



LunaOne
Society Decentralised

Technical Vision

Introduction

Socializing and the building of relationships propel us forward as a society in profound ways. The technological development since the age of personal computing has allowed us to progress at levels that would have been unthinkable only a century ago. This progress has brought about new opportunities and freedoms for people around the world, depending on their exposure and access to new technology. We are truly at the dawn of a new age, thanks to breakthrough technologies.

From the arrival of the very first video game, the excitement around the use of computers for entertainment has grown into a major pastime for countless people of all ages. The hardware available for gaming has rapidly developed into wearables that give the player a much more immersive experience. In 1992, science-fiction writer Neal Stephenson first coined the term “metaverse” to describe a 3D virtual space. In 2003, the launch of Second Life was seen as the first metaverse where users controlled their avatar in a 3D world with social functions in an online environment, but it used regular display screens rather than the advanced virtual reality (VR) kit we see today.

Fast forward to 2022 where the term “metaverse” has far greater meaning as it offers far wider usage such as in education, training, communication, the ability to earn currency, travel, cultural enrichment, and anything else that can be imagined. The use of VR hardware has more recently become synonymous with the term metaverse. **LunaOne** will take full advantage of every possibility and

deliver a next-generation level of metaverse through decentralized blockchain technology.

Thanks to its own technological breakthroughs, **LunaOne** will deliver the creation of virtual communities which now incorporate real-life economic components that can be earned, spent, deposited, and withdrawn to further mirror our real lives. Through blockchain technology, **LunaOne** can provide transparent and safe transactions that are fully traceable and incorruptible. This new level of security is a crucial advance required to legitimize metaverses, one which **LunaOne** will take full advantage of.

The **LunaOne** project is a massive undertaking to bring a seamless virtual world to life in which interactions are built on their own distributed infrastructure. This sets the project apart from anything currently available and will elevate **LunaOne** above its competitors. **LunaOne** is more than just a metaverse, it is a platform in which new gamified solutions can be designed and launched to further expand its boundaries. **LunaOne** developers will thus be provided with limitless opportunities to developers which will continually enhance the experiences and interactions for users.

The **LunaOne Metaverse** will be truly decentralized, hyper-realistic, and fully immersive! It will be accessible on every platform possible including PC, Mobile, PS5, Xbox, and many more. Advanced VR sets, haptic suits and gloves, and other wearables will also be available from **LunaOne**.

LunaOne-Chain

Since the introduction of the first Blockchain and the critical feature of Distributed Ledger Technology (DLT), a growing number of use cases have built steadily as DLT gains popularity as a solution to the double-spend problem. This has also brought greater transparency and security to transactional processing. The use of Blockchain today is far-reaching and adoption is progressing at break-neck speed. Strong use cases are proving the benefits first touted, and doubts and fears are dissipating with increasing awareness of major projects delivering benefits not possible with legacy systems.

Many technology vendors are working to solve issues with speed and scalability that have become the greatest limitations to mass adoption. This has resulted in many new solutions, but they have yet to prove themselves in large-scale projects. Ethereum, the world's most popular blockchain can only handle **13 transactions per second (TPS)**, and alternatives such as Algorand process **3,000 TPS**, and the self-proclaimed fastest is Solana, at **65,000 TPS**.

