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DIGITAL ASSETS – TOKENIZED REVOLUTION IN FINANCIAL SERVICES?

CURRENT DEVELOPMENTS & OUTLOOK FOR SWITZERLAND

DISCUSSION DOCUMENT
AUGUST 2019

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FOREWORD

The Swiss financial centre is currently in midst of a profound transformation. Because of the financial crisis, a tighten regulatory corset was imposed on the financial market players. In parallel digitalisation and new technologies have been accelerating competition and hence the structural change of the industry.

With such a cost and transformation pressure, several business opportunities are opening up for the financial services industry. Amongst other factors, Distributed Ledger Technologies (DLT), which enable new forms of digital transactions, offer a large potential, especially for the Swiss financial centre due to a benign jurisdictional environment.

In capital markets, the two main areas of use cases are 1) process improvements and leveraging DLT based solutions to more effectively share information amongst different parties involved, e.g. in the areas of trade finance, know your costumer (KYC) or corporate actions processing; 2) the universe around storage and transfer of value using a distributed ledger, i.e. the tokenization of assets and financial instruments.

Against this backdrop, the discussion document at hand attempts to pursue the following purpose (on high level):

- Introduce and categorize the concept of tokenized assets
- Outline an estimation on the market size and market potential
- Introduce and describe some of the most obvious business opportunities
- Summarize the anticipated regulatory developments and landscape
- Put tokenized currencies into perspective
- Articulate some of the main challenges ahead
- Contribute to the discussion on increasing the competitiveness of the Swiss financial centre

The paper in its initial version does not consider topics such as tax implications, e-identification, data protection and any other conditions or drivers in detail.

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1. INDUSTRY DRIVERS OF CHANGES

For years now, the financial services industry has been undergoing dramatic changes. With the financial crisis around a decade ago being the major impulse, we have seen increasing regulatory activity, declining interest rates, decreasing profit margin in investment management and substantial **advancement in disruptive technologies**. On top of that, there are also changing client and investor needs. Approaching 2020 and beyond, clients will demand evermore highly customized and easily accessible digital solutions as well as a diverse and especially cost-efficient offering of products along all asset-classes. More generally speaking, the financial industry has started to move from a capital-intensive to a more **technology-intensive market model**.

2. BLOCKCHAIN ON THE RISE

For many organizations, becoming the disruptor rather than the disrupted begins with a fundamental shift in attitude toward disruptive technologies. Figure 1 provides a shortlist of the new technologies leading companies work with most intensely.[1]

Among the new technologies, **Blockchain** and Distributed Ledger Technologies (DLT) are among the most ground-breaking inventions for the financial services industry, fundamentally driving new business models, service offerings and value propositions.

Distributed Ledger Technologies and its subset of applications with its mechanisms for consensus, decentralization, cryptography and immutability, adds new layers of trust and security to the world of digital interconnectedness.

EXTENDED REALITY	Interactive experience software that blends, overlays, or replaces true reality with virtual ones. Encompassing Virtual Reality, Augmented Reality, and Mixed Reality.
CLOUD COMPUTING	Distributed computing model wherein a third party provides Software, an IT infrastructure, a Platform, or other resources virtually and at scale.
3D PRINTING	A process of additive manufacturing wherein 3D objects are printed layer by layer. This can enable Rapid Prototyping and innovations in materials, enabling 4D printing.
HUMAN-COMPUTER INTERACTIONS	Sensing technologies that enable more natural interactions between humans and computer including Gesture Recognition and Brainwave Mapping.
QUANTUM COMPUTING	In classical computing, a computer runs on bits that have a value of either 1 or 0. Quantum bits can hold much more complex information, or even be negative values.
EDGE & FOG COMPUTING	Edge and Fog Computing are methods of optimizing cloud applications by taking some portion of an application, its data, or services away from one or more central nodes.
ARTIFICIAL INTELLIGENCE	Algorithms that imitate human intelligence, reasoning, and decision making, and improve over time. New branches include Bayesian and Swarm AI, as well as AutoML, which automates production of AI applications.
INTERNET OF THINGS	Ecosystem of sensors and analytics that monitor condition and performance of physical assets. New applications include Digital Twins, Smart Dust sensors, in IoT-specific Cybersecurity.
BLOCKCHAIN	Distributed ledger with timestamped verified changes. Useful applications include asset tracking, document management, payments, and smart contracts.
SMART ROBOTICS	Robots that combine traditional robotic capabilities with sensors, computer vision, and intelligences, which enable new capabilities, such as Collaborative Robotics, Autonomous Vehicles, or Swarm Robotics.

