Utilizing Smart Contracts and tokens for the digitalization and democratization of Real Estate Investments in Switzerland

Table of Contents

Executive Summary

To date, many real estate tokenization projects have been conducted by the tokenization community. However, the proof-of-concepts have not been widely adopted and brought into production by the real estate industry so far. The key reason is that the technical tokenization of real estates (in a narrow sense) is only part of the required solution. In addition, a new end-to-end real estate investment process needs to be designed and new market infrastructure services and information systems have to be provided. This requires a rethinking of today's real estate market infrastructure and the way how today's players work together.

Of course, a transition from a traditional real estate market model to a tokenized real estate market model cannot happen instantaneously, a careful go-to-market strategy with a step-by-step approach needs to be developed.

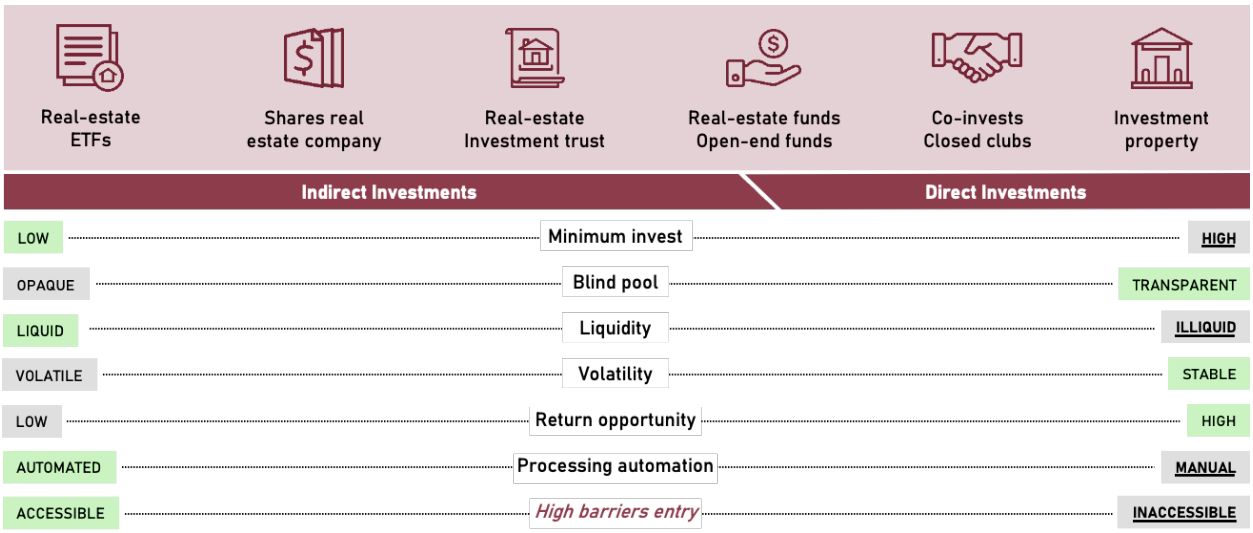
This paper outlines “The Standard Process” for a tokenized real estate market infrastructure and deliberates on various technical considerations and critical business considerations.

Some of the key findings are:

- A tokenized real estate market model can be built and has been prototyped using the Casper CEP-78 NFT standard and the Noumena Smart Protocol Platform.
- Key business considerations, such as the obfuscation of critical financial data can be achieved through the combination of an on-chain NFT and an off-chain smart protocol.
- The current processes around the real estate market can be significantly simplified and automated through the use of a the outlined “Standard Process” for a tokenized real estate market.
- The current CEP-78 NFT standard needs to be and has been enhances to include critical new features to permit the adherence to legal and transfer restrictions.
- The Swiss legal landscape and business environment poses an optimal location for building a tokenized real estate market model.

The Real Estate Market Today

Today, Real estate objects and derived investments are an established, well-understood and highly attractive asset class. There are many diverse types of investment vehicles within this asset class:



The above overview does not claim to be complete with regards to the types of investment vehicles nor with regards to the parameters. Nonetheless, the parameters make it apparent, that direct investments have a higher return opportunity and provide more transparency but with the downside that direct investments lack liquidity, process automation and require a high minimum investment. This leads to the fact that direct investments today are not accessible for a wide range of potential customers.

