UNIVERSITY of NICOSIA

Session 2

DeFi stack

BLOC 611: Decentralized Finance

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   - The Asset layer
   - The Protocol layer
   - The Application layer
   - The Aggregation layer
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3. Conclusions
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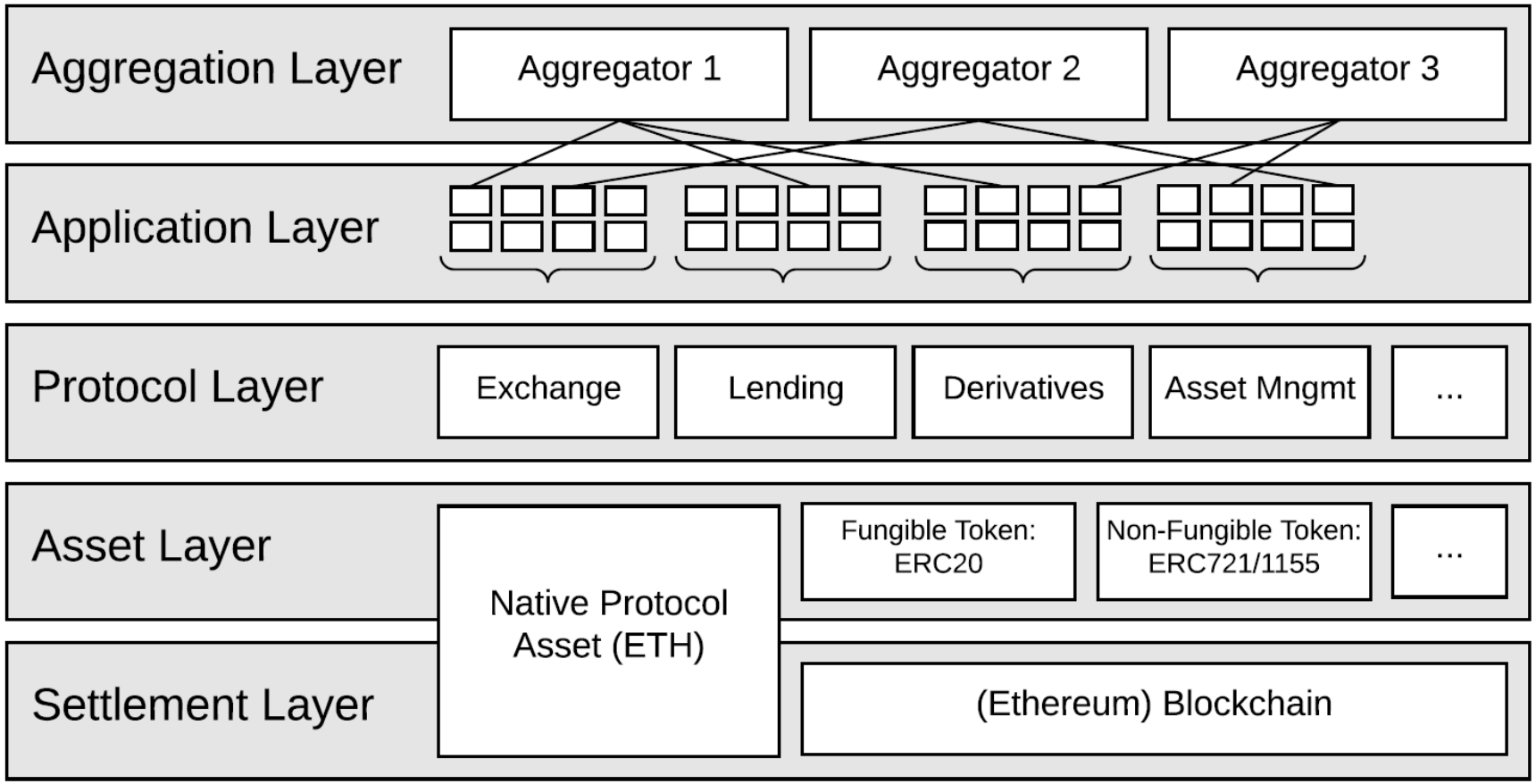
Disclaimer: As always, the discussion of any specific project or organisation is for educational/illustrative purposes only and should not be construed as endorsement or investment advice.

