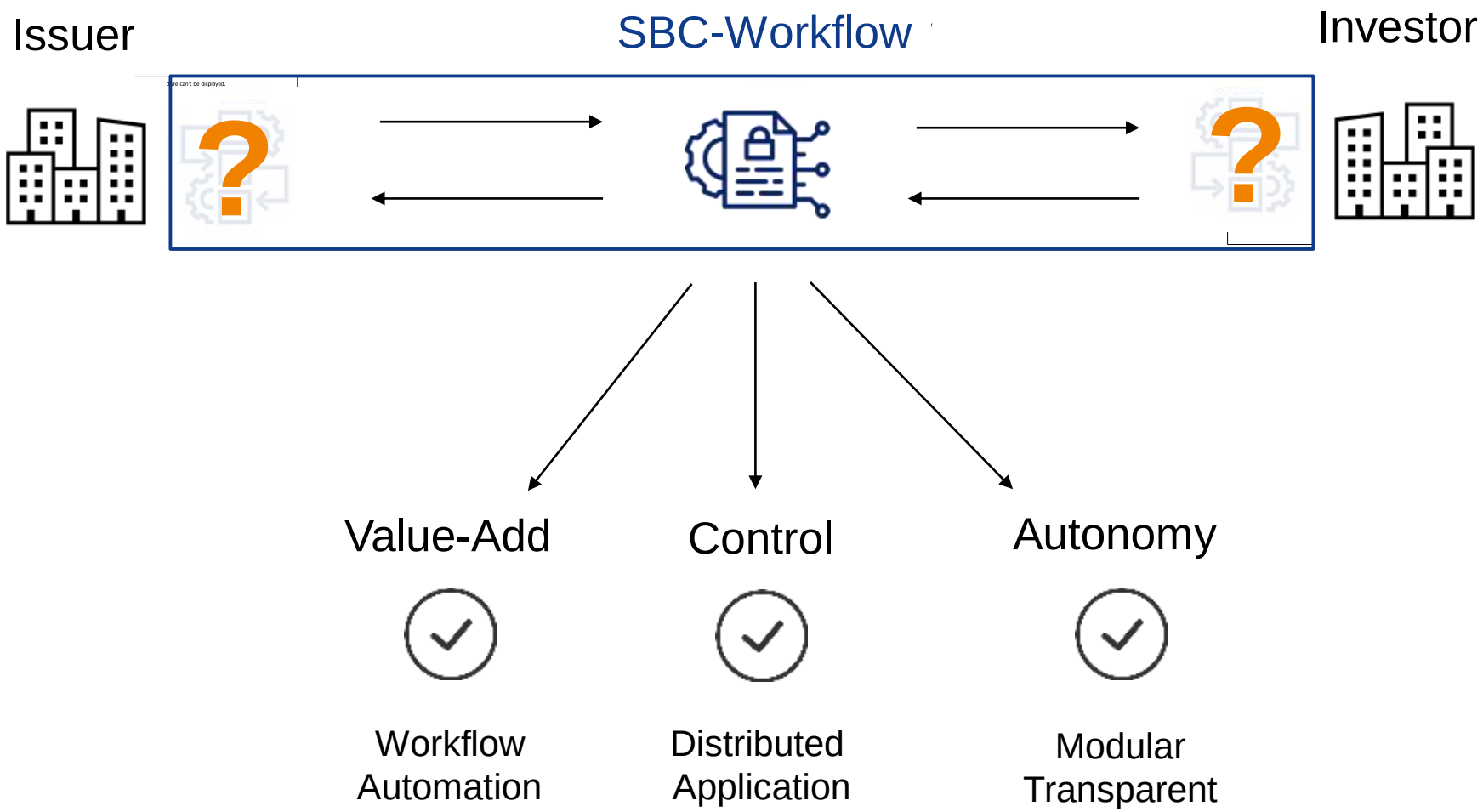
The Efficiency Advantage: T+0 Issuance, Disintermediation, Standardization



