CRYPTO-ASSETS

UNLOCKING CRYPTO-ASSETS POTENTIAL: A CRITICAL ANALYSIS AND VALUE PROPOSITIONS

SOMMARIO

EXECUTIVE SUMMARY

We are living in a **digital revolution era**, where **innovation** and **new technologies** are transforming the way we communicate, work, produce and consume. **Distributed Ledger Technology (DLT)** together with **crypto-assets** are **very promising technology** that might lead to a significant **modernization** for the **financial eco-system**, with crucial impact on the whole **banking sector**. The financial community is totally aware of the **huge on-going opportunity** and every day there are new initiatives exploring the potential of this new disruptive technology.

The **crypto-asset** world is **rapidly evolving**. According to Citigroup[1], the **value of tokenized assets** could reach **USD 4-5 trillion by 2030**. For the same period, Roland Berger[2] estimates that the global market for tokenized assets will reach a value of **USD 10 trillion**. Boston Consulting Group (BCG)[3] estimates a far greater impact, with assets reaching **$16 trillion by 2030**, or 10% of global GDP. The European Union (EU)[4] forecasts a total benefit from European regulations on crypto and Distributed Ledger Technology (DLT) of **EUR 33 billion per year**, represented **by** the **savings** from **streamlining processes** and **services.**

Avantage Reply has conducted an **in-depth study** on the phenomenon from a **front-to-back** banks' perspective. The study has **highlighted important improvements** as well as **considerable challenges** on the industry.

The analysis has identified how different areas of a bank organization will be impacted by the introduction of new technology, highlighting **opportunities**, such as: the creation of new lines of business**,** as **new source of revenue**, along with streamlining processes optimization, as a **cost reduction**, and related **challenges**, such as: **regulatory**, **organization** and **processes revision**, systems and underlying new **technologies integration.**

Significant impacts might be seen in **trading activity** and **structured finance** besides **disintermediation** and **specialization in crypto-assets** domain. The development of **new financial products** and **alternative assets**, with new **automated market making** models, based on **smart contracts**, could become key trends in the sector in the coming future.

The expected **settlement time compression** and the introduction of **tokenized assets** could strongly transform current markets operating model, **lowering cost** of capital and creating a more **efficient** and **flexible collateral management** process. In relation to the lending and repo market tokenization could **facilitate** asset **transfer** and **allocation**, creating **new business opportunities** and new ways of bank's balance sheet **optimization**.

Furthermore, the introduction of **Central Bank Digital Currencies** (CBDCs) will play a **crucial** role in advancing in an even more **automated, programmed** and **effective financial market.** Central banks around the world are actively exploring and preparing for the introduction of Central Bank Digital Currencies (CBDCs) including the European Central Bank (ECB), that after completing an initial feasibility study on the Digital Euro, has now started a preparatory phase from 1st of November 2023 and it will last for the next 2 years. According to Juniper Research[5], the value of payments via CBDCs could reach $213 billion annually by 2030. Other significant examples of improvement will be in the **payment** field as well as in the optimization of **Delivery Versus Payment** (DVP) protocol.

1 Citi GPS Global Perspectives & Solutions, 'Money, Tokens, And Game', March 2023
2 Roland Berger 'Tokenization of real-world assets: unlocking a new era of ownership, trading, and investment', October 2023
3 Boston Consulting Group, "Relevance of on-chain asset tokenization in 'crypto winter'", September 2022
4 European Parliament, 'Increasing European added value in an age of global challenges', February 2023
5 Juniper Research, 'CBDCS & Stablecoins: Key opportunities, regional analysis & market forecasts 2023-2030', March 2023

In addition to the above-mentioned benefits, there are still some **challenges** and **entry costs** that need to be considered and addressed. For example, it does **not exist yet a worldwide harmonized regulatory framework** or a **trustworthy technology** that ensures secure trade exchange and overall market stability.

We are at a very **crucial point** which can lead to a **real transformation** and to an **epic modernization** for the **whole financial industry.** Given that the market is evolving and consolidating around this new technology, banks need to have a **clear strategy** and **be ready to embrace this coming innovation.**

To stand out and be **competitive** or just to **keep up with progress**, financial institutions should get closer involved and commit to catching on to the **benefit** from higher **efficiency, better transparency, risk reduction** and **growth opportunities** in the sector.

AVANTAGE REPLY: WHO WE ARE

Avantage Reply, part of the Reply Group, specialized in **Financial Services** consulting with focus on **Risk Transformation, Treasury, Capital Market, Quantitative Modeling and Regulatory Advisory,** all backed by an in-depth **technological knowledge**.

With offices across **Europe** and **UK**, **since 2004**, Avantage Reply has been **committed** in providing **support** to clients among the **world's leading financial groups**, including retail, commercial and investment banks, insurance, and asset management.

Avantage Reply works and supports board members, CROs, CCOs, COOs and CFOs, senior and mid-management executives of leading financial institutions.

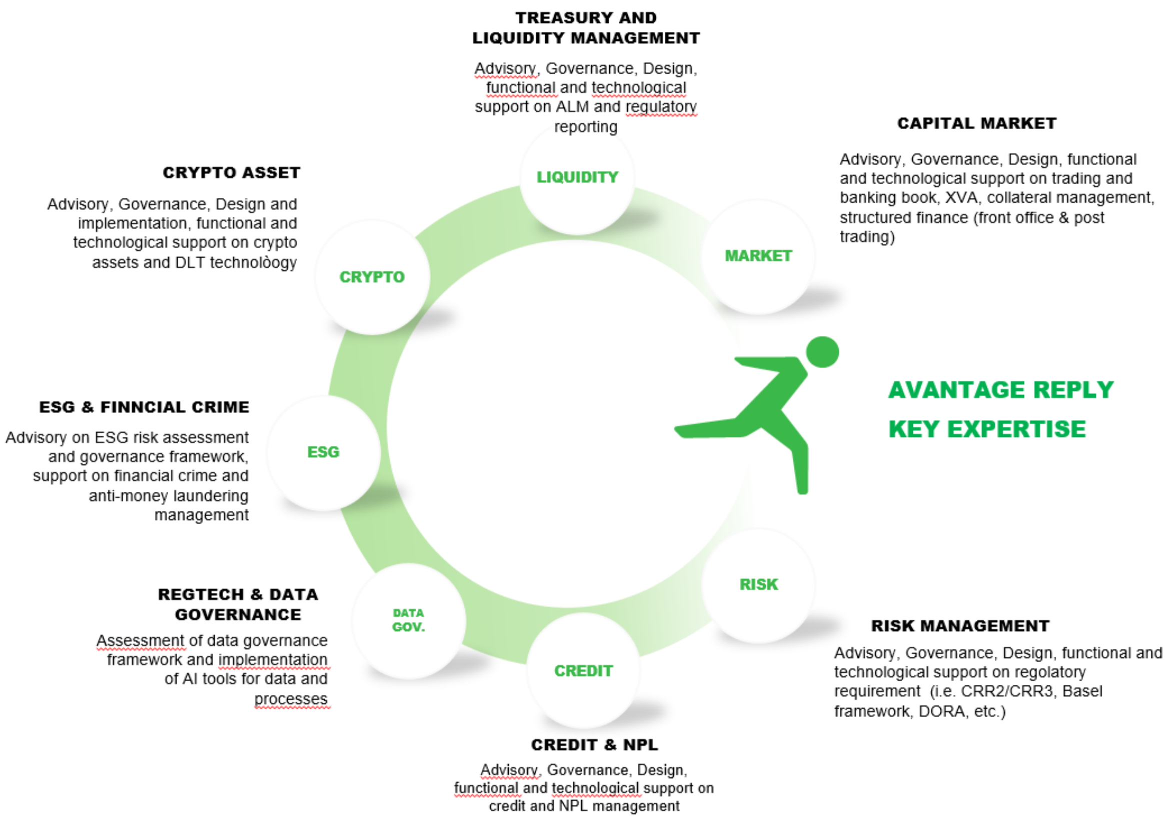

Figure 1 - Avantage Reply - Key Expertise

The **business** and **technology know-how**, the **expertise** matured in the field and the **hard work** put over the years have allowed Avantage Reply to become **qualified** and a **leader** in the financial services.