Session 2: Defi Stack

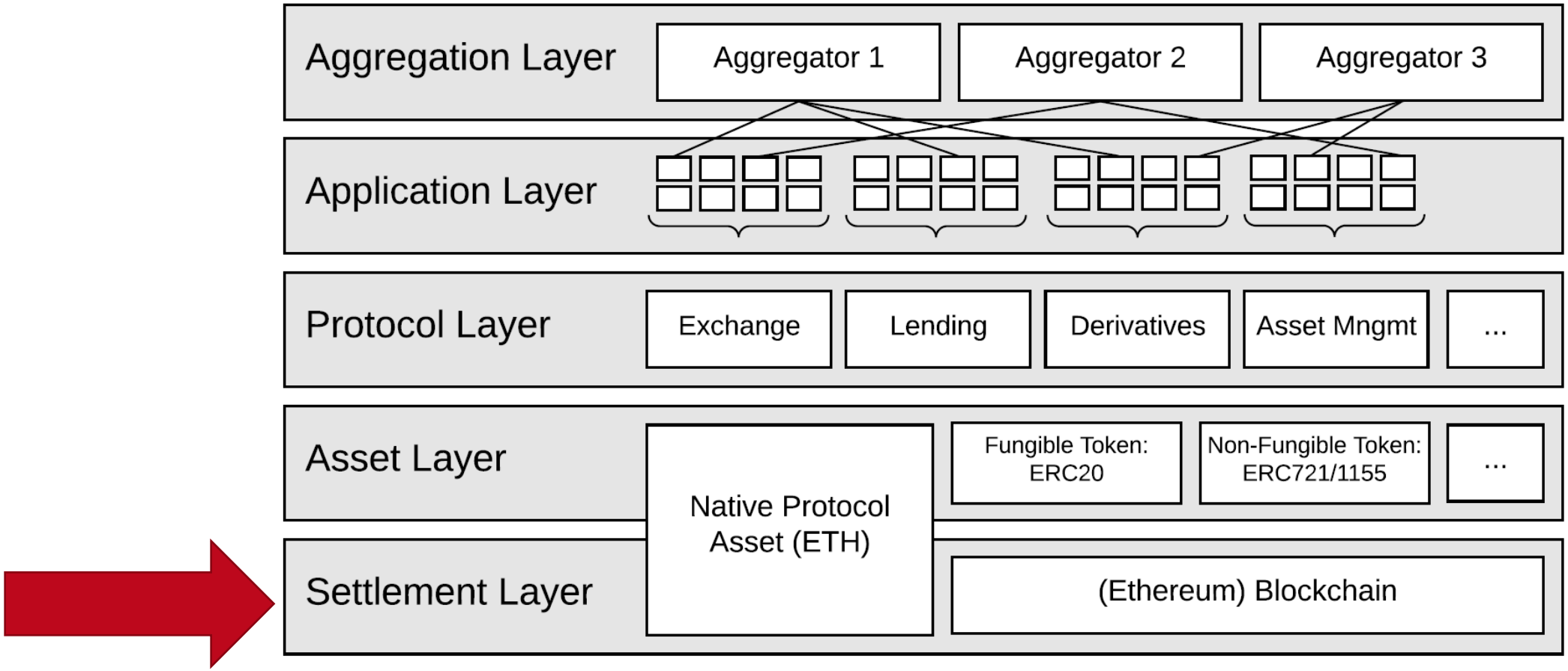
1. The DeFi stack layers

DeFi apps can be considered at different layers of abstraction



Source : Decentralized Finance: On Blockchain- and Smart Contract-based Financial Markets

The Settlement Layer is where transactions are ultimately settled



Source : Decentralized Finance: On Blockchain- and Smart Contract-based Financial Markets

The Settlement Layer is DeFi's Layer 1 (L1)

- The settlement layer is the **foundation** for all activities in a decentralized ecosystem.
  - **It consists of the underlying blockchain, as well as its native asset.**
  - For example, in the case of DeFi apps on Ethereum, the settlement layer includes the Ethereum blockchain and Ether (Ethereum's native asset).

- Settlement layers:
  - **Store** information, value, and ownership **securely**
  - Ensure that **status changes** (balances, ownership, etc) follow the blockchain's rules
  - Enable **trustless** execution

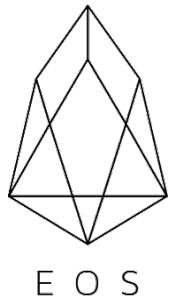
- As settlement is the first layer in the DeFi stack, the blockchains are sometimes referred to as **Layer 1** (or **L1**) blockchains).