Some of the key causes for this are:

- Ownership in most countries is linked to entries in public registries - paper based, slow, costly.
- There are limited “market pricing” mechanisms, only private markets, which rely on appraisals.
- Real estate ownership and management is tightly coupled. Ownership transfer often requires changing multiple management structures associated with the real estate asset in question (asset management, property management, facility management, etc.).
- The acquisition and management of real estate objects/investments involve many parties and intermediaries, leading to complex, costly and opaque processes.
- Fractional ownership models at a granular asset level are rarely available, and if, they are accompanied by a non-standardized difficult to comprehend governance.
- There is a lack of standardization of Real Estate Investment Vehicles.

Furthermore, Real Estate Investments bear many challenges for all involved parties:

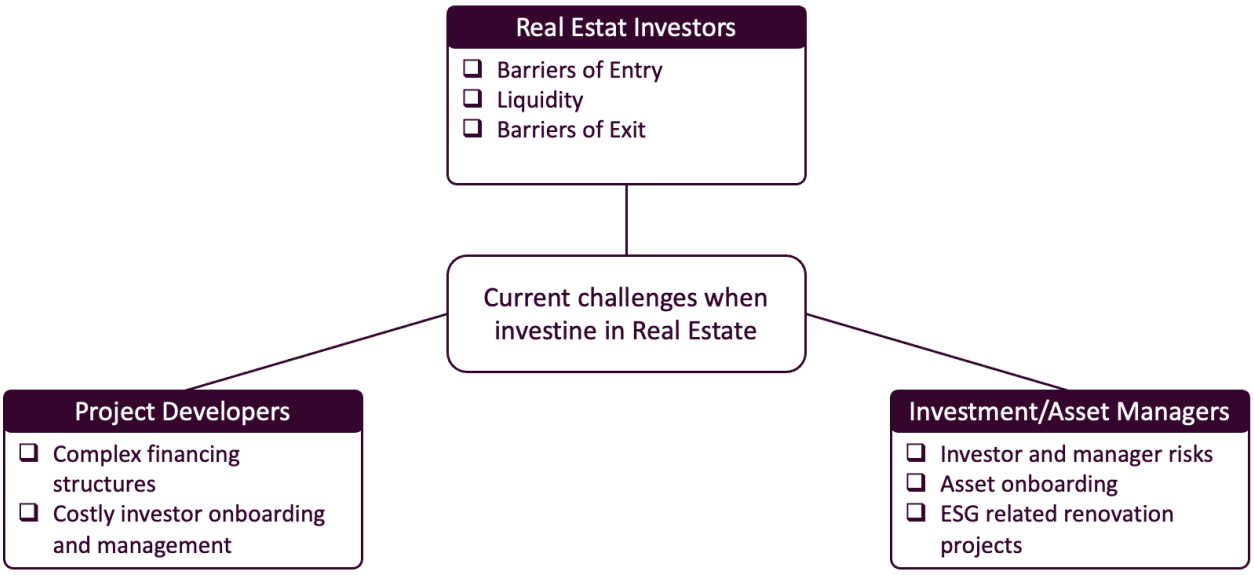


Figure 1: Challenges faced by real estate investments

Challenges for Real Estate Investors:

- *Barriers of Entry*
  Pricing mechanisms and respectively the due diligence necessary are costly and scarce. Since real estate markets are private (assets are not publicly traded), they rely on appraisals (with a sales comparison, cost or income approach), which are costly and time consuming as they have to be performed by an independent and specialized third party.

  Potential investors cannot easily invest on a granular level into interesting real estate assets (or real estate development projects) without going through indirect investments such as real estate funds or project development companies. The best real estate opportunities are managed by large, specialized investment companies or banks and are only offered to large investors (institutional investors, UHNWIs/family offices, etc.).

  Furthermore, investors (especially retail investors), face significant regulatory barriers when trying to invest in the Swiss real estate market. These barriers range from suitability checks to limitations of buying Swiss real estate for foreign nationals (Lex Koller).[1]

- *Liquidity*
  The high upfront capital requirements - for land purchase, project development, asset purchase etc. raise the barrier for small and medium investors even higher. The manual

[1] For a more detailed analysis of the regulatory framework in Switzerland and a list of applicable regulations, see the paper submitted under Milestone 4 of this grant. https://github.com/NoumenaDigital/devxdao-m3/blob/master/doc/m4Documentation/Milestone%204%20-%20Legal%20Considerations.pdf

and non-standardized manner in which real estate financing processes are conducted today, result in high transaction costs and long transaction times - along with opaque and high fees. Once an investment has been placed, it is usually not possible for the investor to trade the asset over a defined multi-year lifecycle of the investment.