Figure 1: New technologies

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Networks are becoming "trustless", allowing multiple stakeholders to confidently and securely share access to the same set of information.[2]

The rise of **Cryptocurrencies** based on distributed systems over the past years already illustrated the enormous potential of Blockchain in the financial industry – and many predict even more to come. With the recent bull-run on Cryptocurrencies and Bitcoin reaching new heights after its peak in December 2017, the announcement of Libra, Facebook's attempt of a digital world currency and some central banks exploring digital fiat currencies, Blockchain again gained new momentum in 2019 after a period of consolidation, innovation and building improved use cases in the year before.

3. DIGITAL ASSETS AND TOKENIZED WEALTH

In financial markets DLT play two key roles: Firstly, they are used as a tool of shared information and trust to **enable more efficient and effective processes** (such as know your customer (KYC) etc.) and second, the focus of this discussion document, **Digital Assets**. Those virtual, digital **tokens** represent a form of economic resource with attached tangible or intangible value *(cryptocurrency, utility or underlying security*) and can be produced and transferred as defined in its underlying distributed ledger network.

The centre of attention is all around the digitalization of assets, also called tokenized assets

In this context, **tokenization** is the enabling process of taking an asset (such as a security or another specific form of information) and creating its digital representation on the Blockchain including information on its ownership. This guarantees the immutability of information and allows for increased accessibility, liquidity and tradability via the Blockchain's protocol.

CRYPTOCURRENCIES
"KRYPTOWÄHRUNGEN" OR "ZAHLUNGS-TOKEN"

- Payment function, therefore also known as payment token
- No claims or rights against emitters or 3rd parties
- Can be produced via "mining"
- Examples: Bitcoin, Ether, Monero

UTILITY TOKEN
"NUTZUNGS-TOKEN"

- Confers rights to access, use or participate in blockchain-based (decentralised) applications or ecosystem
- Examples: Augur, DAV

ASSET TOKEN
"ANLAGE-TOKEN"

- Also known as "Security Token" or tokenized assets
- Rights against emitters / 3rd parties (e.g. participate in profit or revenues, membership rights, derivative rights)
- Underlying securities: equity, debt, derivatives, funds, currencies, real estate etc.

Figure 2: Digital Asset categories based on FINMA view

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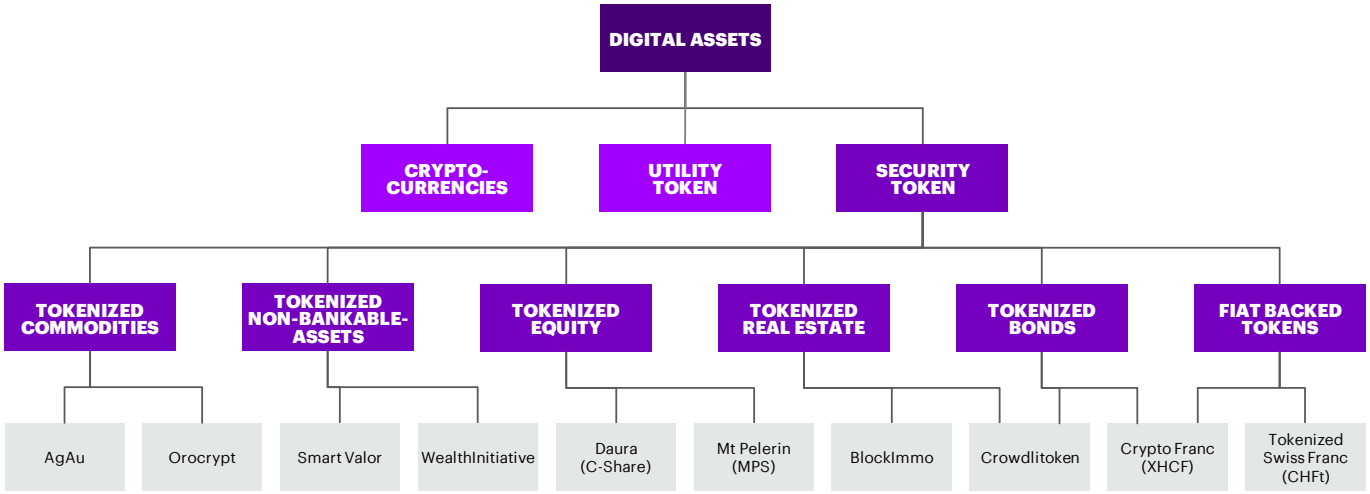

Figure 3: Tokenized securities categories and use case examples in Switzerland (non-exhaustive)

Tokenisation entails a variety of benefits such as **fractional ownership**, **instant settlement of a trade or transfer** or **instant valuation**. Further, Tokenization enhances flexibility and fungibility of assets and enables for example, in the context of Wealth Management, a more holistic view across all its underlying asset classes.