CRYPTO-ASSETS: EMERGING TRENDS AND CHALLENGES IN THE EVOLVING LANDSCAPE

Interest in **crypto-assets activity has grown significantly** over the past years. Financial institutions are **starting** to consider the **opportunity** to include **crypto-asset** in their **business strategy** in the near future. This **disruptive transformation** brings **new** related **risks** to be considered, yet banks are **extending lines of business** and **scope of services** to cope with new client demand and market evolution.

Financial institutions are trying to **create new revenue** by offering **new services** from **crypto trading, lending and custody,** embracing experimental activities in **tokenization, DeFi and CBDC.** These initiatives will also lead to **significant changes** throughout the **entire ecosystem.** Important change management projects are contributing to **technology, regulation, process and resource advancement.**

Avantage Reply, thanks to the **observatory, center of practice, dedicated studies** to the subject and the **know-how** acquired on the field, has the primary goal of **deep learn** and **master risk** and **business opportunities** associated with **crypto-assets** and **DLT** technology in order to **better advice** and **support** customers.

KEY AREAS OF INTEREST

Within the financial services, the **world's leading banking institutions** are **promoting initiatives** regarding the **integration of crypto-asset services** in their business model through the **extension of their services** and targeted **investments in specialized crypto players.** Thanks to recent activity and work experiences, **Avantage Reply has identified** the main crypto services focus trend of the current financial market, namely:

(1) **Custody:** a crypto-asset custody service offered to customers within banks' wallets. Wallets are software or hardware devices that allow crypto-assets to be stored and protected using private keys;
(2) **Tokenization:** tokenization service of traditional assets and/or issuance of native tokens on blockchain or DLT. With the tokenization, it is possible to manage the entire lifecycle of an asset from the configuration of the token to its storage, management and distribution. In addition, it is possible to perform corporate actions on the tokenized asset;
(3) **Crypto-asset trading:** execution of trading operations through proprietary platforms or in collaboration with third-party operators (crypto exchanges). Trading of crypto-assets can take place either through Centralized Exchanges or Decentralized Exchanges;
(4) **Financing & Lending:** new services that use crypto-assets as collateral. Compared to traditional, the whole process might be simplified and automated via smart contracts.

Across these services, the trend confirms that the current financial institutions focus more on exploring the first two.

RISING TRENDS AND CHALLENGES

Integrating the above mentioned **crypto-assets services**, custody, tokenization, crypto-asset trading and lending activity **into a bank's traditional system** is an **ambitious** and **challenging task**. It requires investments in infrastructure as well as a strong coordination and collaboration between supervisors, institutions, technology providers and financial stakeholders.

From an initial analysis has emerged the **awareness** from all players that is important **to address** some **initial entry barriers** and **issues** that are **emerging** on several tables from different financial market institutions that are approaching crypto activity. They will be assessed further on the following pages.

REGULATORY FRAMEWORK: A COMPREHENSIVE ANALYSIS

The **regulatory framework is evolving.** The regulator is trying to fill existing gaps promoting a coherent framework to keep financial stability, to regulate interactions between various crypto player, to manage risks and to protect final customers.

In Europe, the **Commission** is working to integrate and complete a **regulatory framework by 2024.** With the publication of the **MiCA Regulation** has been provided a first clear harmonized high-level set of rules for all EU members regarding **crypto-assets taxonomy** (asset-referenced tokens, e-money tokens and other crypto-assets, including utility tokens), **crypto-asset services** and **activities** definition, as well as **authorizations** and **operating conditions** for **crypto-asset service providers (CASP).** At the same time, the **DLT Pilot Regime** has the **objective** to **facilitate** and **encourage** banks and financial market participants to **explore**, **develop** and **test new market infrastructures** based on distributed ledger technology, i.e. the DLT Multilateral Trading Facility, the DLT Settlement System and the DLT Trading and Settlement System, for MIFID financial instruments qualified as security tokens.

Regarding **AML/CFT the sector is partially regulated.** The anti-money laundering legislation provides a **very broad notion** of both **virtual currency** (which includes crypto-activities with payment and investment purposes) and **Virtual Asset Service Provider (VASP),** defined as any natural or legal person offering services related to virtual currencies on a professional basis.

From **the accounting** and **taxation** point of view **there is not** yet a clear and comprehensive legislation.

IFRS, the International Accounting Standards Board (IASB® Board) decided in April 2022 **not to add** a dedicated crypto-assets project on its 2022-2026 plan. IASB Board Chairman Andreas Barckow stated that **there exist adequate accounting rules for crypto-assets** based on existing literature. According to the latter, the rules for **inventories** (IAS 2) or **intangible assets** (IAS 38) come into play, depending on the intent for which crypto-asset are held. **IAS 2 applies** to **assets held for sale** in the ordinary course of business and not for investment purposes. If the crypto-asset does not meet the requirements of IAS 2, it must be assessed whether it falls within the scope of **IAS 38,** which sets out the criteria for the recognition and measurement of **intangible assets**, defined as identifiable non-monetary assets without physical substance. According to IAS 38, crypto-assets can be measured using the cost or the revaluation model (if there is an active market for the determination of the fair value). In any case, the IASB continues to constantly monitor future developments in the area. Regarding **central bank digital currencies** (CBDCs), that will be issued by a central bank will have the same properties of a legal tender, therefore they can be accounted according to **IAS 7**. **Stablecoins and security tokens** that will meet the requirements within the definition of a **financial asset** provided by **IAS 32,** might be accounted with the provisions of **IFRS 9.**

Regardless of possible future regulatory and accounting developments, financial institutions should be aware that the **current accounting framework implies different interpretations** on the accounting treatment of crypto-assets. Consequently, it is (still) possible **to integrate** these instruments **into existing accounting systems** and there may be a possibility to apply beneficial accounting options, such as the definition of **self-defined metrics** in accordance with **IAS 8**.

Regarding **US GAAP**, the **FASB**, on the other hand, has decisively changed its view compared to previous years when did not foresee the creation of a specific regulatory framework for the crypto sector. Following the growth of investments in crypto-assets market and the pressure for greater regulatory clarity, the FASB **declared** in September 2023 that it was **ready to define a new standard** that will impose fair value through profit & loss accounting for Bitcoins and other crypto-assets, effectively allowing their holders to treat them in a similar manner to instruments/assets held for trading purposes. **Non-fungible tokens (NFT), stablecoins and 'wrapped' tokens** are **excluded** from the new accounting rules. The new accounting rules, which are expected to be published by the end of the year, **will take effect from 2025.**

A reform of crypto-asset accounting could lead to a reinterpretation of past practices and the need for adjustments in measurement methodology and financial reporting. For this reason, institutions that currently hold such instruments and/or intend to invest in crypto-assets should promptly assess the accounting implications (in consultation with the relevant auditing firm).

