



Bocconi Students Fintech Society

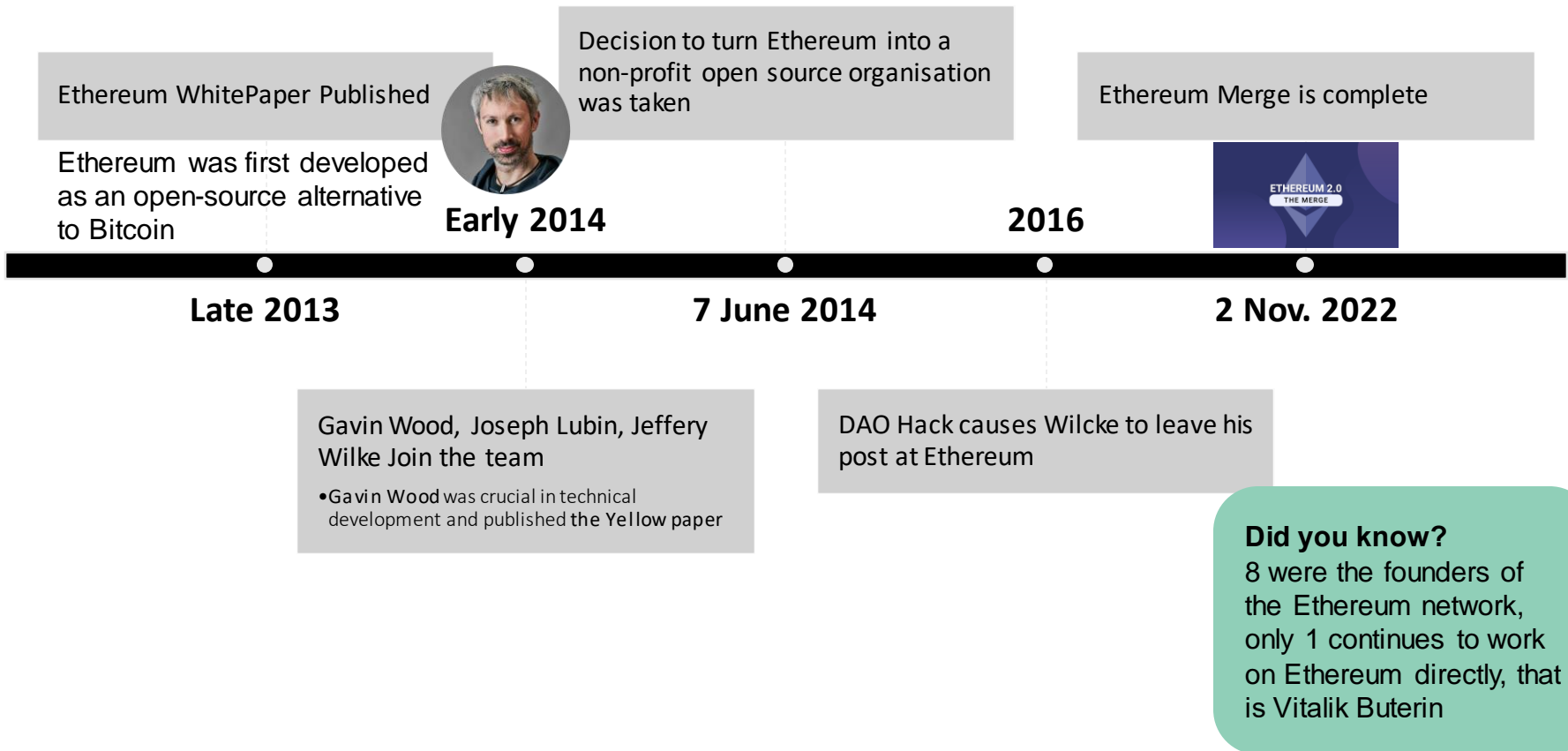
Ethereum's Use Case

www.bsfinfintechsociety.com

History of Ethereum



Purpose & Founders



Sources: Bernardmarr.com, Forbes.com, Ethereum White Paper.

How Ethereum improves Health Care & Privacy



Ethereum's platform was created with the ambition of having considerable uses spanning many sectors,

Let's start by seeing healthcare and privacy.

