1. **What was the impetus for developing Ether and the Ethereum Network, especially relative to Bitcoin?**

The creators of Ethereum were inspired by Bitcoin’s ability to offer an ordered ledger of transactions that does not require trust in a central entity – but instead incentivizes a decentralized network of individuals to use their computers to maintain a verifiable, true record of transactions. However, the creators of Ethereum saw the potential for the technology behind Bitcoin – blockchain – to facilitate more advanced applications, such as smart contracts. Smart contracts are self-executing code contracts that operate according to arbitrary programmed specifications, allowing for the automation of certain processes. For example, a smart contract could be programmed to transfer ownership of assets between parties on a specified date, or upon being triggered by whatever catalyst it is programmed to respond to. A blockchain enables trustworthy execution of these processes, because if the smart contract is programmed to respond to information stored on the blockchain, then users interacting with that contract can guarantee the validity of the execution-triggering data.

Smart contracts can be programmed such that many of them interact with each other to facilitate complex applications, which means that a blockchain capable of supporting smart contracts is also capable of supporting complex applications. It should also be noted that complex applications require Turing completeness, and This was the vision for Ethereum: a blockchain capable of facilitating trustless applications which are stored across a network of computers. This is sometimes called the “world computer,” because instead of storing information related to an application on a central server which individual computers access remotely, in the Ethereum network, that information would be stored across a worldwide network of computers, all coming together to form a sort of “world computer,” which is collectively owned and maintained by the network participants.

But there must be a way to incentivize honesty of the participating computers in maintaining a true ledger of transactions. In Bitcoin, this is done using bitcoin – a digital currency which is produced and issued to participating computers to reward their honest collaboration. In Ethereum, that incentivizing mechanism is Ether. While for the Bitcoin blockchain, bitcoin is also primarily a currency and so also derives its value because it functions as a medium of exchange, for Ethereum, it is only necessary that Ether has enough value that it incentivizes people to use their computers to support the network. Ether, then, while it is often used by individuals as a medium of exchange – and in fact must have value to incentivize honest behavior of network participants – is primarily a way for users of Ethereum applications to pay those running the network (also known as miners or nodes) for transaction costs within the network.

**2. What are the current functionalities and capabilities of Ether and the Ethereum Network as compared to the functionalities and capabilities of Bitcoin?**

The most obvious differentiation is that Ethereum is host to smart contract-based applications, whereas Bitcoin continues to be only a digital currency. Using smart contracts, Ethereum hosts video games, blockchain-native businesses (called DAOs, or decentralized autonomous organizations), digital currency exchanges, social media platforms, and a range of other applications.

Further, these applications are capable of issuing their own digital tokens, which are used for an incredibly wide range of functions. Some uses of these DApp-specific tokens include: game tokens, currency, shares of an asset, unique digital collectibles, tools for voting, and other governance-related functions.

Ethereum has a virtual machine (the Ethereum Virtual Machine, or EVM), which is Turing complete (or at least quasi-Turing complete), while Bitcoin does not have a virtual machine and is not Turing-complete. Turing completeness allows for much greater functionality and flexibility, which Bitcoin does not need because it is only a digital currency. Turing completeness allows for the computation of any imaginable algorithm (given the necessary memory resources), making it almost infinitely flexible to new applications.

The Bitcoin networks takes much longer to create new blocks, and there is a maximum possible size for every block. Ethereum has no block size limit, and blocks are created much faster. It is also generally true that Ethereum can process more transactions per second than Bitcoin. However, the particulars of how long it takes to create a new block, and how many transactions can be processed per second by each network varies considerably. It is generally quoted that Bitcoin has 10 minute block times, and that it can process roughly 3-7 transactions per second, but sometimes blocks are created much faster. With Ethereum, generally blocks are created roughly every 13 seconds, but it varies, and transactions per second range between 4-20.