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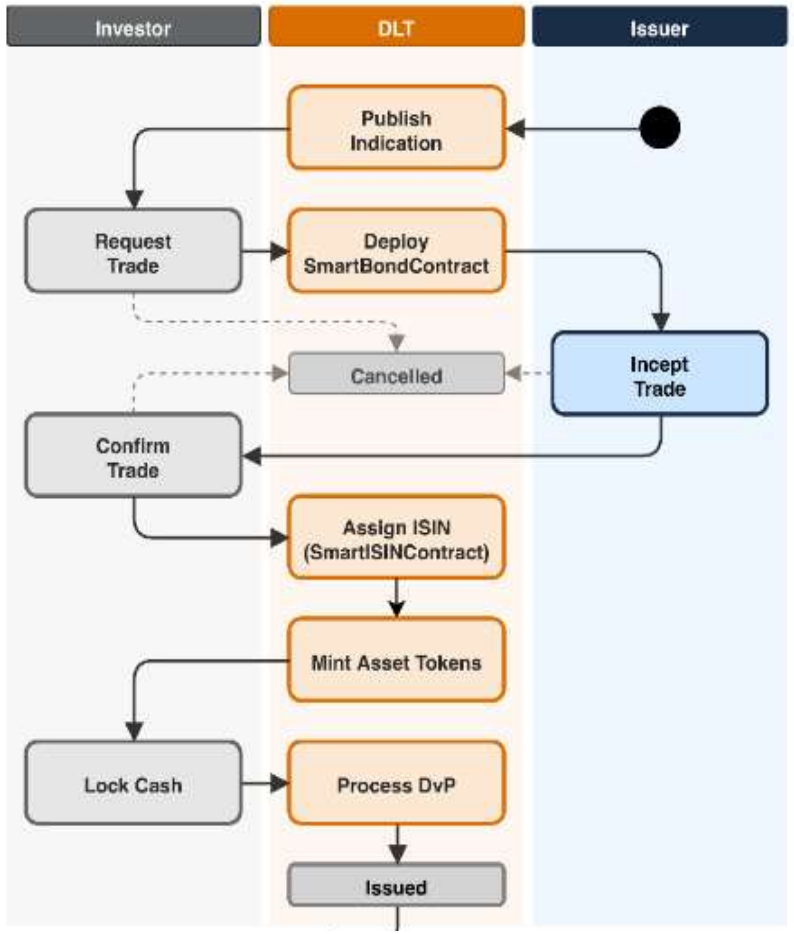
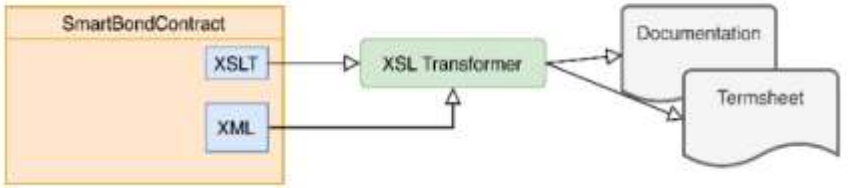
March 2026: SBC Pilot Transaction on a Public Blockchain

Disintermediated Digital Life Cycle



DLT as Single Source for Digital Bond Documentation



SMART CONTRACT— SINGLE SOURCE OF TRUTH

On-chain contracts hold all authoritative state and operate autonomously regardless of backend or frontend availability. Any participant can verify any state transition by reading the contracts directly.

ICMA BDT — DIGITAL DATA OBJECT

The BDT record specifies the digital issuance terms in XML[5] format. Legal terms are represented in an XSLT[6]. Both are stored in the Smart Bond Contract. An external XSL transformation engine enables export into any required downstream format. All from the same canonical on-chain

Legally Binding Tokenized Issuance based on SBC-Workflow

Smart Bond Contract

Disintermediating the Life Cycle of a Tokenized Security

Pilot Report · March 2026

DZ BANK KFW

1	5	6	9	40
Public Blockchain used	Smart Contracts deployed	Market Participants connected	Functional States processed	Minutes until settled

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Moving Forward:
A Pragmatic Approach

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Recommendations

Rethink

Existing processes and products can be *completely* rethought with new technologies such as DLT.

Explore

Pilot Transactions with a view to later integration enable the identification of *hidden potential*

Collaborate

Digital Standardization follows an *economy* and results from partnership-based cooperation

Appendix

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Innovating Digital Workflows: Which Technology to Choose?