Indicative L1s for DeFi applications

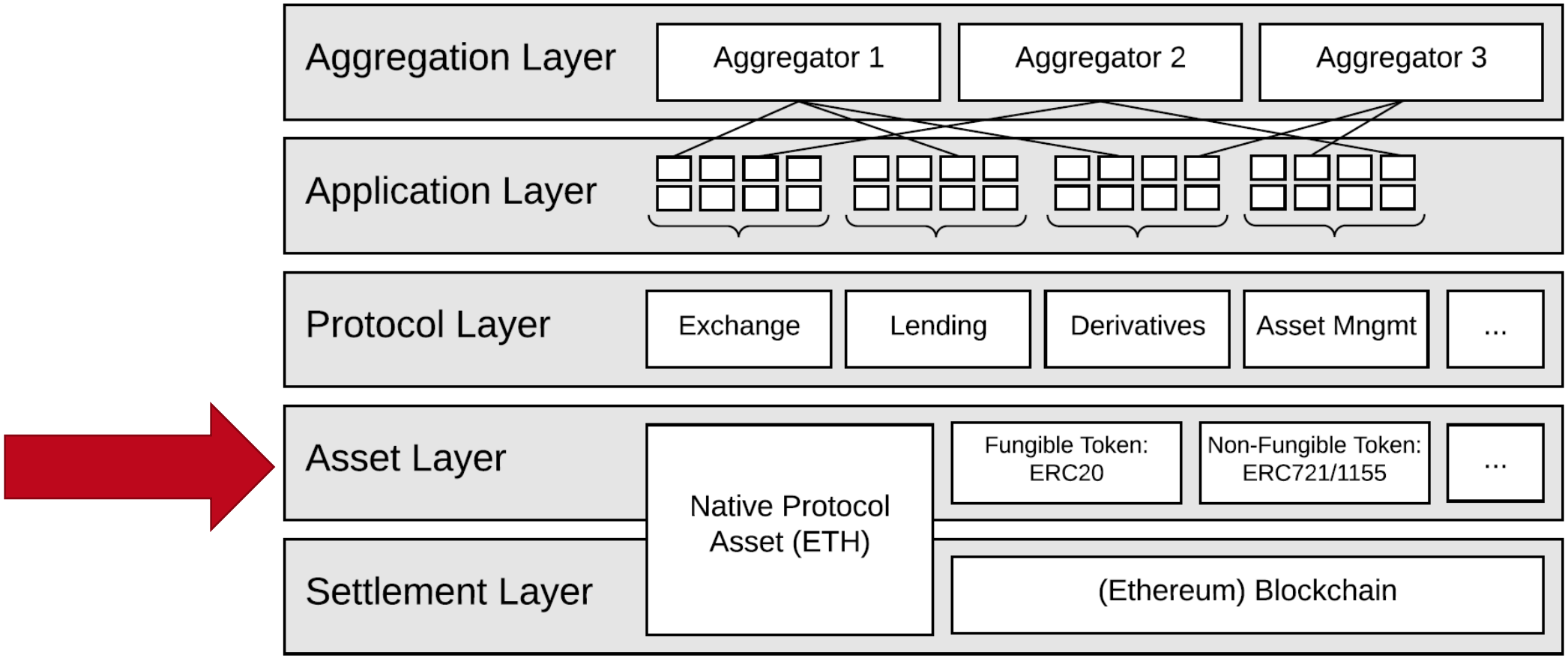
- Ethereum
- Avalanche
- Binance Smart Chain
- Solana
- Polkadot
- Cardano
- Tezos
- EOS

and many more

Polkadot.



The Asset Layer includes all tokens used in DeFi apps

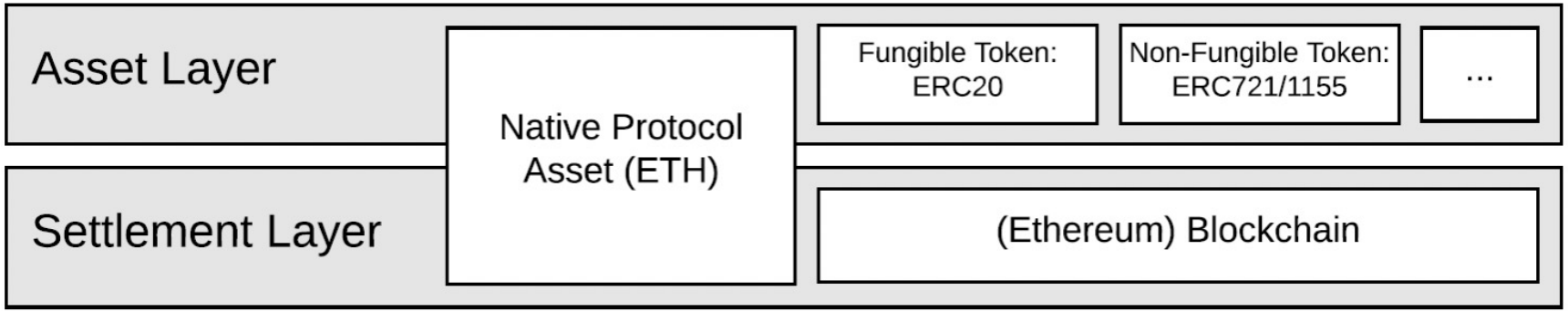


Source : Decentralized Finance: On Blockchain- and Smart Contract-based Financial Markets

The Asset layer refers to both the native (L1) & non-native assets

- The asset layer consists of **all assets** that are issued on top of the settlement layer.
  - This includes the network's native asset (e.g., in the case of Ethereum, Ether)
  - But, also, other tokens that are issued according to L1's rules

- Each L1 blockchain has its own rules for token issuance, encapsulated in **standards**
  - For example, **ERC20** is Ethereum's standard for fungible tokens, **ERC721** for NFTs, etc.
  - Similarly, **SPL** is Solana's fungible token standard, **BEP20** is BSC's, etc.