**3. How is the developer community currently utilizing the Ethereum Network? More specifically, what are prominent use cases or examples that demonstrate the functionalities and capabilities of the Ethereum Network?**

There is not necessarily a clear relationship between what the developer community is building on Ethereum and what end users are using Ethereum for. A significant amount of developer talent is currently being utilized to build the base level protocol of Ethereum, and on what are called “layer two scalability solutions.” All of this development is focused on improving the capacity of the Ethereum network such that it might be capable of more widespread adoption, and use for applications with heavy traffic. Much improvement is needed to the base level protocol before many applications built on Ethereum will be particularly attractive to end users, though there are some existing DApps with fairly significant (though still very limited) user interest. For the most part, the most used DApps are games and financial services applications, though there are some DApps that do not necessarily have a high level of traffic, but which are more respected, talked about, or which have more Ether (or DApp-specific tokens) locked in their smart contracts. Another use case that gets a lot of attention are DAOs, or blockchain-native organizations: These organizations can allow people who do not know or trust each other to coordinate around a common purpose, across borders and time zones.

Financial applications, like decentralized currency exchanges, loan issuers, securities issuers, and companies tokenizing real world assets currently represent a significant amount of use cases. One well-respected DApp is MakerDAO, a platform which allows people to use smart contracts developed by MakerDAO issues Ether-collateralized loans in a stable coin called Dai, which is pegged to the price of the US dollar. MakerDAO represents a significant feat of engineering, as the price of Dai has remained very close the Dollar, despite drastic volatility in the price of Ether. Further, Maker accomplishes all of this through a combination of complex programmed mechanisms and participation by MakerDAO community members. MakerDAO is innovative not just for its ability to offer cryptocurrency-backed stable coin loans, but also in its governance structure, which is increasingly decentralized. It is MakerDAO token holders who govern the loan interest rates and help control price volatility.

Other financial service applications include platforms to fractionalize ownership of assets, like art or housing. Sometimes this is used simply to sell these assets to multiple people, but sometimes it’s more about governing the use of objects or resources. For example, one company, Mattereum, is fractionalizing ownership of a very old and expensive violin. The original owner of the violin is able to fractionalize ownership of the violin and sell it to investors so that she can gain liquidity, but she is able to maintain a share of the violin and stipulate the rules of use: She can stipulate that the violin remain unaltered, and that it be played some minimum or maximum number of times per year.

Games are another popular use case. Ethereum allows for the creation of non fungible assets, which are often used in games as characters or in-game purchases. For example, one of the most popular games (still less than 500 users per day) is called HyperDragons, where people buy unique digital tokens associated with a correspondingly unique digital image of a dragon. Each dragon is encoded with certain traits and capabilities, and then the dragons can battle each other. This works essentially in the same way as Pokemon or other game cards, except that every dragon is perfectly unique and owned by the person who possesses it.

DAOs are another big potential use case. DAOs are blockchain-native organizations that allow some significant portion of operations to be completed on-chain. This allows for anonymous individuals in a global community to coordinate to complete tasks. Some platforms, like DAOstack and Aragon, allow organizations to facilitate payroll and fund management on-chain, and have DAO members participate in decision making through on-chain voting. This voting can even be used to trigger smart contracts to automatically execute based on member votes. DAOs do not require any one individual make any decisions, but instead rely upon participation and coordination between members. Further, because of their basis in smart contracts, DAO members can trust that outcomes will execute exactly as coded.

**4. Are there any existing or developing commercial enterprises that are using Ether to power economic transactions? If so, how is Ether recorded for accounting purposes in a comprehensive set of financial statements?**

Yes, there are existing and developing1 commercial enterprises2 that are using Ether3 to power economic transactions4. A commercial enterprise should report use of Ether according to the IRS Property tax guidelines5 and use the comprehensive financial statements6 that are standard to their accounting method7. Any transaction that takes places on the Ethereum Network requires the use of gas, a measure of Ether, to take place. Therefore, all transactions involving the Ethereum Network should be properly reported.

*Footnotes:*

1. Existing and Developing Commercial Enterprises

The Enterprise Ethereum Alliance (EEA) has a list of members organizations around the globe passionate about evolving Ethereum-based enterprise-grade technology through research and development in a range of areas, including: privacy, confidentiality, scalability, and security.