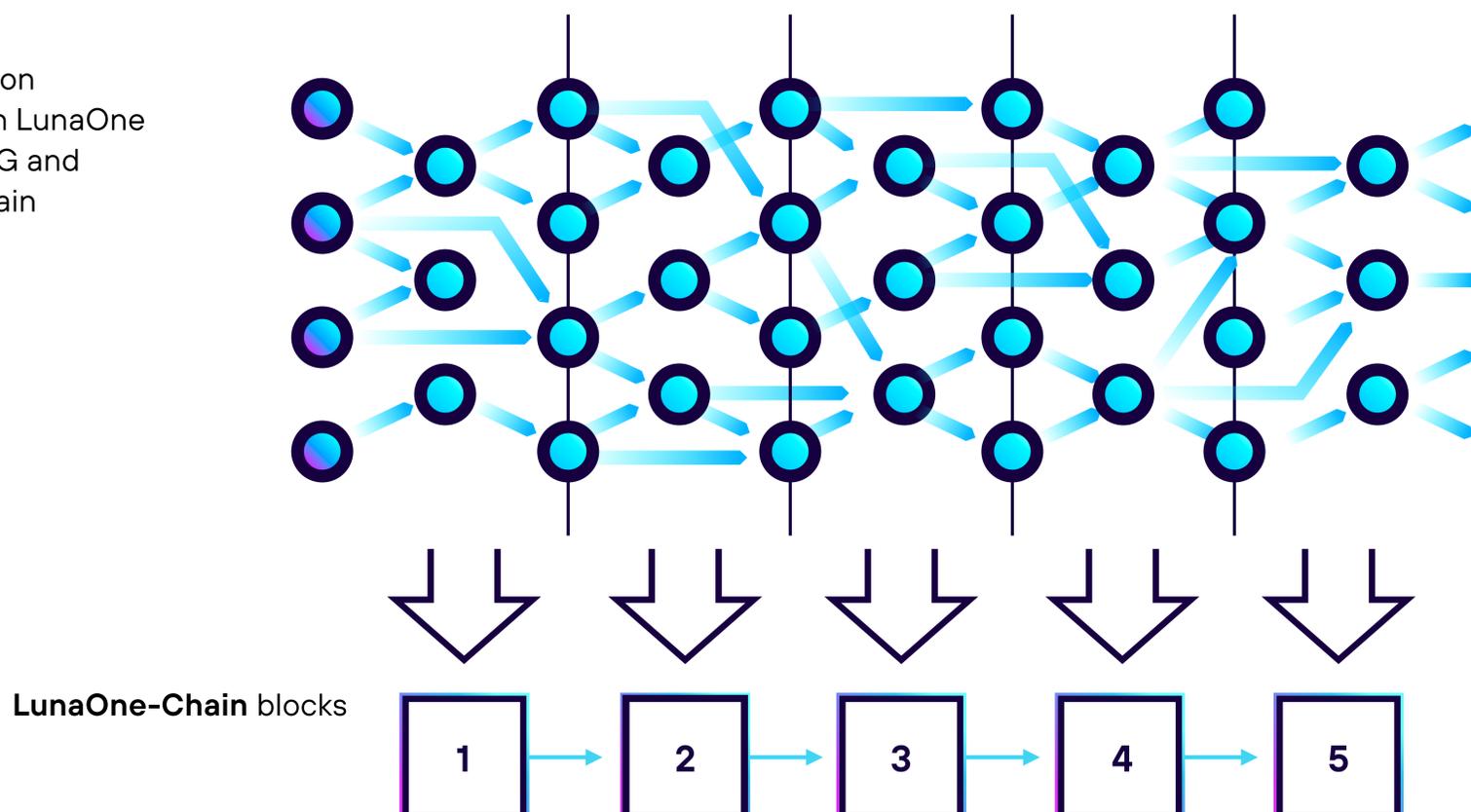
LunaOne has developed its own unique blockchain called **LunaOne-Chain**. Our aim was to solve the major problems that current public blockchains suffer from including the

slow processing of transactions, the high cost of those transactions, and stagnating development and upgrade cycles. **LunaOne-Chain** has been designed to deliver over **400,000 TPS**, making it one of the world's fastest blockchains.

The **LunaOne** team has made breakthroughs by using Directed Acyclic Graph (DAG) technology which is a data structuring and modelling method. Both DAG and Blockchain are the critical foundations to realize the full potential of the **LunaOne** platform. **LunaOne** has also developed its own Smart Contract Engine that features a high Transactions Per Second (TPS) count and ultra-low-cost per transaction. By thinking long-term, such breakthroughs are necessary for the processing of a high volume of microtransactions required in the **LunaOne Metaverse** and the ease of continually tokenizing a large number of assets.

The **LunaOne** platform will feature an NFT Launchpad that attracts exciting possibilities in Play-To-Earn (PTE) gaming, competitions, events, and unique experiences with artists and celebrities wanting to connect more closely with fans. All of the possibilities that NFTs offer can be harnessed within the **LunaOne Metaverse**.

Figure 1
Interaction
between LunaOne
with DAG and
blockchain



The above diagram demonstrates the interaction between two main elements, DAG and blockchain, used within the **LunaOne-Chain**. It shows the process of asynchronous generation of transactions and their links, which allows for the processing of a higher number of transactions and improved scalability. This is achieved by segmenting transactions into batches rather than processing them