AI Agents

Centralistic

Probalistic

Opaque

Interpret Intent

Smart Contracts

Decentralized

Deterministic

Transparent

Enforce Execution

DZ Actitivies with regard to DLT and Digital Assets

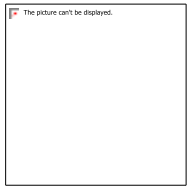
Tokenized Assets

- Digital Custody Servicing
- Expertise in Digital Primary Market Issuances

Digital Payments

- CBDC: Part of ECB’s Pontes Market Group
- Stablecoin: Joined Consortium Qivalis
- Tokenized Deposits: Commercial Money Token

Interoperability



- Infrastructure-Agnostic Approach
- Focus on Digital Products, Workflows and Standardization

Programmability

- Smart Derivative Contract: Aim – Remove Counterparty Credit Risk
- Smart Bond Contract: Aim – A Holistic Digital Workflow for a Security

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Smart Bond Contract

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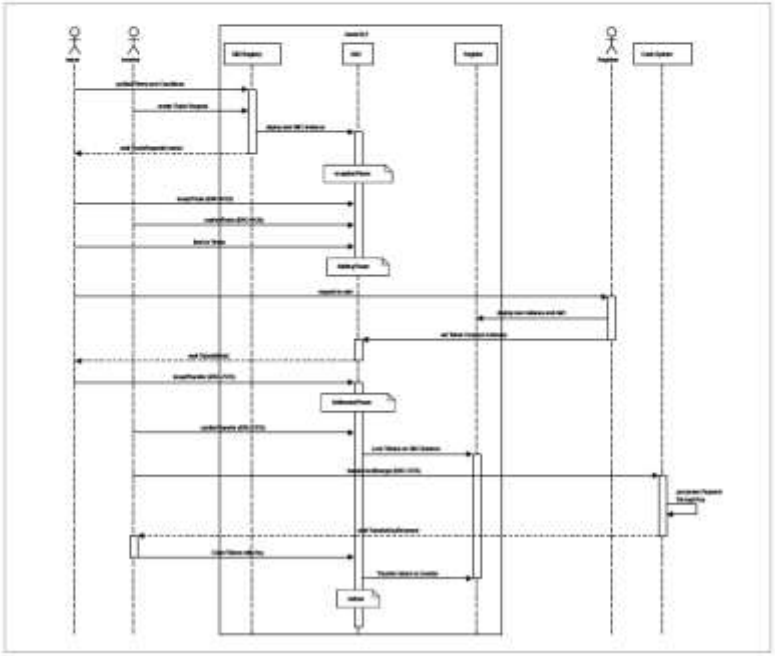
DZ BANK Whitepaper – May 2025

to the security's data by using XSLT to connect the contractual context to XML-based parameters. As far as public availability is non-critical data records can be stored in the Smart Contract directly in an audit-proof manner and edited based on the Smart Contract's process states. The tokenization and settlement process uses efficient protocols such as ERC-7573 – described below. A functional interaction pattern for transaction data reconciliation can be implemented using functionality provided by ERC-6123, which uses a hash-based mechanism to check whether both parties have agreed on the same transaction and trading data. Standardized event objects published by the Smart Contract to the DLT's event queue enable event-based and automated event-driven design.

5.2 Sequence-flow of a functional Issuance Process

The following sequence diagram shows a potential functional interaction flow for a Smart Contract-based issuance process (of a crypto security in terms of the eWpG), involving only one issuer and one investor. The interaction begins when the indicative terms of the issuance are uploaded in a specific Smart Contract registry. A registered investor can create a trade request which results in the installation of an SBC. The issuer then converts this request into a concrete trade offer, which the investor can confirm. Once the terms and conditions of the issuance have been finalized, the security tokens can be generated (a process known as



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Potential SBC: Determinism, Automation, T+0 Issuance

Motivation

- Recent Pilots: Concentration only on single Parts of a Bond‘s Value Chain
- Fragmented System Landscape and no standardized holistic Workflows yet

Innovation

- As a **Digital Intermediary** the SBC orchestrastes the Life Cycle
- SBC designs one Workflow for Tokenization, Settlement, Interaction
- A Smart Contract serves as a Single Data Source for Bond Data
- SBC builds on Top of Standards: **ICMA BDT** and **GFIF-Guidelines**