Cryptocurrencies and utility tokens are a form of a Digital Asset. However, being the centre of attention, we focus on asset-backed digital coins or tokens (security tokens), also called **tokenized assets**. Security tokens are legally binding **blockchain-based investment contracts**. Depending on its design they can be equipped with various property/ownership **rights** such as dividends, shares- or voting-rights. Basically, everything that represents enforceable ownership in a financial instrument or a physical asset. Figure 2 shows the categories of digital assets based on the categorization of FINMA.[3]

Against the backdrop of this categorisation, Figure 3 shows some examples and use cases of security tokens and respective service providers, focusing on Switzerland.

4. HANDLING OF DIGITAL ASSETS

When dealing with digital assets, new rules apply. The ownership of digital assets is represented by a set of **two cryptographic keys**: A **public key** and a **private key**.

The public key (and its representative address on the blockchain) can be thought of as the bank account (and the account number). The private key on the other hand, stands in this analogy for the secret PIN to access the bank account and is used to prove ownership of an address and to authorize transactions with digital signatures.

Private keys are stored in **wallets**, which come in many forms. They can be generally differentiated in "hot wallets", which are connected to the internet while the decoupled "cold wallets" are not. "Hot wallets" are like checking accounts while "cold wallets" could be compared to a safe deposit box.

Wallets can be embedded in a piece of hardware (e.g. Hardware Security Modules or a simple flash drive), can be part of a software solution or one could even write down his/her private key on a piece of paper and place it in a vault.

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5. MARKET POTENTIAL - BUILT FOR THE FUTURE

Several market studies and surveys predict huge potential and growth for Tokenization: According to a survey by the World Economic Forum the amount of assets being digitized on the blockchain will be up to **10% of global GDP** in 2027.[4]

Another research then projects tokenized market volume of **USD 24 trillion** (Figure 4) and indicates that initially Tokenization will start with having an impact on **institutionalized issuing products** such as equities and bonds. The substitution of the conventional IPO with a **STO** (Security Token Offering) or an **IDO** (Initial Digital Offering), will benefit from the overall **lower issuance and trading costs**.[5]

A second phase will cover the tokenization of smaller, more illiquid and non-fungible resources such as shares of small and medium sized enterprises or real estate. Later, leveraging the attributes of blockchain, the tokenization of **non-bankable assets** will bring cars, wine, fine art and other collectibles, previously illiquid and accompanied by high transaction costs assets to the markets and make them accessible for more investors.

Some open questions regarding the whereabouts of the nowadays "normal" financial assets in the market remain. How and when will they be tokenized and what would be the driver for this change? How will a medium-term transition phase look like and how long will it take? How will a parallel setup of the present and future market infrastructure be embellished?