PROCESS REVIEW: INNOVATIONS AND BEST PRACTICES

For financial institutions, the approach to digital assets and innovative technologies such as blockchain and Distributed Ledger Technology (DLT) requires the need to develop new business models and adapt existing processes.

The **main introduced features** by new technologies are:

- **differentiation of tradable assets and new lines of business**
- **market processes optimization**
- **new roles and actors in the traditional financial system**

It is important firstly to **promote knowledge** and to **develop skills** and **competence** on crypto-assets, new markets and new technologies. **Traders** will need to develop **new strategies** and **new financial models** based on the innovation undertaken strategy.

As will be discussed in more detail in this paper, risk **managers** will have to be able to **identify** and **monitor new risk factors** (e.g. operational risks related to the use of new technology and infrastructures, augmented cyber risk, interoperability, etc.) and define **new principles** and **new models** in order to correctly **measure, manage** and **mitigate** new risk components and to adapt the current risk metrics to the new requirements introduced by regulator.

Moreover, it will be necessary to **integrate policies, procedures and internal controls**. The **compliance function** will have to use caution in the **assessing** service providers (e.g. outsourcing processes) and customers in line with regulatory developments regarding **Know-Your-Customer** (KYC), **anti-money laundering** (AML) and **tax** system.

Very important also to create a **frequent dialogue with supervisory authorities** in order to monitor market developments and new trends. Financial institutions are required to **provide qualitative information** relating to **crypto-asset activities** and **risk management policies.** In addition, banks will need to **provide regular disclosures** on **crypto-asset exposures** (e.g. amount of direct and indirect exposures, capital requirements, accounting classification).

INTEGRATING DLT TECHNOLOGIES IN THE FINANCIAL INSTITUTION

Blockchain, which represents a specific sub-set of DLT, is known for its ability **to record and organize transactions data accurately** and in an **immutable way**. Data is grouped into a sort of unit called **'blocks'**. Each block contains a set of transactions or records. These blocks are **connected sequentially** to each other, forming a chain structure. Each block in the blockchain contains a **'hash'**, a unique code derived from the data of the current block and the previous block, **creating a cryptographic link** between the blocks. This link ensures that each block is **secure** and **unchangeable** once added to the chain, making the blockchain particularly resistant to fraud or manipulation.

The technology is **decentralized,** and each node **works independently**. Furthermore, to ensure the validity of the information, all nodes **must reach a sort of consensus** agreement to get updated.

Distributed Ledger Technology offers **significant advantages in the financial services** sector, in particular through the concept of tokenization.

Tokenization can potentially **transform** any traditional **asset** into a **digital** asset, through the creation of tokens as representation of the asset in the blockchain. **These tokens can be exchanged** on blockchain platforms, which offer an **augmented transparency** and **speed** in the transaction compared to traditional platforms.

Tokenization can also **increase liquidity** for illiquid assets, **reducing access barriers** to investors in otherwise inaccessible markets.

Currently, the **scalability** and **efficiency** of blockchains **are still posing some significant technical challenges** in the crypto-asset field. For example, problems might arise when many transactions occur simultaneously, causing **network congestion** and **an increase** of transaction **costs**.

CRYPTO-ASSETS: ANALYSIS AND PERSPECTIVES

In the current ecosystem defined by leading innovative technological changes, **Avantage Reply has analyzed** the **impacts** and the **benefits** rising from the introduction of **crypto-asset** and **DLT** technologies across the whole **front-to-back** banks organization.

The following two matrices exhibit the overall results shown from the analyses. They will be further detailed and examined in this paper.

The matrix in the Figure 2 highlights the **benefits** across a bank organization with **respect to:**

- **New revenue:** resulting from new business opportunities;
- **Cost reduction**: resulting from the introduction of new technology and streamlined processes;
- **Settlement compression**: reduction of cost and transactions uncertainty;
- **Increased liquidity**: new, more accessible and flexible markets;

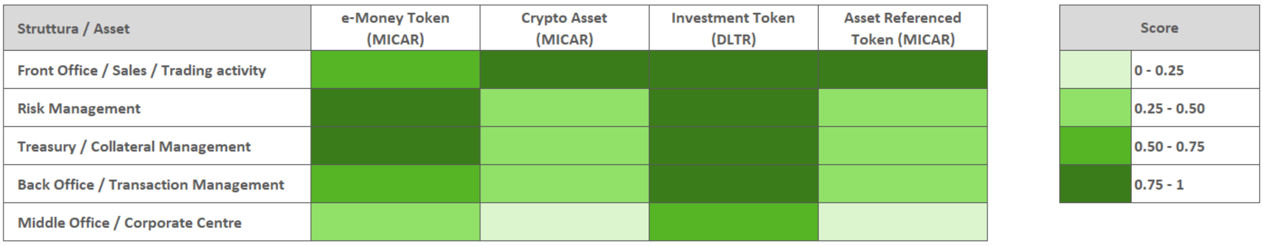

Figure 2 – Matrix of Opportunities

The **benefits** shown on the matrix, as results of our analysis, are expected **across all bank organization** accordingly mainly to the category of **investment tokens**, i.e. **traditional assets**, currently defined in the DLT Regulation. Those assets can be **represented** as **tokenized assets** and they can be **exchanged** on **blockchain** technologies. While, for the **new emerging crypto-asset categories,** which **did not exist** before, such as: **e-money tokens, asset reference tokens, cryptocurrencies and utility tokens,** defined in the MICAR regulation, it is expected a general **medium benefit** from the **Front** and **Back** and a **medium** to **low** from the remaining offices.

The next matrix, shown in Figure 3, summarizes the impacts on the bank organization with respect to three different dimensions:

- **technology**: impact and integration of new technologies;
- **process**: introduction or revision of existing processes;
- **regulation**: complexity introduced by the regulator;

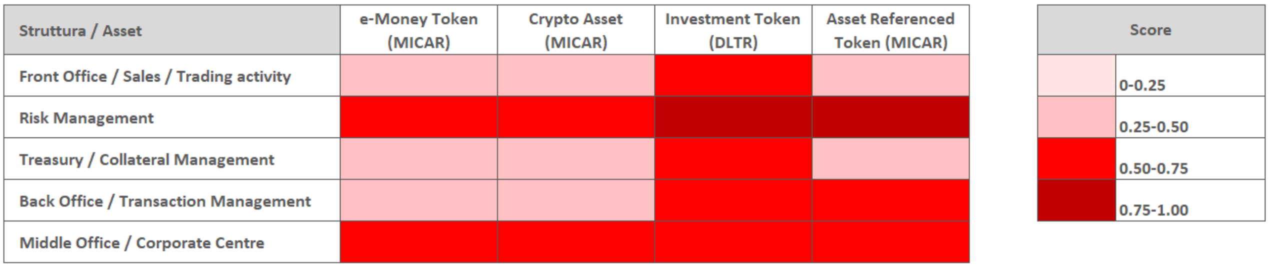

Figure 3 – Matrix of Impacts

The result of our impact analysis reasonably shows that crypto-assets will bring a more **significant challenge** on some areas, like **Risk Management, Back** and **Middle office** compared to others. **Investment tokens** are expected to have a **high impact across the whole bank organization. Cryptocurrencies, ARTs** and **utility tokens,** are expected to have a **moderate** to **low impact on the Front** and **Back office.** On the other hand, **Risk Management, Middle Office & Accounting** functions will face **increased complexity** on these new assets**,** accordingly to the **new coming regulation, new pricing models and risk metrics calculation, accounting and tax treatments developments, tight anti-money laundering policies,** etc.