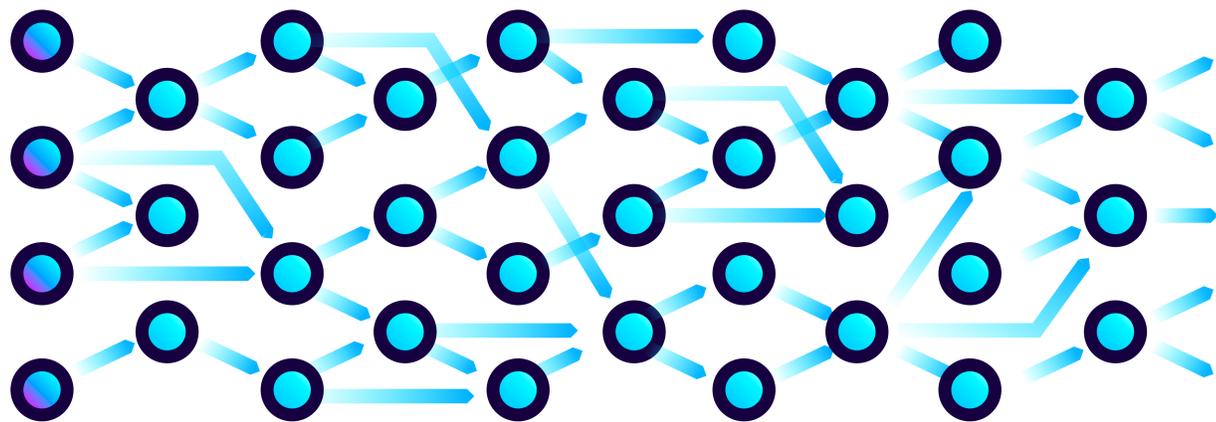
singularly. The additional benefits include the prevention of double-spending during transactions and eliminating the possibility of external attacks. **LunaOne** uses parallel blockchains to solve other problems such as the width of the network and the flow of timing between earlier and later entries in the ledger.

Directed Acyclic Graph (DAG)

DAG is a distributed ledger that differs from blockchain in its record-keeping structure and asynchrony. Unlike blockchain or consensus-building models, it has no blocks. DAG functions as a network of interconnected branches that expands in multiple directions. Transactions can be confirmed much faster whilst remaining decentralized since each node need only confirm the

previous one. Every transaction refers to one or more parent transactions, which in turn, refer to their parent transactions, and so on. Thus, the system recognizes the exact order between transactions in the chain. The result is the formation of a "tree" of transactions where each is validated and immutable.

Figure 2
Structure of the
DAG Ledger



DAG technology appeared as a result of the limitations of blockchain networks in order to cope with heavy loads and global network congestion. Using DAG means that only nodes are controllers and transaction validators. The information resides in transactions giving it great speed. Theoretically, it could handle millions of transactions per second when used to its full potential. **LunaOne-Chain** incorporating DAG is an innovative platform designed to improve scalability, increase transaction speeds, and lower transaction costs.

A large number of degrees of inputs and outputs prevent malicious manipulations with nodes since changing one

node means changing them all. Many coins/tokens require significant computing power for mining such as Proof of Work, but the use of DAG makes **LunaOne-Chain** a very green option. Using DAG means that the transactional branch has an origin and an endpoint ensuring that the path remains unchanged. Transactional branches can be parallel, database availability can have parallel generation, and different value paths between different vertices. This allows for an optimal check of the relationship between the value vertices. At the same time, they are reducible with the unique property of a DAG structure being reducible to an optimal point where the path fulfils all the relations indicated in it without any loss.

Blockchain

With the high speed and asynchrony of DAG, blockchain can protect against double-spending and the risk of desynchronization. As an example, if we imagine that the DAG consists of ten transactional branches, and we have a transaction on one of these ten parts, the accepted transactions will be checked in each of them separately leading to the risk of double-spending. For this reason, **LunaOne-Chain** implements a mechanism for reference verification with blockchain records. At the same time, blockchain allows access to all information of parent transactions providing validation of legitimate events within the main chains of user operation.

LunaOne-Chain is based on Delegated Proof of Stake (DPoS) consensus. Nodes that participate in validation will be selected based on the DAO principle. After an application is submitted, the community will select trust nodes via a vote. This procedure is repeated every few months to maintain the credibility of validators and the possible participation by those who meet the necessary criteria.