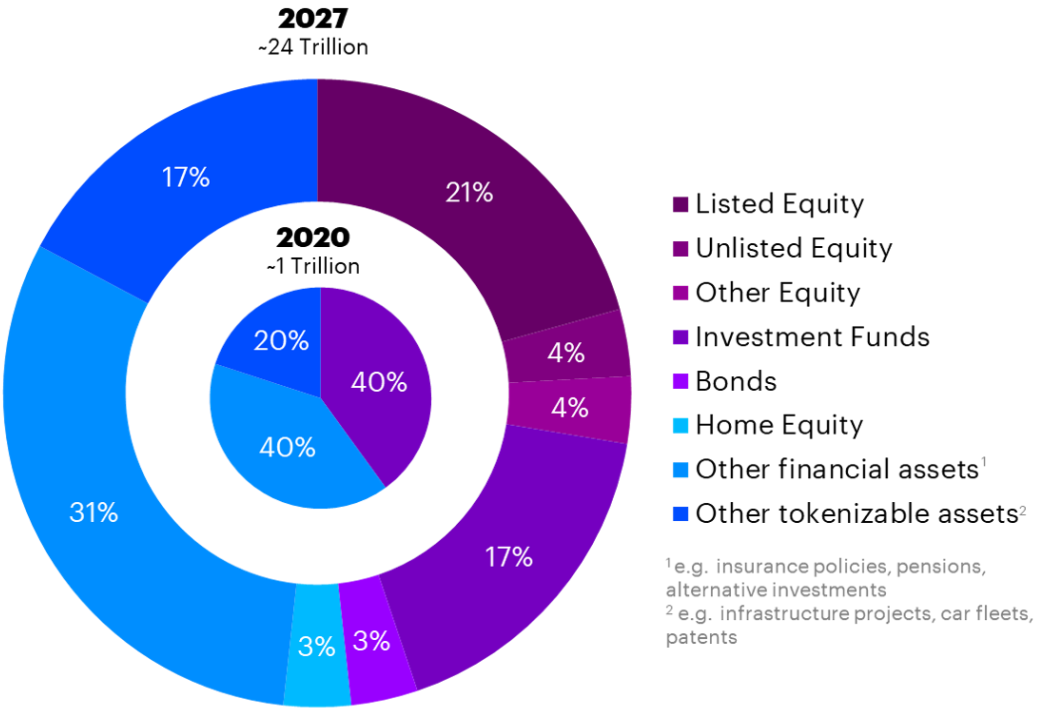

Figure 4: Projected tokenized market volume (in USD), not to scale

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6. BUSINESS OPPORTUNITIES

The Digital Asset value chain is unlike the current system. New business opportunities sound familiar, but require **different capabilities and concepts** for institutions and investors.

Access to digital assets is somehow physical, since owning the private key means owning the asset. This implies a need for **new approaches** when it comes to the three main business areas issuance, trading and especially custody services.

6.1 ISSUANCE SERVICES

One of the main business areas and the start for every business process in this context, is the issuance of tokenized assets, meaning the tokenization of any bankable or non-bankable assets. Tokenization service providers need to provide **technical solutions** that are well aligned with the **regulatory requirements**.

A potential use case, with the purpose to tokenize real estate or a non-bankable asset using a special purpose vehicle is sketched in Figure 5 below.

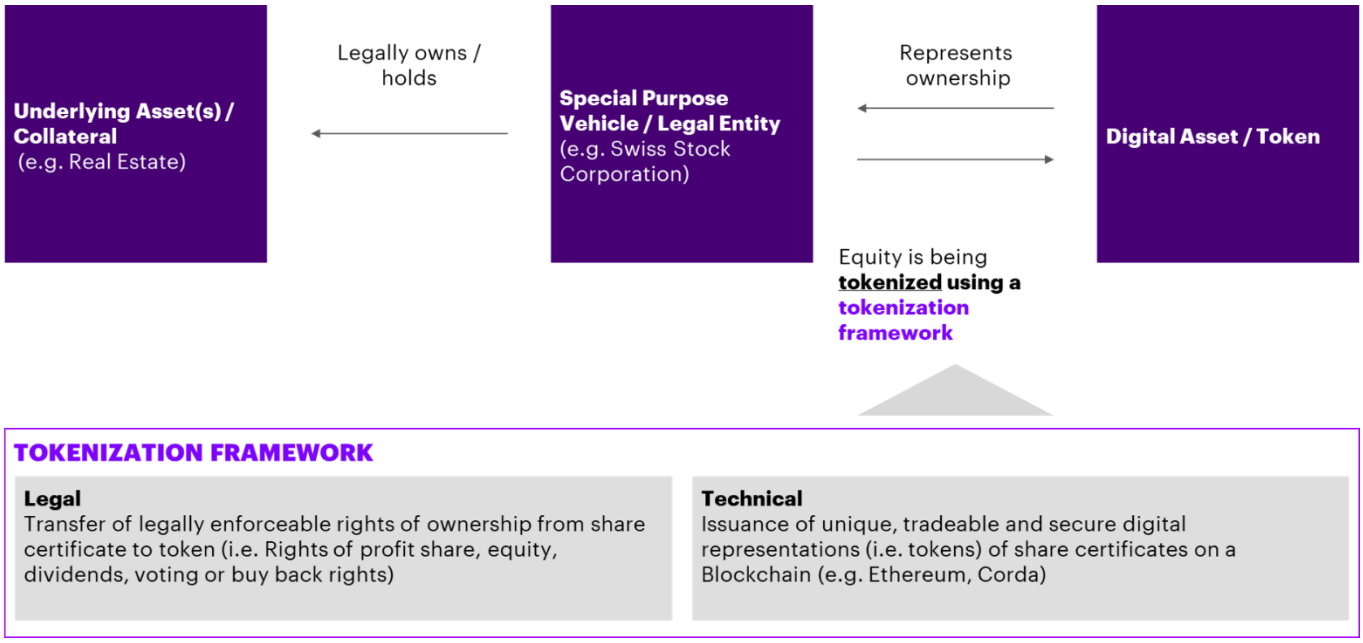

Figure 5: High-level tokenization mechanics (example)