- *Barriers of Exit*
  Liquidation events usually lead to a complete transfer of ownership. Already a fractional ownership transaction often requires negotiating with all other fractional owners, triggers tax liabilities that are often carried by the remaining asset holders, as well as requires the renegotiation of relevant service contracts associated with the asset.

Challenges for Project Developers

- *Complex financing structure*
  Real estate projects are usually difficult to finance during the early stages of a development project. Options on land purchases are typically only available for a short period, in which a large part of the capital for the purchase must be raised. This leaves project developers often only with their own capital and/or debt as financing options. This usually makes project developers dependent on single investors, as the high project complexity and limited time leaves no opportunity for project developers to follow multiple opportunities.

- *Costly investor onboarding and management*
  Today's real estate investment processes tend to be cumbersome, due to a complete lack of standardization, with long and expensive due diligence processes. This leads to long and expensive negotiations between the involved parties. Reporting and investor management procedures are usually complex and manual, resulting in high costs.

Challenges for Investment/Asset Managers

- *Counterparty Risk/ Liquidity Risk*
  Investment- and asset managers are today facing a high dependency on single investors, which paired with high investment volume, project complexity and short timelines pose a substantial risk of funding failure to asset managers. The impossibility for asset managers to follow multiple opportunities (see reasons above) prevents them from being able to leverage and disperse that risk over multiple parties.

- *Asset onboarding*
  Asset data is typically stored locally with the seller. If an investor would like to access this information e.g., for a management change, the data is used as a negotiation subject. This poses a significant funding risk for the other involved parties.

- *ESG related renovation projects*

Investors must fund unexpected ESG related investments in their existing portfolios. They are facing the challenge of following ESG standards which not only requires reporting but also often costly renovation. Standardization and automation of ESG related funding processes can allow investment managers to bring their assets on the green paths.

Real estate investments currently are thus a highly exclusive asset class, predominantly reserved for (ultra) high net worth or institutional investors.

Real Estate Investment Trusts (REITs) and funds bring some degree of standardization to Real Estate Investment, but are largely overpriced due to the aforementioned costly and complex processes around Real Estate Mgmt. Furthermore, investors demand more and more to hold assets directly, while expecting liquidity, democratization and transparency.

The Vision to democratize the Real Estate Market

As is evident from the aforementioned challenges, the Real Estate Market and associated financial products are in need of a solution that increases liquidity through efficient and fast transfer of (fractional) ownership through token exchange, improves market pricing mechanisms by building at-scale information, servicing and trading venues based on common platform setting market standards and lowers barriers of entry and exit.

Given long discussions with a variety of business stakeholders, it is believed that tokenization and smart contracts will enable the democratization of the real estate market: in the future, real estate will be an asset class accessible for a broad range of investors that offers not only new investment opportunities for professional asset managers and professional investors but midterm also for medium to small investors (tokenization would make it possible for retail clients to direct invest in real-estate but the regulation today restricts the investment to institutional and professional investors). Real estate tokens will be traded on liquid, transparent marketplaces at a small fraction of the costs and time compared to the investment and trading processes today.

In the scope of this project, a prototype of a real estate investment platform that enables the democratization and decentralization of real estate investments has been implemented.[2][3] Tokens are split in on-chain and off-chain token, where the former represents the actual ownership of shares in a Real Estate Special Purpose Vehicle and the latter orchestrates the associated business logic and obfuscates the monetary value of the respective ownership.

[2] The code repository and documentation of the modified Casper CEP-78 based token that has been used can be found in the following repository.
[3] The code repository and documentation of the Tokenized Real Estate Market prototype based on the Noumena Platform can be found in the following repository.

“The Standard Process” for the Real Estate Market Infrastructure – from onboarding via trading to holding

This prototype provides a system that allows standardized due diligence, automated onboarding of investors, lean process management, and at its core, the tokenization of the involved assets.

In terms of overall setup, we distinguish three processes / phases:

a. The **onboarding** of real estate assets, initial due diligence, and the issuance of tokens
b. The **“holding”** of real estate tokens, information and servicing of tokens
c. The **trading and settlement** of real estate tokens

The onboarding phase

“The Standard Process” starts with the **onboarding and issuance process** of real estate assets:

1. In the first step asset owners or developers select a portfolio or project for tokenization. Often, professionally managed assets will already have service agreements in place with asset managers.