<https://entethalliance.org>

1. Commercial Enterprise

Commercial enterprise means any for-profit activity formed for the ongoing conduct of lawful business including, but not limited to:

* A sole proprietorship
* Partnership (whether limited or general)
* Holding company
* Joint venture
* Corporation
* Business trust, or
* Other entity, which may be publicly or privately owned.

This definition includes a commercial enterprise consisting of a holding company and its wholly owned subsidiaries, provided that each such subsidiary is engaged in a for-profit activity formed for the ongoing conduct of a lawful business.

Note: This definition does not include noncommercial activity such as owning and operating a personal residence.

<https://www.uscis.gov/working-united-states/permanent-workers/employment-based-immigration-fifth-preference-eb-5/about-eb-5-visa-classification>

1. Ether

<https://ethereum.github.io/yellowpaper/paper.pdf>

In order to incentivize computation within the network, there needs to be an agreed method for transmitting value. To address this issue, Ethereum has an intrinsic currency, Ether, known also as ETH. The smallest subdenomination of Ether, and thus the one in which all integer values of the currency are counted, is the Wei. One Ether is defined as being 1018 Wei. In general, Ether used to purchase gas. Gas is the fundamental network cost unit. Paid for exclusively by Ether, which is converted freely to and from Gas as required. Gas does not exist outside of the internal Ethereum computation engine; its price is set by the Transaction and miners are free to ignore Transactions whose Gas price is too low.

1. Economic Transactions:

IMF Balance of Payments Manual - Two categories of Economic Transactions:

* Transactions involving a quid pro quo (two-way transactions)
  + Sales of goods or the rendering of services against payment in money, other credit instruments, or titles to investment,i.e., capital items
  + Barter
  + The interchange of capital items, such as sales of securities against money, sales of one currency against another currency, the discharge of previously incurred commercial debt, etc.
* Transactions involving no quid pro quo (one-way transactions)
  + Gifts in kind, i.e., in the form of goods and services
  + Gifts of money and other capital items

<https://irows.ucr.edu/research/globres/definitions/imfcncpt.html>

1. Internal Revenue Service Tax Guidance:

The Internal Revenue Service has issued guidance (PDF) on the tax treatment of transactions using virtual currencies, such as Bitcoins or other similar currencies. For federal tax purposes, virtual currency is treated as property. General tax principles applicable to property transactions apply to transactions using virtual currency.

[https://www.irs.gov/businesses/small-businesses-self-employed/virtual-currenciesTranslating foreign currency into U.S. dollars](https://www.irs.gov/businesses/small-businesses-self-employed/virtual-currenciesTranslating%20foreign%20currency%20into%20U.S.%20dollars)

<https://www.irs.gov/pub/irs-drop/n-14-21.pdf>

1. Comprehensive set of financial statements:

*GAAP Financial Statements*

* Balance Sheet
* Income Statement
* Statement of Cash Flows
* Statement of Shareholder Equity
* Notes to Financial Statements

<https://accountinginfo.com/financial-accounting-standards/asc-200/205-financial-statements.htm>

*IFRS Reposting Standard*

* Significance of financial instruments, for performance and financial position
  + Statement of financial position
    - Categories of financial assets and financial liabilities
    - Financial assets and financial liabilities at fair value
    - Reclassification
    - Derecognition
    - Collateral
    - Allowance for credit losses
    - Compound financial instruments
    - Defaults and breaches
  + Statement of comprehensive income
    - Income, expense, gains or losses
  + Other disclosures
    - Accounting policies
    - Hedge accounting
    - Fair value
* Nature and extent of risks, from financial instruments
  + Quantitative Disclosures
    - Credit risk
    - Liquidity risk
    - Market risk
  + Qualitative Disclosures
    - Exposures to risk
    - How to measure and manage the risk

<https://cpaclass.com/gaap/ifrs/ifrs-07.htm>

1. Accounting Method:

Generally Accepted Accounting Principles (GAAP or U.S. GAAP) is the accounting standard adopted by the U.S. Securities and Exchange Commission (SEC). While the SEC previously stated that it intends to move from U.S. GAAP to the International Financial Reporting Standards (IFRS), they considerably different. The SEC has acknowledged that there is no longer a push to move more U.S companies to IFRS so the two sets of standards will coexist for the foreseeable future.  
<https://www.journalofaccountancy.com/news/2013/jan/20137119.html>