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For this, the shares of a legal entity owning real estate could be tokenized using a respective framework consisting of legal and technical aspects, giving investors fractional ownership of an otherwise inseparable asset, the underlying real estate.

Ultimately – in the future of tokenized assets – (almost) **everything can be tokenized**. The possibilities are endless and issuance agents will need to perform new processes when creating new financial products on the blockchain and carefully assess their client's needs. As a current market example, there are players like Daura and Sygnum joining forces with Deutsche Börse and Swisscom to focus on the issuance of security tokens. This approach reduces administration and transaction costs significantly and enables a straightforward and cost-efficient access to the capital market enables for small- and mid-sized enterprises (SME).

With evolving regulations, as outlined in chapter 7, there might be new frameworks to directly issue digital shares in form of digital tokens with new legal forms and new ways and means to evidence investors' rights.

6.2 INFRASTRUCTURE AND TRADING

There are initiatives underway which build a regulated and reliable digital infrastructure, where digital assets can be processed in a highly efficient manner.

The trading area offers business opportunities for (A) market infrastructure services and (B) the broker/ dealer / bank business.

(A) Existing exchanges have the highest potential to grasp a significant market share in the digital asset space. The key advantages they bring to the table are regulatory compliance, an established clientele, a strong brand value and a track record in exchange services. Simply put, exchanges need to build a **new digital infrastructure** only. However, there will be challengers entering the market trying to disrupt the incumbents by differentiating through cutting edge technology and agile business models. Still, those players need to overcome the advantages of the existing exchanges to become a significant competitor in this space.[6]

(B) As shown in Figure 4, the non-listed equity trading business will increase offering opportunities for broker/dealers. One can think of **new marketplaces and exchanges** specializing in trading of tokenized equities of SMEs or tokenized non-bankable assets. This in turn leads to lower costs and improved processes, offering an enlarged investment universe to a broader range of investors.

There are already different marketplaces being established around the globe specializing on various kinds of digital assets. In Switzerland, the race for a tokenized asset exchange has started, with SIX announcing the fully compliant and regulated SIX Digital Exchange (SDX) (A), the decentralized Security Token Exchange and Smart Valor aiming for market share (B). Not to forget about the "new exchanges", the global players" (B) such as Coinbase, Binance and Latoken seeking to comply with soaring regulatory requirements to trade tokenized securities.

The picture below shows the shift from the traditional trading model to the **digital model** with peer to peer transactions without counterparty risk, smart contracts, and overlapping networks of value.

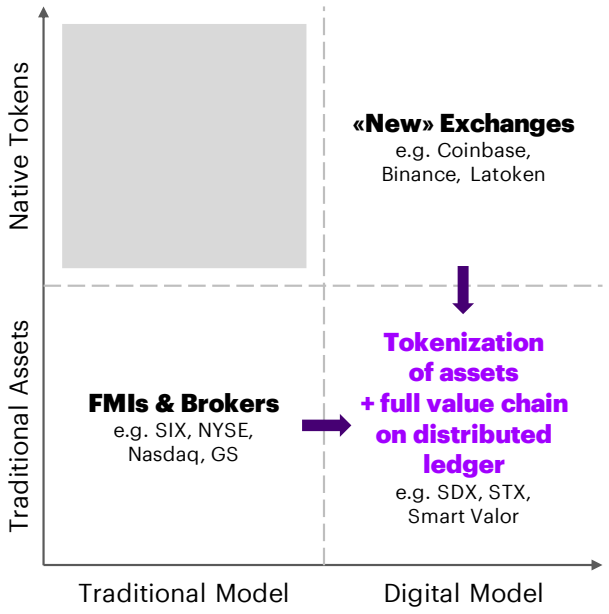

Figure 6: From traditional model to new digital model[7]

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6.3 CUSTODY SERVICES

When speaking of safekeeping, clients might prefer their private keys being handled by the bank, wealth- or asset manager of their trust instead of their private wallet solutions.