Potential

- A SBC-based Issuance can have a high Degree of **Automation**
- A **T+0 Issuance** enables flexible Refinancing
- A transparent and modular Design enables **flexible Adoption**

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The ‘Smart Bond Contract’ builds a functional Layer around ICMA BDT

– Redesign of the entire live-cycle of a bond: From **Issuance to Redemption**

– The Protocol consists of **modular Smart-Contract Plugins**:
  1. Process Governance through deterministic State Transitions
  2. Roles & Entitlement
  3. Storage and Processing of digitized Issuance Terms
  4. Tokenisation & Decentralized DvP (based on ERC-7573)
  5. Functional Subscription Pattern (based on ERC-6123)

– Builds upon **ICMA’s “Bond Data Taxonomy”** (BDT):
  – Digital Issuance Terms derived from ICMA BDT XML
  – Terms (partially) parameterize the Smart Contract

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Smart Bond Contract (SBC) as Digital 3rd Party and Digital Escrow

State Transitions

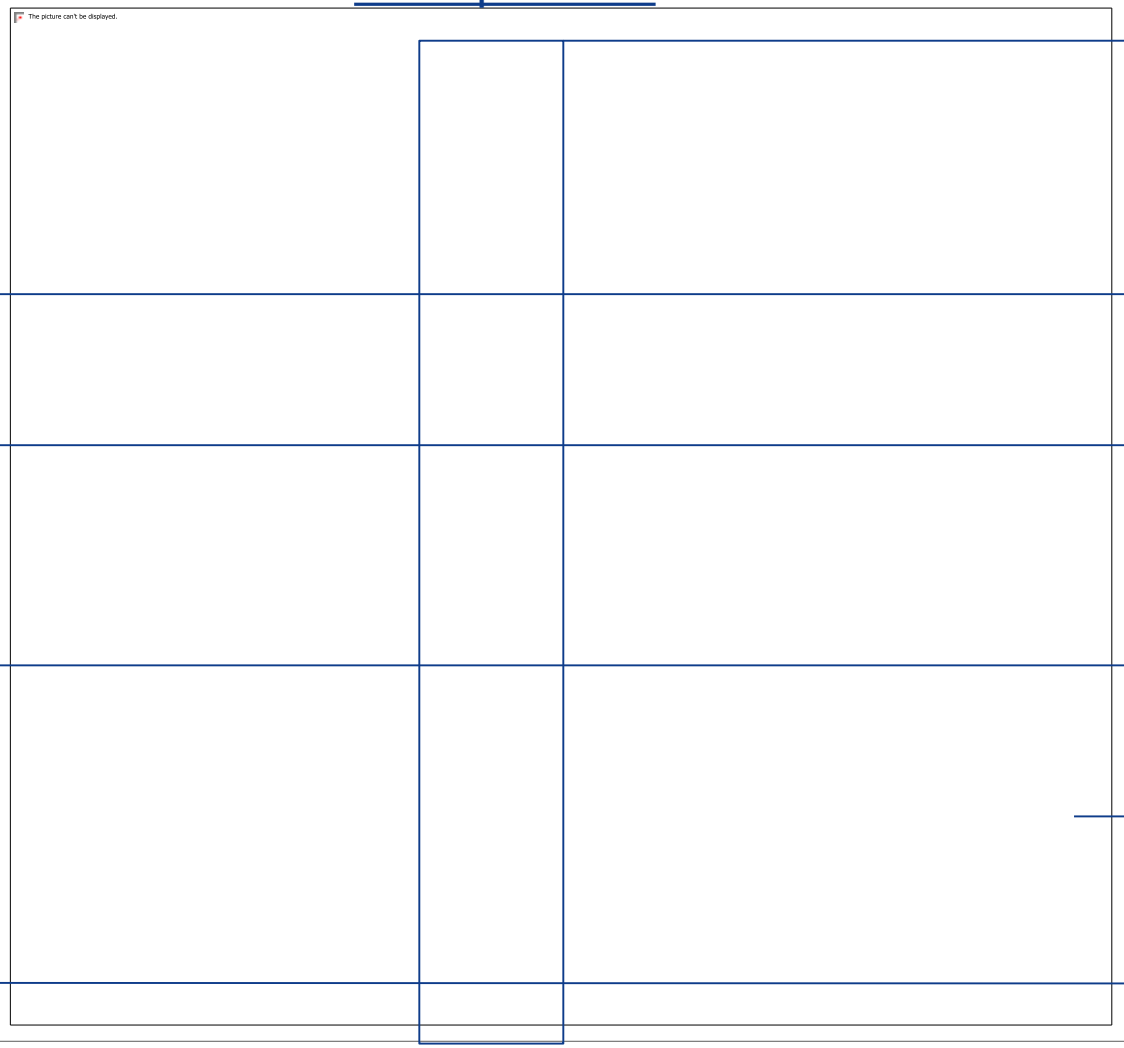
Inception Phase

Minting Phase

Settlement Phase

Settled

Example Flow



Smart Contract as Digital 3rd Party standardizes the interaction of the involved parties through a deterministic logic

Issuer places an offer after Investor has requested a quote

Minting can only be performed when Issuance Terms are finalized

Settlement can only be conducted after Token are minted

SBC act as digital Escrow by locking Tokens on its balance

After DvP has been performed successfully SBC is in State ‚Settled' waiting for next Trigger

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Smart Derivative Contract

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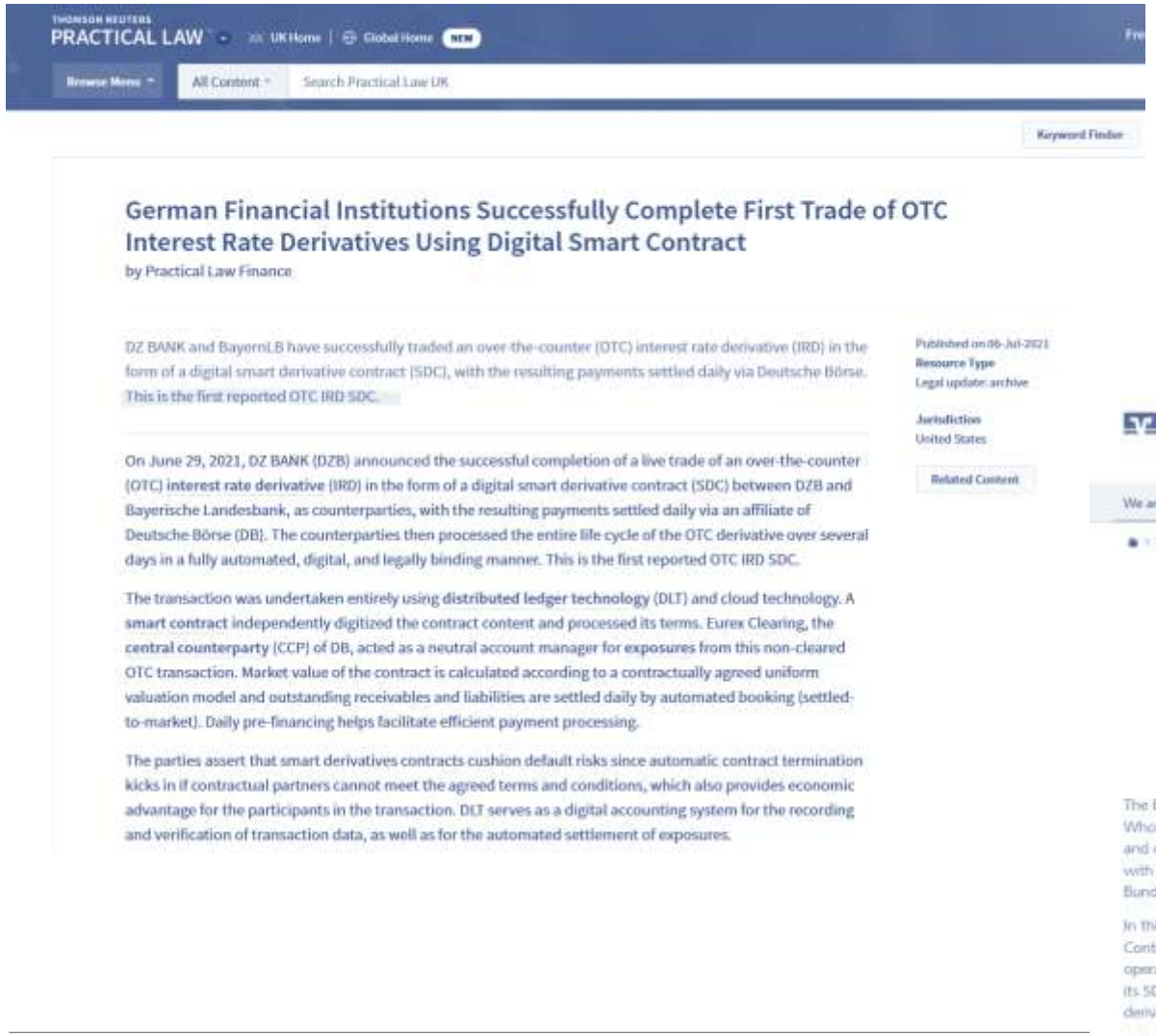
Smart Derivative Contract Realizations 2021 – 2025