2. If the assets are suitable for tokenization and the required checks are completed by the platform, the real estate owner and his/her holdings are onboarded on the platform. In a first step, the ownership of the underlying real estate assets is transferred to a new, dedicated but otherwise completely standardized SPV. Whilst the SPV gets registered as the sole owner of the real estate asset in the public records, the real estate owner retains full ownership of the SPV.

3. In parallel to creating a standardized SPV and transferring the ownership, a smart contract is created on the Casper blockchain, representing the SPV on the chain. This smart contract contains a whitelist of investor accounts managing who may and may not invest in the SPV.

4. Next, the investment is prepared for tokenization. A token holder agreement is prepared, modularly based on legally waterproof templates for the corresponding jurisdiction.

5. Given the value of using a well-known and renowned servicing company that brings long term guarantees to upkeep the real estate property, any service contracts, in particular any pre-existing contracts with asset managers, can be replaced by standardized service contracts by those accredited on the platform.

6. Optionally, asset owners (or the platform) can add additional neutral due diligence or valuation benchmarking performed on their assets. The service is subcontracted by the platform. The fees for this optional service are charged against the SPV. This might be required for newer asset owners without a long and successful track record, or for non-standard assets.

7. An auction is performed on the platform that gives potential distributors the possibility to conduct their own initial due diligence and then bid to obtain the privilege of becoming lead distributor/structurer for the specific assets on the platform. As a result of the auction, a specific lead distributor is chosen for the asset.

8. The lead distributor completes the full due diligence of the asset and provides documentation on the asset and the project developer/issuer. The documentation together with the results of the due diligence and a template for the shareholder agreement are placed in the project data room, that is managed by the smart contract representing the asset.

9. Once the documentation and structuring of the Real Estate SPV is completed, a set of eligible investors is selected by the distributor. The lead distributor may furthermore opt to work with other banks to onboard further investors. Investors need to meet the legal regulatory requirements set forth by the country of their domicile and the country of registration of the platform. This is to be assured by the lead distributor. Investors are provided with offers by the distributors.[1]

10. Investors need to sign a Non-Disclosure Agreement with the issuer to obtain access to all the documentation of the project. This can be done digitally on the platform. Once the Non-Disclosure Agreement is signed, the investor automatically gets access to the full data room of the project.

11. Investors can now choose to accept the offers or reject them.
    If the investor accepts the offer, he signs a shareholder agreement with the issuer and thus the SPV. This outlines all benefits and obligations associated with the acquisition, holding and disposal of shares in the Real Estate SPV.
    Upon signing the shareholder agreement, the Investor is also whitelisted on the Smart Contract governing the SPV on the Casper blockchain. This enables him to own and trade Tokens representing shares in the Real Estate SPV.

12. Once the subscription deadline has been reached, the platform gathers the subscriptions (accepted offers) and respectively assigns shares to the investors. The process is currently based on a first come, first serve basis, but many other systems could be envisioned.
    If an investor is allocated shares in the SPV, a respective on-chain token is minted by the platform on the Casper Blockchain registering the ownership of the shares on the chain. In parallel a off-chain token is generated in the form of a smart protocol on the

platform, which contains detailed information, such as the number of shares and their respective share class.

At this point, a real estate project has been onboarded and structured as a SPV and a smart contract on the Casper blockchain. Investors have been selected and the subscription process has taken place, giving the investors partial ownership in the SPV.

The holding phase

During the holding phase, investors already hold tokenized shares in real estate SPVs.
To illustrate the setup, we start with the **"holding" phase**, assuming real estate assets have already been tokenized and bought by token holders.

- Holders of these tokens are subjected to a shareholder agreement. The shareholder agreement manages all relevant governance amongst token holders, e.g., transfer rights/obligations (e.g., right of first refusal, tag along, drag along, etc.). These rights are as standardized as possible, fully transparent to token holders and fixed at issuance. It also defines the information obligations for asset managers (in particular for the public and for token holders), external audit and due diligence.

- Token holders can at any time individually against a fee claim actual ownership of the real estate assets, by requesting the SPV to transfer the respective fractional ownership associated to the token owner's holding and entering his/her possession in the public registry.
    - In a first stage, such asset owners, however, remain contractually bound to the same rights and obligations as the token holders. The in-principle option to claim ownership of the underlying asset allows the SPV to provide the token owner a "look-through".

    - At a later stage, tokens could have additional structures, allowing investors to invest in particular assets within a real estate portfolio (e.g., a specific apartment in an apartment complex). If such an asset is fungible, i.e., can be extracted from the tokenized asset portfolio without materially impacting other asset holders, the owner of such a structured token can opt to detokenize his/her ownership and claim unencumbered possession of the asset.