Generally Accepted Accounting Principles (GAAP) refer to a common set of accepted accounting principles, standards, and procedures that companies and their accountants must follow when they compile their financial statements. GAAP is a combination of authoritative standards (set by policy boards) and the commonly accepted ways of recording and reporting accounting information. GAAP improves the clarity of the communication of financial information. GAAP may be contrasted with pro forma accounting and with the IFRS standards, which are both considered to be non-GAAP.   
<https://www.investopedia.com/terms/g/gaap.asp>

The U.S. is clearly moving toward IFRS, as re-emphasized by the recent SEC (U.S. Securities and Exchange Commission) proposal, one wonders what the potential impacts of the differences between these two frameworks on the financial statements will be? And how financial executives can anticipate the adoption of IFRS in order to minimize the last-minute adjustments?  
<https://www.ifrs.com/overview/General/differences.html>

### 5. What data sources, analyses, calculations, variables, or other factors could be used to determine Ether’s market size, liquidity, trade volume, types of traders, ownership concentration, and/or principal ways in which the Ethereum Network is currently being used by market participants?

Market participants can generally exist in one or several of the following groups:

* Miners
* Developers
* End Users
  + Market Makers
  + Smart Contract Users

Market participants consider a multitude of factors to gather information about the Ethereum Network. Each of these market participants will be slightly more concerned with certain metrics related to the performance of Ethereum Network. However, all market participants will be interested one metric in particular: the price of Ether (ETH).

The price of ETH is a determined by the supply and demand. If there is a real or perceived lack of support for Ethereum, market makers will begin selling of their assets causing the price to fall. A decrease in the price ETH may disincentivize miners from supporting the network. A robust number of miners is what produces a highly secure blockchain network. If miners leave the network, developers and smart contract users will also decrease or stop their activity on the chain due to a lack of security. To expand this relationship, health price action of ETH should increase the confidence of market participants and increase the overall security of the network.

Commonly Consulted Ethereum Sources:

Etherscan.io

The leading BlockExplorer for the Ethereum Blockchain. A BlockExplorer is basically a search engine that allows users to easily lookup, confirm and validate transactions that have taken place on the Ethereum Blockchain. We are independently operated and developed by a team of individuals who are truly passionate and excited about the kinds of decentralized information and infrastructure applications that Ethereum makes possible.   
<https://etherscan.io/aboutus>

Ethernode.org

The Ethereum Node Explorer. tries to estimate the number of nodes, or validating miners, on the Ethereum network. The estimation is based on an active crawling process that recursively connects to a node and asks for its known peers.  
<https://www.ethernodes.org>

Ethereum Improvement Proposals (EUPs)

Describe standards for the Ethereum platform, including core protocol specifications, client APIs, and contract standards.   
<https://eips.ethereum.org/>

Etherdocs.org

Contains The Homestead Documentation Initiative. It is a guide that should serve to be an entry level for all Ethereum users and developers. The goal is to create documentation with information, short tutorials, and examples that will cover all of the basic and intermediate functionality of using Ethereum to interact with dapps or develop a dapp.

<http://ethdocs.org>

**6. How many confirmations on the Ethereum blockchain are sufficient to wait to ensure that the transaction will not end up on an invalid block?**

This concept is referred to as block finality. As it stands, there is no guarantee of finality for Ethereum blocks – it just becomes increasingly less likely over time that a block will revert. After 6 blocks, the likelihood that a block will be reverted is about .02 percent, and by 10 blocks the chance is .002 percent. People will often talk about “assumed finality” being reached at 6 or 10 blocks, but it’s never completely impossible. However, with block times at roughly 13 seconds, people can be relatively sure that transactions will not revert two minutes after block creation.

When Ethereum switches to proof-of-stake, there will be built-in finality, which will occur periodically – though the exact amount of time is not yet specified.