While **safeguarding** Digital Assets, institutions and service providers may choose between custodial exchanges, third-party custodians and self-custody. While custodial exchanges have the advantage of direct market access, there are open questions about regulatory matters and security risks. Third-party custodians having asset protection at the core of their business and providing audited solutions could offer a valid alternative to self-custody.[8]

Eventually, institutional grade tokenized asset custody solutions or wallets for a large audience of clients, comprising of an invulnerable security setup including **Hardware Security Modules (HSM)** as well as multi-signature access- and transaction-approval management, will be required to take over a leading position in this space and satisfy investors' demand for security.

As it is deemed important to have seamless integration into the clients' digital experiences and as well in the institutions' backends, custody solutions with **smart interfaces** to existing solutions and processes will be preferred by Swiss asset- and wealth managers.

6.4 FURTHER BUSINESS OPPORTUNITIES

Over and above the previously mentioned opportunities there are countless possibilities to take part in the Digital Asset and especially tokenized asset space. Wealth and asset managers must assess their clients potential demand in the "new world" and how they would **leverage Digital Assets properties** to offer products and services that serve those needs.

In the context of Digital Assets, clients will for example ask for high-secure storage solutions, faultless IT security and extensive risk management. Further, clients will demand automated and simple asset services such as reports on asset holdings, tax statements and delegation of technical activities such as corporate actions.

In this context one should further think about all non-core supporting services, such as reporting solutions, data feed solutions and Digital Assets servicing and further, any new financial products, just as new structured products, Digital Asset based funds, indexes and derivatives.

Tokenization of currently non-bankable assets could also provide for a more comprehensive view on a client's total wealth and enable better risk profiling and investment advice such as impactful, life-goal based investment advisory.[9]

Further, tokenization of assets will facilitate for example Lombard-lending along all asset classes, as the collateralization is much easier by simply providing the private keys to the custodian.

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7. TOKENIZED CURRENCIES

To grasp the full potential of digital assets, it is important to look at the cash-side of a digital securities transaction. A tokenized asset is exchanged for a medium of payment and thereby settling the trade with finality. A digital asset ecosystem would naturally be complemented by a tokenized currency as such a medium of payment. This allows for transactions in digital assets to happen based on a token-for-token swap, also called atomic swap, achieving instantaneous or atomic settlement.

To this end, a growing number of fiat-backed tokenized currencies – also called stable coins – have lately been issued by commercial banks, international corporations and FinTechs. However, the application of such stable coins carries some risks such as counterparty risk, FX exposure, problems regarding customer protection and the safety of payment systems, and – ultimately – financial stability. One way to tackle these risks would be the issuance of tokenized legal tender currencies through central banks, so-called **Central Bank Digital Currencies** (CBDC). Thereby a central bank would offer central bank money for participants on token-based exchanges in exchange for reserves – another central bank liability. In an initial step, it would only be issued to entities with a central bank reserve account – i.e. mostly large commercial banks. Widening the recipients of CBDC to other corporates or even retail clients is an interesting scenario but brings along caveats regarding the implementation of monetary policy, exceeding the scope of the paper at hand.

Besides mitigating most of the above-mentioned risks of tokenized currencies with commercial origin, CBDC offers further benefits: It guarantees transaction transparency and enhances new oversight capabilities, reduces frictions and transaction costs in cross-border payments, and offers an alternative channel for central bank liquidity.

As a recent BIS survey among 63 central banks shows, 70 percent are either currently working or will soon be engaged in work on CBDC. This includes conducting conceptual research on the matter, sharing studies and views of developing a "common understanding of this new field of study".

According to the report, half of the respondents have moved to more "hands-on" proof-of-concept activities in order to test new technologies and their potential.[14]

For example, the Monetary Authority of Singapore started project Ubin to explore the use of DLT for the clearance and settlement of payments and securities via tokenized Singapore dollar.

Private institutions are moving ahead by already **tokenizing fiat currencies**. Swiss Crypto Tokens, for example, already brought the Swiss Franc on the blockchain with the "Crypto Franc" (XHCF) and earlier in 2019 JP Morgan announced the "JP Morgan Coin" a digital coin representing collateralized US Dollars held in designated accounts.