- In addition to the shareholder agreement, every SPV will enter one or multiple service contracts, most importantly a service contract with one or multiple asset managers that are responsible, e.g., for the financial, tenant, property and facility management of the real estate assets.

- Asset managers (and other service providers) are accredited on the platform and their performance is benchmarked across assets. They typically have multi-year contracts that are agreed prior to the issuance of the real estate tokens. At the request of a

suitable majority of the token holders (as determined by the shareholder agreement) asset managers (and other service providers) can be exchanged for other accredited services providers by ways of a structured process

- The administration of such processes, as well as other administrative duties, are performed by a lean platform team that operates “at cost”.

- There are further token or asset servicing functions that the platform delivers to its token holders, e.g., automated notification, the notification and execution of rights and/or obligations as described in the shareholder agreement (e.g., exercising right of first refusal, execution of drag agreements in case of a real estate sale), as well as automated transactional processes (e.g., capital calls, dividend payouts, etc.) depending on the details in the agreed-on shareholder agreement.

The trading and settlement phase

Finally, we turn to **trading and settlement**. The intended setup makes use of a flexible and highly performant blockchain.

In secondary market trading of Real Estate SPV tokens, it must be ensured, that the respective counterparty fulfills all requirements as outlined by the Real Estate SPV and the respective legal jurisdiction.

Furthermore, in Switzerland, the Swiss DLT Law requires, that trades must be able to take place on the blockchain, without the interference of third party systems.

This is accomplished by creating a whitelist of investor accounts that are permitted to receive tokens in specific Real Estate SPV. The list is maintained by the distributors of the tokens, the financial institution or bank associated with the Real Estate SPV. The platform is built, in a way, that unless an investor is on the whitelist, the on-chain and thus also off-chain transaction of the tokens/shares fail.

Transfers of tokens take place over the counter. To successfully receive a transfer of a token, the respective counterparty has to first sign all relevant documents, such as the Non-Disclosure Agreement and the Shareholder Agreement, before the financial institution whitelists him. Once this is done, a transfer of tokens can be initiated from the platform or directly via the blockchain.

“The Standard Model” for the Real Estate Market Infrastructure – Technical Considerations

Creation of Tokens representing Real Estate Ownership Shares – Milestone 2

Due to the requirements of obfuscating the value of the Real Estate Investements, NFT tokens representing a share in a Real Estate Project, have been created in Milestone 2 of this grant. Using NFT tokens, the token asserts the ownership of the investment, while being unaware of the actual value of the investment. The value of the investment is managed the off-chain smart protocol within the Noumena Protocol Platform.

The NFT tokens are based on the CEP-78 Standard of the Casper Network:
https://github.com/casper-ecosystem/cep-78-enhanced-nft

A detailed explanation of the implemented token can be found in the README of the Milestone 2 submission:
https://github.com/NoumenaDigital/devxdao-m3/blob/master/casper/README.md

The following modifications were made to the standard:

- Allow Mint, MetadataUpdate and Burn only for contract-installer account.
- Add whitelist of accounts that tokens can be transferred to.
- Modified transfer method so that it can be invoked by the contract-installer account, given that the target account is on the whitelist.
- Enable the acceptance of a token id (or hash), which is passed on token creation and can be arbitrary

Furthermore, the following parametrization was chosen for the standard:

Modality	Implemented value	Reasoning
Ownership_Mode	Transferable	A core requirement of this project is to transfer the CEP-78 NFT between investors qualified for the respective Real Estate Investment (SPV)
NFTKind	Virtual	The tokens are a digital representation of shares representing an ownership stake of a given real estate project
NFTHolderMode	Accounts	The respective NFTs are held by Investor accounts
WhitelistMode	Locked	This is only applicable to the contract whitelist that manages the minting of tokens and not to the

Modality	Implemented value	Reasoning
		whitelist that manages the accounts which are cleared for token transfers. Since the minting and burning can only be done by the installer account, the whitelist should be locked.
Minting	Installer	The ability to mint new tokens is limited to the account that installed the contract
NFTMetadataKind	Custom	The custom configuration allows for the storing of a predefined json_schema. This schema will ultimately store the protocol references to the off-chain smart contracts on the Noumena platform
NFTIdentifierMode	Ordinal	While the original method is more human readable, it also allows for an indication of how many NFTs have already been minted
Metadata_Mutability	Immutable	The metadata carries information such as the external protocol reference. It is thus essential, that it be immutable
JSON_Schema	DummyData	For the purpose of this Milestone, pure dummy data was provided

The roles required for an efficient blockchain and smart contract based market infrastructure have been defined

The following roles have been deemed necessary to run a smart contract based market infrastructure for Tokenized Real Estate Investments.