Native vs. non-native tokens serve different functions

- **Native tokens**
  - They are the lifeblood of the L1 blockchain, underpinning its basic functions and fueling all apps built on it.
  - Examples: ETH (Ethereum), BNB (BSC), AVAX (Avalanche), SOL (Solana), etc.

- **Non-native tokens**
  - All other tokens used in specific applications, serving different functions.
  - Examples: UNI (Uniswap, a decentralized exchange), AAVE (Aave, a lending platform), MKR/DAI (Maker), etc.

Example: Ethereum non-native token standards

- **ERC20**
  - The most widely used standard API for fungible tokens on the Ethereum blockchain.
  - All units of a fungible token are interchangeable and have the same value.

- **ERC721**
  - The standard for non-fungible tokens (NFT) issued on the Ethereum blockchains.
  - Unlike their fungible counterparts, ERC721 tokens are unique and non-divisible.

- **ERC1155**
  - A newer standard, supporting fungible, semi-fungible and non-fungible tokens under a single set of rules, aiming to minimize computational overhead and provide a gas-efficient token contract for developers.

- You may find a list of all Ethereum token standards here.

DeFi tokens enable governance & liquidity provision

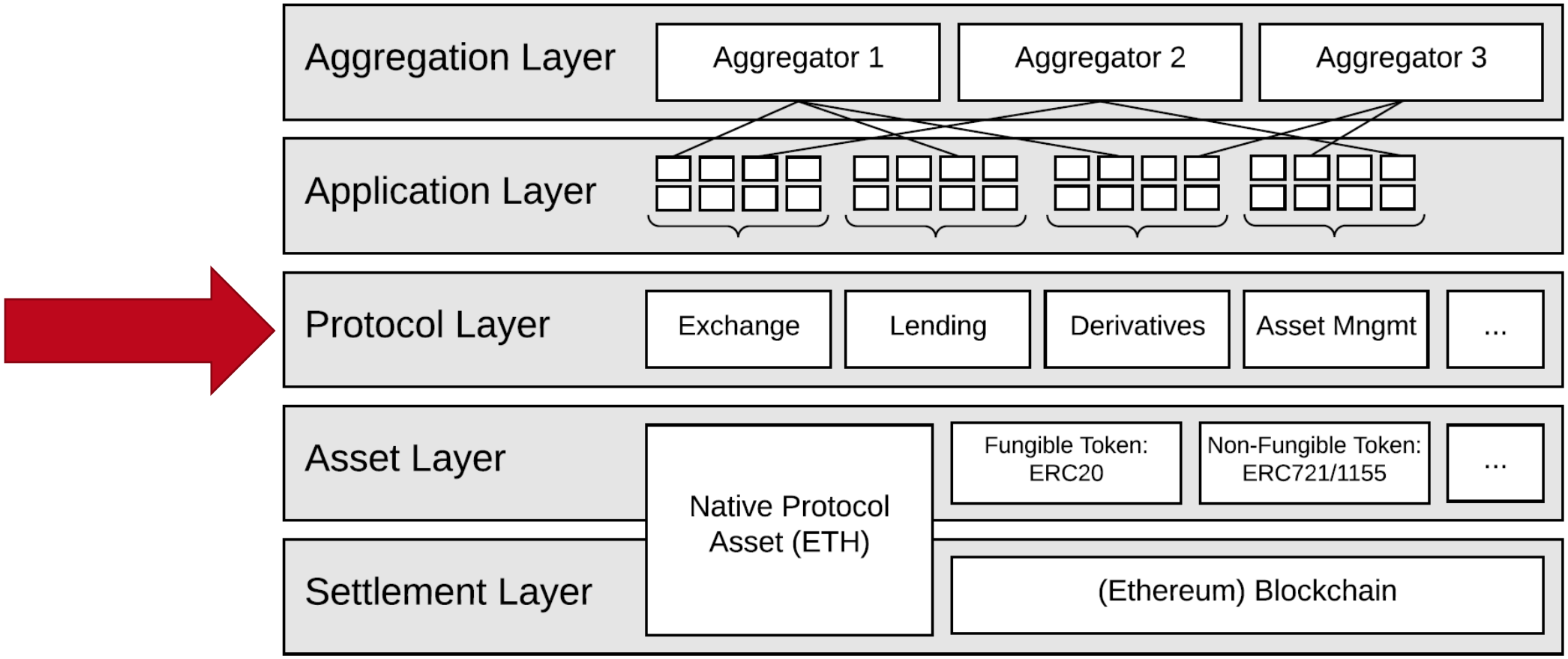
- **Governance Tokens**
  - Allowing collective ownership & decision making of DeFi protocols.
  - Only governance token holders can submit and vote on protocol governance proposals.
  - (in order: UNI, ENS, APE, CAKE, OP)





- **Liquidity Provider (LP) Tokens**
  - LP tokens represent shares in liquidity pools, used in decentralized exchanges (and elsewhere).