SALES E FRONT OFFICE

BENEFITS: POTENTIAL ADVANTAGES OF EMERGING TECHNOLOGIES

DLT and **crypto-assets** might **transform** the **banking sector** thanks to the peculiarities offered by the new technology, **faster** and **more efficient transactions** which will be impossible compared to the current market standards. This is because transactions will be executed on a **distributed, transparent** and **immutable ledger.**

In the current financial market, participants are required to comply with a specific set of rules. Similarly, tokenized assets will have to ensure a minimum level of regulation, comparable to traditional markets. New technologies will promote the **rise of new regulated trading platforms** with **wider and more flexible access to markets, extended trading hours** and with **more efficient pricing and liquidity allocation.**

In a more **fluid** and **competitive market**, driven by **compressed costs** and **thinner bid/ask spreads** in trading, **banks** will likely **need to review their pricing model** and **investment strategies.** This will encourage banks to explore **alternative business models** that could offer **diversification** and **other sources of profitability.**

Crypto's unconventional exchanges, as decentralized exchanges, are **borderless**, which means that crypto assets have a **much larger base** of potential **investors** — it's not easy or too costly to buy a stock listed in another country.

In addition, crypto tokens can accrue value in ways that a traditional stock cannot, like as: staking, yield farming, airdrops and network governance rights are all novel reasons to invest in these new asset classes. These additional forms of value may all be reasons why crypto tokens deserve higher valuation than conventional security.

The sales & trading departments, core revenue making functions of a bank, are the ones that will benefit most of all these new features:

- **Reduced settlement time, lower costs, improved collateral management,** empower sales team to identify new opportunities and new financial products to sell to customers. The creation of an innovative and efficient origination function, based on the features outlined above, could be a big competitive factor for banks that are able to seize these new trends;

- **Recording transactions** on a distributed ledger (DLT), on which **customer accounts can be updated in real-time,** will drastically reduce **time** and **cost** of trade execution and management**,** leading to a fundamental transformation;
- **Process automatization** might **transform** the role of the **market maker** as known today**.** Tasks performed manually will be progressively **automated** or **entrusted via algorithms,** allowing the promotion of automated market makers functionality;
- **Fractional investing,** made possible with tokenization, leads to an **increase of liquidity** and **efficiency** in the commitment and allocation domain, **optimizing** the use of assets pledged as collateral and **releasing resources** that can be allocated for other financing and investment activity or for risk and limit reduction;
- **Settlement time compression** might create a fundamental **revision of liquidity, credit and counterparty risk.** Faster transactions will reduce the period in which parties might default, with a clear and direct impact on trading and cost evaluation and XVA strategies.

IMPACTS: POTENTIAL CHALLENGES OF EMERGING TECHNOLOGIES

Sales & trading activities in **crypto-assets** represent **an operative challenge** for the **Front Office department,** mainly on the **technological** and **operational side**.

New set-up and **tuning activities** are required to facilitate the existing banks' **Order and Execution Management Systems** for proper trade execution and trade management of new tokenized assets in terms of **correctness and accuracy of position, P&L** and **risk representation.**

Complex activities are **required** in terms of **integration** of **new market infrastructures** blockchain-based, **new trading platforms** and **new market data providers.**

Below are reported some of **main technical peculiarities emerging** that **should be explored** when considering **sales** and **trading activities in crypto-assets:**

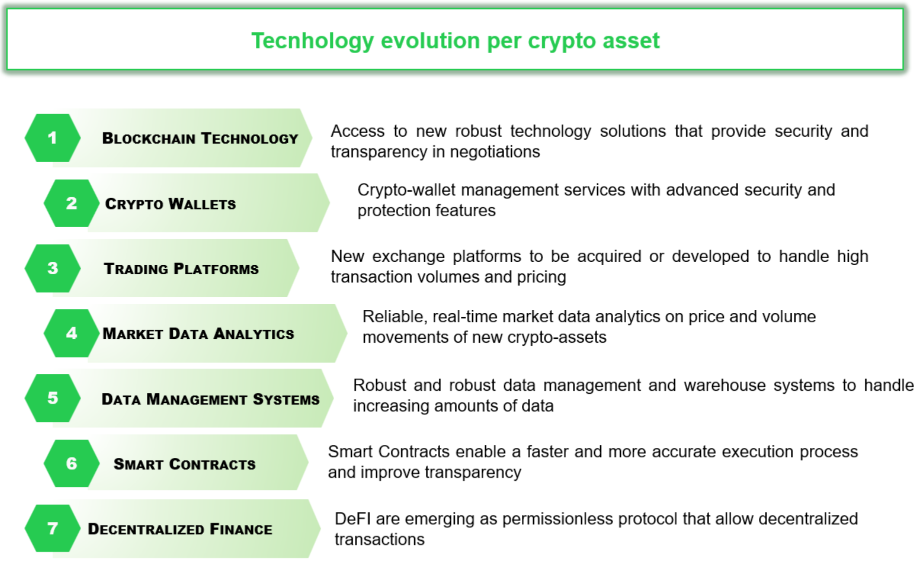

Figure 4 – Technological developments

1. **Blockchain Technology:** several blockchain solutions are now available on the market: Ethereum, Solana, Avalance, Algorand, Tron, Ripple just to mention a few. Banks need to familiarize themselves with new technologies. They offer different models, different transactions management operation and different consensus mechanisms.

2. **Wallets:** key tools for crypto trading activity used to store and control crypto-assets. Financial institutions must develop or integrate wallet management services to operate on blockchain. These might include services offered by specialized providers such as: Metaco, Fireblocks, BitGo, Ledger Vault, Anchorage, Gemini Custody, Coinbase Custody, Fidelity, etc. These providers offer different solutions with different features and different degrees of security and transparency (public vs. private, permissioned vs. permissionless).

3. **Trading Platforms:** new specialized crypto-trading platforms will have to be developed or acquired from the market. These platforms will play a key role and must offer integrated and market-recognized solutions. Some of the best known and most established platforms on the market are Coinbase, Binance, Kraken and Bitstamp for cryptocurrencies, Metaco, Securitize, Polymath, Harbor and Bitbond for tokenized assets.

4. **Market Data Analytics:** new market data analytics need to be integrated with new markets and product types. Specialized companies providing information and analytics on blockchain and crypto-assets are emerging in the markets, including: Infotrend, Chainanalysis, Elliptic, Glassnode, Missari, CryptoQuant.

5. **Data Management Systems:** together with the bank's warehouse mainframe will oversee and manage an ever-increasing amount of data coming from different sources. Developments and interventions will need to be considered in those areas.