An important functional requirement of the blockchain module is the ability to classify and order transactions. The functionality of multi-level sharding will be developed

for this purpose. Sharding is a function that allows effective scaling by synchronizing and systematizing data by coordinating the work of validators. Sharding distributes the load on the blockchain, improving its efficiency. **LunaOne-Chain** will segment the database by:

- **The height of the blocks allowing optimisation of work with the blockchain for nodes which makes it possible to validate actions in the network without resorting to pumping out the entire database;**
- **The type of transactions giving the ability to segment various interactions for the possibility of validating the system of illegal intentions on the part of intruders;**
- **Time allowing the segmentation of data according to the principle of time intervals which can be measured in days, months, or years.**

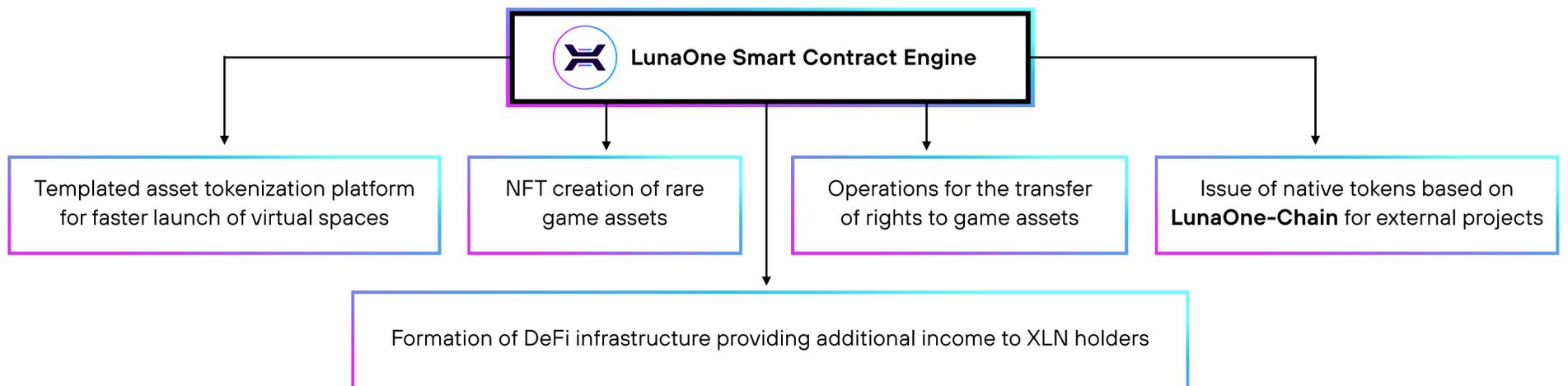
The process of sharding can be of use on blockchains by allowing the structuring of the information in the most efficient way. Given that the interaction between the blockchain and DAG is based on the constant writing and reading of data, it unlocks the potential of **LunaOne** as an ecosystem.

Smart Contracts

Smart Contracts are programs stored on **LunaOne-Chain** that self-execute when predetermined conditions are met. As a rule, they are used to automate the instant execution of an agreement between parties, which assures

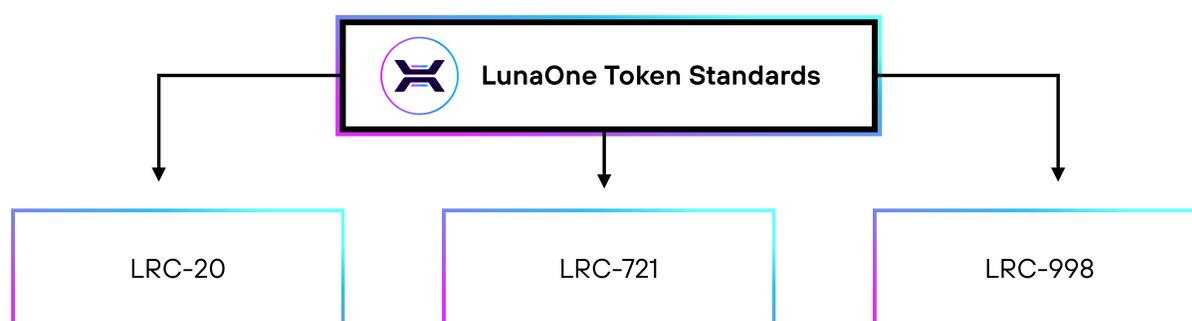
a predictable result without the need for an intermediary. Smart contracts are an essential element of the **LunaOne** ecosystem allowing for the tokenization of rare assets and the processing transactions between users.

Figure 3
Main Features of Smart Contract Engine



LunaOne has implemented its own Request for Comments standard. Three subtypes of token standards are available.