The Protocol Layer is where most DeFi apps lie



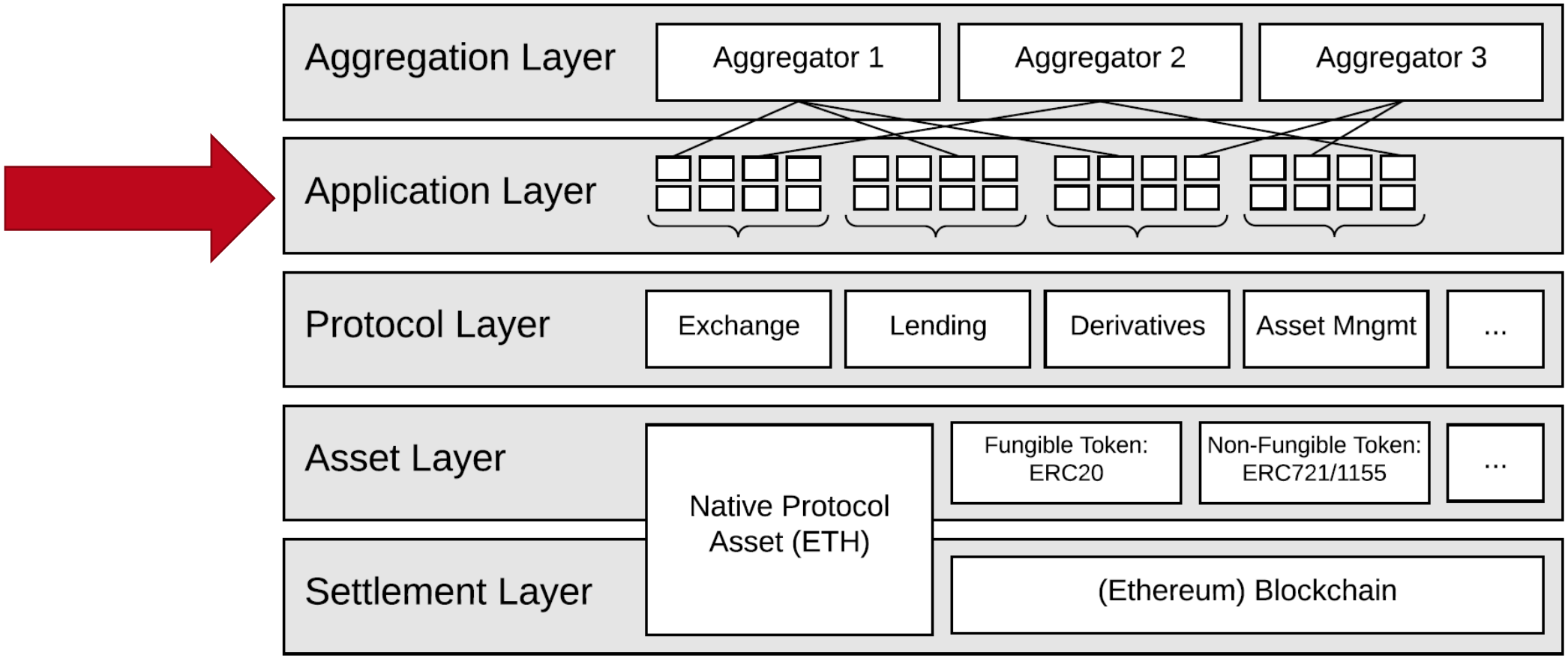
Source : Decentralized Finance: On Blockchain- and Smart Contract-based Financial Markets

The Protocol Layer includes the core functionality of dApps

- The **Protocol Layer** is where the core functionality of decentralized applications (dApps), including DeFi, lies.
  - dApps are implemented as **smart contracts**
  - These contracts are typically interacted with by users in a standard Web2 interface. This interface is part of the next layer (Application Layer).