NPL Role	Description	Casper Account
pBank	Represents the bank that conducts the due diligence and selects the investors for the specific Real Estate SPV. The bank issues the RE SPV tokens. The bank is furthermore in charge of managing the lifecycle of the RE SPV.	No account, acts through pPlatform
pPlatform	Represents the Real Estate Investment platform itself. The Real Estate Investment platform hosts RE SPVs, banks and investors and facilitates the interactions between them.	Contract Installer Account
pInvestor	Represents the investor who signs the required legal documents with the bank and acquires Real Estate Investment equity on the primary and/or secondary market.	Investor Account
pBuyer	The role of the investor who is party to a Trade Agreement and intent on buying equity represented by a Casper Token in a RE SPV.	Investor Account
pSeller	The role of the investor who is party to a Trade Agreement and intent on selling his equity represented by a Casper Token in a RE SPV.	Investor Account

Modelling of key elements of processes involved in the onboarding, trading and holding phases of a tokenized real estate market model as smart protocols and smart contracts

The end-to-end process from the creation of a Real Estate SPV on the platform to the secondary transfer of Tokens representing shares in the Real Estate SPV have been implemented using the Casper Blockchain and the Noumena Protocol Platform.

The respective smart protocols in the Noumena Protocol Platform can be found in the following repository: https://github.com/NoumenaDigital/devxdao-m3/tree/master/npl/src/main/npl

The protocols are identified using the general definition:

```
Protocol[Parties] Name(Constructor parameters){ Protocol Body }
```

The end to end process is shown in the following demo files:
https://github.com/NoumenaDigital/devxdao-m3/blob/master/npl/src/main/npl/demo/demo.npl
(simplified version focusing on elements related to the Casper network)
https://github.com/NoumenaDigital/devxdao-m3/blob/master/npl/src/main/npl/demo/demo.npl
(extended version focusing on the business process through smart protocols on the Noumena Protocol Platform).

The on-chain smart contract based on the CEP-78 standard of the Casper Network, which governs the whitelist of investor accounts that governs who can invest in the Real Estate SPV, can be found in the following directory: https://github.com/NoumenaDigital/devxdao-m3/blob/master/npl/src/main/npl/demo/demo.npl

Noumena Protocol Structure

Next to being built on the Casper Blockchain, this platform is largely built based on the Noumena Protocol Platform. The Noumena Protocol Platform creates an ecosystem in which a multitude of instances or pre-defined smart protocols interact with each other and create a full-fledged business solution.

Such smart protocols are defined in an easy to read and understand domain specific language called the Noumena Protocol Language. The general structure of a protocol is consistent and will be explained based on the smart protocol representing the off-chain token.

The source code for this smart protocol can be found here: https://github.com/NoumenaDigital/devxdao-m3/blob/master/npl/src/main/npl/platform/financialInstruments/token.npl

Each protocol starts with a generic protocol statement that highlights the parties which are involved in the smart protocol and the constructor variables that need to be passed when instantiating the protocol. In the case of the token smart protocol, this looks as follows:

```
protocol[pBank, pOwner] Token(var numberOfShares: Number, var shareClass:
 ShareClass, var owner: Investor) { … }
```

The Bank and the Owner have roles to place in the token protocol. Furthermore, upon instantiation, the number of shares held by the Token, the respective share class and the investor need to be passed to the protocol.

Protocols have a finite lifecycle, meaning that they start in an initial state and end in a final state, at which point they can no longer transition states. This is defined by the state definition:

```
protocol[pBank, pOwner] Token(var numberOfShares: Number, var shareClass:
 ShareClass, var owner: Investor) {
 …
 initial state minted;
 final state traded;
 …
}
```

In the case of the off-chain token protocol, it starts as minted and ends as traded. In a later stage, when the tokens become fungible, further states could be added.