Figure 4
Token standards



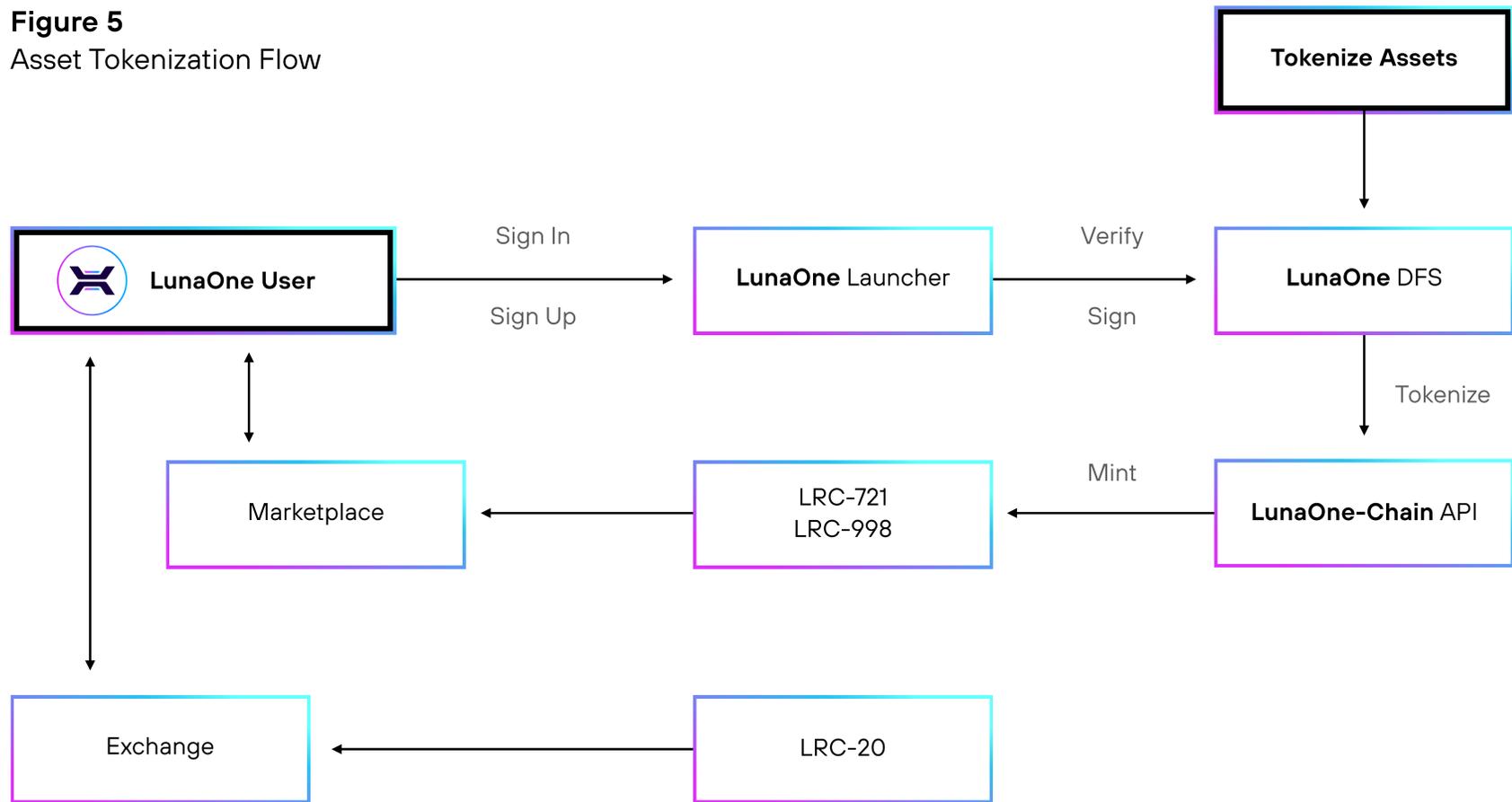
These standards refer to generally accepted industry standards. Their capabilities and functionality are implemented according to the consistency principle.

LRC-20: The base standard on which a token that is interchangeable can be issued.

LRC-721: The basic standard that meets the NFT requirement; each issued token that meets this standard is unique.