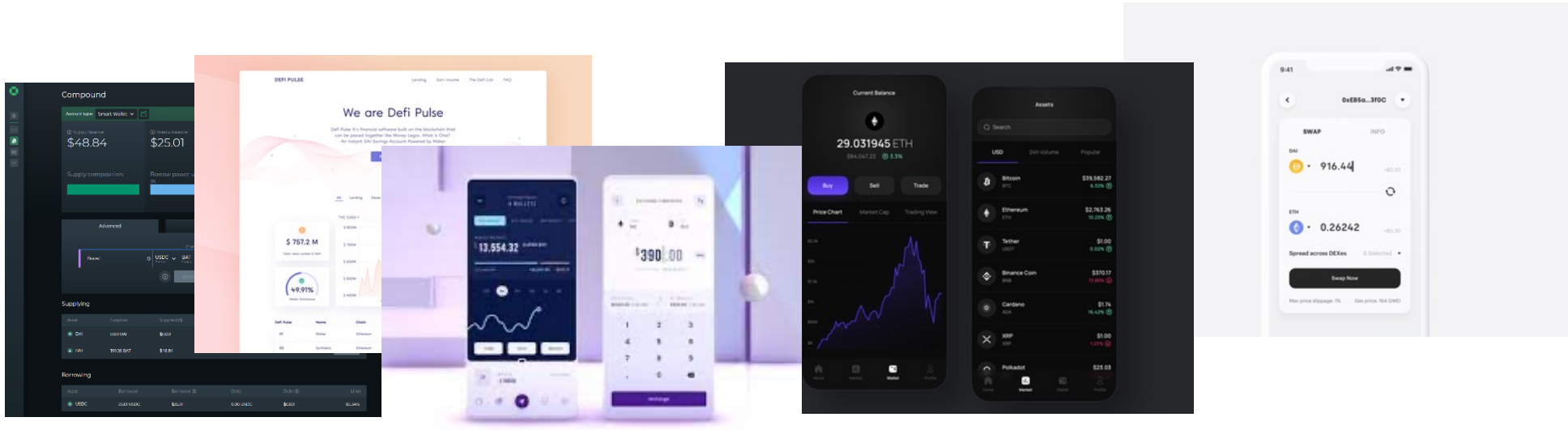
- The Protocol layer includes smart contracts for things like:
  - Decentralized exchanges
  - Lending and borrowing
  - Derivatives
  - and much more

Application Layer



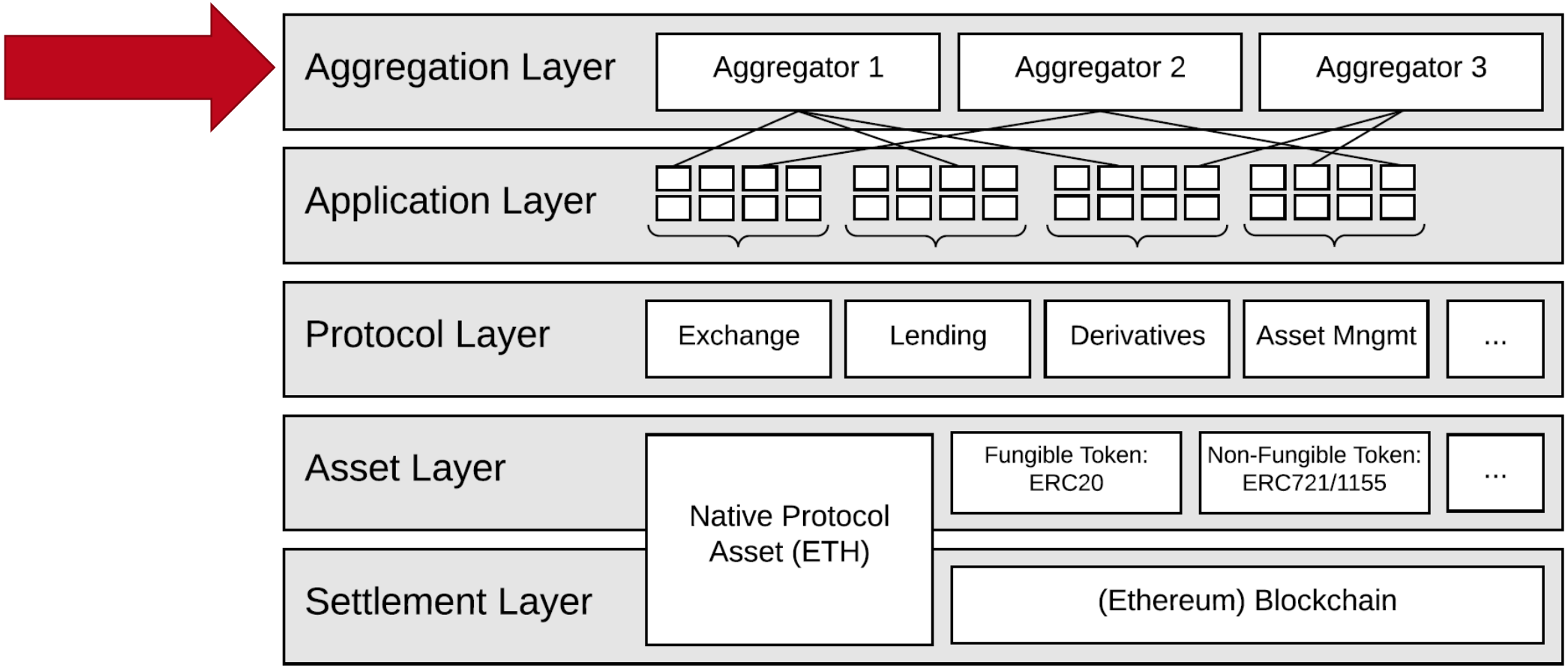
Source : Decentralized Finance: On Blockchain- and Smart Contract-based Financial Markets

The Application Layer enables most users to access DeFi apps



- Most DeFi users will not interact with the Protocol Layer (i.e. smart contract) directly.
- Therefore, DeFi apps provide a **User Interface** (UI) for non-expert users to interact with the financial service.
- The Application Layer is the **front-end** layer that provides easy access to DeFi smart contracts.
- Important: Web front-ends are a way to access DeFi apps; they are not the apps themselves!