The protocols also hold some data which is stored as variables on the protocol. In the case of the off-chain token protocol, this is the id of the on-chain token as well as a list of trade agreements, which show the history of the token. Initially the id of the on-chain token is empty, since the off-chain token is created first and then generates the on-chain token.

```
protocol[pBank, pOwner] Token(var numberOfShares: Number, var shareClass:
 ShareClass, var owner: Investor) {
 …
 var bcId: Text= "n/a";
 var tradeAgreements: List<TradeAgreement> = listOf<TradeAgreement>();
 …
}
```

Protocols can also contain an init statement, which is a set of actions that are executed upon instantiation. In the case of the off-chain token, the off-chain token is added to the wallet of the owner and to the list of tokens associated with the share class.

```
protocol[pBank, pOwner] Token(var numberOfShares: Number, var shareClass:
 ShareClass, var owner: Investor) {
 …
init{
  owner.returnWalletPerProject[pBank](shareClass.project)
   .addToken[pOwner](this);
  shareClass.addToken[pBank](this);
 };
 …
}
```

Next, the logic associated with the protocols is defined. This follows a deontic logic. There are:

- things you may do: Permissions
- things you must do: Obligations
- things you are prohibited from doing: Implicit by the lack of a Permission or an Obligation

In the case of the off-chain token protocol, Permissions are used. For example: the bank is permitted to set the id for the on-chain token:

```
protocol[pBank, pOwner] Token(var numberOfShares: Number, var shareClass:
 ShareClass, var owner: Investor) {
 …
 @api
  permission[pBank] setBcId(id: Text) | minted {
   info("Setting bdId: " + id);
   bcId = id;
  };
 …
}
```

The permission firstly defines the parties that are permitted to execute the logic. If more than one party is listed, one must define if either parties can execute the logic (|) or if both must do so together (&). The permission then has a name “setBcId” and is passed a variable “id”, if required. Furthermore, permissions tend to have so called “state guards”, meaning that they can

only be executed when the protocol is in a specific state. In the case of the off-chain token, the on-chain token id can only be set in the state “minted”. The body of the permission contains the logic that is to be executed by the permission.

Note the “@api” identifier above, this auto-generates an endpoint that makes it possible to trigger the permission externally from the smart protocol ecosystem, given that all conditions are met.

The smart protocols also contain guards, which can be placed on the protocol as a whole or on the individual permissions. Guards are gate-keepers that ensure that certain conditions are met, prior to instantiating a protocol or executing a piece of logic:

```
protocol[pBank, pOwner] Token(var numberOfShares: Number, var shareClass:
 ShareClass, var owner: Investor) {
 …
 @api
 permission[pOwner & *newInvestorParty] offChainTransfer(newInvestor:
  Investor) | minted, traded {

  guard(shareClass.project.whiteListedInvestors.contains(newInvestor), "The
  new investor is not whitelisted");
  };
…
};
 …
}
```

The above guard verifies that when the owner of a token transfers his token to another investor because he has sold it, that investor is whitelisted on the smart contract on the blockchain and thus meets all legal and business requirements to be able to invest in the Real Estate project.

Lastly, there is the notion of a notification, which is a message sent to the outside world to complete a predefined action. An example can be found in the “offChainTransfer” permission:

```
protocol[pBank, pOwner] Token(var numberOfShares: Number, var shareClass:
 ShareClass, var owner: Investor) {
 …
 @api
 permission[pOwner & *newInvestorParty] offChainTransfer(newInvestor:
  Investor) | minted, traded {
 …
  notify TransferToken(oldInvestorAccountHash, newInvestor.accountHash,
   bcId);
  };
…
};
 …
```

```
}
```

In this case, the notification serves the purpose to tell the Casper Blockchain to transfer the on-chain Token asserting the ownership of the Real Estate Token to the new investor in parallel to the transfer of the off-chain token.

Analysis of legal requirements and conclusions from consultations with key business stakeholders

In the course of the work done to build the Tokenized Real Estate Platform, a thorough analysis of legal requirements towards such a platform was conducted, with a focus on the Swiss legal landscape. The findings are elaborated in the following document: https://github.com/NoumenaDigital/devxdao-m3/tree/master/doc/m4Documentation

Critical business considerations

The following questions were identified as critical business considerations during the deliberations that were held in the course of the project with business stakeholders.

Which services must be provided, who could provide it?

The services provided, can be split into the roles of the parties involved on the platform:

Platform

- Provision of standardized templates for creation of SPVs
- Minting of tokens representing financial ownership
- Token life cycling

Bank

- Due diligence of the real estate project
- Real Estate project structuring & documentation
- Creation of SPV
- Investor acquisition
- Wallet management
- Token life cycling (Corporate Actions)

Project Developer / Issuer

- Real Estate Opportunities
- Due diligence

Facility Managers

- Provide Service Agreements and Facility Management

Investor

- Provide equity to finance projects
- Provide liquidity on secondary market

What are market participant prerequisites for real estate token trading?

