Proof of concept for the issuance, trading and settlement of tokenized investment products

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This paper looks in detail at a proof of concept for the issuance, trading and settlement of tokenized investment products completed in December 2022. The proof of concept was developed and carried out under the aegis of the CMTA, with the support of representatives of BX Swiss, Credit Suisse, Homburger, Lenz & Staehelin, METACO, Pictet, targens, Taurus, UBS and Vontobel.

Satoshi Nakamoto's whitepaper on the creation of a peer-to-peer electronic cash called „bitcoin" was published in 2008. Ever since, the financial industry has been looking for ways to use the distributed ledger technology in the capital markets. This effort was particularly sustained in Switzerland. In 2018, Switzerland's financial regulator, FINMA, was among the first to provide guidelines on the treatment of digital assets in financial markets. In 2020, the Swiss Parliament also stepped in. It approved an overhaul of the country's financial laws to better regulate digital assets.

Among the general public, much attention has been directed toward cryptocurrencies. But, for most of the finance industry, the main focus is elsewhere.

In 2018, the Capital Markets and Technology Association was created in Geneva. It was founded by Lenz & Staehelin, the law firm, Swissquote, the online bank, and Temenos, the producer of banking software solutions, with the support of the Ecole Polytechnique Federal de Lausanne.

The association's purpose is to develop standards for using the distributed ledger in traditional financial markets.

Today, it regroups more than 40 of the Swiss financial industry's key players, including banks, fintechs, exchanges, law firms and trade bodies. The CMTA has adopted standards on subjects such as the digitalisation of securities, the custody of digital assets, and their treatment under the Swiss anti-money laundering rules.

In December 2022, after more than a year of work, a group of CMTA's members carried out a proof of concept for the issuance, trading and settlement of investment products. The project involved three banks – Credit Suisse, Pictet and Vontobel – issuing investment products in the form of ledger-based securities, and trading them through BX Swiss, a Swiss regulated trading venue.

One of the main originalities of the test was that the trades executed on-exchange were settled bilaterally through the Ethereum blockchain in Swiss francs, without using cryptocurrency.

The significance of the proof of concept can be better understood by considering how securities are managed in traditional financial markets. Today, securities are held via custodians – mostly banks. Those banks in turn deposit the securities that they hold with central depositaries called CSDs. In Switzerland, the main CSD is SIX SIS, a company based in Olten. When an investor wishes to buy or sell a security, it generally gives a trading instruction to its bank. The buy and sell orders are communicated to a securities exchange, where they are matched to generate trades. Once agreed, the trades must be settled. This involves transferring the purchase price owed by the purchaser to the seller, and the securities promised by the seller to the purchaser. To achieve this, financial markets traditionally rely on centralized systems. The banks are part of a clearing system, usually operated by their national bank, which carries out the cash transfers. The system debits the cash account of the purchasing bank at the central
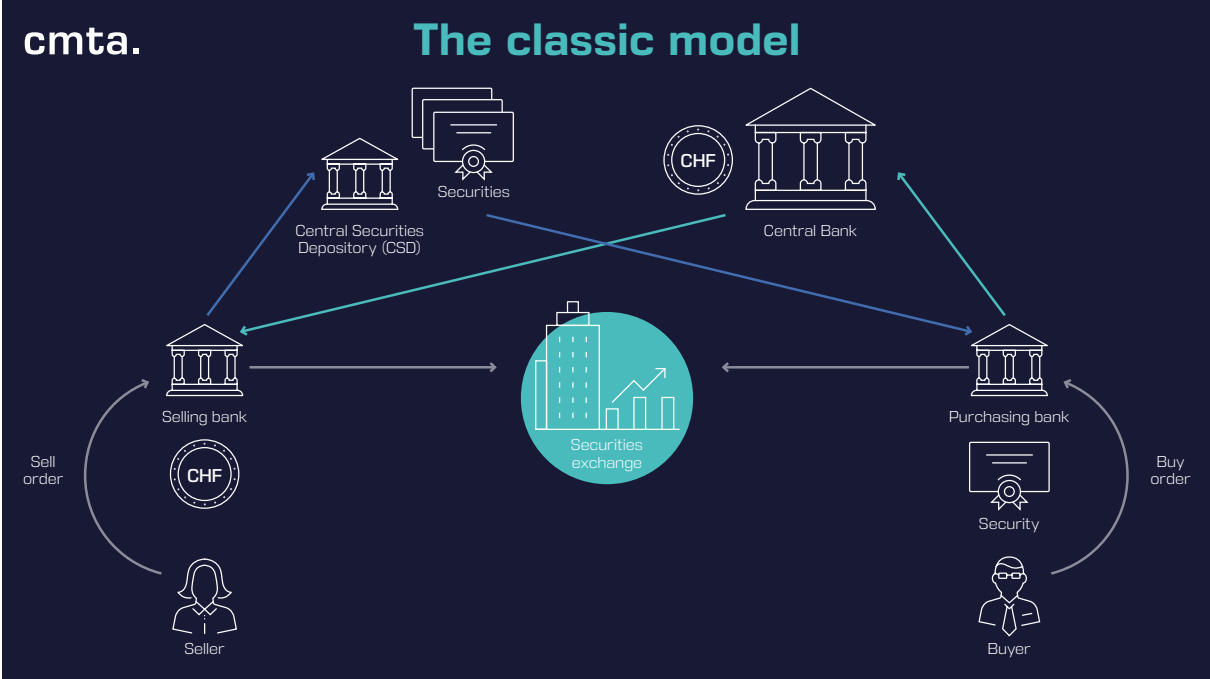
In traditional financial markets, securities are held via custodians (mostly banks) who deposit the securities they hold with central depositaries (CSD). The trade is settled through a centralized clearing system.