Aggregation Layer



Source : Decentralized Finance: On Blockchain- and Smart Contract-based Financial Markets

The Aggregation Layer combines many DeFi apps in a single access

- This layer is an **extension** of the application layer.

- Like application layer, the aggregation layer is another user-focused layer that provides web access to underlying apps.
  - The difference is that aggregators combine several DeFi protocols for convenience, comparability and cross-functionality.

- Examples of aggregators include:
  - Zapper (DeFi portfolio management)
  - 1inch (decentralized exchange aggregator)

Zapper

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2. Composability in DeFi

DeFi apps should be able to be combined across Layers

- According to **Wikipedia**:

  "Composability is a system design principle that deals with the inter-relationships of components. A highly composable system provides components that can be selected and assembled in various combinations to satisfy specific user requirements."

- **Composability** in Decentralized Finance is the ability of dApps to interact with each other in a permissionless manner.

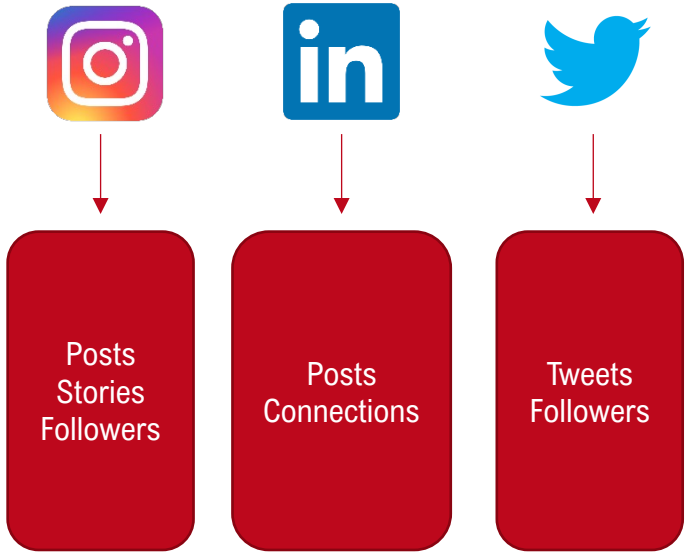
- Therefore, decentralized financial services can be combined to form novel and **complex** financial services.
  - This is also known as the **Money Lego** aspect of DeFi.

Source: https://en.wikipedia.org/wiki/Composability

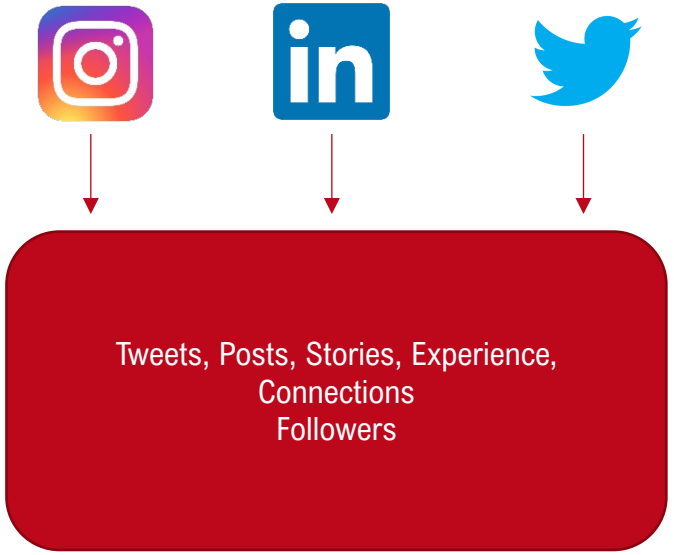
Web2 apps are not composable; DeFi apps are

- Imagine if all your followers, friends, posts, photos, tweets were available to all your social accounts!