The **Health Care** field has gained numerous benefits with the implementation of blockchain:

- Reduction of information asymmetries
- Data security in clinical trials
- Patient consent management
- Drug supply chain management
- Incentivization through micropayments

Privacy is one of the fundamental of every Blockchain. Indeed, also Ethereum guarantees security to every users:

- Private data is encrypted so only authorized parties have access to it
- Privacy layers are being developed
- Off-chain solutions are united with ethereum to better store private data

Sources: Consensys

Payments



Ether is a digital currency that can be qualified as money. Using it as money has advantages, however, its disadvantages must also be considered.

Ether is a digital currency that is used as a payment method in the Ethereum Virtual Machine. To use the Ethereum network you'll pay a fee in ETH, this helps to process and verify what people are doing. To be qualified as money, Ether must satisfy the following three conditions: **store of value** (i.e., it maintains its value without depreciating), **medium of exchange**, and **unit of change**.

Advantages of Ethereum as Money	Disadvantages of Ethereum as Money
Ether is a highly liquid financial asset, as it is quick to exchange the digital currency for cash or even other valuables such as gold.	Transactions costs, known as "gas", grow along with the growth the digital currency's popularity and can thus become quite costly.
Ether is a currency that it less prone to losing value due to inflation (as the blockchain system is limitless) and maintains its purchasing power better than a standard currency.	Smart contracts on ethereum seem to be safe but an online hacker can find a vulnerability and exploit it. Between January and August, a reported \$2billion dollar in cryptocurrency has been stolen this way, many of which are operating on the Ethereum blockchain.
Websites like Travala are constructed to solely use cryptocurrencies like Ether. Recently, even Amazon has also adopted payments with certain cryptocurrencies.	Ether holds one of the main characteristics of a cryptocurrency: high volatility . This means that it could lose all its value and using Ether as a payment method could make you purchasing power decrease.

Source: lbm.com



Smart contracts are self-executing protocols that allow transactions to be performed on the Ethereum blockchain.

The Ethereum platform is largely based around smart contracts, but what are smart contracts exactly?

Smart contract: contract that executes itself. They are programs run on blockchain with the code of a contract being directly written into it as soon as an agreement between the buyer and the seller is reached. The transactions which make up the agreements such as the parties are anonymous and do not require a central authority, legal system, or external enforcement system, thus making it a decentralized transaction.

But what is the appeal of smart contracts?

Trust and transparency - the omission of a third party in the transaction and the fact that all terms of the smart contract are shared with all the involved, allows trust and avoids asymmetric information between the parties.

Speed - contract execution is instantaneous once all the terms of agreement are met.

Security - the blockchain network allows for **encrypted transactions** to take place, making them hard to hack. The idea behind is to have every change connected to the previous one, so transactions are trackable.

Source: lbn.com



Initial Coin Offerings (ICOs) on Ethereum

Initial Coin Offerings (ICOs), or token sales, are asset distribution methods used to raise funds for blockchain-based initiatives. Billions of dollars have been raised through ICOs since they first gained popularity in 2017. Ethereum became a key player in the crypto ecosystem because of the explosive growth of token sales.

The concept of ICOs is a hybrid of crowdfunding and Initial Public Offerings (IPOs). Crypto companies can raise capital and fund development through ICOs without having to undergo the lengthy and regulatory-intensive process of an IPO. Rather than giving buyers equity, the tokens are usually marketed as having future utility on the blockchain or as a funding mechanism for dApps.

The crypto community was captivated by ICOs between 2017 and 2018. Thousands of projects have done **crowdfundings**. In the end, ICOs gave birth to a new wave of blockchain projects that had a huge impact on crypto ecosystem.

Crowdfunding

Selling tokens to generate money for a range of initiatives, funding the creation and introduction of blockchain technologies and decentralized apps (dApps).

Sources: Ethereum.com



Ethereum's Role in the ICO Boom

Ethereum's initial funding came from an ICO that took place in 2014. In return for bitcoin, buyers got ether (ETH),

Developers can relatively easily create new derivative tokens and platforms using Ethereum's open-ended smart contract protocol. Due to the fact that **ERC-20** tokens are instantly usable with all other tokens on the Ethereum blockchain, the bulk of ICOs has been conducted over the Ethereum network. Many investors who took part in ICOs used ETH to buy protocol-specific tokens.