6. **Smart contracts:** self-executing contracts that are realized within the agreed terms and conditions written directly into the line code used to exchange or update contracts in some blockchains. They allow a faster, controlled, programmed and more accurate execution process, reducing manual intervention and improving transparency.

7. **DeFi:** decentralized trading platform are new emerging permissionless protocol that allow decentralized transactions. To be noted that all those platforms are introducing transaction fees for certain tokens traded through their web app and wallet. The fee will support the continuous research and development needed to maintain the protocol public good. Some of the best known and most established DeFi platforms on the market are: Uniswap, Aave, PancakeSwap, SushiSwap, DefiSwap, etc.

A specific **customer support service** with **specific learning sessions** and **training tools** dedicated to crypto-assets world needs to be developed and designed according with the newly provided services and technological context. This will enable customers to better understand the risk-benefit associated with the new assets and technology.

On **the regulatory side** there are still **doubts** and **interpretative difficulties,** mostly in the **definition of roles** and **responsibilities** of main actors involved in the creation and management of crypto financial market, both in the **primary** and **secondary market.**

In Europe, the **European Union** has made some **progress even if it has not yet defined a whole and completed regulatory framework** on crypto financial markets and services in a more structured way. In fact, the **MiCAR** regulation, introduced by REGULATION (UE) 2023/1114, **covers only some aspects** of crypto market, and the **DLT Pilot Regime**, introduced by REGULATION (EU) 2022/858, has **only created a temporary grace landscape,** generating **exceptions** to the existing regulations, like **MiFID**, to better develop and test new crypto market infrastructures. As main consequence there are still some **ambiguities** whether for instance an issuance of a **tokenized bond** on a DLT can be considered as a **real and valid debt instrument** in compliance with European and local jurisdictions.

Furthermore, financial instruments **listing** and **negotiation**, under European law, can only be done in **regulated** and **authorized trading venues**. The development of a secondary market is still an ongoing process.

However, some **big players** keep moving up with **important initiatives** to pave the way of future crypto markets infrastructure. One of the most significant examples is the first **'Digitally Native Notes'** issued on 24 October 2023 by the **World Bank,** which raised EUR 100 million through **Euroclear,** launching the **Digital Securities Issuance (D-SI) service**[6]. Another important initiative is the **HSBC** plan to introduce an institutional **custody service** for digital assets, except for cryptocurrencies, by 2024[7] in partnership with Metaco. Again, several DLT-based native securities have been issued in Europe. However, these have **not yet** been **listed on the secondary market** which is still under development.

AVANTAGE REPLY: STRATEGIC SUPPORT TO THE INNOVATION JOURNEY

DLT and **crypto-asset**s are bringing **new business models** and **opportunities** with operative **benefits** for the Front Office & Sales teams. However, at the same time exists various **technological challenges**, such as: **interoperability, scalability, sustainability, regulatory, compliance** and **overall not yet matured level of market confidence on new technology**.

Avantage Reply has a **deep know-how** on **Front Office activities,** including **business** and **capital market** understanding as well as **technology** and **operative** front office **process,** together with an **extensive experience in**

[6] Euroclear, 'Euroclear launches DLT solution for the issuance of digital securities', October 2023
[7] Metaco , 'Announcing HSBC's New Digital Assets Custody Service', November 2023

managing and **delivering** Front Office end-to-end projects, focused on:

• **support and integration of trading platforms;**

• **support and integration of position keeping systems, including pricing and risk validation tools**

• **front to back process definition and implementation for management and execution of transactions;**

• **development and implementation of pricing and algorithmic strategies;**

• **tools to support sales activities.**

The market and financial institutions strategy and focus emerging, regarding crypto implementation, are in order to prioritize crypto-asset custody service as a fundamental starting point, followed by other services.

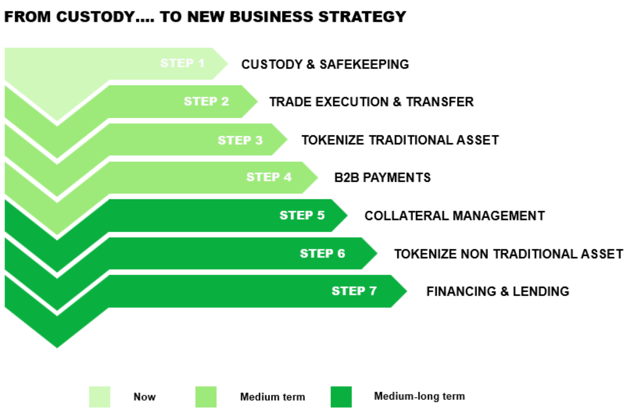

Figure 5 – New Business

Business and capital market expertise together with technology knowledge allows Avantage Reply to support banks during the definition, assessment, planning and implementation of their digitalization strategy for Front Office department.

RISK MANAGEMENT

BENEFITS: POTENTIAL ADVANTAGES OF EMERGING TECHNOLOGIES

DLT and **crypto-assets** introduction for **risk management** might represent a **significant breakthrough.** The transition from traditional to tokenized assets could have a deep positive impact leading to better risk management.

Asset digitalization can in fact lead to an **improved transparency** and **speed** in trade execution, therefore risk management will **benefit** in **facilitating risks identification** and **mitigation.**

Bringing the **settlement time** from a standard T+2 to a more real time T+0 together with **tokenized assets** might produce **numerous important benefits** for banks and market infrastructure, such as:

• **Reduction of credit risk and systemic risk** guaranteed by a more real-time settlement of the transactions;

• **Reduction of counterparty risk**, particularly relevant for Credit Value Adjustment (CVA), guaranteed by the reduction of settlement of the transactions;

• **Liquidity management optimization** due to the liquidity increase for some assets and some markets;

DLT network might also **enable participants** to improve their processes for **risk and transaction settlement customization** between T+0, T+1, T+2 or T+N according to different risk factors, including counterparty risk assessment and trade-off between transaction frequency and costs. Projects such as Jasper, with Payments Canada, Bank of Canada, TMX Group, are exploring the use of DLT to **optimize** the use of **collateral** and **minimize counterpart risk** by **linking settlement time to counterparty rating** and **liquidity risk**.

Among various benefits **collateral management** stands **out**. The amount of **collateral** processed to mitigate the counterparty risk will thereby **decrease** releasing resources available for other operations.

Tokenization and **use of smart contracts** can **automate** and **simplify** the **execution** and **monitoring** of the transactions, **automatically** manage **dividends** or **income distribution** and **improve operational** efficiency, reducing **legal** and **counterparty** risks and enabling as seen the use of new trading and settlement methods.