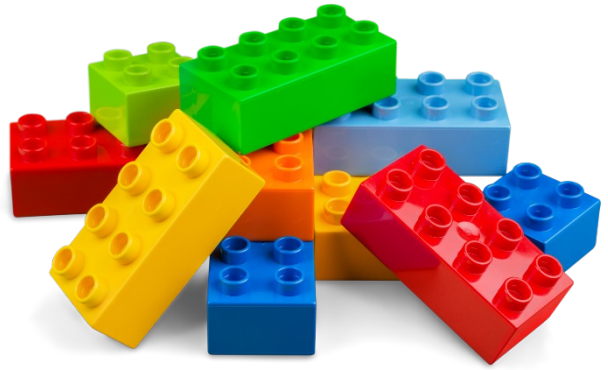
Non Composable



Composable



Money legos allow for innovation & explosive growth



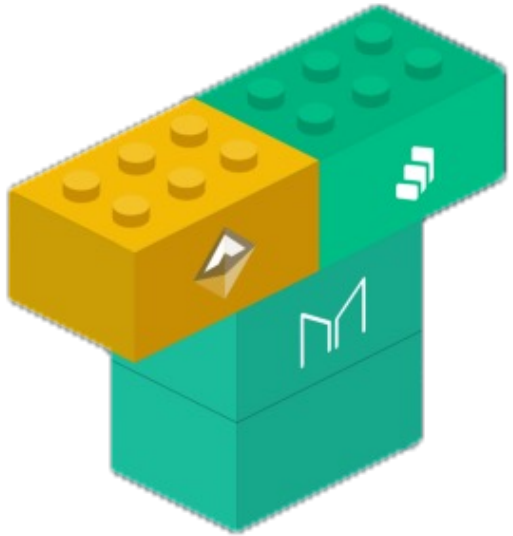
- There are more than 1579 different DeFi projects listed in DeFi Lama. (DeFiLama, 2022).
  - If each represents a single piece of lego, there are **3.936.827.539** different 3-piece combinations that can be deployed!

- Users may find **ready-to-use** lego combinations, but can also create their own ones.

Let's Build Legos! Example 1 - Coumpound

LEGOS

- DAI
- MakerDAO CDP Tool
- Compound Smart Contact



Source: https://medium.com/totle/building-with-money-legos-ab63a58ae764

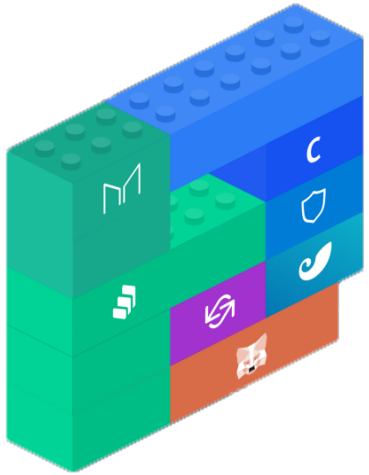
FINANCIAL SERVICE

- Compound used MakrerDAO's borrowing services as infostructure for its lending protocol.
- Borrowers may take DAI collagenized loans supported by Compound by a fee.
- Lenders can provide with tokens into smart contracts and get rewards in the form of *"cTokens"* which represent an asset that is contributed to the lending pool.
- Lenders can take as a reward cDAI which then can be exchanged to the normal DAI token
- Compound supports Web3 wallets so users can lend and borrow founds directly through their UI.

Let's Build Legos! Example 2 - Zerion

LEGOS

- Uniswap
- MakerDAO CDP Tool
- Compound
- Coinbase Wallet
- MetaMask
- imToken
- TrustWallet
- Tokenary



Source: https://medium.com/totle/building-with-money-legos-ab63a58ae764

FINANCIAL SERVICE

- Zerion uses MakerDAOS CDP tool so users can borrow and lend tokens.
- Zerion is also connected to Compound so users can earn interest.
- Zerion is connected to Uniswap and enables participants to swap their tokens with other tokes.
- This platform also supports Web3 wallets such as: MetaMask, imToken, TrustWallet, Tokenary and enable users to interact with the available services in a variety of ways.

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3. Conclusions

Conclusions

DeFi can be abstracted into a **stack of interconnected layers** that include:

- **Settlement**: when transactions become final in an underlying L1 blockchain
- **Asset**: where native (L1) and non-native (DeFi governance and LP) tokens live
- **Protocol**: where DeFi dApps are deployed as smart contracts
- **Application**: where users interact with the smart contracts through Web interfaces
- **Aggregation**: where dApps are combined to form money legos

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4. Further reading

Further Reading

DeFi Stack:

- Schär, Fabian. "Decentralized finance: On blockchain-and smart contract-based financial markets." FRB of St. Louis Review (2021).

Money Legos:

- Popescu, Andrei-Dragoş. "Decentralized finance (defi)–the lego of finance." Social Sciences and Education Research Review 7.1 (2020): 321-349.
- https://medium.com/totle/building-with-money-legos-ab63a58ae764

Ethereum Tokens:

- https://blog.makerdao.com/what-are-ethereum-tokens-a-guide-to-the-asset-types-of-defi/

DeFi Composability:

- https://medium.com/coinmonks/the-true-power-of-defi-composability-14fe8355e0d0

Tip: Clicking while pressing Cltl key opens a new tab in Chrome browser on non-Apple devices

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Questions?

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