Due to this, the price of ETH increased exponentially boosting the popularity of IPOs, which was the primary driver of the ICO bubble.

Number talk

More than 7 million ether worth around \$2.2 million were sold in the first 12 hours of the sale. By the time the sale was through, **more than 50 million ether, or nearly \$173 million**, had been purchased.

Sources: Ethereum.com



Ethereum DeFi Ecosystem

For several reasons, Ethereum is the ideal base for DeFi:

- 1) **Everyone has access to use DeFi** since no one owns Ethereum or the smart contracts that run on it. This also implies that nobody can impose new regulations;
- 2) **All DeFi products communicate using Ethereum.** On one platform, it is possible to lend tokens, and on a separate platform or application, you may trade the interest-bearing token for another one;
- 3) **Ethereum has tokens and cryptocurrencies built in;** keeping track of transactions and ownership is kind of Ethereum's thing;

DeFi as layers:

- 1) The **history** of transactions and the current status of accounts are stored on Ethereum's blockchain;
- 2) The **assets** – ETH and the other tokens (currencies);
- 3) The **protocols**—smart contracts—provide the functionality, for instance, by enabling decentralized asset lending through a service;
- 4) The **tools** we use to maintain and access protocols are called apps.

Sources: Consensys, Ethereum.com

Defi and Ethereum



How Does Ethereum's P2P Network work?

The RLPx Node Discovery Protocol is implemented by the official Ethereum client node software Geth and is based on the Kademlia DHT overlay maintenance system.

Two data structures are used by the Geth client to hold information about other nodes DB and temporary database.

DB	Temporary database
A longterm database that is kept on disk and survives client reboots.	When the client restarts, the table is empty. There are 256 buckets in the table, and each one may store up to 16 entries .
The client has data about each node in the database.	Each entry contains data about different Ethereum node.
You always find Node ID, IP address, TCP port, UDP port, time of the most recent ping sent to the node and returned from the node.	A client initially starts with an empty database and only six hardcoded bootstrap nodes. Then, when the client begins to discover peers, it adds them to the table and database via the aforementioned techniques.
A node will be deleted from the database if it sent its last ping more than a day ago.	A node will be eliminated from the database if it ignores findnode for more than four times consequently.

Sources: Consensys, Ethereum.com



NFT represents a unique ownership of a digital asset and are protected by the Ethereum blockchain.

NFTs, or non-fungible tokens, are tokens that represent a **unique ownership** used for real estate and artwork (non-fungible means its irreplaceable and unique). Cryptocurrencies such as Ether are all fungible as there are plenty of them which are all the same.

The relation between NFTs and Ethereum is that NFTs are protected by the Ethereum blockchain as it leads the DeFi market and is also where NFTs were born.

Due to the high amount of network traffic on the Ethereum blockchain, a transaction backlog is created which increases the transaction fees. Therefore, some NFT creators have moved to a newer network called the **Solana blockchain**.

NFTs are **seen** by many **as a very risky asset** as its value is determined by the community who takes a lot factors in account such as:

- **previous** price of sale
- portfolio of the creator's previous work
- Who collected their work,

Due to the trends of human behavior, the value of an NFT may **skyrocket on one day and plunge the very next**.

Sources: Cointelegraph.com, Ethereum.com

Ethereum Data Storage



State machine and Data Tries.

Ethereum's Transaction State Machine

The state machine: Reads a set of inputs to alter its state

- **State:** The status of the systems that are waiting to execute a transition;
- **Transition:** A set of actions to execute when a specific condition is fulfilled or an event is received.

Ethereum state machine has 2 states:

- 1) **Genesis State:** Blank state before transactions have been executed;
- 2) **Final State:** This is the state after transactions have been executed.

Data Trie: Mechanism to store various types of data in a tree-like Structures. Used to retrieve a string value by traversing down a series of nodes

There are **2 major tries** in the Ethereum Network:

- **State Trie:** Mapping between the addresses and account states across all clients of the Ethereum network. The State Trie needs to be constantly updated by the transaction executions;
- **Transaction Trie:** Stores of the transactions themselves as permanent data. This data can never be altered as it is required to validate actions.