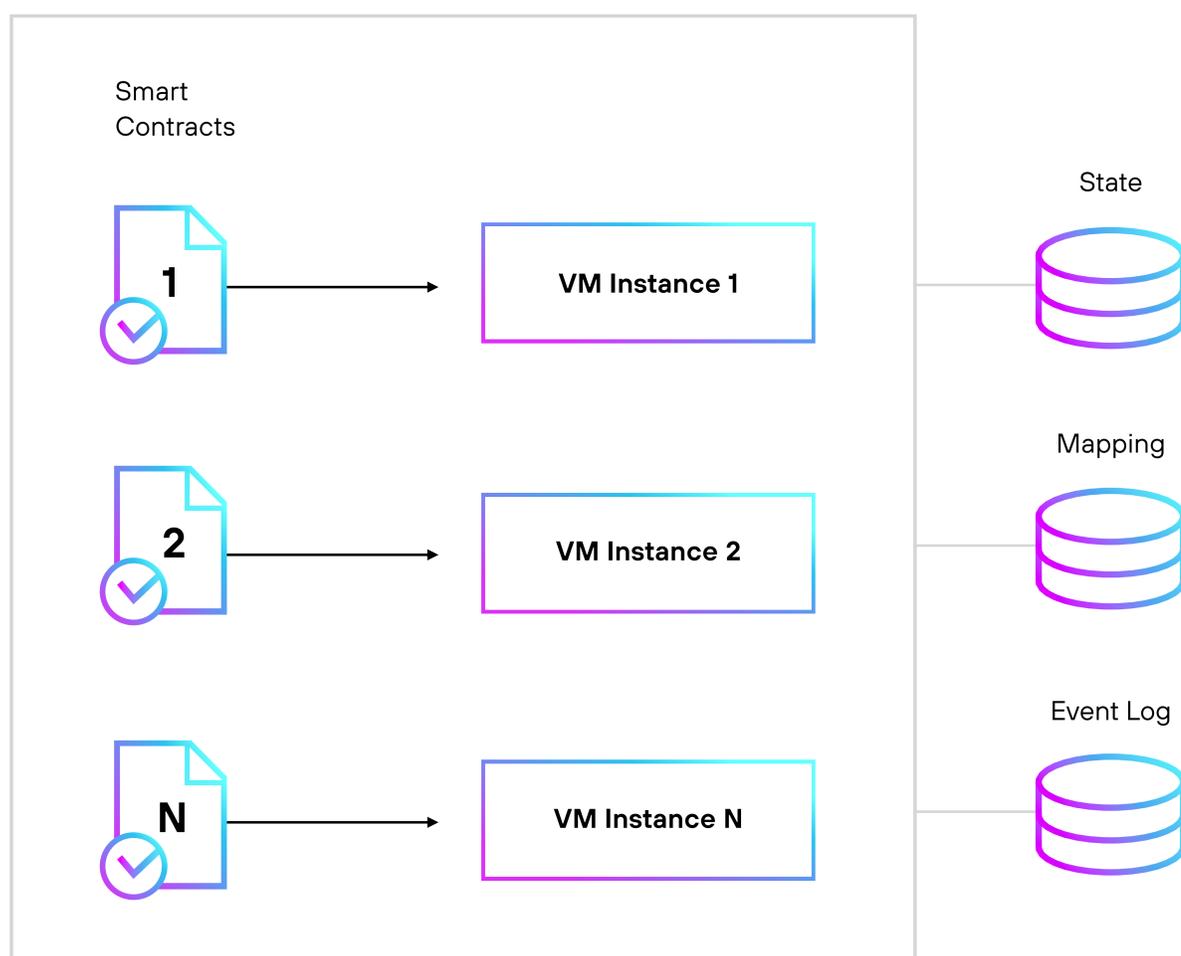
LRC-998: The standard that allows the creation of composite NFT assets that belong to one NFT, essentially forming collections.

Figure 5
Asset Tokenization Flow



The **LunaOne Virtual Machine (LVM)** is the direct execution environment for Smart Contracts. In this case, Smart Contracts are executed in separate virtual machine instances.

Figure 6
Smart Contract Storage



Each smart contract has three types of storage:

STATE: Stores the most current state of the Smart Contract.

MAPPING: Stores the Smart Contracts mapping, which is a hash table of keys and values. Mappings can be infinitely multi-leveled. For example, a value for a mapping key is another mapping.

EVENT LOGS: Store all events related to the Smart Contract and can be accessed via an API to read the historical data. Subscription to specific types of events using data filtering is supported via web sockets.

The **LunaOne-Chain** uses Plasma to handle computation work to enable Smart Contract functionality. The amount of XLN token paid for when executing a transaction depends on the amount of Plasma consumed and the PlasmaPrice attribute. The amount of Plasma paid depends on the transaction amount. It is possible to define the total amount of Plasma that the sender of a transaction is willing to consume to complete a transaction by specifying the PlasmaLimit attribute.