Cryptography used in the tokenized assets can **increase security** of transactions, **reducing risk of fraud** or **manipulation** events. This will produce an **increase** in **trust** and **stability** in the **whole financial systems.**

IMPACTS: POTENTIAL CHALLENGES OF EMERGING TECHNOLOGIES

New technology comes with new risks. In the integration process of crypto and DLT for the Risk Management office is important to consider new risk coming with the new technology. Below are reported some of the **more relevant risks** associated to the **new technology**:

• **Operational and security risks:** transactions **executed on blockchain,** blockchain **interoperability**, **wallet** and **key** management activities might be **very risky** and subject to **errors** which could lead to **unexpected losses.** Some of the more marked **risks that fall into this category** are:

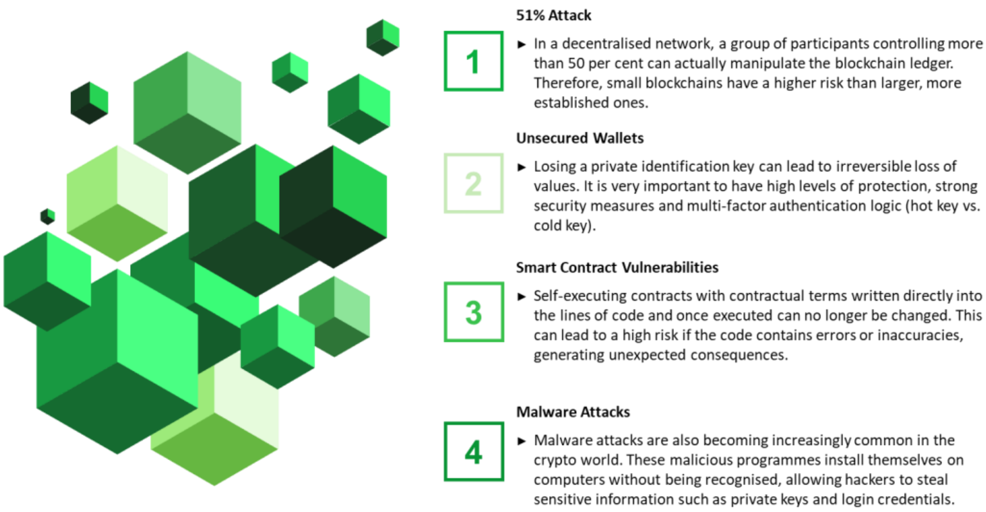

Figure 6 – Operational Risk Focus

• **Illegal activities and reputational risks:** they can be **significant** in the context of crypto-assets.

Cryptocurrencies for example have been **used** in the past for **illegal activities, money laundering, terrorist financing** and **tax fraud;** all this can compromise very easy banks' reputation.

• **Compliance risk:** the use of crypto-assets greatly **increases** regulators' **attention** to **compliance risks,** including **Anti Money Laundering** (AML) and **Know Your Customer** (KYC). Financial institutions must work with regulators to ensure legal compliance and have to establish internal policies and monitoring processes to prevent illicit.

• **Legal risk:** business activities related to crypto-assets come with high legal risk, associated with existing regulatory uncertainty, mainly in relation to different international jurisdictions.

• **Decentralized finance risk (DeFi):** applications of **DeFi**, such as **staking[8], lending and borrowing[9] and yield farming[10],** can carry **additional risks** such as Ponzi schemes, or lack of liquidity in some markets.

Furthermore, Regulators are integrating the Basel risk managment framework in order to consider **new risk requirements** necessary for the assessment and calculation of the bank's obligations for the **prudential capital treatment** resulting from crypto-assets market developments.

The **Basel Committee** has **introduced** a detailed crypto-assets **classification**[11]. This classification is based on the **definitions** applied to identify the **nature** of the **crypto financial instrument** and the **belonging risk group** (**Group 1 and group 2**). On top of the classification, the regulation has defined the **level of risk** and the **prudential capital treatment** associated for specific assets. Below an abstract table of the latest BIS guideline on crypto-asset:

TYPE	CLASSIFICATION	PRUDENTIAL TREATMENT	ADD-ON AND TEST	LIMITS
INVESTMENT TOKEN	**Group 1a**	The Digital Asset follows the capital requirements already in place for the physical asset if it has the same asset and income rights	Possible capital add-on for any observed infrastructure weaknesses	
CRYPTOCURRENCY (inclusi E-Money Token)	**Group 2a/Group 2b**	If it is used for proven hedging purposes then it is Group 2a with RW 100% over max $(long, short)$ - 0.65×min $(long, short)$ otherwise it is Group 2b with RW 1250% over max $(long, short)$	Capital adequacy review for short positions on Group 2b assets	Less than 1% of Tier 1, with commitment not to exceed 2%
ASSET REFERENCE TOKEN	▪ **Group 1b** ▪ **Group 2a/Group 2b**	If full convertibility to fiat is demonstrated even under stressed conditions the digital asset follows the same capital requirements as the physical asset (Group 1b). Otherwise it follows Group 2a or Group 2b depending on whether the requirements are met.	▪ **Group 1b:** required to pass redemption risk test ▪ **Group 2:** capital add-on due to observed infrastructure weaknesses	▪ **Group 1b:** no limit ▪ **Group 2:** less than 1% of Tier 1, with a commitment not to exceed 2%.
UTILITY TOKEN	**Group 2b**	RW 1250%	Capital adequacy review for short positions on Group 2b assets	Less than 1% of Tier 1, with commitment not to exceed 2%

Figure 7 – Prudential Crypto-asset Treatment

The Risk Management role is therefore called to evolve in the definition and development of risk calculation strategies. Functions such as: **quantitative** and **risk analyst** will have to **develop new models** and **strategies** to consider the evolution of the technological and regulatory environment.

AVANTAGE REPLY: STRATEGIC SUPPORT TO THE INNOVATION JOURNEY

8 Staking is the practice used to block tokens to ensure that transactions are properly verified and protected (PoS).
9 Lending and borrowing are practices that allow holders to lend their tokens to borrowers and earn interest.
10 Yield farming, also known as liquidity mining, is a practice in the field of decentralised finance (DeFi) that allows cryptocurrency holders to earn rewards, used by DLTs with a consensus mechanism based on Prof of Work (PoW).
11 Basel Committee on Banking Supervision, 'Prudential treatment of cryptoasset exposures', December 2022

Thanks to the **expertise** gained over the years in the **risk management** subject, **Avantage Reply** supports banks for **regulatory** and **operative risk management** for **financial and non-financial risks**.

Avantage Reply develops models and **metrics** to **measure**, **control** and **mitigate market, credit, counterparty and interest rate risk,** in the **analysis** and **implementation** of **regulatory** compliance and for treasury **dashboard** and **reports** to the **top management** and to the **supervisory authorities**.

Thanks to the support of **specialized teams**, it is possible to perform a case-by-case study or full assessment of risk management strategy in the **new regulatory frameworks**.

The **most relevant areas of expertise** are:

• **Definition and implementation of the prudential framework** relating to the calculation of capital requirements according with latest Basel guidelines;

• **Integration of the financial valuation framework** (Fair Value Adjustments with impacts on the income statement and Additional Valuation Adjustments with impacts on the capital account);

• **Identification and implementation of risks data model** for the integration of new data in the existing process;

• **Definition and implementation** of first level of control (i.e. Independent Price Verification) and second level control framework.

Avantage Reply is **expert** also in **designing** and **implementing** processes to monitor and manage operational risks in compliance with new regulations, such as: **Cyber Security ACT, Data governance ACT, Digital Service ACT, AML and DORA.**

TREASURY AND COLLATERAL MANAGEMENT

BENEFITS: POTENTIAL ADVANTAGES OF EMERGING TECHNOLOGIES

Treasury & Collateral Management are fundamental functions for bank's daily activity. Emerging technologies, in particular asset tokenization, promise to **reform financial transactions,** will obviously have a considerable **impact** on **collateral management** and **margin calculation, securities lending, repo market and more in general on the lending/financing field.** It is reasonable to foresee an **evolution** in the **type of assets accepted as collateral** and in the models for **margin calculation** according to the new developments.