bank, and credits the cash account of the selling bank. The banks, in turn, debit and credit the cash accounts of their respective end clients. The same happens on the „paper side" of the trades. The CSD debits the securities account of the selling bank, and credits the securities account of the purchasing bank. The relevant banks, again, debit and credit the accounts of their respective end clients.

The situation is different in a blockchain-based market environment. Instead of a debit and credit of the participating banks' account at the CSD, the transfers are recorded directly on the blockchain, where they are validated by a community of participants by means of a consensus protocol. The securities are associated with digital tokens recorded on the blockchain to become what Swiss law calls „ledger-based securities". Under Swiss law, the ownership of these securities follows the digital tokens.

For the purpose of the proof of concept, the banks issued three investment products. Vontobel and Pictet each issued an actively managed equity certificate representing a basket of equities. Credit Suisse issued a structured note. These securities were associated with digital tokens, which were recorded on Ethereum's Sepolia testnet. The tokens were created using a modified version of the CMTAT, an open-source smart contract published by the Capital Markets and Technology Association.

The process for creating ledger-based securities has been known for some time, so the focus of the proof of concept was not the issuance of security tokens. Rather, the focus was on how trades in ledger-based securities can be settled. In other words, how the tokens can be transferred from the seller to the purchaser, while the purchase price is transferred from the purchaser to the seller.

There are several ways to achieve this result. The most commonly used consists in „pre-funding" the relevant trades. Pre-funding involves transferring both the security tokens and the cash to the exchange prior to each trade. Once a buy and a sell order are matched on the exchange and a trade is entered into, the exchange debits the cash account of the purchaser and credits the cash account of the seller. It does the reverse with the securities accounts of each party.

The downside of this is that both the cash and the securities must be transferred to the exchange in advance.

One alternative is to transfer the securities and the cash only after the trade has been entered into. This is more complicated though because the transfers of the securities and the cash must be synchronised. It is important to avoid a situation in which the seller transfers the tokens to the purchaser but does not receive the purchase price in return, or a situation in which the purchaser pays the purchase price but does not receive the tokens in return. In traditional capital markets, synchronised transfers are achieved through a „delivery-vs-payment" or „DvP" settlement. DvP is a process in which a security is only transferred upon simultaneous transfer of the purchase price.

If markets for digital assets are to develop, the DvP function needs to be created on the blockchain. This was a key objective of CMTA's proof of concept.

Replicating a DvP function on the blockchain is reasonably easy to do if the ledger-based securities are traded against a cryptocurrency. In that case, a smart contract can be used to swap the security token against the payment token. The transfer of the two tokens is simultaneous. None of the parties incurs a credit risk.

The situation becomes more complex when trades are to be settled in Swiss francs. There is currently no official Ethereum version of the Swiss franc. A payment in Swiss francs involves either transferring physical coins and notes or a transfer from one bank account to another. When more than one bank is involved, an interbank clearing system is needed. In Switzerland, this system is called the Swiss Interbank Clearing or SIC. It is operated by SIX by mandate of the Swiss National Bank.

Coordinating a cash transfer through the SIC system and a token transfer on the blockchain requires specific functionalities. In CMTA's proof of concept, this was achieved via an application called „DLT2Pay" from the German company targens and the use of a DvP smart contract.

The DvP smart contract was created by CMTA and makes it possible to swap tokens on the Ethereum blockchain.

CMTA benefited from the technical expertise of Taurus, a Geneva-based fintech, and the assistance of targens in this aspect.

With DLT2Pay, the purchaising bank issues (or "mints") a "Payment Order Token" (POT) on the blockchain, which contains a unique digitally represented payment instruction to the SIC system. Once a trade has been executed, the exchange communicates the details of the trade to each bank. Using DLT2Pay, the purchasing bank will issue a Payment Order Token. The Payment Order Token is minted or transferred on a ledger address controlled by the exchange, where it is held until completion of the settlement process.