Metaverse NFT Launchpad

NFT Launchpad is a platform for metaverse providers and creators of PTE games to tokenize assets and simplify entry into **LunaOne**. It is possible to create, add, and delete objects which can be transferred between games and metaverse spaces participating in the **LunaOne** metaverse.

NFT Launchpad uses templates of source data and rules for game objects. Each NFT is tied to a template that implies a specific game item or character as well as its associated standards and parameters so that they will have the same properties, visual components, etc.

The main tasks of NFT Launchpad:

- To implement a mechanism for interacting with the tokenization process allowing gaming studios to independently release NFTs for use in their game.
- To implement a seamless mechanism for transferring and using objects between games in the **LunaOne** ecosystem and directly into the **LunaOne Metaverse**.

A fundamental process of the platform is the creation of templates assigned to each in-game item, which are assigned to objects for the minting of NFTs. Example below:

Figure 7
Template in DB Store
Game Ecosystem

ID	3456798525						
Name	Template 1						
Template Policy	<table border="1"> <tr> <td>1. Unchangeable</td> <td>E</td> </tr> <tr> <td>2. For the Same Theme</td> <td>REL</td> </tr> <tr> <td>3. For All</td> <td>REL</td> </tr> </table>	1. Unchangeable	E	2. For the Same Theme	REL	3. For All	REL
1. Unchangeable	E						
2. For the Same Theme	REL						
3. For All	REL						
Author ID	3456798525						
DS of the Author (Digital Signature)							

Variable Part									
Parameters			Policies of the Parameter						
Title	Blockchain Wallet	Link to the Set of Resources in DB	Unchangeable	For the Same Theme	For All	Editor's ID	Editor's DS	Coefficient of Game 1	Coefficient of Game 2
1. Health	1324656487					1324656487			
2. Attack	1234679845					1234679845		1	0.1
3. Defense	4631659782	5487632154	E	RE	RE	4631659782		2	0.5
...		10	0.001
							Editor's ID	254789652	658997427
							Editor's DS	DS Coefficient 1	DS Coefficient 2

Author - the creator of the template; might be an editor, if he/she has a game, or an administrator (in this case, he/she doesn't set the coefficients for the game). After creating a template, the author can only change the policies (at any time). The author has no right to change the coefficients of games if he/she is not their editor.

Editor - the owner of a particular game who sets the rules for it. After creation, editors change only their game coefficients and can add their parameters from their policies.

Wallets - the values of wallets (number of tokens) are changed by transferring tokens to them.

Link to the template (Template ID) gets inserted into the NFT.

REL - policies (R-read, E-edit, L-licenced)

Tokens - internal tokens of the ecosystem, bought by editors, used for mutual settlements.

Set of resources - a package of objects, which may include: name, image, textures, etc.

The coefficient of the game is responsible for the ratio of game parameters concerning the tokens in the system blockchain. Each game will be able to use a different coefficient for the object, thereby allowing the object to fit into the format of the game more efficiently.

NFT Launchpad features include:

- Inside the NFT, there is a link to the template, which is stored in the DFS. Users can use the portability of objects with parameters (templates) and see the cost of objects in each virtual space only on the platform.
- The use of templates is possible only through the platform API in conjunction with the corresponding NFT, which is created automatically when creating a template.
- Ecosystem server creates events for all changes in templates and parameters. All members can subscribe to them and react accordingly.
- Changing individual parameters of templates can be done at any time by their authors.
- Objects, parameters, and resources contained in the templates which can be used or modified with the permission of their authors.

Project Structure & Definitions

LunaOne-Chain

HRC 721/ HRC 998 Smart Contract Mechanism - module responsible for creating and managing Smart Contracts. The token is subsequently assigned to a game object.

Decentralized File Storage (DFS) - module for storing data about items tied to NFTs (for example, images, information about an object, etc.).

KMS (Key Management System) - module responsible for storing and generating keys needed to identify users and provide them with functionality within the platform.

API Blockchain - module is responsible for storing, updating, and transferring information about the NFT, its status, the possibility of creating an NFT, and transferring ownership (transfers between wallets).

Metaverse Ecosystem Area

DB Store Metaverse Ecosystem - module responsible for storing templates of created NFT objects.

Core Metaverse Ecosystem Logic - this module provides the ability to create a template, change the template, and set the rules for applying templates in games.

The Event module - functional module responsible for notifying the occurrence of certain events within the platform. The creation of a new object, changing the characteristics of existing objects, etc. This module gives metaverse creators the opportunity to receive the most up-to-date information about the number of objects and their states.