Furthermore, Facebook recently launched the **Libra association**, a non-profit foundation out of Geneva and released a white paper outlining Libra, a digital currency backed by a basket of low-volatility assets, including bank deposits and government securities in currencies from stable and reputable central banks. Other major firms such as Paypal, Mastercard and Stripe, just to name a few, joined forces in this attempt to establish a global financial infrastructure. Calibra, a subsidiary of Facebook manages the cryptocurrency's development and its wallet solution.[15]

New types of currencies are in demand and – even though they are not yet a threat to central bank money as we know it today – show the need for innovation in this centrally controlled, monopolistic area. In short, central banks need to move forward to keep their currencies relevant as a legal tender.

After all, the obvious dependency to CBDCs or other standardized digital fiat currencies should not keep institutions from getting involved. One could work on issuing their own digital currency or exploring the field using existing providers. Most importantly, banks must start now converging with the subject, work under assumptions, be flexible and ultimately be prepared to **incorporate evolving standards** quickly.

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8. REGULATORY DEVELOPMENTS IN SWITZERLAND

The so called "**Crypto Valley**" in Zug, a hub of more than 800 blockchain-related start-ups, service providers and other organizations is on the one hand influencing – and on the other hand, a result of the progressive regulatory landscape in Switzerland.

In December 2018, the Federal Council has announced in its report to further improve the conditions for Switzerland to **take advantage** of the opportunities offered by digitization and DLT. It targets to create the best possible framework conditions, so Switzerland can develop and establish itself as a leading, innovative and sustainable location for rising fintech and blockchain companies.[10]

To be mentioned is also the law on intermediated securities (Bucheffektengesetz) in Switzerland, wichallows security token to be recognized as a value right at all. This principle distinguishes the Swiss law strongly from the surrounding countries.

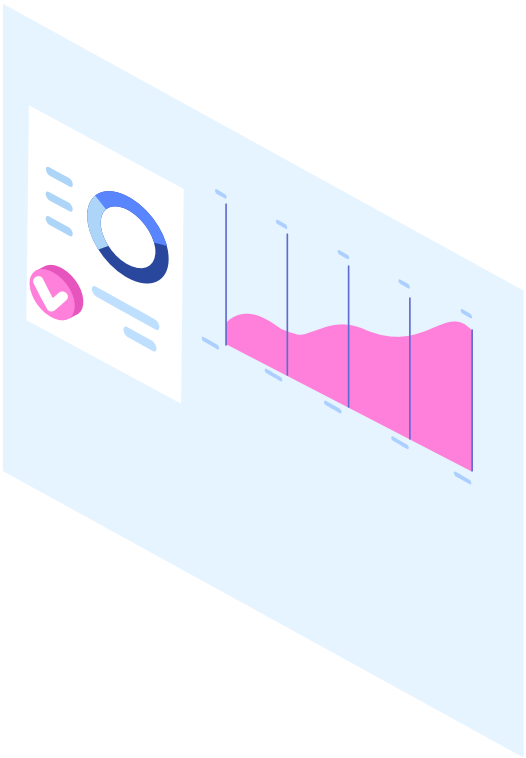
A specific regulation covering all aspects of Digital Assets is missing and therefore the laws in place apply to regulate the Swiss financial market: OR, BankG, BEHG, FinfraG, KAG, GwG, FINMAG, FIDLEG and FINIG among others. To give an example, Cryptocurrencies ("virtual currencies") are defined as money and securities transactions and therefore fall under the Swiss anti money laundering law. So far, the **FINMA** has issued the mentioned **guidelines**, with a differentiation between Cryptocurrencies ("Kryptowährungen"), Utility Token ("Nutzungs-Token") and asset tokens ("Anlage-Token"). However, a circular ("Rundschreiben») or even a regulation ("Verordnung") is still outstanding.

A preliminary draft on the adaptation of federal laws to developments in the Technology of distributed electronic registers has been submitted and just finished its review by various stakeholders (Vernehmlassung).[11] In this consultation proceedings period, the cantons, political parties, associations and other interested parties had the possibility to provide their input and feedback – the public discussions around suggestions for further refinements are already ongoing and final results are expected later.[12]

The currently non-approved proposal "adaptation of federal laws to developments in the Technology of distributed electronic registers" forces established players as well as start-ups to work under a certain degree of uncertainty. At the same time. this challenge can be an opportunity: A healthy risk appetite combined with a thorough analysis of options and a drive to advance is inevitable when having ambitions to be relevant for what is to come.