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Keyword Finder

German Financial Institutions Successfully Complete First Trade of OTC Interest Rate Derivatives Using Digital Smart Contract

by Practical Law Finance

DZ BANK and BayernLB have successfully traded an over-the-counter (OTC) interest rate derivative (IRD) in the form of a digital smart derivative contract (SDC), with the resulting payments settled daily via Deutsche Börse. This is the first reported OTC IRD SDC.

Published on 06-Jul-2021
Resource Type
Legal update: archive

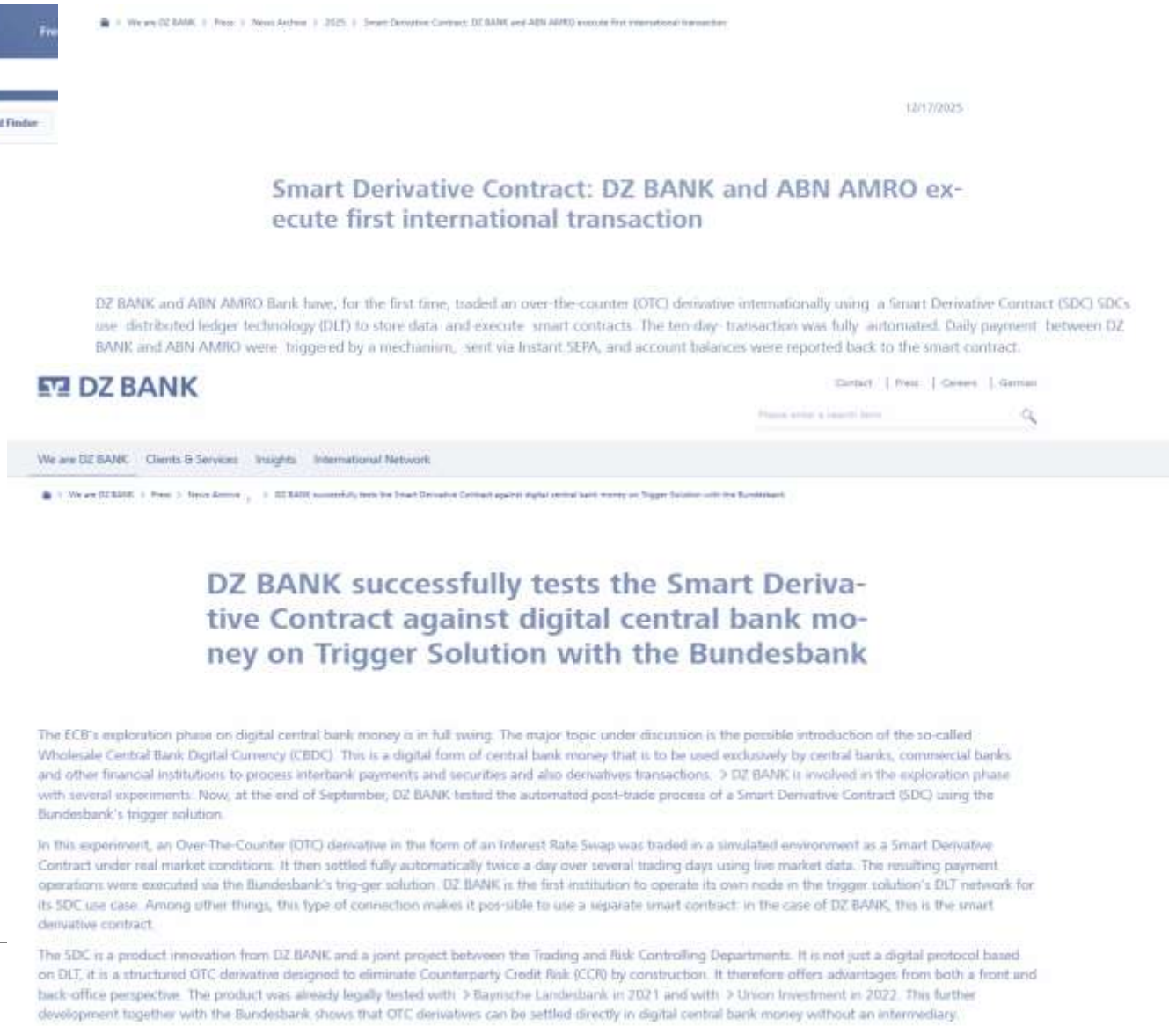
Jurisdiction
United States

Related Content

On June 29, 2021, DZ BANK (DZB) announced the successful completion of a live trade of an over-the-counter (OTC) interest rate derivative (IRD) in the form of a digital smart derivative contract (SDC) between DZB and Bayerische Landesbank, as counterparties, with the resulting payments settled daily via an affiliate of Deutsche Börse (DB). The counterparties then processed the entire life cycle of the OTC derivative over several days in a fully automated, digital, and legally binding manner. This is the first reported OTC IRD SDC.

The transaction was undertaken entirely using distributed ledger technology (DLT) and cloud technology. A smart contract independently digitized the contract content and processed its terms. Eurex Clearing, the central counterparty (CCP) of DB, acted as a neutral account manager for exposures from this non-cleared OTC transaction. Market value of the contract is calculated according to a contractually agreed uniform valuation model and outstanding receivables and liabilities are settled daily by automated booking (settled-to-market). Daily pre-financing helps facilitate efficient payment processing.

The parties assert that smart derivatives contracts cushion default risks since automatic contract termination kicks in if contractual partners cannot meet the agreed terms and conditions, which also provides economic advantage for the participants in the transaction. DLT serves as a digital accounting system for the recording and verification of transaction data, as well as for the automated settlement of exposures.