The selling bank allows the transfer of security tokens representing the investment products to a ledger address controlled by the exchange.

address controlled by the exchange. If the allowance is insufficient, the trade is not settled and the Payment Order Token is deactivated. But if the allowance is sufficient, the security tokens are automatically transferred to a ledger address controlled by the exchange, where they are held in escrow until completion of the settlement process.

Once both the Payment Order Token and the security tokens have been transferred to a ledger address controlled by the exchange, the Payment Order Token is activated and its status on the blockchain is changed to „Payment Initiated". The DLT2Pay solution then conveys the payment instruction to the SIC system and the payment is processed as a regular SIC payment. Once the SIC system acknowledges the payment, the DLT2Pay solution triggers a new change to the Payment Order Token's status on the blockchain as „Payment Confirmed". Upon such event, the DvP smart contract releases the security token from escrow and transfers it to the pur-

chaser's ledger address. If for any reason the payment cannot be completed on the SIC system within 48 hours, the Payment Order Token is deactivated and the security token is returned to a ledger address controlled by the seller.

What does the proof of concept demonstrate? Many of the implications of this new way to issue and trade securities remain to be fully grasped. But the proof of concept demonstrates that it is possible to issue securities in the form of digital tokens, to admit ledger-based securities to trading on a regulated exchange, and to settle trades carried out on exchange in fiat currency on a peer-to-peer basis without any of the parties incurring a credit risk. The potential ramifications are deep and manifold. The proof of concept shows that the potential of digital assets extends far beyond cryptocurrencies, and has far reaching implications for the financial industry in Switzerland and abroad.
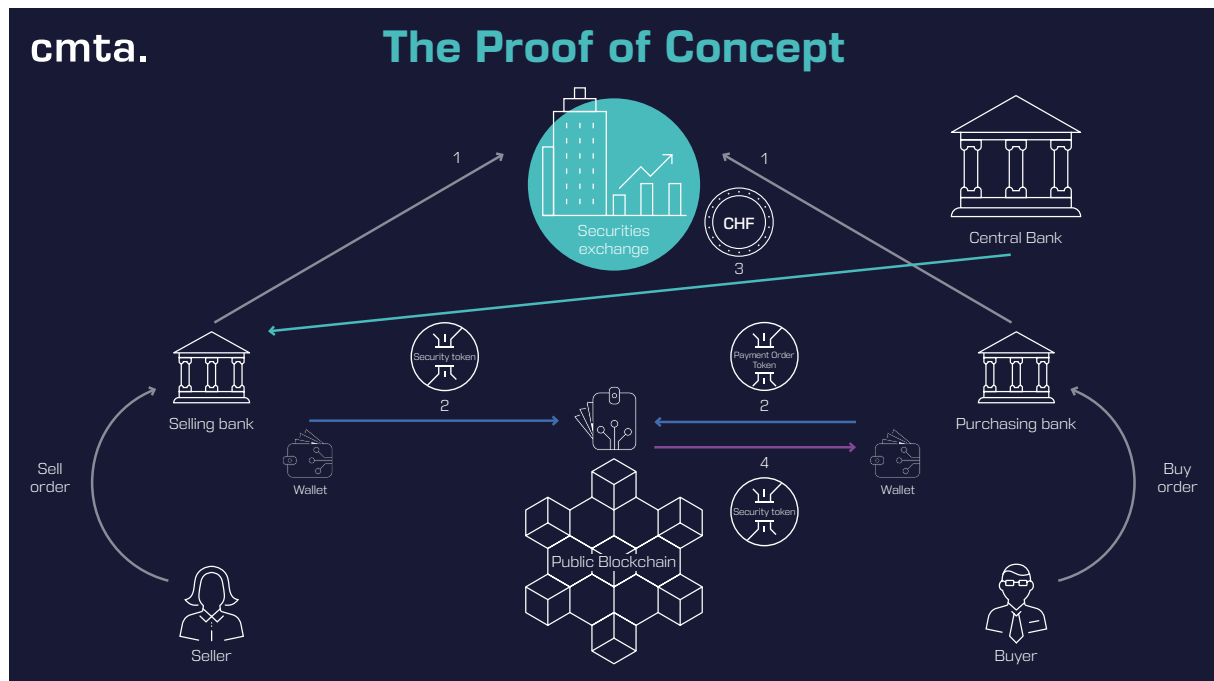
The proof of concept involves the issuance, trading and settlement of tokenized investment products. These three distinct operations all happened within hours, when they take days to unfold in a traditional financial environment.

About the Capital Markets and Technology Association

The Capital Markets and Technology Association (CMTA) is a not-for profit organization based in Geneva, Switzerland, which brings together experts from the financial, technological and legal sectors to promote the use of new technologies in capital markets. The Association provides a platform to create open industry standards around issuing, distributing and trading securities in the form of digital tokens using distributed ledger technologies. Created in 2018 by Lenz & Staehelin, Swissquote and Temenos with the support of the EPFL, it has today over 40 members representative of the Swiss and international financial industry.

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