Digitalization might improve **asset optimization** and **asset transfer security** in the use of collateral in financial transactions. Asset transfers will be **transparent**, **faster** and in synchronization **mode** within a 24-hours service.

Digitalization will lead also to a **differentiation** of collaterals and to a **diversification of haircuts**, depending on whether they are traditional or digital assets. For example, a 10-year BTP, which today is accepted as collateral for 94% of its market value, could be traded as collateral for, say, 96% or 97% of its market value if digitized. Both types of assets might coexist in the future and it is possible that crypto will present **greater liquidity**, **more secure** exchanges and **cheaper** transactions than traditional assets.

In general, a **review of haircuts** might potentially **free up extra collateral** that can be available for other transactions or serve as **cost reduction** and **margin increase.**

Recently, J.P. Morgan facilitated the settlement of an OTC derivative transaction between BlackRock and Barclays using a blockchain-based network called the Tokenized Collateral Network (TCN)[12]. The TCN allowed participants to transfer ownership of the assets pledged as collateral without having to transfer the underlying asset to a third-party depositary. The transfer of collateral occurred almost instantaneously, differently from the current traditional market where the same operation could have taken a few days.

Fractionality allows to fractionalize and sizing assets and to own and perform actions over only a portion of an asset, cutting down barriers to investment and enabling greater liquidity. **DLT simplifies fractioning** activity and it can find applications also in the optimization of the collateral management process.

Asset digitization in general can **boost liquidity** and can **create opportunities** for innovative financing and portfolio diversification strategies, even for assets that are now considered less liquid or illiquid.

In the **real estate sector** for example, tokenization might lead to a sort of **democratization of investment**, allowing other investors to participate in the market. The implications for the bank will be an increase of transacted volumes in certain illiquid markets, extended turnover of assets, collateral and balance sheet optimization.

IMPACTS: POTENTIAL CHALLENGES OF EMERGING TECHNOLOGIES

Treasury & Collateral Management plays a crucial role in the bank's liquidity management process; **significant effort** is required for these offices to **harmonize new operating models** that will be introduced with the new technologies.

Operations and consolidated **market standards** on collateral management cycle will need to be **optimized** according to **new opportunities** and **new models.** Offices will have to review their strategy and procedures for collateral allocation, margin exposures calculation and discrepancies analysis accordingly with other players involved in the collateral management life cycle.

Therefore, models and strategies used to ensure capital soundness and income continuity will have to be adjusted to the new operating models.

It is therefore **expected** that might exist a **transition phase.** Banks and financial market infrastructure will have to manage in **parallel** both **traditional and tokenized assets.** Systems need to be capable of managing both categories of financial products, interacting with new DLT networks, new procedures and new actors that are emerging on the markets. Processes and IT infrastructure will have to be adapted and modernized to ensure functionality and interoperability, together with new expertise and technical skills will be a major re-organization challenge for banks in this area.

AVANTAGE REPLY: STRATEGIC SUPPORT TO THE INNOVATION JOURNEY

Avantage Reply has been working in the banks' treasury and collateral management offices for many years, supporting clients **in the whole liquidity** and **collateral management process.**

[12] Bloomberg, 'JPMorgan Debuts Blockchain Collateral Settlement in BlackRock-Barclays Trade', October 2023

Avantage Reply develops models and **metrics** to **measure** and **control liquidity, interest rate and counterparty risk,** in the **analysis** and **implementation** of **regulatory** compliance and treasury **reports** for the **top management** and for the **supervisory authorities** (i.e. ALMM, NSFR, LCR.)

This includes **mastering** the **processes** and **tools** used daily by treasury department to **measure**, **monitor** and **manage treasury** and **liquidity** for both **trading** and **banking book.** (i.e. gap analysis, Maturity Ladder, structural and operative liquidity, etc.).

Thanks to its **experience** in **Collateral Management,** Avantage Reply provides **methodologies** for the **collateral management and post-trading requirements,** assessing costs of transactions with Clearing Houses, calculating and reconciling initial and maintenance margins on uncleared derivative exposures, following ISDA SIMM methodology and assisting clients in the development of the XVA methodology framework with the use of advanced pricing methodology and algorithmic techniques.

Treasury, financial market, regulatory framework and **technological evolution** is the **right mix** that allows Avantage Reply to best support our clients all around treasury process for strategic modernization plan with DLT and crypto-assets technology.

BACK OFFICE E MIDDLE OFFICE

BENEFITS: POTENTIAL ADVANTAGES OF EMERGING TECHNOLOGIES

The introduction of new technologies might lead to a transformation for the **Back and Middle Office**, creating **new operating models** that will **simplify** and **streamline post-trading, trade management** and **control activities** handled in the Back and Middle Office.

Back Office functions might be more **streamlined** and **automated**. The development of increasingly **peer-to-peer** oriented forms of **payment** and the introduction of **CBDC** would bring considerable **benefits** throughout the supply chain, **simplifying** existing manual **operation, reconciliation, confirmation** and **payment processes.**

Currently, there are **several initiatives** and **experiments** with **encouraging results**, especially in terms of **simplification**, **settlement** and **speed of payments,** as they allow transactions, involving both payments and exchanges of collateral, to be **transparent** and completed between parties in an **instantaneous time**, with a **24/7 availability.** Among the most important initiatives, there are those realized by the **Innovation Hub** of the **Bank for International Settlements** (BIS), together with **other central banks** in the Asian region, that are shaping a number of different projects and experiments, such as the **mBridge** project focused on cross-border payments through the use of CBDCs; the **Dumbar** project based on international wholesale settlement via a common platform for issuing and exchanging central bank digital currencies (multi-CBDC). The target is to create an **ecosystem** with a more **efficient** and **cheaper way of payment**, especially for cross-border payments.

Projects such as **Spunta Banca**, promoted with **ABI**, use DLT to **automatically detect mismatched** transactions through a shared algorithm, **reducing** the number of **errors** and **increasing accuracy** in the reconciliation process.

The process of modernization would also bring enormous **benefits** to Middle Office, such as**: control, evaluation and validation of transactions and customers.** The following example is a pure scenario of how the new technology can streamline the control and validation of documents required for instance **during KYC/AML**

assessment. Shared data on a DLT network will allow all interested parties to have access in an **unambiguous, rapid** and **transparent** manner to the information. This mechanism would also significantly **reduce customers' obligations** by simplifying data sharing and validation procedure.