12/17/2025

Smart Derivative Contract: DZ BANK and ABN AMRO execute first international transaction

DZ BANK and ABN AMRO Bank have, for the first time, traded an over-the-counter (OTC) derivative internationally using a Smart Derivative Contract (SDC). SDCs use distributed ledger technology (DLT) to store data and execute smart contracts. The ten-day transaction was fully automated. Daily payment between DZ BANK and ABN AMRO were triggered by a mechanism, sent via Instant SEPA, and account balances were reported back to the smart contract.

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DZ BANK successfully tests the Smart Derivative Contract against digital central bank money on Trigger Solution with the Bundesbank

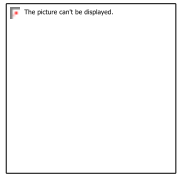
The ECB's exploration phase on digital central bank money is in full swing. The major topic under discussion is the possible introduction of the so-called Wholesale Central Bank Digital Currency (CBDC). This is a digital form of central bank money that is to be used exclusively by central banks, commercial banks and other financial institutions to process interbank payments and securities and also derivatives transactions. > DZ BANK is involved in the exploration phase with several experiments. Now, at the end of September, DZ BANK tested the automated post-trade process of a Smart Derivative Contract (SDC) using the Bundesbank's trigger solution.

In this experiment, an Over-The-Counter (OTC) derivative in the form of an Interest Rate Swap was traded in a simulated environment as a Smart Derivative Contract under real market conditions. It then settled fully automatically twice a day over several trading days using live market data. The resulting payment operations were executed via the Bundesbank's trig-ger solution. DZ BANK is the first institution to operate its own node in the trigger solution's DLT network for its SDC use case. Among other things, this type of connection makes it pos-sible to use a separate smart contract: in the case of DZ BANK, this is the smart derivative contract.