Client Panel Ecosystem UI - a personal account of an editor, a representative of game studios - through this panel, it will be possible to perform all the functional manipulations/actions that the platform has.

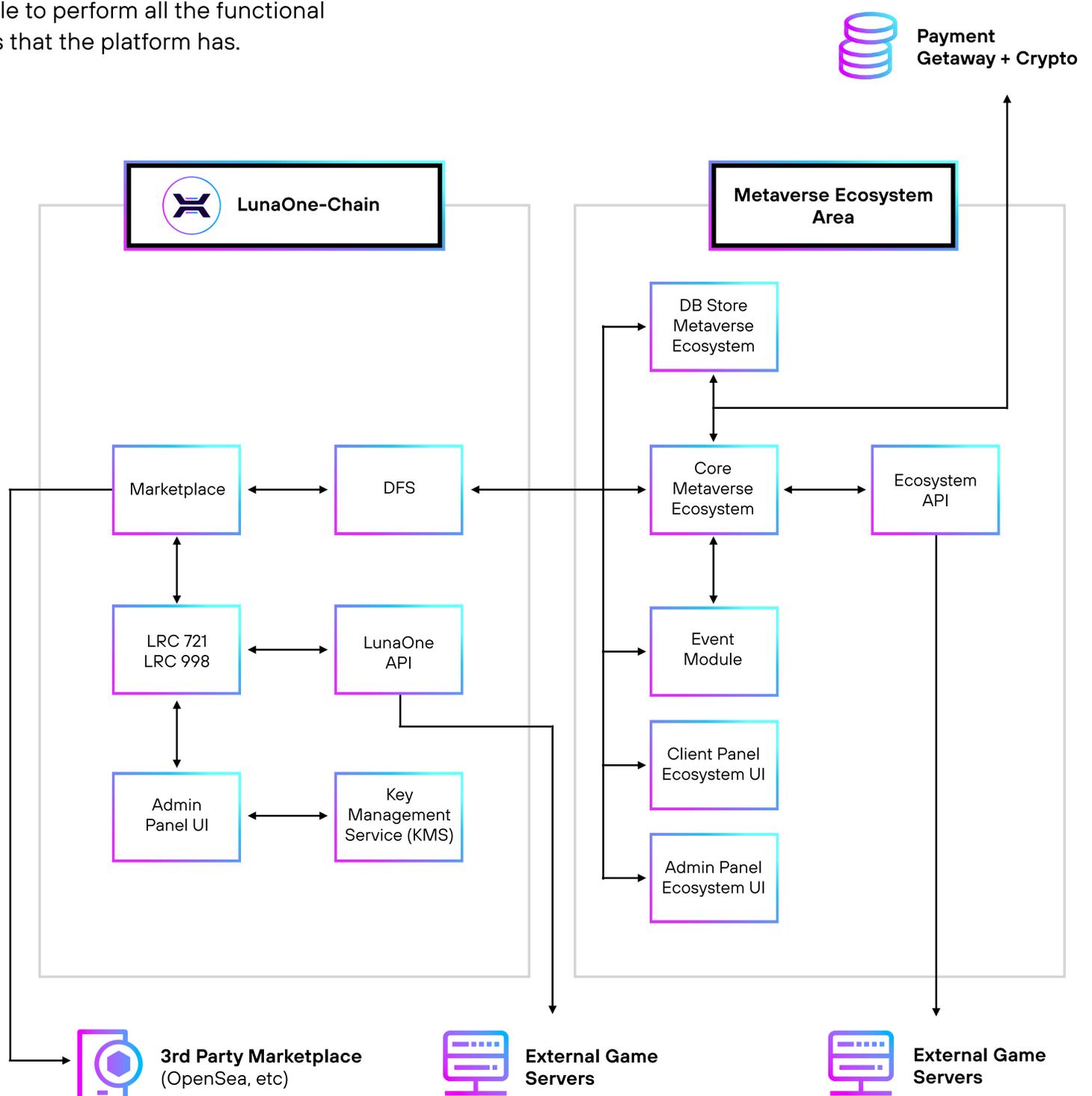
Admin Panel Ecosystem UI - the platform admin panel that will allow viewing all user lists, tracking financial transactions, etc.

API ecosystem - responsible for the exchange of platform information with games.

Payment Gateway + Crypto - module responsible for receiving and processing fiat/crypto payments for using the platform functionality or interacting with the marketplace.

External Game Servers - module responsible for the possibility of tokenization of already created games with their assets.

Figure 8
Project Structure



Luna One

Luna One