Sources: Medium.com, Ethereum.com

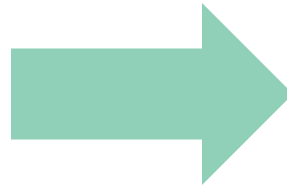
Ethereum: The Merge



On September 15, 2022 Ethereum switched from PoW (*Proof of Work*) to PoS (*Proof of Stake*)... but what are the differences between the two mechanisms?

PoW - Proof of Work

- Initial underlying algorithm that made work hard for the miners on proof of work blockchains
- Required expensive computer calculation ("*mining*")
- Rewards fastest miner in cryptocurrency
- Needs about 10 minutes to validate new transactions and for creating a new block
- Miners compete to solve **complex mathematical puzzles** using their computational resources
- Huge amount of **energy consumed**



PoS - Proof of Stake

- **Beacon Chain** introduced PoS to Ethereum system
- Fairer mining system
- Higher transaction scalability
- Rewards through fees based on how much it is staked
- Algorithm determines the winner randomly, taking into account the amount of coins staked
- **Low** energy consumption
- **Reduced centralization risk**

Sources: Medium.com, Ethereum.com

What are the reasons of the Merge of Ethereum



Ethereum wasn't born just from an idea, but for a need that the creators thought to increase the technological world

Since 2015, Ethereum had the goal of moving to the more efficient "**PoS**" **mechanism**, goal that turned out to be more complex than anticipated

According to developer **Tim Beiko** there were delays related to possible bugs and therefore more diagnostic tests were needed

The benefits achieved after the Merge, on September 15, 2022, concern higher execution speed and lower transaction costs and in energy consumption (around -99%)

Another positive effect there was was related to the speed of block validation, which decreased by 13%

A further step toward efficiency relates to so-called "**Sharding**," a kind of splitting of the blockchain, which would allow for increased transaction throughput

Sources: Cointelegraph.com, Cryptonomist.com

Ethereum: The Merge



Why did Ethereum after the Merge lose value?

- Before the merge in September Ethereum's value was around **\$1700**, after the Merge, it declined reaching a low of \$1,250-\$1300 immediately after the switch to *PoS*. This is **more than 20% drop**.
- Although it may seem strange and unexpected, this is actually due to a few reasons summarized below:
 - The speculation of investors who previously bought Ethereum with the aim of selling right at the time of the Merge (Buy the rumors, sell the news!);
 - The announcement of the FED which said it could come up with a rate increase of 100 bps.
- A **short term price rise** was never inconsidered to happen. The Merge laid the ground funds for future infrastructures that would solve future problems
- In any case, in the long run the future prospects shows a flourish trend which will take Ethereum back to its all-time highs around the next two years.

Experts predictions

Bloomberg analysts predicted that it could end 2022 at the impressive value of **\$4000-\$4500** but if the crypto market has another crash it could end at a drastic **\$750**.

Sources: Borsainside.com

Authors



Project lead



Sofia Leali
Project Leader



*BSc International Economics and Finance student at Bocconi University.
Driven by challenges and innovation.*

Junior Analysts



Davide Gerace



Brent Verhoest



Charvak Thatha



Eren Yildiz





[Instagram.com/bocconistudentsfintechsociety](https://www.instagram.com/bocconistudentsfintechsociety)



[LinkedIn.com/company/bsfintechsociety](https://www.linkedin.com/company/bsfintechsociety)



[Bsfintechsociety.com](https://www.Bsfintechsociety.com)



As.bsfintechsociety@unibocconi.it

www.bsfintechsociety.com

Following presentation may have included forward-looking statements. These statements are not historical facts, but instead represent only our belief regarding future events, many of which, by their nature, are inherently uncertain and outside of our control. It is possible that the Firm's actual results and financial condition may differ, possibly materially, from the anticipated results and financial condition indicated in these forward-looking statements. These materials are based on information provided by the internet or otherwise reviewed by us. We have assumed that such estimates and forecasts have been reasonably prepared on bases reflecting the best currently available estimates and judgments. These materials are not intended to provide the sole basis for evaluating and should not be considered a recommendation with respect to any transaction or other matter. Prior to entering any transaction you should determine, without reliance on us, the economic risks and merits as well as the legal, tax and accounting characterizations and consequences of any such transaction. These materials do not constitute an offer or solicitation to sell or purchase any securities and are not a commitment by us to provide or arrange any financing for any transaction or to purchase any security in connection therewith. We assume no obligation to update or otherwise revise these materials.