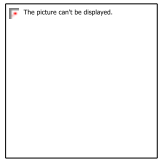
The SDC is a product innovation from DZ BANK and a joint project between the Trading and Risk Controlling Departments. It is not just a digital protocol based on DLT, it is a structured OTC derivative designed to eliminate Counterparty Credit Risk (CCR) by construction. It therefore offers advantages from both a front and back-office perspective. The product was already legally tested with > Bayrische Landesbank in 2021 and with > Union Investment in 2022. This further development together with the Bundesbank shows that OTC derivatives can be settled directly in digital central bank money without an intermediary.

Smart Derivative Contract: ‘Rethinking Financial Derivatives’: The SDC redesigns the Live Cycle as a Smart Contract

Digital Trade Data
Format defines all trade and process terms, can be stored immutably on DLT

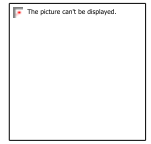


Valution Model
is part of the legal contract and determines calculation of the settlement amount



Settled-2-Market
procedure is based on a prefunding mechanism and removes existing collateral processes

Prefunding
is required and gets verified at the beginning of each settlement cycle. This guarantees settlement



Termination Feature
is based on pre-agreed fees reduces uncertainties and shortens the close-out period

No Contract Risk

No Disputes

No Collateral Process

No Counterparty Risk

No Close-Out Risk

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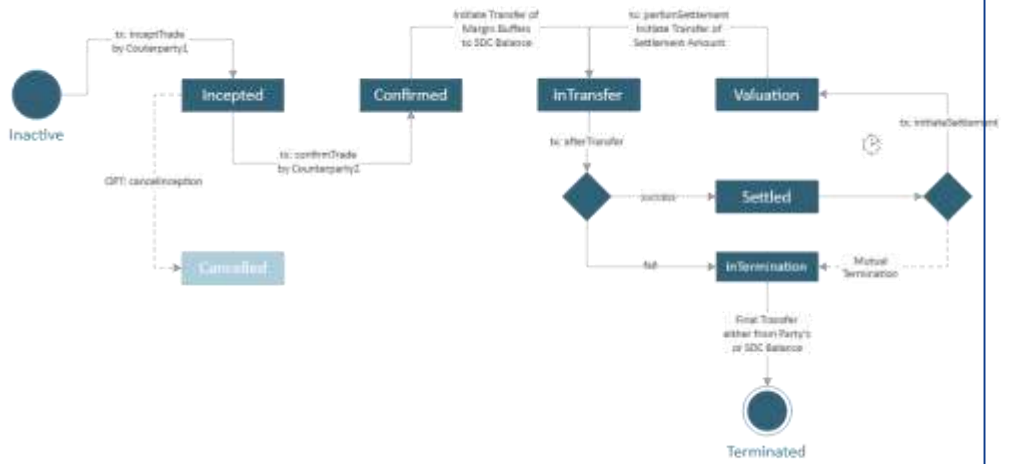
Product Innovation: Smart Derivative Contract (SDC)

Motivation

- OTC derivatives: Management of market risks (e.g. Interest Rate Swap)
- Settlement involves risks: **Counterparty Credit Risk** (CCR)

Deterministic settlement process



Innovation

- The SDC is a **new structured** derivative **without CCR**
- Complete **determinism** and automatable life cycle
- **Prefunding** of settlement – ideal: **tokenized central bank money**

Potential

- Derivatives can be **settled without intermediaries** via an SDC (use case: *derivatives in funds*)
- Trading parties can **reduce risks on both sides** and streamline processes (*collateral process*)
- DZ BANK is piloting the product **on a legally binding basis** and developing it further **in partnership** with market partners

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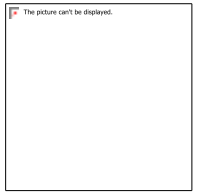
The SDC protocol utilizes the core features of smart contracts

The Smart Contract controls the post-trade process as a state machine

Prozess Determinism

SDC may operate with self-owned tokenized cash units in the event of failed settlement

Digital Escrow



SDC connects trading parties and service providers as a technical intermediary

Disintermediation

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