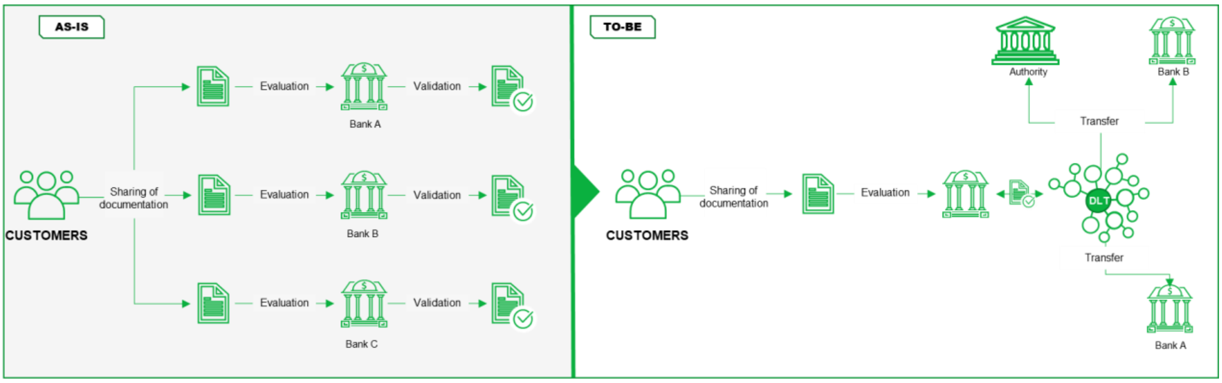

Figure 8 – Example of the evolution of the control/validation and documentation management process

Transparency is a key aspect in which tokenization might bring a real **innovation**. Each transaction is **uniquely and irreversibly recorded** in the network and it is **equally accessible to all participants** having the rights. Transactions can be **monitored in real time,** providing a **high level of transparency** that it is difficult to match with traditional systems, which often involve a different number of intermediaries, such as: brokers, custodians, asset managers, and thirty parties that could introduce forms of slowdown and opacity into the trade life cycle. With tokenized assets will **be possible to verify transactions** and **ownerships** directly on the blockchain. This is a **significant opportunity** for instance to **simplify** and **improve** trades reconciliation and reporting processes as well as to **reduce the risk of fraud or mismanagement.**

IMPACTS: POTENTIAL CHALLENGES OF EMERGING TECHNOLOGIES

The adoption of blockchain technologies and the use of crypto-assets might renovate the bank's Back and Middle Office functions, **requiring major changes** in the way these areas operate daily.

To reach a **high level of maturity** blockchain-based market infrastructure requires an high coordination and collaborative work **between various players** involved in the financial market. Standards such as **ISO 20022** and **the Common Domain Model** are playing an **important role** in **creating** the **best technology solution** for each specific use case, bringing **harmonization** and process **simplification**, particularly with regard to the security transfer management and payment process.

Regulatory **compliance** is another aspect that should **not be underestimated**. Blockchain is also distinguished by its **decentralized operating models**, an aspect that is **in contrast** with the **centralized** and **regulated structure** which is typical of the financial sector. In a decentralized finance (DeFi), there is no central entity acting as an intermediary between users. This **dichotomy** represents a **challenge** that is still unresolved and that regulators are working to solve.

Furthermore, although blockchain is **known** for its **transparency** and **immutability** features, it is **not immune** to **risks** and **threats** of attack. Ensuring the security of transactions and protection of customer data remains a **significant challenge.**

The **interoperability** of the various DLT networks is another important part of the blockchain. This could lead to difficulty with the real use of these new technologies in the existing banking system.

To improve interoperability between various blockchain solutions **Swift**, for example, is **leading** a series of **developments** through a partnership with **Chainlink** on payment experiments. The target is to **solve the problem of interoperability** between different networks as shown in the following example:

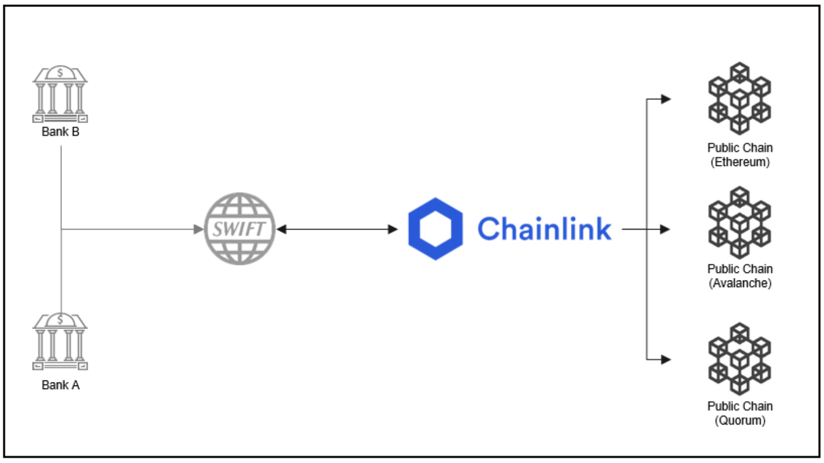

Figure 9 – Interoperability between networks

Therefore, **technical challenges still exist,** including the need to make extensive changes in the existing bank's IT infrastructure as well as to create qualified staff able to understand and manage correctly new technology and procedures in an effective way. Consequently, banks will have to **start analyzing future impacts** on their **organization** arising from **new procedures** associated with the implementation of **new technologies**, considering all benefits as result of **increased speed** and **improved efficiency** for whole Back and Middle Office operation activity.

AVANTAGE REPLY: STRATEGIC SUPPORT TO THE INNOVATION JOURNEY

Avantage Reply has **experience** in **banking processes, regulatory, compliance, governance, reporting and IT infrastructures.**

Avantage Reply has **provided support** to clients over the years on the **evaluation, monitoring and managing post-trading activities and transaction lifecycle,** within the current **regulatory framework.**

Technological and regulatory developments in recent years in the areas of ICT, governance, data management and data protection have generated a rapid boost in the digital transformation, increasing supervisory and policy concern to the non-financial risks.

Avantage Reply is **an expert** in **designing** and **implementing** processes to monitor and manage operational risks in compliance with new regulations, such as: **Cyber Security ACT, Data governance ACT, Digital Service ACT, AML and DORA.**

VALUE PROPOSITION: WHY AVANTAGE REPLY

The integration and development of new technologies such as DLT and Digital Assets require skills that go beyond a pure technology aspect. Financial market, processes and operating banking model expertise are key factors to succeed. For years, Avantage Reply has supported financial institutions through their innovation and digital modernization program. Banks need to be aware of the real impacts and order of magnitude of changes needed to develop the right path in order to benefit from a process modernization.

Avantage Reply has a deep understanding of the banking sector, including business, processes and technologies, ensuring the right mix and capability to support banks in their strategic digital innovation plan for the coming years.

The main provided services are:

- **Advisory:** Avantage Reply provides advisory services to support the identification and planning of objectives and resources needed in order to achieve innovation and modernization initiatives that involve crypto-asset and DLT technology.

- **Design:** the adoption of crypto-asset and DLT technologies involves the re-design and re-engineering of banks' processes and infrastructures. Thanks to qualified experts, Avantage Reply support in the analysis, business requirements definition and collection, identification and design of target solution, as well as in the design of processes, models, algorithms and prototypes for trading and risk management activity in crypto-asset, including AML and KYC assessments.

- **Implementation:** Avantage Reply provides a multidisciplinary team with technical and functional "crypto" expertise for the development and integration of banking operative processes and IT architecture.

- **Testing:** Avantage Reply can support during the System Integration Test and User Acceptance Test by defining, monitoring and validating technical and business test cases on DLT and crypto-assets.

Crypto-assets and blockchain represent a real turning point. It is not anymore only an abstract concept but it is a real coming opportunity of modernization and innovation for the whole financial ecosystem.

Banks should embrace innovation and take advantage of underlying opportunities. Start your change with the help of Avantage Reply as a partner in your journey.

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