On the primary market, the banks act as the distributors by creating access to a variety of potential investors. Potential investors need to be cleared with regards to various legal requirements, such as being Lex Koller compliant, AML, KYC and in an initial phase, being professional investors. The role of the bank here is crucial in ensuring that these restrictions are met.

On the secondary market, liquidity is primarily created by investors or in case of discretionary mandates the decision of the according investment board reselling their investments due to a variety of reasons. An important technological prerequisite for this, is that the platform only permits the transfer of such investments to investors that are cleared from a legal perspective. For this reason, a whitelist was implemented on the smart contract on the Casper chain, that acts as a gate keeper to which investors may acquire tokens representing ownership in a real estate SPV.

Banks and issuers play an important role in informing investors about the possible upside of trading their investments on the secondary market and facilitating such actions by bringing existing and new investors together. To facilitate this process, the platform requires a high level or automation, reducing the heavy costs of manual actions and lowering the barriers of entry for new investors.

Lastly, in a second phase, the current model based on NFTs could be extended to use fungible tokens, allowing the splitting of investments and facilitating the trading of portions of an investment on the secondary market.

Which customer segments should be prioritized?

In an initial phase, a tokenized real estate platform should focus on professional and institutional clients as these require less regulatory verifications. This is outlined in more detail in the regulatory analysis completed in Milestone 4 of this grant: https://github.com/NoumenaDigital/devxdao-m3/tree/master/doc/m4Documentation

As such the following client segments should be prioritized:

- Professional investors: clients of the issuing bank and other intermediaries
- Asset management: institutional clients of the issuing banks and other intermediaries
- Portfolio management: structuring the discretionary mandates for the discretionary clients of the issuing bank and other intermediaries
- External asset managers: clients of the issuing bank and other intermediaries

Favorable Legal Jurisdictions

While a complete analysis of global legal jurisdictions is not feasible, the analysis of the Swiss Legal Landscape has proven to be well suited for the creation of a tokenized real estate investment platform.
Amongst others, Switzerland has created the Swiss DLT Act in 2021, which adapts the Swiss Federal Laws to incorporate the new business models provided by DLTs and facilitate innovative DLT trading facilities. For example, amongst others, it requires that assets that are traded on a chain, must have the possibility to be transferred on the chain, without the involvement of any third party systems.

This is the reason why the platform created within this grant includes a smart contract on the Casper chain based on the CEP-78 standard, which governs the accounts to which real estate tokens may be transferred without the requirement of verifying these with the Noumena Protocol Platform prior to a transfer.

The fact that taxation is by large amount handled by the investor himself, also reduces the complexity one might face by having to build complex tax logic into the platform as might be the case in other jurisdictions.

While Switzerland does provide some hurdles for foreign investors when investors invest in Swiss properties through the Lex Koller legislation, these laws do not apply when investing in foreign real estate projects and unilaterally also apply if investors from foreign platform invest in Swiss properties. This law thus does not provide any hinderance with regards to operating a tokenized real estate platform in Switzerland.

Lastly, Switzerland does not require financial suitability checks, when only simple execution services are offered. Since the platform does not provide any advisory services, financial suitability checks are thus not required in Switzerland.

Conclusion

As has been outlined in the Grant “An Open Source Smart Contract Market Model for Tokenized Real Estates”, the combination of Distributed Ledger Technologies such as the Casper Blockchain and the Noumena Protocol Platform acts as a solid basis for building a Tokenized Real Estate Market catering to the primary issuance of tokenized shares for Real Estate projects as well as the secondary trading of such shares between a verified network of investors, which are governed by a smart contract on the Casper Chain.

Through the many discussions held during this project, it has become evident, that the obfuscation of the actual value of the tokens on the chain is a primary requirement by investors. This is achieved through, the combination of a Casper CEP-78 based on-chain token which guarantees the respective ownership of the shares, with a respective off-chain smart protocol that contains the detailed financial information to the real estate SPV, the respective share classes and the number of shares,

Furthermore the on-chain smart contract which governs a whitelist of investor accounts that are permitted to invest in the real estate SPV, ensures that legal restrictions and transfer restrictions are met.

Lastly, it has been shown that the Swiss legal landscape provides a good environment to build such a tokenized platform.

With this, we believe that it has been demonstrated, that a tokenized real estate platform would lead to a more liquid, democratic and transparent market and that such a platform can be realized with the technologies set forth by the Casper Network and the Noumena Protocol Platform.