Also, with Switzerland being frequently mentioned at the **forefront of adoption of Blockchain**, this is a real location advantage for Swiss banks, WMs and AMs, boker, dealer and market maker over their global peers.[13]

Now is the time to become active, to join in and to move ahead while exploring use cases around the new technologies.



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9. CHALLENGES – GROWING WITH THE TASKS

Tokenized assets are not exempted of (practical) challenges and open questions:

- Which standards will be established? (DLT, smart contracts etc.)
- What happens to a tokenized asset if the underlying collateral is stolen or destroyed?
- How is shared ownership and shared usage of a non-bankable digital asset realised and organised?
- How will interoperability of different Blockchains be ensured?[15]
- How will concerns about security issues (i.e. recent news about hacked crypto exchanges) be answered?
- How to deal with operational errors in context of immutability (i.e. the fact, that one can't reverse a transaction made on a blockchain)?

10. NEW MARKET PARTICIPANTS

In the new space around tokenized assets, traditional and new players (e.g. BigTech, FinTechs etc.) are competing for market share. Whereas one has, what the other one does not (e.g. money, clients, established brand, technology), means of collaboration (or competition) are needed.[16]

Established institutions need to carefully asses their **approach towards FinTechs** as well as new technologies. Following some initial questions to examine: Make or buy? Compete or collaborate? Cooperate or integrate? Strategic venture investment or partnership? Ecosystem participant or ecosystem orchestrator?

The advent of Digital Assets is a "Kodak moment" for the financial services industry

Blockchain is all about collaboration and when speaking about blockchain, **consortia** must be mentioned. Driving a use case or the development of a common blockchain together with like-minded peers is beneficial for all. But, blockchain is also global and one faces global competition.

In the financial industry there are consortia in Trade finance (Marco Polo, we.trade, Komgo), around shared KYC procedures, certification & qualification management as well as anti-fraud. Another example is BankChain, a community of banks for exploring, building and implementing blockchain solutions.

Switzerland is in a good starting position to become **leading in a global context** and setting standards, which eventually get adopted by a majority.

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11. LEADING IN THE NEW

In the age of tokenized assets completely new capabilities, new technologies and new approaches become necessary. It is a great **opportunity** to make a difference and to lead in the new space – for everyone, established incumbents and newcomers alike. It is clear that being established in the "old world" may be an advantage, but certainly no guarantee to stay relevant in the "new world". The advent of digital assets is a Kodak moment for the financial services industry (when your industry changes on your head because you did not see or act in time to the changes coming and become irrelevant for your clients and the market).

As highlighted in the previous chapters, all players of the financial services industry must decide **which role** they want to seize, and which approach they want to take, especially when dealing with start-ups and newcomers.

Tokenized assets enabled by Distributed Ledger Technologies unify intermediaries on the capital market and reduce costs for issuers and investors due to optimized issuance, distribution, trading, instant settlement and automated lifecycle management.

Future clients, such as millennials and generations to come, have shown a great interest in Blockchain / DLT and perceive banking services as a **commodity**. For them, it is all about "anything, anytime, anywhere". Services must be instant, flawless and at an attractive price.

At the end, laser-focused **client-centricity** combined with a relentless **innovation-attitude** and lean-agile processes and operations will make a difference when market players adopt tokenized assets.

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LIST OF ABBREVIATIONS

AM	Asset Manager
AML	Anti money laundering
BankG	Bundesgesetz über die Banken und Sparkassen
BEHG	Bundesgesetz über die Börsen und den Effektenhandel
BIS	Bank for International Settlements
CBDC	Central bank digital currency
DLT	Distributed Ledger Technologies
FIDLEG	Bundesgesetz über die Finanzdienstleistungen
FINFRAG	Bundesgesetz über die Finanzmarktinfrastrukturen und das Marktverhalten im Effekten- und Derivatehandel
FINIG	Bundesgesetz über die Finanzinstitute
FINMA	Eidgenössische Finanzmarktaufsich (Swiss Financial Market Supervisory Authority)
FINMAG	Bundesgesetz über die Eidgenössische Finanzmarktaufsicht
GDP	Gross domestic product
GwG	Bundesgesetz über die Bekämpfung der Geldwäscherei und der Terrorismusfinanzierung
HSM	Hardware Security Module
IDO	Initial Digital Offering
OR	Obligationenrecht
KAG	Bundesgesetz über die kollektiven Kapitalanlagen
KYC	Know your costumer
SDX	Swiss Digital Exchange
SME	Small and medium-sized enterprises
STO	Security Token Offering
WM	Wealth Manager

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